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## Correspondence and Communications

## The impact of hepatitis B and C diagnoses on surgical outcomes following mastectomy and breast reconstruction



Dear Sir,

Breast reconstruction is a crucial component of breast cancer care. Given that this can involve longer flap operations, extensive dissections, and use of foreign bodies including breast implants, the outcomes of these procedures can be significantly influenced by peri-operative parameters that may affect wound healing.<sup>1</sup>

Hepatitis B and C (HBV and HCV) have a global prevalence of 3.9% and 1.6%, respectively, with HCV being more common in the United States.<sup>2,3</sup> Many studies have analyzed the effects of hepatitis on outcomes following hepatic surgeries, given that HCV is heavily implicated in hepatocarcinogenesis.<sup>4</sup> Viral hepatitis and associated liver dysfunction is known more generally to increase the risk of postoperative infections including bleeding and coagulopathy.<sup>5</sup> It stands to reason that viral hepatitis could have important implications for wound healing following plastic and reconstructive surgeries. This is the first large scale study to evaluate the effects of HBV and/or HCV status on postoperative outcomes following mastectomy and breast reconstruction procedures.

The New York State Statewide Planning and Research Cooperative System (NYS SPARCS) database was queried to identify all patients who underwent mastectomy and/or breast reconstruction procedures between 2008 and 2013. Patient were divided into two cohorts: those with HBV and/or HCV and those without. HBV and HCV patients were identified with ICD-9 diagnosis codes corresponding to acute, chronic, and unspecified hepatitis B and C, with or without hepatic coma. This study was deemed exempt by the Institutional Review Board (Protocol #19-09020808).

Baseline demographics and pre-operative conditions for the two cohorts were compared using propensity-score matching. Univariate and multivariate analyses were conducted to assess differences in demographics and rates of post-surgical outcomes. All statistical analyses were performed in SPSS Statistics Version 24.0 (IBM Corporation, Armonk, NY).

36,072 patients were identified. The majority (35,898) had no history of HBV or HCV, and 174 patients had

documented history of HBV/HCV. There was no difference in age (56.3 vs. 56.6 years for non-HBV/HCV and HBV/HCV patients, respectively). The majority of patients were female (98.6% of non-HBV/HCV, 95.9% of HBV/HCV patients,  $p=0.005$ ). The race distribution was significantly different between the cohorts, with Black/African American, Native American/Alaska Native, and Asian patients making up a larger proportion of the HBV/HCV cohort ( $p < 0.001$ ) (Table 1). Insurance types also differed ( $p < 0.001$ ) with a larger proportion of HBV/HCV patients utilizing Medicaid (37.9% vs. 12.0%) compared to private insurance (35.0% vs. 58.3%). This may be suggestive of the higher rates of HBV and HCV in patients of a lower socioeconomic status. Hepatitis patients had more frequent comorbid HIV/AIDS, deficiency anemias, chronic pulmonary disease, coagulopathies, depression, diabetes without complications, drug abuse, hypertension, fluid/electrolyte disorders, psychoses, renal failure, and weight loss in all cases ( $p < 0.04$ ) (Table 2). HBV and HCV patients have a higher incidence of postoperative hemorrhage (8.0% vs. 3.1%,  $p < 0.01$ ), urinary system complications (1.1% vs. 0.3%,  $p = 0.030$ ), death during hospitalization (0.6% vs. 0.1%,  $p = 0.003$ ), and had a lengthier overall hospital stay (2.39 vs. 2.84 days,  $p = 0.03$ ). Other complication rates were comparable. HBV and HCV patients were more likely to have any postoperative complication (10.3% vs. 5.4%,  $p = 0.004$ ), and to have two or more postoperative complications (1.7% vs. 0.4%,  $p = 0.008$ ). Multivariate analysis revealed that HBV/HCV patients had greater odds of postoperative hemorrhage (OR = 2.45, 95% CI 1.39–4.32,  $p = 0.002$ ) and greater odds of having at least one of the postoperative complications analyzed in this study (OR = 1.72, 95% CI 1.04–2.87,  $p = 0.03$ ).

This study demonstrates that patients with prior HBV/HCV who undergo breast reconstruction are at increased risk of postoperative complications compared to propensity score-matched patients without these conditions. Importantly, our results differed slightly from other reports which have not been able to establish HBV and/or HCV as an independent risk factor for poor post-surgical outcomes. We must consider new and emerging therapies for HCV, the probability that patients will receive treatment, and how our risk assessment for patients with these infections should be adjusted accordingly.

Our study is not without limitations. The quality of data is innately limited by the NYS SPARCS standard of reporting. The database only specifies that patients have a hepatitis diagnosis, but not how long ago they were diagnosed, how long the disease had been present prior to breast reconstruction, or whether or not the patient was receiving treatment for hepatitis. Additionally, complication reports

**Table 1** Baseline characteristics of the breast reconstruction and/or mastectomy cohort.

	No HBV/HCV	HBV/HCV	P-value
Total	35,898	174	-
Age (years)	56.28	56.57	0.692
Sex			
Male	1.44%	4.02%	0.005
Female	98.55%	95.98%	
Race			
White	64.53%	35.26%	<0.001
Black	12.98%	26.01%	
Native American	8.96%	17.34%	
Asian	4.23%	10.40%	
Native Hawaiian/Pacific Islander	0.16%	0.57%	
Other/Unknown	9.14%	10.40%	
Insurance (primary payer)			
Medicare	26.66%	24.71%	<0.001
Medicaid	12.01%	37.93%	
Private Insurance	58.32%	35.05%	
Self Pay	1.67%	1.15%	
No Charge	0.03%	0.00%	
Other	1.30%	1.15%	
Total In-Hospital Stay Charges (USD)	\$35,632.98	\$37,890.64	0.336
Length of Hospital Stay (days)	2.39	2.84	0.03
<b>Year</b>	<b>Procedures Analyzed, n (percent of total)</b>		
2008	22 (0.06)		
2009	7774 (21.55)		
2010	7164 (19.86)		
2011	7261 (20.13)		
2012	7346 (20.36)		
2013	6288 (17.43)		
<b>Procedure Type</b>	<b>n (percent)</b>		
Mammectomy	4391 (7.52)		
Implant Reconstruction	733 (1.25)		
Tissue Expander Placement	13,879 (23.76)		
Mastectomy	29,571 (50.63)		
Autologous Reconstruction	8838 (15.13)		
DIEP Flap	2776		
TRAM Flap (free and pedicled)	2602		
SIEA Flap	185		
GAP Flap	72		
Latissimus Dorsi Myocutaneous Flap	1437		
Other Autologous Reconstruction	1766		
Other Reconstruction	998 (1.71)		
Total	58,410 (100)*		

Abbreviations: HBV = Hepatitis B; HCV = Hepatitis C; DIEP = Deep Inferior Epigastric Perforator; TRAM = Transverse Rectus Abdominis; SIEA = Superficial Inferior Epigastric Artery; GAP = Gluteal Artery Perforator.

\* Total number of procedures reflects patient who have had multiple procedures.

were limited to thirty days postoperatively, which may not be adequate for assessing long term changes. Although we can speculate that hepatitis infection may impact immune, hematologic, or liver function in the peri-operative period, further study is needed to isolate key factors that may explain why patients with prior HBV/HCV have a higher rate of postoperative complications.

This study determined that comorbid HBV and/or HCV is a predictor of greater complication rates after mastectomy and breast reconstruction procedures compared to breast

reconstruction patients without a history of infectious hepatitis. This study represents the first large-scale analysis of HBV and HCV diagnoses as they relate to outcomes in mastectomy and breast reconstruction.

### Financial disclosure statement

None of the authors has a financial interest in any of the products, devices, or drugs mentioned in this manuscript.

**Table 2** Comorbidities of the breast reconstruction and/or mastectomy cohort.

Comorbidities	No HBV/HCV	HBV/HCV	P-value
AIDS	0.10%	2.30%	<0.001
Alcohol abuse	0.40%	0.00%	0.385
Deficiency Anemias	4.10%	7.50%	0.026
Rheumatoid	1.50%	1.10%	0.674
Blood Loss Anemia	0.20%	0.60%	0.179
CHF	1.10%	1.10%	0.996
Chronic Pulmonary Disease	10.60%	24.70%	<0.001
Coagulopathy	0.70%	4.60%	<0.001
Depression	8.00%	16.10%	<0.001
Diabetes	11.20%	22.40%	<0.001
Diabetes, complicated	0.60%	0.6%	0.995
Drug Abuse	0.40%	8.60%	<0.001
Hypertension	34.40%	44.80%	0.004
Hypothyroidism	11.20%	10.30%	0.734
Liver Disease	0.40%	51.10%	<0.001
Lymphoma	0.30%	1.10%	0.069
Fluid/Electrolyte Disorder	2.00%	4.60%	0.013
Metastatic Cancer	12.70%	10.90%	0.478
Neurological Disorder	2.10%	2.90%	0.452
Obesity	7.10%	5.70%	0.482
Paralysis	0.40%	0.60%	0.625
PVD	0.80%	0.60%	0.775
Psychoses	1.40%	5.70%	<0.001
Pulmonary Circulation Disorder	0.40%	0.00%	0.409
Renal Failure	1.20%	2.90%	0.038
Solid Tumor, no metastases	1.40%	1.70%	0.705
Peptic Ulcer Disease	0.00%	0.00%	0.865
Valvular Disease	3.40%	2.30%	0.425
Weight Loss	0.25%	1.72%	<0.001

Abbreviations: HBV = Hepatitis B; HCV = Hepatitis C; CHF = Congestive Heart Failure; PVD = Peripheral Vascular Disease.

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Olachi O. Oleru  
Department of Surgery, SUNY Downstate Medical Center,  
450 Clarkson Ave, Brooklyn, NY, USA

Ishani D. Premaratne  
Department of Surgery, Weill Cornell Medicine, 1300 York  
Avenue, New York, NY, USA

Christine H. Rohde  
Department of Surgery, Columbia University Irving  
Medical Center, NewYork-Presbyterian Hospital, 630 W.  
168th St., New York, NY, USA  
E-mail address: chr2111@cumc.columbia.edu (C.H. Rohde)

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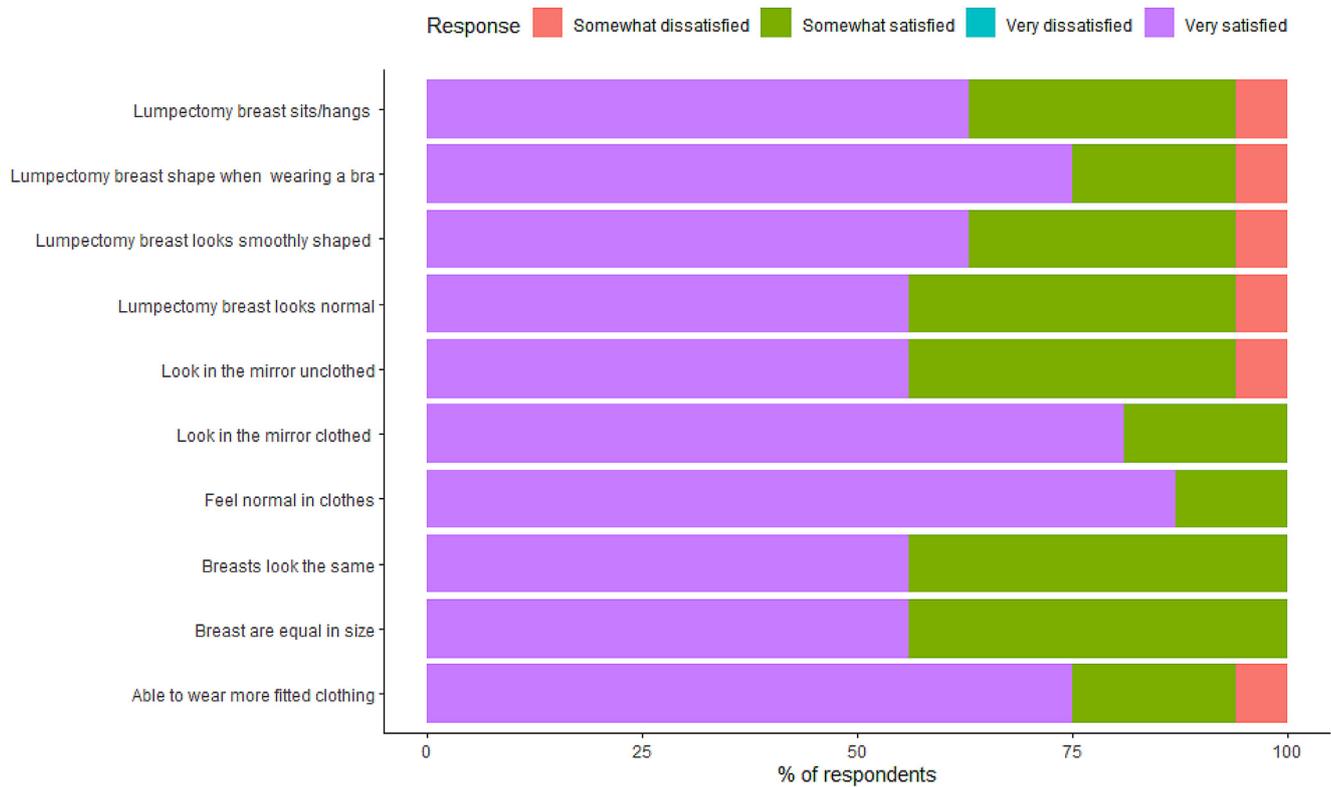
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## An evaluation of patient reported outcomes by utilizing breast Q following oncoplastic breast conserving surgery and arc-LICAP flap partial breast reconstruction



Dear Sir,

Chest-wall perforator-based volume replacement techniques for breast conserving surgery allow excision of large



**Figure 1** The score for 'satisfaction with breast' domain of BREAST Q after arc-LICAP flap partial breast reconstruction.

breast volume with minimal sequelae of large volume excisions such as the displacement of the nipple areola complex, parenchymal indentation, or contour deformity. Chest wall perforator flaps facilitate to retain breast symmetry hence eliminating the need for contralateral surgery.<sup>1,2</sup> Traditional Lateral intercostal artery perforator (LICAP) flap involves a long lateral chest wall scar, which is visible beyond the bra line. There is evidence to suggest that breast conserving surgery scars limited to inframammary crease provide superior cosmesis.<sup>3</sup> We propose an arc-shaped modification of the harvested LICAP flap (arc-LICAP). With arc-LICAP flap, the surgical scar is concealed in inframammary/lateral breast crease. The arc-LICAP flap enables the preservation of all available perforator vessels thus potentially minimising the risk of fat necrosis.

Between June 2017 to July 2019, twenty patients, who underwent arc-LICAP flap partial breast reconstruction after wide local excision of breast cancer for cancer in the outer quadrant, were invited to complete the BREAST-Q questionnaire. (Hospital Governance Committee Approval Reference number 3370). The median (IQR) age of patient at the time of surgery was 60 (14) years. One patient suffered from type II diabetes mellitus and none of the patients smoked at the time of surgery. None of the patient received previous ipsilateral radiotherapy. One patient had neoadjuvant chemotherapy. Median (IQR) size of the tumour was 28 mm (7). Five patients had axillary nodal metastasis; median Nottingham prognostic index was 4.56 (1.46). Median surgical pathology specimen weight was 47 (40) g and median operating time was 56 min (42) min. Median time from surgery to radiotherapy was 65 (131) days and median time between surgery and the start of chemotherapy was 56 (24) days. One patient had neoadjuvant chemother-

apy. Two patients (10%) had positive surgical margins; one required re-excision and the second patient was not offered margin re-excision as she developed liver metastasis while on chemotherapy. One patient developed a further breast cancer away from the index quadrant, while on chemotherapy and required mastectomy. There were no major complications such as flap necrosis, 1/20 developed a small post-operative haematoma that was managed conservatively, two patients 2/20 required antibiotic for post-operative redness and suspected surgical site infection. 1/20 patient developed partial wound dehiscence and required sutures under local anaesthetics, and 2/20 patients developed symptomatic seroma that was managed conservatively. These complication rates are similar to other reported studies of chest wall perforated flaps.<sup>2,4</sup> Sixteen of the 20 patients completed the Breast Q questionnaire mean (SD) 10.5 (2.95) months after ARC-LICAP flap partial breast reconstruction.

The satisfaction with the cosmetic outcome of breast after arc-LICAP was one of the highest in the reported literature with a median (IQR) score of 88(34). The score for each domain of BREAST Q are summarised in [Table 1](#). Satisfaction with breast surgeon, satisfaction with medical team and the office staff were highest scored domains, median (IQR) of 100 (0). The lowest scoring domain was sexual well-being with a median (IQR) score of 70(50). No patient complained of having difficulties in lying on the side of their lumpectomy breast all the time. Eight patients experienced some difficulty some of the time in lying on the side of lumpectomy. Patient satisfaction with the radiation therapy of the breast was also high, median (IQR) score 87(22). [Figure 1](#) demonstrate the further analyses of satisfaction with breast scores. No patient was very dissatisfied with any

**Table 1** Breast- Q Patient satisfaction with various domains after partial breast reconstruction with arc-LICAP flap.

Satisfaction with breast	88 (34)
Adverse effects of radiation	87 (12)
Psychological well being	93 (37)
Physical well being	82 (26)
Sexual well being	70 (51)
Satisfaction with information surgeon	100 (25)
Satisfaction with information oncologist	100 (20)
Satisfaction with surgeon	100 (0)
Satisfaction with medical team	100(0)
Satisfaction with office staff	100 (0)

of the breast satisfaction domain. All patients were very or somewhat satisfied by the way they looked in the mirror clothed, how their breasts felt, how normal they felt in their clothes, about the symmetry of size and shapes of breasts on both sides. One patient was somewhat dissatisfied in each of the domains of shape of lumpectomy when wearing bra, being able to wear tight fitting clothes, how lumpectomy breast hanged, how normal lumpectomy breast looked and how patients looked in the mirror unclothed. The psychological and physical wellbeing also scored high after partial breast reconstruction with arc-LICAP flap, median (IQR) 93 (37) and 82 (26) respectively.

This is the first study to provide patient related outcome data on arc-LICAP partial breast reconstruction. The strengths of our study are that it provides real life data on patient satisfaction with the cosmetic outcome as measured by Breast Q. This study includes patients who have had radiotherapy and hence providing more accurate information about short to medium term cosmetic outcome. The limitations of this study are common to other cosmetic outcome studies of breast conserving surgery; there is no pre-operative data available and a single time point evaluation is used to assess patient satisfaction with breast conserving surgery.

In summary, after undergoing arc-LICAP partial breast reconstruction patient satisfaction was high and complication rate was low in a selected group of women after breast conserving surgery for breast cancer. We conclude that in a selected group of women with breast cancer, the arc-LICAP flap for partial breast reconstruction was associated with high patient satisfaction as well as high physical, psychological and sexual well-being.

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### Ethical approval

Not required

### Declaration of Competing Interest

None declared

## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:[10.1016/j.bjps.2020.10.107](https://doi.org/10.1016/j.bjps.2020.10.107).

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A.R. Carmichael, A. Goyal  
University Hospital of Derby and Burton NHS Foundation  
Trust. Uttoxeter Road, Derby DE22 3NE, UK

A.S. Sami  
United Lincolnshire Hospitals NHS Trust, Lincoln,  
Greetwell Rd, Lincoln LN2 5QY, UK

I.M. Lahart  
University of Wolverhampton, Walsall Campus, Gorway  
road, Walsall, West Midlands, WS1 3BD, UK

K. Mokbel  
The London Breast Institute, The Princess Grace Hospital,  
42-52 Nottingham Place, London, W1U 5NY, UK  
E-mail address: [amtulcarmichael@nhs.net](mailto:amtulcarmichael@nhs.net) (A.R.  
Carmichael)

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## Time to surgery and composite graft survival in paediatric fingertip amputations: A systematic literature review



Dear Sir,

Fingertip injuries including fingertip amputations are amongst the most common hand injuries in paediatric populations<sup>1</sup>. Management options include healing by sec-

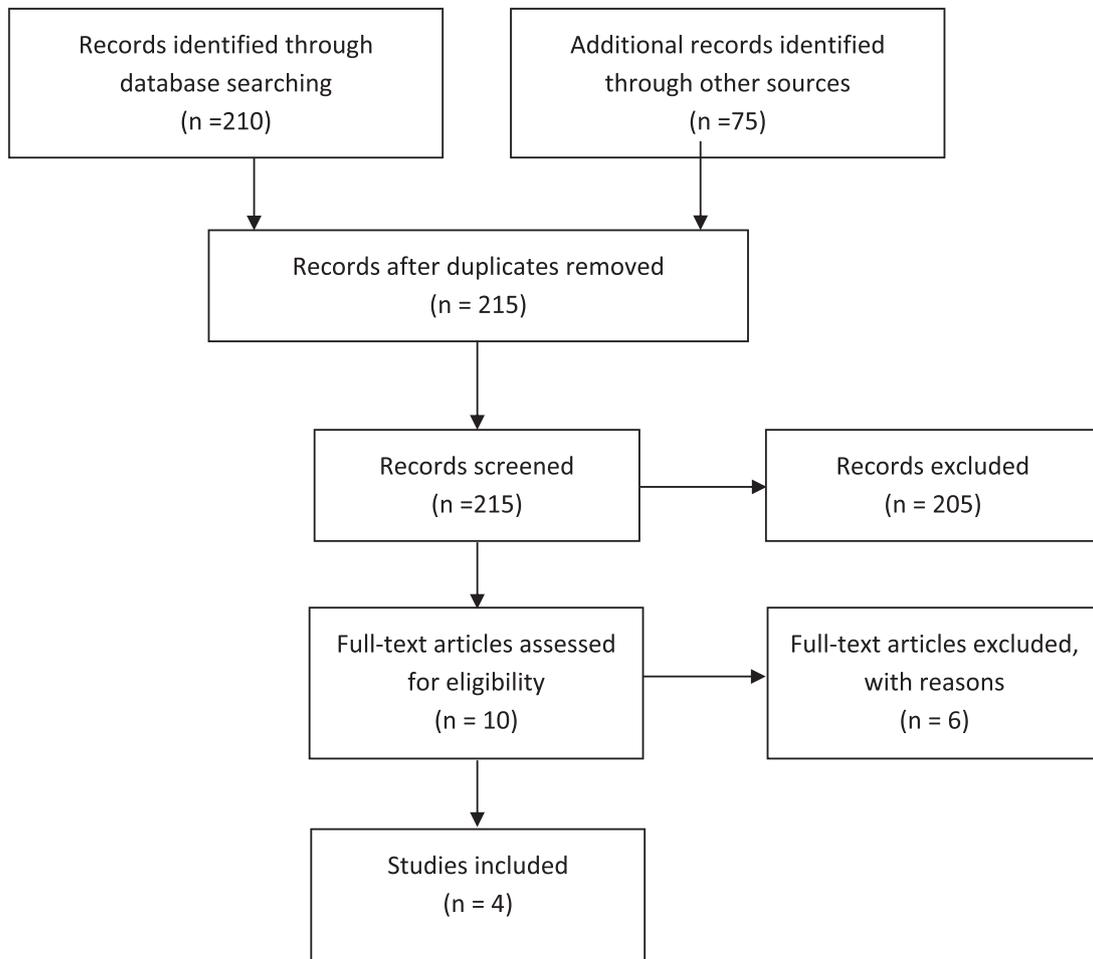


Figure 1 PRISMA flow diagram.

ondary intention, composite grafting, terminalisation and microvascular replantation. Composite grafting involves non-microvascular reattachment of the amputated fingertip in cases where microvascular reattachment is unavailable, impossible or deemed inappropriate on balance of risks and benefits. Controversy exists regarding various perioperative aspects in composite grafting and practice is not standardized amongst centres adopting this approach. One area of contention is whether time to surgery impacts graft survival and/or outcomes.

## Aim

Our aim was to conduct a systematic review of the literature addressing time from injury to composite grafting of amputated fingertips in a paediatric population with the endpoint being graft survival.

## Methods

An electronic and systematic search of the literature in PubMed/Medline, EMBASE and The Cochrane Library databases was conducted from 1959 to 2019 using MeSH terms and keywords. The PRISMA guidelines were followed

in conducting the search with the flow diagram presented in Figure 1. Abstracts were reviewed by two investigators (OA and QYS) and the retrieved abstracts' references were screened for additional articles not identified on primary search. Articles fulfilling eligibility were retrieved and data extraction was conducted by two investigators (SM and QYS).

This search was limited to the English language, paediatric patients (<18 years of age) and articles including time to surgery as a reported variable.

A statistical analysis was not possible due to the small number of studies, heterogeneity and reporting variability.

## Results

All four studies eligible for inclusion were single centre retrospective case series published between 1997 and 2018. A comparative table of the studies is presented in Table 1.

The total population was  $n = 343$  patients with  $n = 343$  amputated fingertips. There was a male predominance (58% vs. 42%) with a mean age of 4.2 years (age range 0-16 years). Most commonly reported mechanism was a crush/blunt type injury representing 89% of cases.

**Table 1** Comparative table of studies included.

	Moieman (1997)	Murphy (2016)	Butler (2016)	Borrelli (2018)
Design	Single Centre Retrospective Case Series	Single Centre Retrospective Case Series	Single Centre Retrospective Case Series	Single Centre Retrospective Case Series
Evidence Level	IV	IV	IV	IV
Total Patients (Digits)	50 (50)	96 (96)	97 (97)	100 (100)
Male	38	48	55	57
Female	12	58	42	43
Age (Mean)	5.7	2.4	4.4	4.4
Age (Range)	1 to 14	0 to 16	1 to 15	0.08 to 15.8
Mean Follow-Up (Months)	14.8	2.3	27	4.65
<b>Mechanism Described (Y/N)</b>	Y	Y	Y	Y
Crush/Blunt	47(94%)	89(93%)	94(97%)	75(75%)
Sharp/Cut	3(6%)	4(4%)	3(3%)	12(12%)
Avulsion	0	0	0	13(13%)
<b>Level Classification</b>	Modified Ishikawa	Modified Ishikawa	Modified Ishikawa	Modified Ishikawa
<b>Time to Surgery Reported (Y/N)</b>	Y	Y	Y	Y
Range of Time to Surgery (Hours)	3.9 to 7.8 (range of means)	2.2 to 22.5	2 to 20	<6 to >24 hrs
Mean Time to Surgery (Hours)	5.6	7.5(median)	6.8	N/A
<b>Perioperative</b>				
Anaesthetic	GA	GA	N/A	GA (85%) and LA (15%)
Pre-Op Cooling	Yes	Yes (52%)	Yes	Yes (81%)
Tourniquet	No	No	N/A	Yes (14%)
Defatting	No	No	Yes	Yes (22%)
Nail Plate Management	Replaced/Preserved	Replaced/Preserved	Discarded/Replaced (surgeon preference)	Replaced/Preserved
Suture	Absorbable Interrupted	Absorbable Interrupted	Absorbable Interrupted	Absorbable Interrupted
Dressings	Bulky Bandage	Cast/Splint	Bulky Bandage	N/A
Splint	Yes (nail plate used as splint)	Yes	No	Yes (6%)
Post-Op Antibiotics	Yes (5 days)	Yes (5 days)	Yes (7 days)	Yes (5-7 days)
<b>Graft Survival Assessment</b>	<b>Clinical</b>	<b>Clinical</b>	<b>Clinical</b>	<b>Clinical</b>
Full	22%	16%	10%	13%
Partial	52%	52%	34%	46%
Failure	26%	32%	56%	41%
<b>Complications Reported (Y/N)</b>	N/A	Y	Y	Y
Infection	N/A	N/A	36%	16%
Reoperation/Revision	N/A	2%	12%	9%
<b>Time Lag to Surgery and Graft Survival</b>				
Significant Factor	Y	N	N	N
Comment	Grafts carried out within 5 hours were significantly more likely to achieve full take (p <0.000001).	Time to surgery did not have a statistically significant effect on graft take (p 0.312).	Trend towards increased survival in the group operated within 5 hours (p 0.280) compared to 10 hours (p 0.110) but not statistically significant.	No survival benefit if operated on within 6 hours (p 0.439) however no grafts survived if operated on beyond 24 hours.

Graft survival was based on post-operative clinical assessment in all studies. Composite grafts veered towards partial take (46%) followed by failure (39%) and full take (15%), respectively.

Time to surgery was reported in all studies albeit non-uniformly and to varying levels of detail accounting for delay causes and factors. Moieman's (1997) series of 50 amputated finger tips proposed time to surgery as a signifi-

cant factor for full graft take<sup>2</sup>. Of 18 composite grafts performed within 5 h from injury 61% showed full take. This was deemed as the successful group with a mean time to surgery of 3.2 h. Conversely, mean time to surgery was 7.2 h in the group (32 composite grafts) with partial take (69%) or failure (31%).

The other three studies ( $n = 293$  patients) did not find time to surgery to be a significant factor on graft survival.

## Discussion

The sparsity of literature examining time lag to surgery and its impact on graft survival reflects the non-standardized practice amongst centres. The studies presented are inherently prone to bias and limited generalizability due to the low number of patients and low level of evidence. A key issue unexplored is the level of graft survival and whether it translates to an acceptable outcome, be it sensory, functional or aesthetic. Thus far, there is not enough evidence to suggest a causal relation. Majority of composite grafts tend to only achieve partial take<sup>1</sup> and the most common mechanism reported is crush injuries which are less likely to succeed as composite grafts.

Addressing whether time to surgery is a significant factor and the ideal time frame is important as it carries implications throughout the patient's journey.

Preoperatively, it impacts the consent and counselling process as well as transfer logistics. Parents should be counselled the outcome of graft take is comparable whether an emergency approach versus a time delayed approach is used to provide a safer general anaesthetic.

Additionally, as the majority of patients are under five years of age, deferral of surgery to daylight hours when operating is safer and with a paediatric anaesthetist is involved may be a safer approach rather than out of hours operating in a high risk population.

Composite grafts predominantly consist of skin and fat which can sustain a cold ischaemia time of up to 24 h<sup>3, 4</sup> and as such, theoretically, it can be performed within but not beyond this window; as noted in Borrelli's study, none of the grafts carried out after 24 h survived and as such it may not be advisable to allow more than a 24 h window.<sup>5</sup>

Postoperatively, a better understanding of how graft survival impacts on fingertip outcome measures would guide and standardize future practice.

## Conclusion

It is our view that there is little evidence in the literature to suggest a particular time window within the first 24 h from injury which impacts graft survival and no causal relation translating full take to improved outcomes. Counselling parents should not suggest worse graft survival if surgery is deferred for daylight hours when operating is safer.

## Declarations

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## Conflicts of interest

None declared.

## Ethical approval

Not required.

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O. Abbassi, S. Murphy  
Addenbrooke's Hospital, Hills Road, CB20QQ Cambridge,  
United Kingdom

Q. Young Sing  
St. Andrew's Centre for Burns and Plastic Surgery, CM1  
7ET Chelmsford, United Kingdom  
E-mail address: oabbassi@doctors.net.uk (O. Abbassi)

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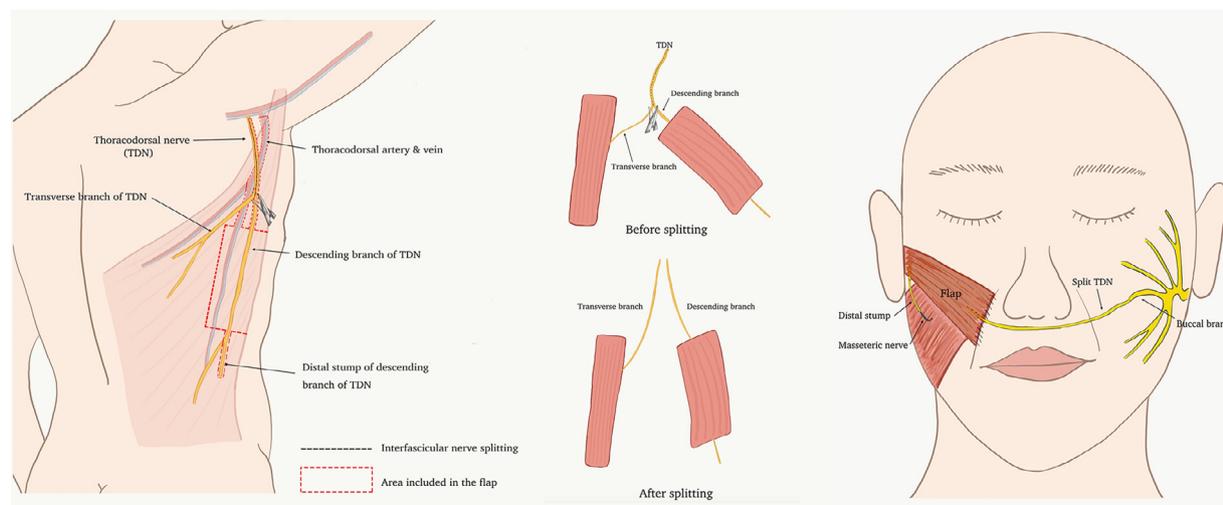
## Minimizing donor site morbidity using the interfascicular nerve splitting technique in single-stage latissimus neuromuscular transfer for facial reanimation



Dear Sir,

## Introduction

Free muscle transfer for facial reanimation requires the sacrifice of motor nerves and muscles, which inevitably leads to donor site morbidity. For overcoming donor site morbidity,



**Figure 1** Schematic illustration of surgical method using interfascicular nerve splitting and dual-innervation technique. (Left) The flap included thoracodorsal pedicle, split thoracodorsal nerve (TDN) and descending branch of the TDN, muscle and distal stump of descending branch of the TDN. (Center) Interfascicular nerve splitting divided transverse branch and descending branch. (Right) Split TDN-descending branch was coapted with buccal branch of the normal side. Distal stump of descending branch of the TDN was coapted with the masseteric motor nerve.

we performed an interfascicular nerve splitting technique during neurovascular latissimus dorsi muscle flap harvest. The possibility of this technique was first confirmed with an anatomic study.<sup>1</sup> The aim of this study was to examine the efficacy of our interfascicular nerve splitting technique through the evaluation of donor site morbidity.

## Patients and methods

This investigation was approved by the Institutional Review Board (IRB No. 1807-143-961). We examined all patients that underwent free latissimus dorsi flap for facial reanimation using the interfascicular nerve splitting technique between January 2012 and December 2016.

## Surgical technique

A schematic illustration of the key procedure is shown in [Figure 1](#). The general surgical procedure is the same as the conventional method except for flap harvest. After thoracodorsal vessels and thoracodorsal nerve (TDN) were identified, additional dissection was performed until reaching the bifurcation of thoracodorsal vessels and nerve near the hilum. We could identify the bifurcation of the descending branch and transverse branch of thoracodorsal vessels and TDN. After marking the required size on the muscle, additional dissection above the distal end of the muscle was performed in order to find the distal stump of the descending branch of the TDN. Approximately 5 cm of the distal stump was harvested with muscle. After separating the muscle, interfascicular nerve splitting of the TDN was performed to the maximum extent possible under microscopy. We confirmed the twitch of the muscle by stimulation of a split motor nerve using a nerve stimulator ([Figure 2](#), Supplementary Video 1). The proximal TDN was coapted with the buc-

cal branch of the contralateral side. The distal stump of the descending branch of the TDN was coapted with the ipsilateral masseteric motor nerve.

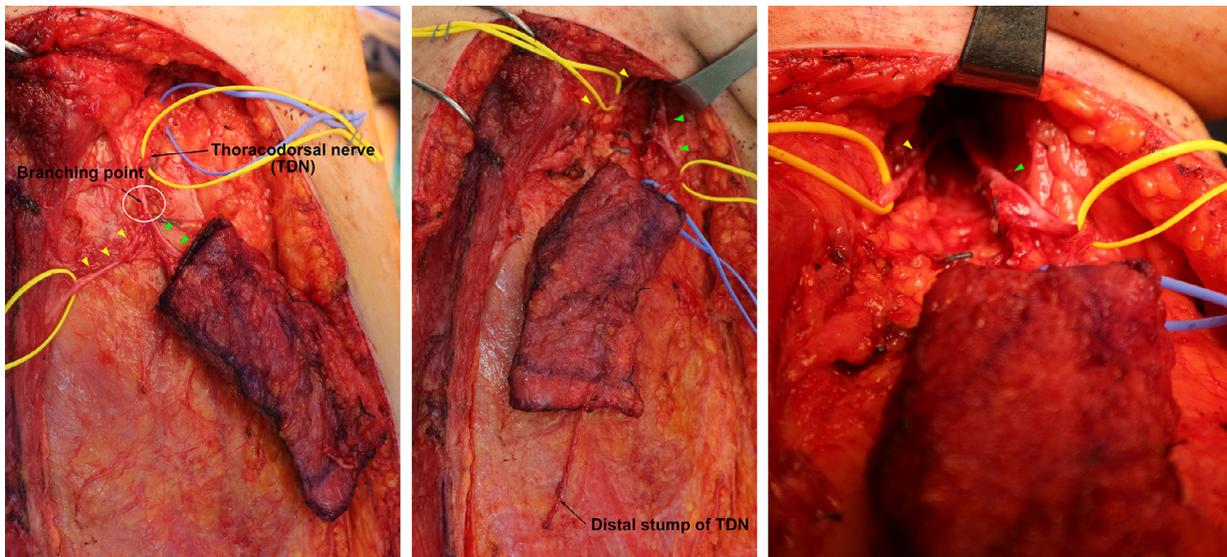
## Outcome measures

Postoperative results were assessed 24 months post-surgery using evaluation criteria from the study by Harii et al.<sup>2</sup> Quantitative measurement was performed using Hadlock's Smile Measurement of Improvement in Lip Excursion scale.<sup>3</sup> For this, we utilized Emotrics, from the Sir Charles Bell Society.<sup>4</sup>

The donor site morbidity were measured by two aspects: (1) objective findings using electromyography (EMG) and nerve conduction study (NCS) in postoperative 12 months - the severity of lesions were scored into 6 grades ([Table 1](#)) (2) subjective assessment using the Quick-Disabilities of Arm, Shoulder, and Hand (QuickDASH) questionnaire at three time points: preoperative, postoperative 6 months, and postoperative 12 months.

## Results

A total of 13 patients with a mean age of 39.6 years were included in the study. The mean length of interfascicular nerve splitting was 7.0 cm (range, 6.0-8.0 cm), and the mean length of the harvested descending branch of the TDN was 11.4 cm (range, 9.0-13.0 cm). All flaps survived without specific complications. The average postoperative grade was 3.77, which was statistically different from the preoperative grade. ( $3.77 \pm 0.73$  and 1, respectively,  $P = .001$ ). Postoperatively, the lip excursion of the paralyzed side improved from  $27.59 \pm 5.31$  mm to  $33.39 \pm 4.87$  mm ( $P < 0.001$ ). The difference on the contralateral side decreased sig-



**Figure 2** Intraoperative photography that shows interfascicular nerve splitting. (Left) Note the transverse branch, descending branch, and branching point visualized before nerve splitting (Center) After nerve splitting, the transverse branch and descending branch are separated. Distal stump of the thoracodorsal nerve (TDN) is dissected. (Right) Magnified image of two separated nerves, which are linked to the brachial plexus. (yellow arrowhead, transverse branch of the TDN; green arrowhead, descending branch of the TDN).

**Table 1** EMG and NCS criteria for estimation of donor-site morbidity.

Grade	EMG		NCS
	PSWs/fibrillations	Recruitment	CMAP amplitude
Normal (0)	0	Normal	Normal
Very mild (1)	0 - 1+	Normal	Normal
Mild (2)	1+	Normal	Normal
Moderate (3)	1+ - 2+	Normal	Normal
Moderately Severe (4)	2+ - 3+	Normal - minimal decrease	Normal - minimal decrease
Severe (5)	3+ - 4+	Moderate decrease	Moderate decrease
Very Severe (6)	3+ - 4+	Moderate decrease - Absent	Absent

**Table 2** Result of estimated donor site morbidity and postoperative result.

Donor site morbidity						
QuickDASH	Preop	Postop 6 months	<i>p</i>	Postop 12 months	<i>p</i>	
	1.57 ± 2.34	8.74 ± 4.62	0.001	2.62 ± 3.19	0.059	
EMG & NCS grade	Donor	Contralateral	<i>p</i>			
	0.42 ± 0.51	0.08 ± 0.28	0.073			
Postop result						
Grade	Preop	Postop 24 months	<i>p</i>			
	1	3.77 ± 0.73	0.001			
Hadlock's Smile Measurement in Lip Excursion scale						
Excursion of paralyzed side (mm)	27.59 ± 5.31	33.39 ± 4.87	< 0.001			
Difference from normal side (mm)	16.63 ± 8.71	7.54 ± 4.60	< 0.001			

DASH, Disabilities of the Arm, Shoulder and Hand; Preop, Preoperative; Postop, Postoperative.

nificantly from 16.63±8.71 mm to 7.54±4.60 (*P* <0.001) (Table 2).

The EMG and NCS grades were evaluated by the rehabilitation department. The donor site grades averaged 0.42±0.51. The contralateral side averaged 0.08±0.28. There was not a statistically significant difference between

donor site and contralateral side (*P* = .073). The average preoperative QuickDASH score was 1.57±2.34. At postoperative 6 months, QuickDASH scores averaged 8.74±4.62, which were significantly different from the preoperative score (*P* = .001). At postoperative 12 months, the average QuickDASH score was 2.62±3.19, which was an improve-

ment from the postoperative 6-month average, but not significantly different from the preoperative score ( $P = .059$ ) (Table 2).

## Discussion

Currently, the dual-innervation technique is widely performed, and many reports show fair results. Faster and more powerful re-innervation through the masseteric nerve as well as spontaneous smile through the contralateral facial nerve can be achieved with this technique. Additional donor site morbidity is inevitable for this, for example, due to sural nerve harvest for gracilis flap or transverse branch of the TDN harvest for latissimus dorsi flap.

Interfascicular nerve splitting is not technically difficult, taking approximately 15 min under microscopy or high-magnified surgical loupes. Dissecting the distal stump of the TDN also takes approximately 5 min. These small procedures could induce greater shoulder function improvement compared to other studies regarding donor site morbidity of muscle-sparing latissimus dorsi flap or TDAP flap. Our patients showed the same level of recovery within 12 months compared to at least 3 years of recovery in other studies.<sup>5</sup>

There are several limitations in this study. This was a retrospective chart review and bias could exist. There was no control group where the whole thoracodorsal nerve was removed. To address this, we compared the donor and contralateral side results.

## Declaration of Competing Interest

N/A.

## Funding

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## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi: [10.1016/j.bjps.2020.10.030](https://doi.org/10.1016/j.bjps.2020.10.030).

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Seong Oh Park

Department of Plastic and Reconstructive Surgery,  
Hanyang University College of Medicine, Seoul, South  
Korea

Jaewoo Kim

Department of Plastic and Reconstructive Surgery, Seoul  
National University College of Medicine, Seoul, South  
Korea

Il-Kug Kim

Department of Plastic and Reconstructive Surgery, College  
of Medicine, Yeongnam University, Daegu, South Korea

Jee Hyeok Chung, Ung Sik Jin, Hak Chang

Department of Plastic and Reconstructive Surgery, Seoul  
National University College of Medicine, Seoul, South  
Korea

E-mail address: [hchang@snu.ac.kr](mailto:hchang@snu.ac.kr) (H. Chang)

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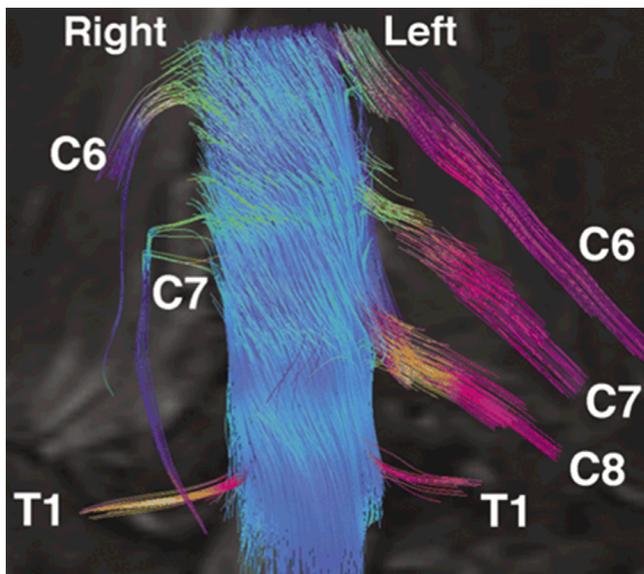
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## Advances in magnetic resonance imaging for evaluation of peripheral nerve injuries: Diffusion tensor imaging



Dear Sir,

Traumatic peripheral nerve injuries are common and often pose diagnostic challenges for clinicians attempting to determine the precise location and severity of injury.<sup>1</sup> The mainstay of evaluation is by clinical examination and electrodiagnostic tests. However, these methods are cumbersome and depend on the clinician's experience and skill. In particular, injury patterns with blunt, indirect, or traction-type forces are difficult to diagnose and grade in terms of potential for spontaneous recovery. Consequently, surgeons may feel compelled to surgically explore the suspected area of injury. This will result in patient morbidity if the operation is performed prematurely and unnecessarily in the case of neurapraxic injuries, or, more commonly, if the operation is performed after prolonged observation when earlier



**Figure 1** Tractography showing a reduced density of nerve fibres in the right C6 and C7 nerve roots and complete avulsion of the right C8 nerve root. Figure reused from Gallagher et al. (2015) *Neurosurg Focus*, 39, E10, with permission by Journal of Neurosurgery Publishing Group.

intervention would have led to a more favorable outcome. Furthermore, monitoring recovery after surgical intervention relies on the same cumbersome, indirect techniques over long durations of time.

Imaging techniques such as ultrasound and magnetic resonance imaging (MRI) may be helpful as adjunct investigations, but they also have major limitations with respect to sensitivity and accuracy.<sup>2</sup> Recent advancements in MRI techniques have shown promise in enhancing objective evaluation of peripheral nerve injury and are briefly overviewed here (Figure 1).

### Diffusion tensor imaging (DTI) and tractography

Magnetic resonance neurography (MRN) refers to the modification of MRI sequences to optimize the visualization of peripheral nerves from adjacent soft tissues. Although MRN enables improved delineation of nerves, image interpretation is typically qualitative, with subjective descriptions of image intensity to suggest inflammation or edema.<sup>2</sup>

DTI is a novel MRI modality that leverages the restricted pattern of water diffusion longitudinally along nerve fibers to provide information about the integrity of axons and myelin.

Unlike conventional MRN sequences, DTI enables the derivation of several objective quantitative parameters such as Fractional Anisotropy (FA), a scalar value, which quantifies the degree of anisotropic (directional) diffusion. This in turn describes the amount of microstructural changes within the fibers (see Jeon et al.<sup>3</sup> for further information regarding the physics). The normal FA value is approximately 0.6; however, variations are expected depending on the area of the nerve evaluated and the patient's age.<sup>1</sup>

DTI images may be processed using sophisticated algorithms to generate 3D image reconstructions of nerve tracts, a technique referred to as tractography. Additional parameters are extrapolated from DTI in tractography to enable the color-coded visualization of axon integrity.

Although commonly used in the central nervous system to visualize white matter tracts, DTI and tractography have gradually emerged as powerful modalities of peripheral nerve evaluation.<sup>3</sup>

### Application of DTI and tractography

Superficial peripheral nerves and proximal segments of brachial plexus often pose difficulties when evaluated with ultrasound, and conventional MRI images are limited in assessing patients presenting with clinical symptoms but otherwise healthy nerves.<sup>1</sup> DTI and tractography can thus supplement conventional MRI because of their superior sensitivity, enabling them to detect subclinical demyelination.<sup>5</sup> Studies have shown the utility of DTI and tractography in imaging both intact and transected peripheral nerves in animals and humans.<sup>1</sup> Meek et al.<sup>4</sup> used tractography to evaluate nerve regeneration after median nerve transection and direct repair at the wrist. Regenerating nerve fibres could be visualized after two months before any clinical recovery was detectable, demonstrating the sensitivity and clinical feasibility of using tractography for monitoring nerve recovery. Other studies have demonstrated the value and complementary role of DTI and tractography to conventional MRN in the assessment of compression neuropathies, peripheral nerve tumours, and traumatic nerve injuries (Table 1). Recently, Simon HYPERSPACE and Kliot<sup>5</sup> used tractography to visualize axon regeneration 1 month and 13 months after nerve autograft reconstruction of a transected deep peroneal nerve. Therefore, it is possible to distinguish regenerating from non-regenerating nerve fibers in a timely manner with DTI and tractography, without the need for exploratory surgery.

### Limitations

There are several caveats to DTI and tractography with respect to its practicality in the clinical realm. Similar to MRI, the techniques require user input and are time consuming. Young children and other uncooperative patients may require sedation. Furthermore, artifacts from proximity to air interfaces may hinder DTI metrics obtained from brachial plexus.<sup>3</sup> More powerful magnetic field scanners have greater signal-to-noise ratio but at the expense of increasing inhomogeneities. Thus, future studies should address the limitations of DTI and tractography, in addition to focusing on their role as improved modalities.

Although peripheral nerves are quantitatively assessed with DTI and tractography (unlike conventional MRI), the modelling and assumptions involved in postprocessing and analysis of images can introduce subjectivity to image interpretations. This source of bias can be mitigated with rigorous oversight by trained individuals during image postprocessing and analysis.

**Table 1** Diagnostic and prognostic values of Diffusion Tensor Imaging (DTI) and tractography for clinical conditions. CTR, carpal tunnel release.

Clinical condition	Authors	Imaging	Application	Notes
Carpal tunnel syndrome	Liu et al. (2018) Clin Radiol 74, 1058.e11-19	DTI	Diagnostic	Patients clearly differentiated from healthy subjects
	Naraghi et al. (2013) Sk Radiol 42, 1403-12	DTI	Prognosis after CTR	Increased Fractional anisotropy in concert with clinical improvement
Peripheral nerve tumours	Kasprian et al. (2015) Muscle Nerve, 51, 338-345	Tractography	Diagnostic	Margins delineated from a tumour causing mass effect only
	Vargas et al. (2010) Neuroradiol 52, 237-45	Tractography	Diagnostic	Visualizing fiber dislocation, compression, injury
Traumatic nerve injuries	Gallagher et al. (2015) Neurosurg Focus, 39, E10	Tractography	Diagnostic	Identification of injury site (Figure 1)
	Simon et al. (2014) Neural Regen Res 9, 2122-24	Tractography	Prognostic	Serial evaluation of recovery

## Conclusions

DTI and tractography are novel MRI imaging modalities that enable evaluation of microstructural nerve changes without patient discomfort or clinician subjectivity. There has been an increasing interest in understanding the clinical applications of these modalities in the peripheral nervous system, because they can provide objective evidence of viable axons that remain in continuity or regenerate. This can help guide decision making for surgical exploration and timing. DTI and tractography are the future and more animal and human studies are needed to refine the quantitative and the qualitative interpretations.

## Disclosures

None.

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Golsa Shafa

Neurosciences and Mental Health, SickKids Research Institute, Canada

Kevin J. Zuo

Division of Plastic and Reconstructive Surgery, Department of Surgery, University of Toronto, Canada

Tessa Gordon, Gregory H. Borschel

Neurosciences and Mental Health, SickKids Research Institute, Canada

Division of Plastic and Reconstructive Surgery, The Hospital for Sick Children, Canada

Division of Plastic and Reconstructive Surgery,

Department of Surgery, University of Toronto, Canada

E-mail address: [gregory.borschel@sickkids.ca](mailto:gregory.borschel@sickkids.ca) (G.H. Borschel)

Borschel)

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## Anatomic landmarks for masseteric nerve identification: Anatomic study for a new reference point



Dear Sir,

The masseteric nerve is a motor branch of the trigeminal nerve often used as a donor nerve in the treatment of facial paralysis<sup>1</sup>. Several anatomical studies have been reported about the detection of anatomical markers that can assist in the identification of the nerve<sup>3-5</sup>. Despite this, the reliability of the reference points described up to now is limited by anatomical variability and changes due to the dissection.

The Authors describe an anatomical study performed to define the zygomatic branch (ZB) of the facial nerve as a reliable and easy to identify landmark, not variable during surgery.

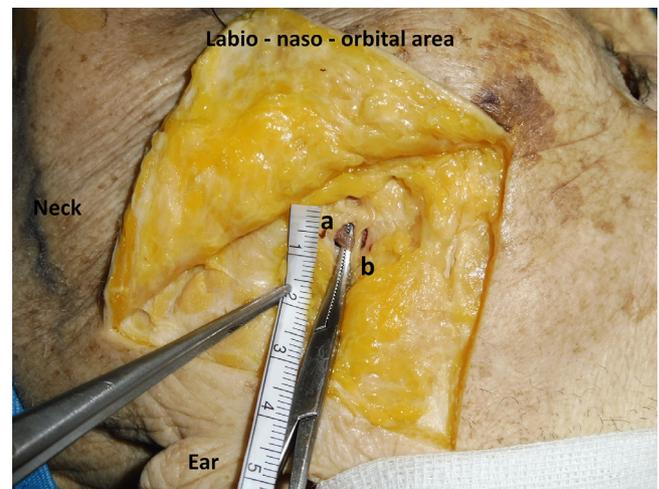
### Materials and methods

Sixteen dissections were performed on both sides of 8 cadaveric specimens; of these, 5 were male and 3 female. All procedures have been performed at the Anatomy Laboratory - Institut for Clinical Anatomy of the University of Tübingen Medical Center, Germany. Bodies donated for research and medical education to the Department, were used according to the ethical commitment of the University.

To have a wide view of the structures to be identified, on each side of the heads a pre-tragal incision extending from 1 cm below the ear lobule to the pre-helical area and prolonged on the superior border of the zygomatic arch was performed. A cheek skin flap including the SMAS (Superficial muscular aponeurotic system) was raised and the parotid fascia was dissected in order to identify the facial nerve braches. In the first four heads a complete facial nerve dissection was performed at the beginning of the procedure through an intraparotid anterograde dissection, to visualize the pattern of distribution of the ZBs. In the remaining four heads the identification of the zygomatic nerve was performed on the anterior border of the parotid gland without the need for an intraglandular dissection. The masseteric muscle, the caudal edge of the zygomatic arch and subsequently the masseteric nerve were identified. In the first four heads a generous masseteric nerve exposure and dissection were performed. In the remaining heads the masseteric nerve was identified and isolated through a minimally invasive dissection within a small circular aperture of less than 1 cm (Figure 1), basing on measures and landmarks identified during dissection of cadaver 1 through 4.

### Results

In all cadaver heads the masseteric nerve was localized at the plane between deep and middle layers of the masseteric

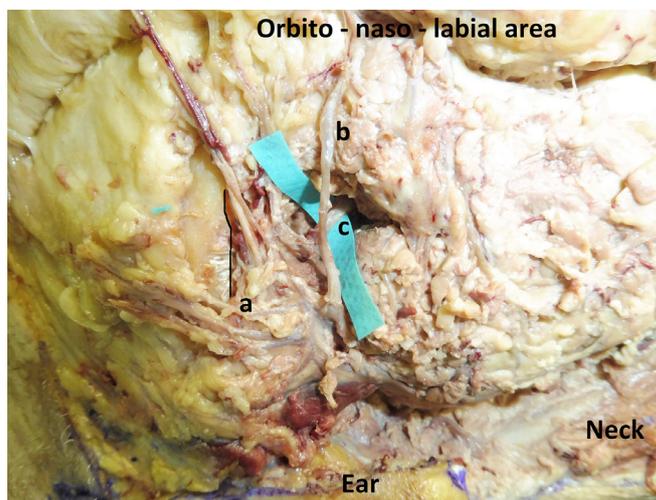


**Figure 1** Circular approach of less than 1 cm to find the masseteric nerve (a) under the zygomatic branch of the facial nerve (b) (left side of the head). The approach was performed in the area where the masseteric nerve passes under the zygomatic nerve, following the measures identified during the dissections: average distance of 1,57 cm from the lower border of the middle third of the zygomatic arch (range: 1,7-1,4 cm) and average distance of 0,8 cm from the posterior edge of masseteric muscle (range: 1,0-0,7 cm).

muscle. The pattern of distribution of the facial nerve didn't influenced the results of the study since in all the hemi-heads the masseteric nerve crossed under the zygomatic branch before its division into terminal twigs. The relationship between the ZB and the masseteric nerve (Figure 2) was constant in all the specimens dissected, with small ranges of variation. The measures showed that the zygomatic branch intersects the masseteric nerve at an average distance of 1,57 cm from the lower border of the middle third of the zygomatic arch (range: 1,7-1,4 cm) and at an average distance of 0,8 cm from the posterior edge of masseteric muscle (range: 1,0-0,7 cm); the masseteric nerve was located at a depth of 0,78 cm (range: 0,7-0,9 cm) from the zygomatic branch of facial nerve. No variations due to sexual dimorphism were observed.

### Discussion

After the description of the use of the masseteric nerve for facial reanimation, several anatomic landmarks have been proposed for its identification<sup>2-5</sup>. All the reference points until now described have the disadvantage to vary depending on sex, race and habitus of the patients. Moreover, the surgical procedure can change the anatomical status making more difficult the identification of the landmarks. During surgery in most cases the direct visualization of bony structures, such as the zygomatic arch, mandibular condyle or angle, is not always possible, as the dissection is performed on a more superficial plane. Furthermore the traction of the tragus, necessary to have a good visualization of the facial nerve, doesn't allow its use as a precise reference point. The imprecision of the until now described landmarks often forces surgeons, especially the ones less experienced,



**Figure 2** Relationship between the inferior edge of the zygomatic arch (a), the zygomatic branch of the facial nerve (b) and the masseteric nerve (c) (right side of the head).

to an extensive dissection within the masseter muscle, with longer operative times, greater fibrosis and a higher risk of post-operative pain and trismus. The anatomic study reported demonstrates the constancy of the relationship between the masseteric nerve and the ZB of the facial nerve. The dissection performed in the 16 anatomical specimens showed in all cases the same result: after the identification of the main zygomatic branch, the masseteric nerve can be found exactly below it, at a depth of about 1 cm and a distance of 1.6 cm from the lower edge of the middle third of the zygomatic arch. Thanks to that constancy, it is possible to identify and isolate the masseteric nerve through a minimally invasive dissection within a small circular aperture of less than 1 cm in the masseteric muscle.

### Declaration of Competing Interest

None.

### Funding

None.

### Ethical Approval

N/A.

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Chiara Copelli, Alfonso Manfuso  
Operative Unit of Maxillo-Facial Surgery, Otolaryngology  
and Dentistry, Fondazione IRCCS Casa Sollievo della  
Sofferenza, San Giovanni Rotondo (Fg), Italy

Teodoro Aragona  
Operative Unit of Otolaryngology, University- Hospital  
Ospedali Riuniti di Ancona, Italy

Antonia Cama  
Operative Unit of Maxillo-Facial Surgery, Federico II  
University, Naples, Italy

Davide Topazio  
Otolaryngology, ASL di Teramo, Italy

Bernhard Hirt  
Institute for Clinical Anatomy, University of Tübingen,  
Germany

E-mail address: [copkids@tin.it](mailto:copkids@tin.it) (C. Copelli)

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## RE: Single vac dressing for pedicled groin flaps prior to second stage division



Dear Sir,

It is with great interest that we read Cohen-Shohet et al.'s article entitled 'Single VAC dressing for pedicled groin flaps prior to second stage division'.<sup>1</sup> This piece proposes a novel application of topical negative pressure dressings to the problem of ideal wound temporisation in patients with pedicled groin flaps in order to avoid skin maceration and secondary infection secondary to exudate from the flap itself.

We are impressed that your patients were able to maintain a seal and keep the topical negative pressure dressing on for four weeks, a feat in itself. It would be of interest to know what was used as an interface, both over the wound and for protection of adjacent normal tissue for such a large surface area to be covered.

In our experience, we find leaving vacuum dressings for long periods of time challenging because of loss of the vacuum, typically arising through either loss of the seal or battery neglect. This can lead to the sponge being unsuitable for further repeated suction and necessitating change; soaked sponges/gauze macerate tissue further and are an excellent medium for infection.<sup>2</sup> If the initial problem was localised maceration secondary to exudate, it is unclear why potentially inducing maceration over a far wider contact area by leaving unchanged sponge/gauze for a month is the solution.

Having a vacuum dressing wrapped around the arm indisputably works as a splint, and wrapping it around the flap is certainly a valid option to reduce exudate. However, the photographs suggest the topical negative pressure dressings were wrapped circumferentially around the flaps. This must make flap monitoring challenging, particularly when left in situ for four weeks. We would also be concerned about the impact of pedicle compression by the circumferential topical negative pressure dressing and potential flap compromise.

An additional concern is the potential for a topical negative pressure dressing, when used simply for covering the raw components of the pedicle, to risk damaging the pedicle or flap by indirect trauma. Considering the increased functional limitations of a patient with a pedicled groin flap, the physical attachment of a bulky machine and tubing to the flap could easily get caught, snag, or tear the pedicle or inset. Smaller negative pressure devices such as PICO or PREVINA are viable alternatives with shorter tubing components and lighter more discrete portable cannisters. These do however exert a fixed constant pressure which can limit flexibility. Certainly, other less complicated options such as tubularisation or split-thickness skin graft with bolster dressings are simpler, cheaper, and relatively risk-free alternatives which have a proven track record and can be discarded after pedicle division if not required. Usually by day 5 these have significantly reduced the exudate from the

pedicle, leaving the patient with over 3 weeks until flap division (by your protocol). Use of shoulder and arm braces, whilst awkward to fit, facilitate skin hygiene maintenance, minimise maceration and associated social and physical discomfort, and can be effective arm splints.

Finally, functional considerations are key in patients requiring reconstruction, particularly when considering the impact of dressings on joints and potential rehabilitation.<sup>3</sup> The additional advantage of removable shoulder and arm braces is they facilitate a degree of physiotherapy to take place on shoulder and elbow joints. Finger position is a vital consideration, particularly in the elderly and when associated with significant swelling. These topical negative pressure dressings not only place the fingers in positions which are suboptimal in even the short-term, but also prevent access and movement, if only to maintain passive ranges of motion, for the duration of the splinting; something which could be easily achieved with less complicated dressings. It will be finger/upper limb stiffness and not maceration of their groin that will remain with the patient once their groin flaps have healed.

### Declaration of Competing Interest

The author(s) declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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### Informed consent

Not applicable.

### Ethical approval

Not applicable.

### Contributorship

All authors wrote, reviewed, and edited the manuscript, and approved the final version.

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Diana Kazzazi, Ian CC King  
 Department of Plastic and Reconstructive Surgery, Guys'  
 and St Thomas' NHS Foundation Trust, St Thomas'  
 Hospital, Westminster Bridge Road, London SE1 7EH,  
 United Kingdom

E-mail address: [dianakazzazi@doctors.org.uk](mailto:dianakazzazi@doctors.org.uk) (D. Kazzazi)

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## Stahl's ear deformities treated with auricular splinting

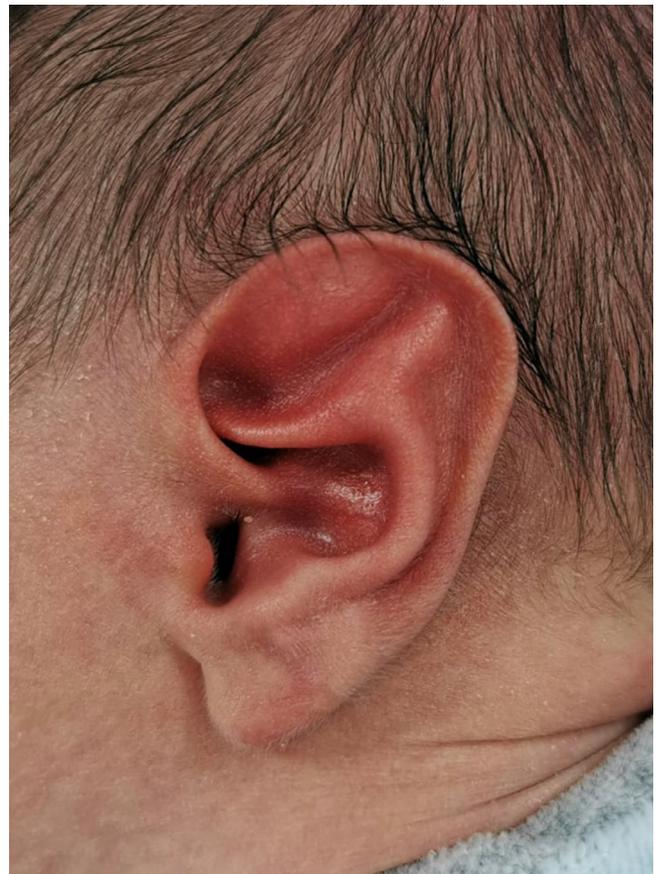


Dear Sir,

Stahl's ear is a congenital anomaly of the upper third of the ear characterized by an abnormal antihelical third crus with a horizontal orientation extending from the site of the normal bifurcation of the antihelix to the postero-superior margin of the helix. This horizontal crus causes the unrolling of the helical rim and consequently the appearance of a flat helix which is associated with a broad scaphoid fossa and a lack of proper development of the superior crus.

Between January 2012 and December 2019, 16 newborn infants were referred to us with Stahl's ear deformity, one bilateral and 15 unilateral. Newborns were examined in the Neonatal Care Unit usually one or two days after birth. Pictures were taken of the infants born with Stahl's ear who were considered suitable for ear splinting. The natural evolution of the deformed auricles was monitored for 2-3 days after birth. Parents were then fully informed about the proposed treatment, timeframe, alternatives and the possibility of failure in achieving the desired result. Treatment was started as soon as possible. The splint was composed of a wire core portion in a 6-French Silastic tube. It was custom cut to the appropriate length and shaped according to the specific ear curvature and then positioned in the groove between the infants' helix and antihelix, perpendicular to the abnormal third crus. The splint was held in place with 5 to 6 Steri-strips in order to force the cartilage in the appropriate position.<sup>1</sup>

The intended purpose of Stahl's ear splintage was to press out the abnormal fold in the scapha, flattening the convex third crus and converting it to a planar or slightly concave geometry and augmenting the helical rim curvature.



**Figure 1** Left Stahl's ear deformity at day 3 post birth.

Anterior protrusion of the upper ear was corrected by taping the pinna to the mastoid region with surgical tape (Micropore, 3M) so as to reduce the auricular-cephalic angle. An elastic bandage or a headband was strongly recommended for reinforcement.

The splint was applied for the first time in the Neonatal unit or in the clinic as an outpatient procedure with no anesthesia. Parents were asked to leave the splint in place 24 h a day and come back at weekly intervals at which time the splint was removed, the correction achieved was monitored and photographed and the splint curvature was adjusted. The splint was then sanitized and repositioned with fresh Steri-strips. Once the satisfactory correction was achieved, the splint was again applied until the shape remained stable for one more week.

The criteria chosen to assess our results were divided into four categories: not improved, improved, satisfactory, excellent.<sup>2</sup> Almost all the treated ears improved significantly within the first 1 or 2 weeks after application of the splint. Deformity correction was achieved within three to four weeks. No superficial skin necrosis nor allergy to Steri-Strips was detected in this patient series. Follow-up ranged between 1 and 9 months. Results were rated as "excellent" in 87,5% of the treated Stahl's ear deformities. (Figure 1; Figure 2) In the remaining 12,5% of cases results proved "satisfactory".

Stahl's ear and other congenital ear deformities are traditionally corrected surgically, but results are often unpredictable, especially for more complex cases.



**Figure 2** Same ear after three weeks of splinting.

Non-surgical correction of ear deformities, including Stahl's ear, obtained by splinting external ears in the early neonatal period has been advocated as an effective treatment that often produces better results than surgery.<sup>3</sup> Many different types of materials have been used for ear splinting: Reston foam, dental materials, Aluwax, coated wire, thermoplastic materials and a system consisting of Velcro, conformers, and polysiloxane gel. One of the most diffused molding systems in the U.S. is the Ear-Well Infant Ear Correction System.<sup>4</sup>

However, we have found that the possibility to assemble the splint in an easy manner within a short time frame is essential as the earlier the newborn is treated, the better the results.

Parents' collaboration and motivation are extremely important for the success of this treatment. Stahl's ear requires an extremely reduced treatment period in comparison to most other congenital ear deformities. It is very important that neonatal pediatricians, obstetricians and general practitioners are informed about early detection of the deformities.

Our results reported herein demonstrate that the best results are achieved and the shortest period of splintage is needed when treatment is started as soon as possible because, after the first post-partum weeks, as the blood estrogen levels decrease, the infant's ear becomes stiffer and less amenable to being molded.<sup>5</sup>

Based upon our experience we conclude that our proposed method of ear splinting of Stahl's ear deformity is an effective and safe technique for treatment of infants in the early neonatal period. It also prevents later psychological distress by treating the deformity before it is perceived as a problem by the child.

### Ethical approval

N/A

### Declaration of Competing Interest/Funding

The authors do not declare conflict of interest and did not receive any financial support for the study presented in the manuscript.

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Fabrizio Schonauer  
University Federico II Naples, 80131 Napoli, NA, Italy

Giuseppe Pezone  
Plastic Surgery Unit, Università degli Studi di Napoli  
Federico II Scuola di Medicina e Chirurgia, 80131 Napoli,  
NA, Italy

Rosita Pensato  
Plastic Surgery Unit, Università degli Studi della  
Campania Luigi Vanvitelli Scuola di Medicina e Chirurgia,  
80131 Napoli, NA, Italy

Francesco D'Andrea  
Prof, Plastic Surgery Unit, Università degli Studi di Napoli  
Federico II Scuola di Medicina e Chirurgia, 80131 Napoli,  
NA, Italy

E-mail address: [fschona@libero.it](mailto:fschona@libero.it) (F. Schonauer)

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## Nipple reconstruction on mastectomy scar: The “double flap” technique



Dear Sir,

Nipple-areola complex (NAC) reconstruction is the final stage of breast reconstruction and improves patient psychosocial and sexual well-being.<sup>1</sup> The aim of the surgeon is to create a new nipple appropriately located on the breast mound, showing symmetrical projection, size and shape with the contralateral one. Several surgical techniques have been proposed, using local flaps, grafts or a combination of them.<sup>2</sup> Local flaps are the most frequently described and well-vascularized soft tissues of adequate thickness are mandatory to perform them.<sup>3,4</sup>

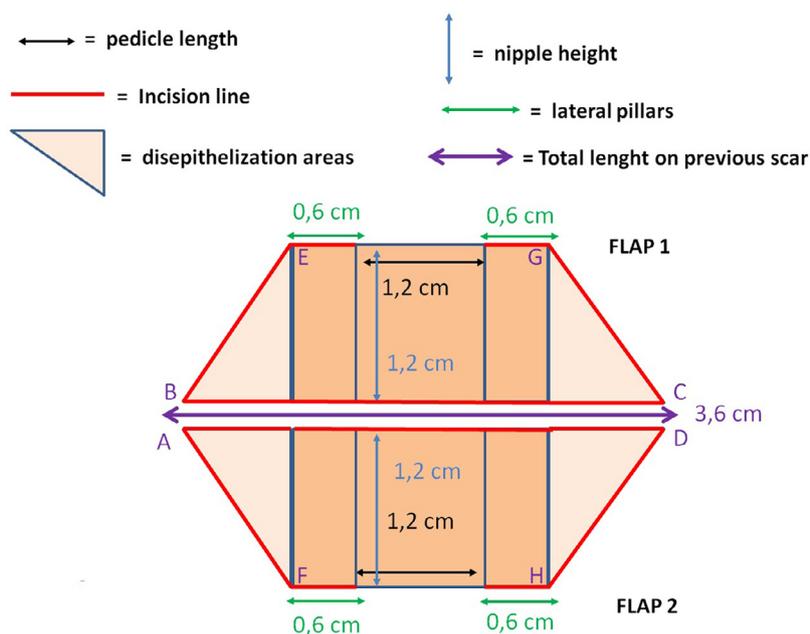
A big challenge is represented by the possibility that the appropriate position of the new nipple is located on the previous mastectomy scar: the pedicle of the flap used for reconstruction should not include this scar and should be placed adequately to ensure a viable vascular supply. To solve this problem and to avoid a shift in nipple position, we propose a new technique based on two opposite flaps and named the “Double flap” technique.

Markings are carried out with patient in a standing position, keeping arms along the body. The drawing consists of two identical and specular trapezoidal flaps placed on scar sides. Each flap is composed by a rectangular central body and two side wings with a rectangular triangle shape. The central body consists in flap pedicle and two lateral pillars which, joining the contralateral ones, forms the external

cylindrical surface of the new nipple, while the lateral wings are de-epithelialized and joined together inside the cylinder to give projection. The central body width and height measure respectively 2.4 cm (pedicle 1.2 cm and each lateral pillars 0.6 cm) and 1.2 cm, although these dimensions can vary according to size and projection of the contralateral nipple. Each triangular side wings measures 0.6 cm length for a total flap length of 3.6 cm (Figure 1).

Under local anesthesia, the technique begins with skin incisions based on preoperative markings. De-epithelialization of the triangular lateral wings is performed, followed by removal of the previous mastectomy scar from area between the two flaps (Figure 1). The two flaps are then elevated on their pedicle bases, placed distal to mastectomy scar: dead space between these flaps is closed with subcutaneous stitches in 4/0 absorbable braided thread (point E with point F and point G with point H). After that, the ends of the de-epithelialized wings are sutured with 4/0 absorbable braided thread positioned clockwise from point A to D. Closure of subcutaneous tissue and skin laterally to the two flaps is carried out along the incision line. Lateral pillars and upper edges of the central bodies of the flaps are stitched together with 5/0 nonabsorbable monofilament thread to shape the new cylindrical nipple (Figure 2). Any dog ears at the end of the procedure can be easily managed lengthening the incision on the previous mastectomy scar.

We performed “Double flap” technique in 10 female patients without unilateral NAC due to skin-sparing mastectomy and breast reconstruction using tissue expander and implant. Nipple reconstruction was performed about 6 months after implant placement and the appropriate position of the new nipple was located on the previous mastectomy scar. No significant postoperative complications



**Figure 1** Preoperative markings: two specular trapezoidal flaps placed on scar sides. In each flap the central body is composed by flap pedicle and two lateral pillars. Triangular lateral wings are de-epithelialized and the previous mastectomy scar is removed. Red line indicates where skin is incised: flaps are elevated on their pedicle bases.



**Figure 2** Final result: lateral pillars are stitched together followed by suture of the upper edges to create new nipple.

were reported, including nipple necrosis, wound dehiscence, hematoma and infection. After 6 months follow-up the mean percentage loss of nipple projection measured with a caliper was about 30%, however the largest number of patients was satisfied.<sup>5</sup> Reconstruction of the areola was carried out through tattoo between 4 and 6 months after nipple reconstruction.

Waiting to describe a more extensive experience, we believe that when the appropriate position of the new nipple is located on the previous mastectomy scar, “Double Flap” technique could be a reliable and useful option for nipple reconstruction.

### Declaration of Competing Interest

None.

### Funding

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Giuseppe Nisi, Diletta Maria Pierazzi, Edoardo Pica Alfieri, Roberto Cuomo, Irene Zerini, Luca Grimaldi  
 Division of Plastic and Reconstructive Surgery,  
 Department of Medicine, Surgery and Neuroscience, “Santa Maria alle Scotte” Hospital, University of Siena, Viale  
 Bracci 16, 53100 Siena, Italy

E-mail address: [edoardo.picaalfieri@gmail.com](mailto:edoardo.picaalfieri@gmail.com) (E. Pica Alfieri)

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## USE of 3D printing and virtual 3D imaging to aid mandibular reconstruction; A low cost, easy and reproducible methodology at our centre



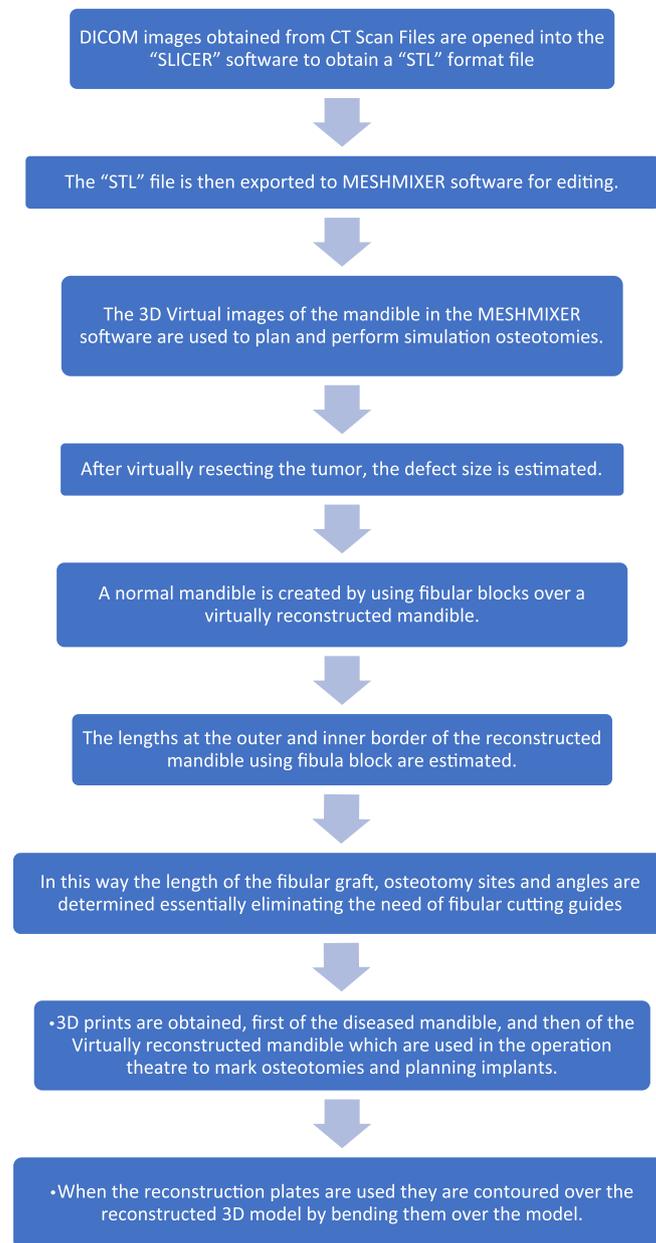
Dear Sir,

We know that Free Fibula Flap is now regarded as the gold standard for reconstruction following mandibular resection for oncological conditions.<sup>1,2</sup> However, the results are often confounded due to inappropriate estimation of the defect and/or angulation of osteotomy. When we talk about problems of traditional methods of reconstruction we observe that it requires surgeons experience as a guide to accurate planning of the fibular graft. This is difficult to control and often the surgeons are met with dissatisfying results.

3D printing and virtual planning has changed the course of managing mandibular defects in the last few years. This technique has given improved results in terms of reduced operating time and good aesthetic results.<sup>3</sup> Many authors have given a detailed methodology on going through this technique. Although, this technique has now been in the field for many years, it is observed that not many surgeons are using this consistently in their practice. This is partly due to the added costs and a complicated looking methodology requiring a good cooperation between the radiologist, a team of engineers preparing 3-D model printing as well as the surgeons.<sup>4</sup>

We believe that there needed to be an easy, reproducible as well as cheap technique to employ these techniques to the developing countries. Our study essentially aims to make this process easier as well as fast using freely available software thereby making this technique universal in all mandibular reconstructions. We designed a prospective study at the Department of Plastic Surgery, SMS Hospital, Jaipur between 2016 and 2020 in which 40 patients were randomly categorised in two groups, one of which underwent Conventional Free Fibula Flap and the other group consisted of those where 3D Printing and virtual planning was used. [Figure 1](#) describes the methodology in virtual planning and 3D printing.

To evaluate the efficacy of this technique the mean reconstruction time (defined as the time taken from incision for Fibula Harvest to completion of anastomosis) was calcu-

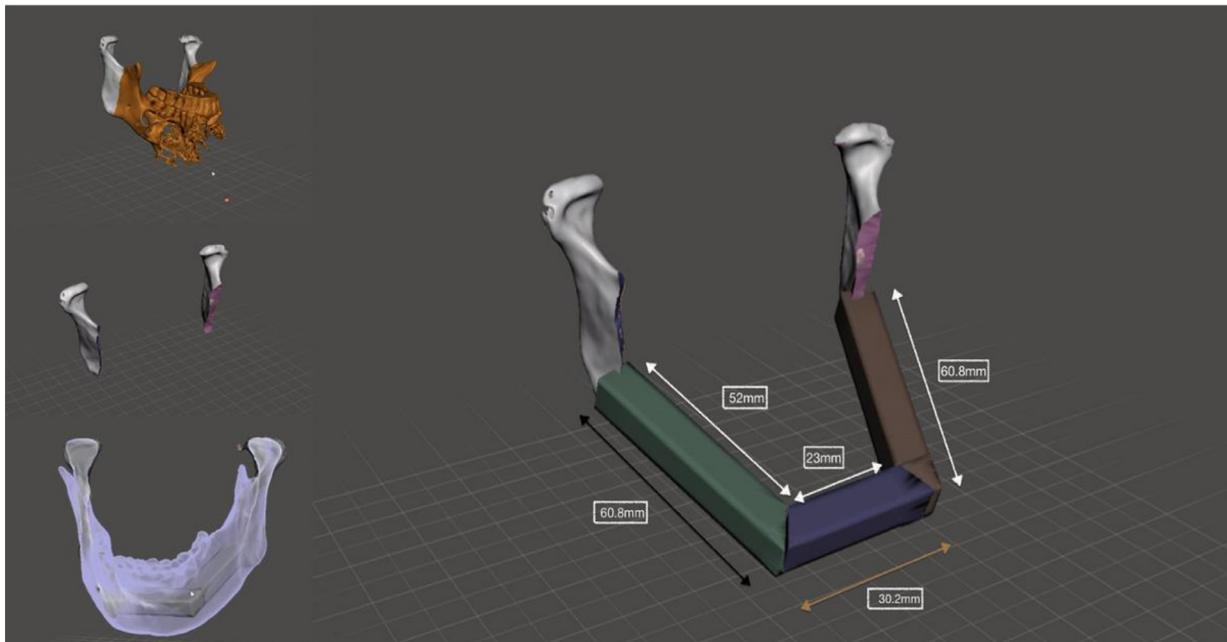


**Figure 1** Flowchart depicting the methodology.

lated which was 83.9 min in the control group and 124 min in the cases group. On applying the Paired T test this was found to be significant difference with a  $p$  value of less than 0.001. Aesthetic outcome was measured by pre and post-operative CT Scans taken at a 3 month follow up measuring the bony landmarks, distance and angle. Bony points used for measuring symmetry were: bilateral condyle, bilateral gonion, gnathion. The difference in mean in gonial angle was found to be 2.85 in the cases group and 4.9 in the conventional group. Similarly, mean difference in Intercondylar distance was found to be 3.05 and 6.12 in the case and control group respectively. The mean difference in AP distance was found to be 4.2 and 7.4 in the case and control groups. These parameters were found to be significantly better in the cases group. In accordance with more costly published

data, our results show that the mean differences between the preoperative and postoperative intercondylar distances, anteroposterior distances, and gonial angles were significantly smaller in the computer-assisted group compared with conventional group.

In a hospital like ours serving to the patients of lower socioeconomic strata, we observed that there needed to be a simplification of this process. Therefore, we devised a simpler, cheaper and a reproducible method which requires lesser number of personnel. The entire process of virtual planning can be performed by the surgeon or a working resident. Initially it took 4-5 h for a beginner to learn about these software, but within a matter of a couple of cases the entire planning could be finished in about 2 h. The use of software is easy and once learnt it can be used in ev-



**Figure 2** Steps of virtual surgery.

ery mandibular reconstruction. 3D prints are readily available nowadays and there are a lot of videos over the web demonstrating on how to make one at home. The overall cost for the entire process was not more than 30£ as only mandible prints were obtained omitting the use of fibular cutting guides. This is a significantly lower price compared to the what the published data state which can run up to thousands of pounds.<sup>5</sup> We could overcome the two main challenges in this technique, namely cost and learning curve.

3D printing and virtual 3D Imaging helps to improve the quality of mandibular reconstruction giving a better aesthetic outcome. It obviates the need of speculation and gives exact measurements in all dimensions. Besides, it also reduces the operative time and gives us a chance to use pre bent implants used for reconstruction. Our methodology is simple, cost effective and fast therefore we believe that this tool should be incorporated often in Free Fibula Flaps for mandibular reconstruction in developing countries like ours. [Figure 2](#)

### Ethical approval

N/A

### Declaration of Competing Interest

None.

### Funding

None.

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Samarth Gupta, Pradeep Goil  
Department of Plastic Surgery, SMS Hospital Jaipur,  
Jaipur, India

E-mail address: [guptasamarth@hotmail.com](mailto:guptasamarth@hotmail.com) (S. Gupta)

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## Reconstructive perineal surgery in the era of robotic surgical systems: Embracing the new technology<sup>☆</sup>



Dear Sir,

The innovation of robotic surgery has transformed many specialties across the surgical field. Plastic surgeons work jointly with various disciplines to provide reconstructive services. Hence, it is important to embrace this novel technology and be familiar with it. Robotic surgical systems add a new prospective to surgery in limited operative space.

We have adopted this new technology to augment flap inset in perineal reconstruction utilizing the pudendal thigh fasciocutaneous (Singapore) flap. This is the first report of using robotic assisted Singapore flap inset in this setting to the best of our knowledge.

Two patients suffered carcinoma of the bladder neck which was managed with robotic partial cystectomy, urethrectomy and anterior vaginal resection utilising the Da Vinci Robot (Intuitive Surgical™, Sunnyvale, CA). Both patients underwent continent urinary diversion. The first one underwent Mitrofanoff procedure (appendicovesicostomy) while the second patient underwent Monti-Yag procedure (ileovesicostomy) as the tip of the appendix was not viable. No bladder augmentation or hysterectomy was performed. The resultant defect (Figure 1) was reconstructed with a unilateral Singapore flap (Figure 2) in each of the cases. The flap was raised in a standard approach, de-epithelialized and tunnelled through to the defect. The inset of flap was then carried out utilising the Da Vinci Robot allowing the surgeon to obtain access to the proximal vagina in the retroperitoneum and close the deep layers. By performing this technique, we ensured accurate placement of sutures which would otherwise require approach from the abdomen or tedious approach from the perineum. It also ensured that a complete closure of the proximal vaginal defect was carried out through direct visualization via the access in the retroperitoneum. We note that this technique of flap inset did not add to the total operative time. At follow up both patients did not suffer significant flap or vaginal complications.

Since the first published report of the clinical use of robotic systems in 1985, many specialties have started a race to implement its use in various surgical procedures.<sup>1</sup> Its use of in reconstructive surgery is still primitive. However, it is on the rise. It has been used to facilitate flap harvest, micro-anastomosis, flap inset transoral and nerve surgery.

The advantage of minimal access surgery utilizing the robots is well documented in the literature. In muscle flap harvest, it provides minimal external scar, least possible tissue damage, ability to navigate comfortably in a small op-



Figure 1 Picture showing the size of the defect from the perineum.



Figure 2 Picture showing a Singapore flap raised on a single perforator.

erative space and early recovery. Pedersen et al reported using robotic systems in harvesting rectus abdominis muscle flap for perineal reconstruction with preservation of the anterior rectus sheath which in turn reduces donor site comorbidities associated with this procedure.<sup>2</sup> Similar reports of harvesting the latissimus dorsi muscle flap have been published using the same principles.<sup>3</sup>

Potential areas for future development include microsurgical anastomosis. This is due to the impact of the robotic systems on motion scaling and elimination of tremor.<sup>4</sup>

However, teething problems are expected in all innovative devices. To solve these problems, we need to adapt and make full use of this new technology. Potential issues

<sup>☆</sup> This paper has been accepted as a poster presentation at the Abdominal Wall Reconstruction Europe (AWR) conference. London 2020.

include an increase in operative time due to early learning curve. This can be alleviated by training, higher volume of cases and improved experience. Also, the costs incurred from buying the robotic system and its maintenance. In addition, lack of costumed instruments designed for specific reconstructive procedures. It maybe that there is a need to modify our surgical approach to make full use of the capabilities of the robot.<sup>5</sup>

This report highlights our experience using robotic assisted techniques to augment flap inset in a narrow operative field. Robotic surgery is feasible with a relatively short learning curve and can be used efficiently in areas of limited access. This technique is now routinely used in our unit for cases undergoing robotic assisted surgery in conjunction with the urology team. It allows good access and relative ease of suturing in what was previously a difficult and slow procedure.

## Funding

None

## Ethical approval

Not required

## Declaration of Competing Interest

None declared

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A. Sleiwah, M. Mughal  
Department of Plastic Surgery, Guy's and St Thomas' NHS  
Foundation Trust. London. UK

R. Thurairaja, M. Khan  
Department of Urology, Guy's and St Thomas' NHS  
Foundation Trust, London, UK

P. Roblin  
Department of Plastic Surgery, Guy's and St Thomas' NHS  
Foundation Trust. London. UK

E-mail address: aseel.sleiwah@doctors.org.uk (A. Sleiwah)

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## UK national survey on facial palsy services



Dear Sir,

The benefits of multidisciplinary are well accepted in various medical and surgical specialties. Facial palsy has a range of functional and psychological effects and requires the input from multiple specialties.<sup>1</sup> The multidisciplinary team (MDT) is an important asset in the management of facial palsy as it allows for these patients to be identified early and promptly referred to optimise patient-centred care. A study was undertaken to ascertain the composition of the MDTs and the services available on site, for each unit in the UK, which provides this service.

In August 2018, a prospectively populated database was developed using a questionnaire covering the use and structure of MDT for facial palsy, patient cohort, range of static and dynamic procedures offered, and the use of supportive therapies. An electronic survey was produced on Google Forms to collect, analyse and broadly categorise responses into adult, children or both (Figure 1). In situations where discrepancies arose from responses received from multiple consultants within the same unit, direct email correspondence was made with the unit for further clarification.

Responses were received from 15 out of 19 centres (78.9%). Facial palsy treatment was provided to adults only in four centres, children only in two centres and both adults and children in nine centres. 13 centres conducted regular MDT meetings. Facial palsy speciality MDT meetings were regularly attended by representatives from plastic surgery (93.3%), otolaryngology (ENT) (46.7%), oral maxillofacial surgery (OMFS) (13.3%) and ophthalmology (26.7%). Facial palsy nurse specialists were only available in 3 centres (20.0%).

Static procedures performed include gold weights (93.3%), platinum weight (73.3%), static slings (93.3%). Botox<sup>TM</sup> injections are performed in all centres.

Free tissue transfers and cross-facial nerve graft (CFNG) are the commonest procedures performed by all centres (86.7% and 93.3% respectively). Muscle transfers that are commonly performed include temporalis myoplasty (Labbe procedure) (11 centres, 73.3%), temporalis myoplasty with graft (McLaughlin) (six centres, 40.0%) and anterior belly of digastric transfer (six centres, 40.0%). Ipsilateral nerve transfers after performed in 12 centres (80.0%).

Nerve stimulation and electromyographic (EMG) biofeedback is offered in four centres (26.7%) and three centres (20.0%) respectively. Eight units (53.3%) hold patient support groups. (Table 1)

### Facial Reanimation MDTs in the UK

There is huge variability regarding the provision of facial reanimating services in the UK.

We are interested in ascertaining the composition of the MDTs and the services available on site, for each unit in the UK, which provides this service.

#### \* Required

1. Which unit are you based? \*
2. Who do you provide a facial reanimating service for? \* (Adults/ Children/ Both)
3. Do you have regular facial palsy MDTs? \* (Yes/ No)
4. If YES, how frequent (weeks)?
5. Which members make up the MDT? \* (Plastic Surgery/ Ophthalmology/ ENT/ Maxillofacial surgery/ Neurosurgery/ Neurology/ Neurophysiology/ Nurse specialist/ Speech and language/ Physiotherapy/ Psychology/ Medical photography/ Other)
  - If other, please specify
6. Which members are ALWAYS PRESENT at the MDT? \* (Plastic Surgery/ Ophthalmology/ ENT/ Maxillofacial surgery/ Neurosurgery/ Neurology/ Neurophysiology/ Nurse specialist/ Speech and language/ Physiotherapy/ Psychology/ Medical photography/ Other)
  - If other, please specify
7. Which members are not routinely present at the MDT but are available ON REQUEST? \* (Plastic Surgery/ Ophthalmology/ ENT/ Maxillofacial surgery/ Neurosurgery/ Neurology/ Neurophysiology/ Nurse specialist/ Speech and language/ Physiotherapy/ Psychology/ Medical photography/ Other)
  - If other, please specify
8. Which of the following STATIC procedures are performed in your unit? \* (Gold weight/ Platinum weight/ Static sling/ Botox therapy)
  - If other, please specify
9. Who performs Gold/Platinum weight insertion? \* (Plastic surgery/ Ophthalmology/ ENT/ Maxillofacial surgery/ Neurosurgery/ Other)
  - If performed as a combined procedure please indicate which specialties are involved
10. Who performs static sling procedures? \* (Plastic surgery/ Ophthalmology/ ENT/ Maxillofacial surgery/ Neurosurgery/ Other)
  - If performed as a combined procedure please indicate which specialties are involved
11. Who performs Botox injections in your unit? \* (Plastic surgery/ Ophthalmology/ ENT/ Maxillofacial surgery/ Neurosurgery/ Other)
  - If performed as a combined procedure please indicate which specialties are involved
12. Which of the following DYNAMIC procedures are performed in your unit? \* (Free tissue transfer/ Temporalis myoplasty (Labbe)/ Temporalis myoplasty plus graft (McLaughlin)/ Cross facial nerve graft/ Masseteric to facial nerve transfer/ Hypoglossal to facial nerve transfer/ Digastric transfer)
  - If other, please specify
13. Who performs free tissue transfer in your unit? \* (Plastic surgery/ ENT/ Maxillofacial surgery/ Neurosurgery/ Other)
  - If performed as a combined procedure please indicate which specialties are involved
14. Who performs temporalis myoplasty (Labbe) in your unit? \* (Plastic surgery/ ENT/ Maxillofacial surgery/ Neurosurgery/ Other)
  - If performed as a combined procedure please indicate which specialties are involved
15. Who performs temporalis myoplasty plus graft (McLaughlin) in your unit? \* (Plastic surgery/ ENT/ Maxillofacial surgery/ Neurosurgery/ Other)
  - If performed as a combined procedure please indicate which specialties are involved
16. Who performs cross facial nerve grafts in your unit? \* (Plastic surgery/ ENT/ Maxillofacial surgery/ Neurosurgery/ Other)
  - If performed as a combined procedure please indicate which specialties are involved
17. Who performs ipsilateral nerve transfers in your unit? \* (Plastic surgery/ ENT/ Maxillofacial surgery/ Neurosurgery/ Other)
  - If performed as a combined procedure please indicate which specialties are involved
18. Who performs digastric transfers in your unit? \* (Plastic surgery/ ENT/ Maxillofacial surgery/ Neurosurgery/ Other)
  - If performed as a combined procedure please indicate which specialties are involved
19. Does your unit offer any of the following? (Nerve stimulation/ EMG biofeedback/ Support groups)
20. Does your unit hold patient support groups? (Yes/ No)

**Figure 1** Survey contents and response options. (Blue = Response options).

**Table 1** Summary of survey findings (RD&EH=Royal Devon & Exeter Hospital, BCH=Birmingham Children's Hospital, AHCH=Alder Hey Children's Hospital, G&StT=Guys and St Thomas London, RNTNEH=The Royal National Throat, Nose & Ear Hospital London, Y=Yes, N=No, GW=Gold weights, PW=Platinum weights, SS=Static slings, B=Botox™ therapy, FTT=Free tissue transfer, L=Labbe procedure, McL=McLaughlin procedure, CFNG=Cross-facial nerve graft, V-VII=Masseteric to facial nerve transfer, XII-VII=Hypoglossal to facial nerve transfer, D=Digastric transfer, NS=Nerve stimulation, EMG=EMG biofeedback, SG=Support groups).

Unit	Service type	Regular MDTs?	MDT frequency	Static procedures				Dynamic procedures							Other		
				GW	PW	SS	B	FTT	L	McL	CFNG	V-VII	XII-VII	D	NS	EMG	SG
Aberdeen	Adults	Yes	2 weekly	Y	Y	Y	Y	N	N	N	N	N	N	N	N	N	Y
AHCH	Children	Yes	Every 2 weeks; Moebius clinics 4 times a year	N	N	N	Y	Y	Y	N	Y	Y	N	Y	Y	N	Y
BCH	Children	Yes	Every 6 weeks	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N
Birmingham	Both	Yes	2 weekly	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	N	N
Edinburgh	Both	No	N/A	Y	Y	Y	Y	Y	N	N	Y	Y	N	N	N	N	Y
G&StT London	Both	Yes	Weekly except 2nd week of the month	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	N	Y
Glasgow	Both	Yes	Weekly	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	Y
Hull	Adults	Yes	12 weekly	Y	N	Y	Y	Y	Y	N	Y	N	N	N	N	N	N
Manchester	Both	Yes	Skull base - monthly; non-skull base - 2 monthly; paediatric - 3-4 monthly	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N	Y	Y	N
Newcastle	Both	Yes	2 weekly	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y
Norwich	Both	Yes	Monthly	Y	Y	Y	Y	Y	Y	N	Y	Y	N	Y	N	N	Y
Oxford	Both	Yes	-	Y	Y	Y	Y	Y	Y	N	Y	Y	N	Y	N	N	N
RD&EH	Adults	Yes	Weekly	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y	N	N	Y
RNTNEH London	Adults	Yes	4 weekly	Y	Y	Y	Y	N	Y	Y	Y	N	Y	N	Y	Y	Y
South Wales	Both	No	N/A	Y	N	Y	Y	Y	N	Y	Y	N	N	Y	N	N	N

The MDT approach is now well-established in management of common medical conditions. A multidisciplinary team set up allows patients to access the full complement of care but also serves to reduce the waiting time for referrals between specialists. This can have significant impact on the resulting functional outcomes of the patient through the development of comprehensive management plans for the patient. Studies have shown improved short and long term<sup>2</sup> outcomes as well as patient satisfaction<sup>3</sup> of patients treated in an MDT setting for various conditions. However, objective evidence pertaining this in facial palsy is still lacking.

Clinical nurse specialists (CNS) have become an integral member of many cancer and non-cancer multidisciplinary teams. CNS roles have initially developed around the need for streamlined navigation through the complex, lengthy and disjointed pathways in treatment of cancers. These roles were initially funded and developed by Macmillan cancer charity, which in 2014, has funded 3500 nursing posts in the UK.<sup>4</sup> This is coupled with the need for delivery of holistic care and good communication in an empathetic manner to patients. This survey has shown that not every patient with facial palsy treated within the MDTs has access to a CNS, which highlights a potential room for improvement in the structure of MDTs for facial palsy.

An essential part of facial palsy therapy includes patient education, pre-operative optimisation, post-operative rehabilitation and non-surgical care that is largely provided by a robust physiotherapy and SLT team. In this survey, only seven MDTs are regularly attended by physiotherapy, and four MDTs by SLT.

Apart from functional and aesthetic problems, facial palsy patients often experience significant psychosocial problems. Patient support groups have the potential to alleviate this impact by allowing patient to interact with other patients with similar issues in order to come up with day-to-day coping mechanisms. Being part of these groups also relieves the social isolation and provides opportunities for them to become more educated about available surgical and non-surgical therapies. Facial Palsy UK coordinates patient support groups in approximately a dozen centres in the UK.<sup>5</sup>

The current facial palsy MDT core team in the UK according to our survey comprises of Plastic Surgeons, ENT surgeons, physiotherapists and SLT as regular members. When required, additional support should be provided by OMFS, neurosurgery, ophthalmology, medical photography and neurophysiology. The survey shows that there is a variability of specialties within facial palsy MDTs in the UK. MDTs should be the standard of care in tertiary centres providing facial palsy care.

### Funding

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### Ethical approval

Not required

### Declaration of Competing Interest

None declared

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Christopher David Jones

*Department of Plastic Surgery, Aberdeen Royal Infirmary, Foresterhill Health Campus, Foresterhill Rd, Aberdeen AB25 2ZN, United Kingdom*

Weiguang Ho

*Department of Plastic Surgery, Norfolk and Norwich University Hospital, Colney Lane, NR4 7UY Norwich*

Charles Nduka

*Department of Plastic and Reconstructive Surgery, Queen Victoria Hospital, East Grinstead RH19 3DZ, United Kingdom*

*E-mail address: [ho.weiguang@gmail.com](mailto:ho.weiguang@gmail.com) (W. Ho)*

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## Discussion: The impact of context on the planning and delivery of overseas surgical collaborations.

### Re: The governance of overseas surgical collaborations - BFIRST/BSSH



Dear Sir,

The authors outline the principles upheld by a multidisciplinary faculty of BFRIST/BSSH colleagues concerning governance of collaborations involving practitioners of high-income countries (HIC) in low to middle income countries (LMIC).

The comments below support the consensus reached in this article. In addition, points are raised concerning how the context influences every decision and action.

### **Collaborations with the local units**

The article powerfully makes an important point: visiting team are only visitors. Both invitation and a preliminary visit the LMIC unit is ideal. Together, clinicians can decide what is desirable and what is possible and agree realistic goals. A plan can be then formulated and logistics/funding evaluated before clinical work commences. From the outset, funding and sustainability must be discussed to avoid broken promises that can tarnish a collaboration. This will be even more crucial going forwards as funding will get even tighter after Covid-19.

A further collaboration must be discussed: that between HIC NGOs already present in the field and new arrivals. We should plan together to prevent duplication of activities. This has two advantages: not all components of the project need to start from the base up and each NGO can work to their strengths improving overall patient care. Historic presence does not always translate to best clinical care. We must be open to evolve, share resources and collaborate.

### **Practice safe surgery**

The context the team find themselves in is just as important as “the skill set” they bring. The ability to undertake a procedure may not be enough to ensure patient safety. A procedure should not be attempted until the patient, and the team, are set up for success.

This can get forgotten for two reasons: the enthusiasm to help and time pressure to deliver care in a short mission. The most frequent complications I see from HIC surgeons fall into three groups: a) Misjudgement of the context b) no follow-up c) performing an operation unfamiliar to the surgeon in their daily work back home. Complications a + b do not necessarily relate to the surgeon’s degree of skill in the HIC. They have indeed only preformed surgeries they would do commonly at home but without considering context and follow-up.

The mission has a finite duration so timing is crucial. To ensure patient safety I would advocate the following time considerations: 1) Screen all your patients and plan the lists early 2) Plan to do complex cases first, straightforward cases middle, easy day-cases last. 3) Time each list meticulously: list only as many patients as you can do in the time available 4) Do the first dressings change yourself: any complications are evident early can be dealt with for before you leave. Finally, as the authors point out, it’s quality, not quantity. The easiest way to avoid the temptation of planning too many cases or last minute additions is to know you will return and when.

### **Logistics planning**

Equipment brought must be maintained and used by local surgeons between visits. It is well worth investing in the training and support of the sterilisation service.

To avoid blocking routine local hospital flow, consider utilising structures that are not public hospitals or working during local “down-time” (weekend and evenings). Rented private hospital facilities/Military tents/container hospitals are all possible alternatives to main theatres in public hospitals. Local colleagues can still attend in rotation for teaching. This allows one to one surgical training rather than crowd attendance with few benefitting.

### **Communication with the your patients**

Obtaining informed consent and shared decision making may be very different in a LMIC and HIC. The visiting surgeon may find themselves surprised by the lack of disclosure but equally both patients and local clinicians may show surprise and concern at the degree of disclosure we share with our patients. Ultimately, and globally, patients appreciate knowing the truth concerning risk, a reasoned explanation and a two-way discussion. However, the visiting clinician may have to gently teach this process. An excellent translator with good patient communication skills is the key. Equally the clinician needs some knowledge of cultural concerns: Cosmesis, or retaining limbs, may hold more importance than gaining function. These issues come to light through discussion and can only be reasoned with the help of a great translator.

### **Clinical colleagues**

By training we can bring on the next generation of global surgeons. This is a two way process. Our colleagues can educate us concerning the context. With flexibility and innovation we can adapt together in order to overcome logistic issues without compromising patient care. Trust comes if teams deliver quality work and return regularly. That’s when the real collaboration evolves. With time, our colleagues become the teachers of that region and then, for sure, it’s time for us to leave.

### **Governance and the right people to deliver it**

Which HIC surgeons should go to LMIC to support and train? HIC Surgeons with the correct skills for the job, and the desire to do global work, require recognition and support from Institutions that govern surgical practice within HIC. A HIC consultant surgeon doing global work intermittently (and for short periods only) is not a guarantee of quality, or in fact ability, to do this work. Those who judge who does this work effectively must also have experience. To achieve follow-up and continuity of care in LIC, HIC surgeons need to be able to factor leave within their working year. This needs careful planning and support.

HIC could argue why should they support their specialist surgeons in this work? I would suggest we live in troubled times. Specialist surgeons who have experience in war-zone work, addressing complex wounds or have performed specialist surgery in austere environments are of value to any HIC. The trauma, or “war” surgeon, helps on the front

line. The specialist surgeon follows on with the timely second wave intervention restoring function and form. Better to have few surgeons with these skills nationally at anyone time than try and train them last minute should the need arise.

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Yvette Godwin

*Freelance Plastic Reconstructive surgeon*

*E-mail address: [ygodwin@hotmail.com](mailto:ygodwin@hotmail.com) (Y. Godwin)*

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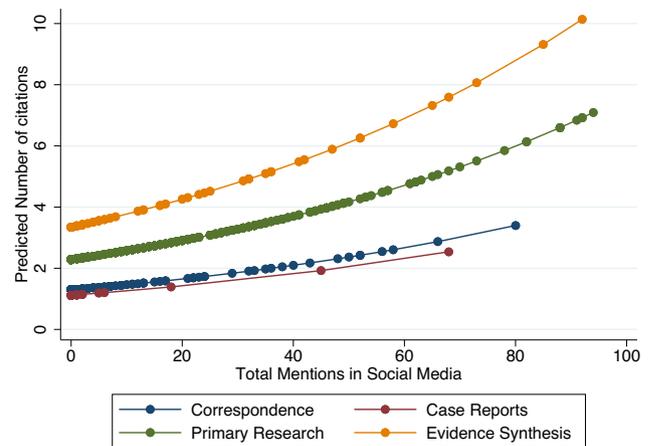
# The role of social media in disseminating plastic surgery research: The relationship between citations, altmetrics and article characteristics



Dear Sir,

Social media (SoMe) offer a powerful alternative to the traditional routes of research distribution. SoMe platforms enable both publishers and authors to disseminate content directly to a global audience of interested end-users. Alternative metrics (altmetrics) are non-traditional bibliometrics that quantify activity across numerous online platforms and offer complementary information about the exposure and impact of an article beyond citations. Altmetrics are increasingly valued by academics, institutions and journals<sup>1</sup> because they represent both short and long-term attention for an article.

Prominent plastic surgery journals were selected for this cross-sectional study, including: *Plastic and Reconstructive Surgery* (PRS), the *Journal of Plastic, Reconstructive and Aesthetic Surgery* (JPRAS), *Annals of Plastics Surgery* (APS) and *Plastic Surgery* (PS). The digital object identifier (DOI) of every article published during 2018 was input to the Altmetric Explorer ([www.altmetric.com](http://www.altmetric.com)) and altmetrics were extracted. Altmetric Explorer uses real-time text mining to identify mentions of scholarly content (books,



**Figure 1** The relationship between the total number of mentions on social media platforms (e.g. Tweets, Facebook posts, blogs, subreddits, YouTube content, etc.) and the number of times different types of articles were cited.

journal articles, presentations, theses, etc.) based on the inclusion of DOIs or URLs in Twitter, Facebook, Policy documents, mainstream media reports, over 15,000 blogs, YouTube, Mendeley, CiteULike, PubPeer, Publons, Reddit, Google+, patents, Wikipedia, F1000 and more. The Altmetric score is derived from an automated algorithm and represents a weighted count of the amount of attention an article received. Count data were widely dispersed so negative binomial regression was used to estimate the relationship between citation counts and predictors, which is presented as incident rate-ratios (IRR) with 95% confidence intervals (CI). An IRR > 1 equates to relatively more citations. For more detailed methodology, visit <https://medrxiv.org/cgi/content/short/2020.08.26.20182337v1>.

Overall, 1215 articles were captured during 2018 from four journals including: PRS ( $n=565$ ), JPRAS ( $n=358$ ), APS ( $n=258$ ) and PS ( $n=34$ ). These articles were cited 3269 times; 2149 citations (66%) were of articles published in PRS, 725 (22%) in JPRAS, 365 (11%) in APS and 30 (1%) in PS. PRS, JPRAS and APS had active Twitter accounts with 15,900, 1742 and 143 followers, respectively. The same three journals had Facebook accounts with 29,862, 711 and 270 likes respectively. PRS used two other SoMe platforms and JPRAS used one other platform.

Multivariable analysis (Table 1) showed that the use of SoMe to disseminate research was independently associated with significantly more citations, as compared to articles which were not promoted on SoMe; marginal analysis showed that for (approximately) every 45 mentions in social media, one extra citation was observed. As expected, evidence synthesis articles (systematic reviews with or without meta-analysis) were cited approximately three-times as often as correspondence or case reports and more often than any other type of article (Figure 1). The journal in which articles were published was strongly related to citations as on average, articles published in PRS had at least one more citation (median difference 1 [IQR 1, 1],  $p < 0.001$ ) and an Altmetric score which was 3-points higher (median difference 3 [IQR CI 2, 5],  $p < 0.001$ ) than articles published elsewhere.

**Table 1** The relationship between citations, article characteristics and social media attention.

Factors associated with the number of citations		Univariable IRR		Multivariable IRR	
		IRR (95% CI)	p-value	IRR (95% CI)	p-value
Journal	PRS	4.33 (2.48, 7.54)	<0.001	4.77 (2.36, 9.62)	<0.001
	JPRAS	2.03 (1.30, 4.06)		3.04 (2.47, 6.38)	
	APS	1.60 (0.91, 2.83)		2.25 (1.08, 4.71)	
	PS	Reference		Reference	
Type of article	Correspondence	Reference	<0.001	Reference	<0.001
	Case report	0.70 (0.44, 1.12)		1.06 (0.72, 1.57)	
	Primary research	1.64 (1.23, 2.21)		1.77 (1.43, 2.19)	
	Evidence Synthesis	2.54 (1.79, 3.62)		2.92 (2.18, 3.91)	
Open access		0.64 (0.43, 0.95)	0.027	0.82 (0.55, 1.21)	0.315
Total social media mentions		1.01 (1.01, 1.02)	0.009	1.01 (1.01, 1.1)	<0.001
Altmetric score (weighted)		1.00 (1.00, 1.01)	<0.001	*	*
Type of people mentioning articles	Scientific Community	1.37 (1.17, 1.62)	<0.001	*	*
	Researchers	1.30 (1.25, 1.35)	<0.001	*	*
	Medical Professionals	1.08 (1.07, 1.10)	<0.001	*	*
	Public	1.06 (1.04, 1.05)	<0.001	*	*
Platforms on which articles were mentioned	Policy makers	4.70 (2.22, 9.96)	<0.001	*	*
	F1000	3.37 (3.06, 3.69)	<0.001	*	*
	Bloggers	2.31 (1.59, 3.35)	<0.001	*	*
	Google+	1.42 (1.16, 1.73)	<0.001	*	*
	Facebook	1.30 (1.20, 1.42)	<0.001	*	*
	Wikipedia	1.26 (1.18, 1.35)	<0.001	*	*
	Videos	1.28 (0.70, 2.38)	0.426	*	*
	Patents	1.19 (1.18, 1.19)	<0.001	*	*
	Tabloid Media	1.03 (1.01, 1.05)	0.001	*	*
	Twitter	1.01 (1.01, 1.02)	<0.001	*	*
Mendeley	1.06 (1.04, 1.08)	<0.001	*	*	

\* Excluded because they are a component of the Altmetric score and thus collinear  
IRR = incidence rate ratio. An IRR above 1 means relatively more citations

This study adds to the literature concerning the interplay of SoMe and journals' Impact Factor but re-opens the debate<sup>2,3</sup> of 'who came first?' - do people follow and subscribe to journals on SoMe platforms because their articles are regularly cited, or are articles cited more often because they are more widely distributed on SoMe<sup>4</sup>? The direction and magnitude of the relationship between social impact and traditional metrics (citations) is difficult to elucidate. Several speciality journals have shown a strong association between altmetrics and their respective Impact Factors<sup>2,4</sup>. Further, the Impact Factor of journals with a Twitter profile have consistently exhibited better growth compared to journals without Twitter accounts<sup>2,3</sup>. Ultimately, given that Impact Factor is a function of citations over time, and our work shows that SoMe activity increases citation rates, we concur with the wider scientific community that SoMe are a powerful force in the shaping author-, article- and journal-level metrics in plastic surgery.

Over the last decade, numerous articles have shown that Tweets are a significant predictor of citations in medical journals<sup>1,5</sup>. Additionally, authors who promote their own research on SoMe receive more citations than those who do not<sup>1</sup>. Tweets have a half-life and (what will be the) top-cited articles of the future can be predicted from the first 3-days of Twitter activity with 93% specificity and 75% sensitivity<sup>5</sup>. Academics should note that citations increase by 1%

per 1.09% increase in Twitter followers, and Editors should note that increasing a journal's Twitter following by 1.46% increases its Impact Factor by 1%. Regardless of the impact on citation rates, SoMe is a powerful tool for discourse and dissemination which reaches beyond a journal's readership.

We present convincing evidence that social media play an important role in disseminating plastic surgery research and that plastic surgeons (and especially academic clinicians) and publishers should engage with social media to both maximise the impact of their research, and to filter out emergent, relevant articles from the ever-growing body of evidence.

## Declaration of Competing Interest

There are no conflicts of interest.

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**Ethical review**

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Michael C Grant, Kai R Scott-Bridge  
University of Sheffield, Beech Hill Road, Broomhall,  
Sheffield S10 2RX, United Kingdom

Ryckie G Wade  
Department of Plastic and Reconstructive Surgery, Leeds  
General Infirmary, Leeds, United Kingdom  
Faculty of Medicine and Health, Worsley Building,  
University of Leeds, Leeds, United Kingdom  
E-mail address: [ryckiewade@gmail.com](mailto:ryckiewade@gmail.com) (R.G. Wade)

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## Plastic surgery and social media in the public health sector



Dear Sir,

Plastic and reconstructive surgery as a speciality generates a great degree of public interest. The advancements in internet connectivity and mobile devices have seen the increased use of social media by surgeons and patients.<sup>1</sup> It

has become a major way of information propagation and consumption. Traditionally, social media has raised concerns amongst medical professionals regarding ethics and verity.

Social media's effectiveness relies on establishing a community engagement (i.e. views and follows) which is measurable. There are a number of digital platforms available and one must be careful, as healthcare professionals, to engage responsibly and appropriately. At present it seems popular social media platforms sensationalise cosmetic practice,<sup>1,2</sup> and whilst they may go about increasing education and safety in aesthetic practice,<sup>2</sup> this bias greatly skews society's perception of plastic and reconstructive surgery, and does not accurately represent plastic surgery as a public health service.

Rather than attacking social media profiles who focus on aesthetic practice, we believe that engaging in social media as a public sector plastic surgery department in the NHS will educate and provide insight for both patients and colleagues, restoring the holistic image of our speciality. The main objectives of social media in the NHS should be;

- health promotion
- education
- enabling access to health services & support

We believe these objectives mirror the values of NHS trusts in providing a service that is reassuring, clearly communicated, respectful and welcoming.

In a study conducted by Taber et al., it was found that there are three primary reasons people avoid seeking medical care<sup>3</sup>;

- 1) anticipating unfavourable evaluations or affective concerns (e.g. fear of pain, needles or specific procedure and low confidence in doctor's expertise)
- 2) low perceived need to seek medical care (i.e. lack of health education)
- 3) traditional barriers to medical care (e.g. doctor is inaccessible, concerns about high costs and transportation).<sup>3</sup>

Increased transparency on a universally available platform may help encourage people to seek appropriate medical care by "humanising" our expert consultants and dedicated trainees; allowing patients to become familiar with research and patient care. Furthermore, displaying certain procedures, such as the administration of local anaesthesia may help alleviate patient anxiety and be positively reassuring concerning its safety and effectiveness in surgery. Patients may gain insight to solutions available for conditions that may be affecting their physical and mental wellbeing.

Our hospital, the Royal Free, is one of the largest hand trauma centres in the UK. Patient's referred to our hand trauma service are often surprised that they are being seen by the 'plastic surgery' department, as their preconceived notions are often shaped by the representation on social media. We aim to further empower our patients by increasing patient education and dispelling concerns about barriers to receiving care in plastic surgery.

In order to establish professional representation on social media, it is imperative to have;

1. A Social Media Ethical Content Committee(SMECC): a multidisciplinary team who will actively review content and ensure compliance with recommendations

set by professional bodies (e.g. GMC), organisations (e.g. BAPRAS/ BAAPS) and social media community guidelines.

2. Content which should depict surgical mentorship, evidence-based practice, inspire collaboration and be representative of the patient experience within the NHS.<sup>4</sup>
3. Consent and security policies - if clinical information or imaging is to be shared, written consent must be obtained in person. BAPRAS further advises strong password settings, customisation of sharing and engagement settings and awareness that a platform's security policy is likely to change
4. Safe clinical practice - abstaining from giving medical opinions on members of the public that the surgeon has not personally examined themselves.<sup>4</sup>

The doctor-patient relationship has evolved over time. We have seen a shift from a predominately paternalistic model towards encouraging patient autonomy; relying on the clear communication of health services. Plastic surgery is very specialised and inherently complex and representation through visual modalities will be beneficial. Exhibiting our departments work will allow patients to have a visual reference of surgery and recovery; understanding reconstructive techniques will ensure more active and informed participation in the decision-making process.

There are a number of benefits of a departmental social media account for medical professionals as well, as it has proven to improve peer-to-peer communication and support learning.<sup>1,2</sup> We have seen the role of social media evolve during the Covid-19 pandemic acting as a way for colleagues to stay connected, arrange academic teaching, discuss topics with the wider medical community and through collaboration and sharing of information - we have been able to improve the safety and quality of the service we provide.<sup>1</sup>

Use of social media in public health education remains controversial. We trust that establishing an accurate and representative social media presence will increase awareness of the diverse skill set of the plastic surgeon, inspire confidence in reconstructive patients and help facilitate meaningful representation of plastic surgery on social media.

## Declaration of Competing Interest

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## Ethical approval

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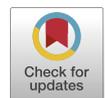
Andreas Georgiou  
Prateush Singh  
A. Mosahebi

Plastic and Reconstructive Surgery, Royal Free London NHS  
Foundation Trust, Pond Street, Hamstead, London NW3  
2QG, United Kingdom  
E-mail address: drakgeorgiou@gmail.com (A. Georgiou)

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## Challenges for plastic surgeons and estheticians during COVID-19: A Twitter study



Dear Sir,

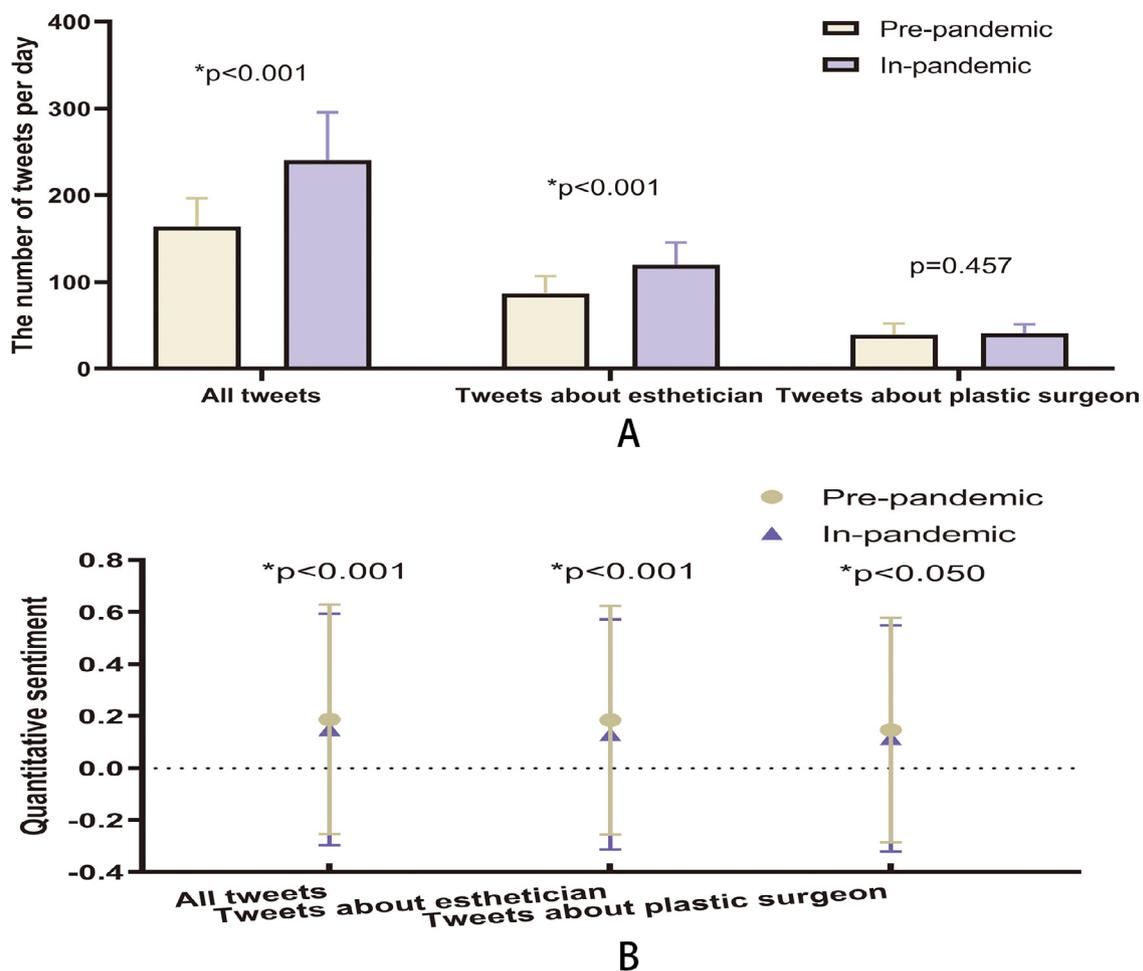
Since the World Health Organization (WHO) named COVID-19 on February 11, 2020 and then declared it a pandemic on March 11, 2020, COVID-19 has had a serious impact plastic and esthetic medicine. The large number of cancellations of surgical appointments, as well as the decreasing number of esthetic procedures, were great challenges for both plastic surgeons and estheticians.

Twitter, as the most popular social media microblogging website, which indicate the changes of public interest, demand and expectations. Moreover, it was also an important tool for connection and interaction for both plastic surgeons and the public, which could help plastic surgeons understand people's expectations, enabling them to make rational adjustments and effective decisions. However, many of them lack the basic experience and understanding of social media marketing like Twitter. Since these, we had conducted a Twitter study. Through a pre-search, we selected the keywords like "esthetician", "plastic surgeon" and so on, which were more directly reflect public attitudes and expectations. By using these keywords, we made a searching for Tweets from January 1 to May 9, 2020 and downloaded them. With sorting the Tweets data into two groups: pre-pandemic (Tweets before February 11, 2020) and in-pandemic (Tweets after March 11, 2020), t-tests, sentiment analysis, word frequency analysis and co-occurrence analysis were performed respectively.

The details of the Tweets data results were showed in the Supplementary material. Since the start of the pandemic and quarantine, people increased the time and attention spent on social media, and the number of Tweets per day has increased significantly (Figure 1A). Moreover, the sentiment analysis results indicated that COVID-19 caused various negative impacts on people's work and life (Figure 1B). Based on these results, we put forward some suggestions for plastic surgeons and estheticians to improve their business and marketing decisions.

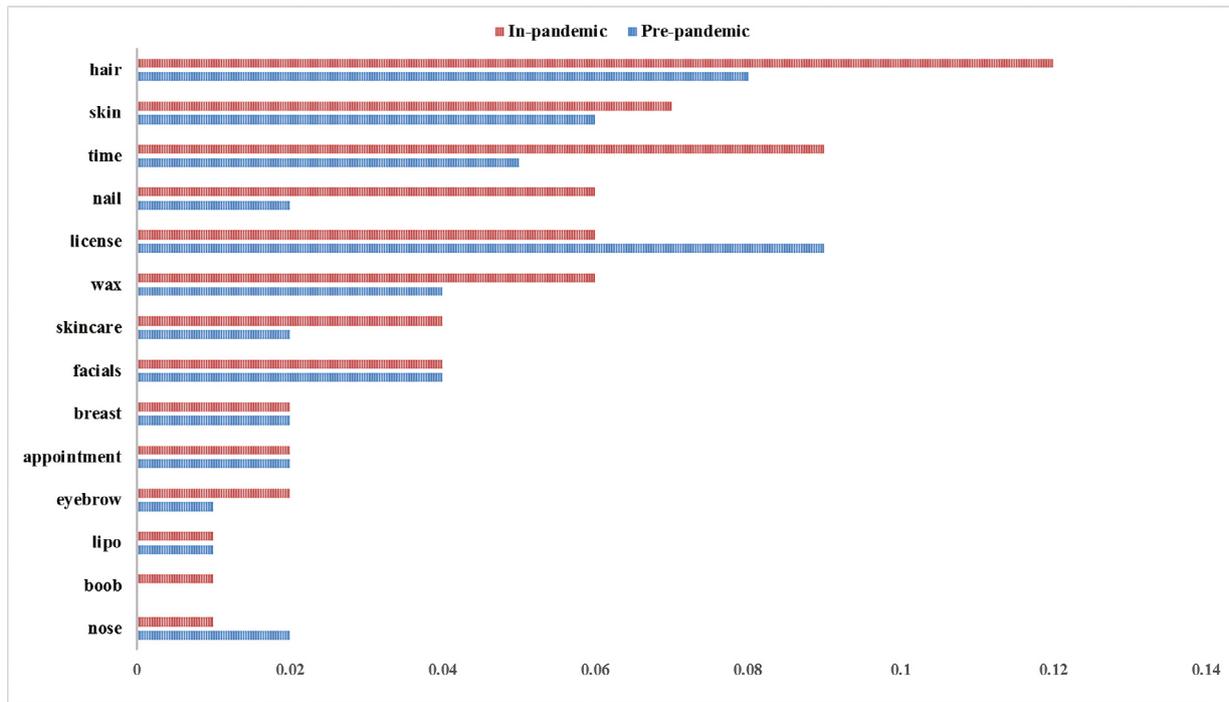
After the outbreak of the pandemic, people's interest in procedures like skincare, facials, peel and hair removal increased significantly, whereas interest in plastic surgery did not change substantially (Figure 2A). This result could be interpreted as the interest in plastic surgery being less strongly associated with economic decline than expected. This suggests that plastic surgeons may not need to decrease prices because of the recession and reduction in number of procedures performed, since plastic surgery does play a luxury role in the market,<sup>1</sup> and cutting prices does not improve the surgery appointments.

Moreover, people were paying more attention to lashes, eyebrows and lip procedures as well as nail techs and hairdressers, and demand for these increased. This could be explained by the lipstick effect: when the economy is weak, women's consumption of cheap cosmetic products/procedures increases.<sup>2</sup> Hence, business promotion and marketing of these cheap procedures could be considered. Using co-occurrence analysis, we found that nose and breast surgery and injected fillers/Botox were the most popular plastic procedures (Figure 2B). Therefore, business marketing could focus on these operations. Besides, as the results showed, injected fillers/Botox were worthy of promotion as they have the advantages of a moderate price, minimal invasiveness, and a rapid and simple procedure. It seems that people are more willing to undergo non-surgical procedures, and show a higher satisfaction. Therefore, plastic surgeons also need to be aware of competition from non-surgeon esthetic workers.<sup>3</sup> They also share the market of non-surgical procedures, such as laser therapy for scars, injected fillers for augmentation, Botox injection for facial lines, and use of radio frequency for skin lift and tightening. So the plastic surgeons, especially younger ones, must expand the range

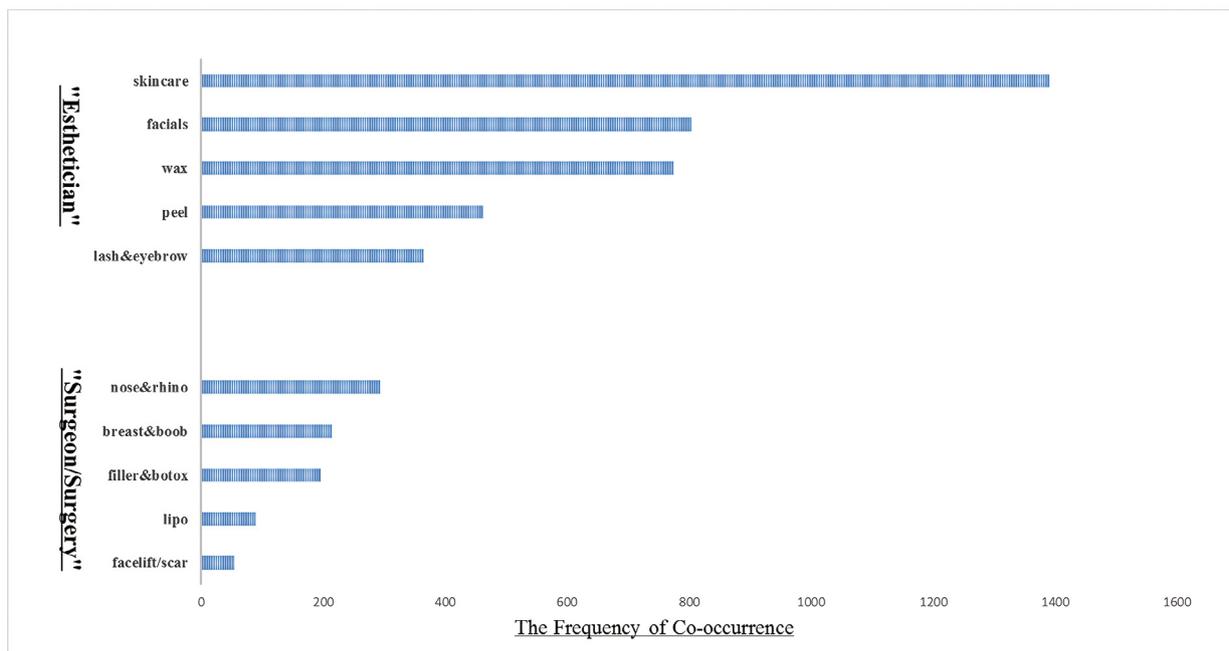


**Figure 1** A, The average number of pre-pandemic Tweets and in-pandemic Tweets per day in three groups (all Tweets, Tweets about esthetician and Tweets about plastic surgeon).

B, The average quantitative sentiment value of pre-pandemic Tweets and in-pandemic Tweets in three groups (all Tweets, Tweets about esthetician and Tweets about plastic surgeon). Values were shown as mean  $\pm$  standard deviation. \* Significant difference.



A



B

**Figure 2** A, The standardized word frequency of main procedures and surgeries in pre-pandemic Tweets and in-pandemic Tweets. (the word frequency were standardized by the number of pre-pandemic and in-pandemic Tweets)  
 B, The co-occurrence frequency of the top five words of esthetic procedure name (the upper half, co-occur with “esthetician”) and words of plastic surgery name (the lower half, co-occur with “surgeon/surgery”).

of non-surgical esthetic procedures they offer to cope with the increased competition.

Combined the results of word frequency analysis and co-occurrence analysis (Figure 2), there was a high and increasing demand for skin protection, such as skincare, facials, and peels. This was mainly due to people having to use masks during the COVID-19 pandemic, which in-

evitably cause some skin damage such as allergies, soft tissue edema, mechanical damage and even secondary infections.<sup>4</sup> Therefore, people’s demand for skincare will probably remain high, and business marketing and price of these procedures should be adjusted. In addition, the data showed that part of people who complained on the environment and the protection measures, there were

also some complained on the exaggerated marketing, etc. Therefore, plastic surgeons and estheticians should pay great attention to environmental disinfection and virus protection measures. Last but not least, pay attention to ethical principles during business adjustments and social media marketing to avoid ethical dilemmas.<sup>5</sup>

In general, the present study suggests that plastic surgeons and estheticians could focus more on injected fillers/Botox, surgeries of the nose and breast, skincare and facials, especially on non-surgical and skin protection procedures.

## Funding

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## Ethical approval

Our study does not involve human or animal subjects.

## Declaration of Competing Interest

The authors declare that they have no conflicts of interest.

## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:[10.1016/j.bjps.2020.12.010](https://doi.org/10.1016/j.bjps.2020.12.010).

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Zong Chen, Zhi-You Chen, Wen-Hui Liu, Muhammad Tipu Sultan, Guang-Shuai Li  
 Department of Plastic and Reconstructive Surgery, The First Affiliated Hospital of Zhengzhou University, Zhengzhou, China

E-mail address: [liguangshuai@zzu.edu.cn](mailto:liguangshuai@zzu.edu.cn) (G.-S. Li)

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## Having a blast at home this year? The increased risk of firework injuries and an algorithm for management<sup>☆</sup>



Dear Sir,

2020 has been an exceptional year. The COVID-19 pandemic has had a dramatic and unprecedented impact on all aspects of daily living. Social distancing, travel restrictions and local lockdowns have changed the way we socially interact. Current UK infection rates suggestive of a second wave, have precipitated heightened restrictions, threatening usual seasonal celebrations. 'Firework season' (the period between October and January when peak incidence of firework injuries occur) is already upon us. Circumstantial limitations are likely to result in a higher proportion of people hosting private firework displays, which are associated with increased injury risk.<sup>1</sup> Both frequency and severity of firework injuries are likely to surge, due to a higher number of untrained individuals using them. By summarising both the mechanisms and patterns of firework injuries, we present two algorithms for the management of these patients.

## Scope of the problem

Nationally, firework injuries are on the rise.<sup>1</sup> In 2017, 373 people in the UK presented with firework injuries between 29th October - 2nd November alone.<sup>2</sup> Unpublished data from the Northern Burn Care Network (presented at BAPRAS Winter meeting, 4-6th December 2019) demonstrates firework injuries are on the increase in both adult and paediatric groups. In the current COVID-19 crisis, most firework display events will be prohibited, at a time when firework availability (in the form of pop-up firework outlets, sales over social media and the Dark web) have proliferated. Accordingly, during social limitation and frustration, there will be minimal access to safely organised events and plentiful access to firework purchase for private use.

Fireworks are low grade explosive devices that deflagrate (subsonic combustion) giving a propellant force in combination with activation of pyrotechnic substances productive of sound, colour and self-sustaining exothermic reactions.<sup>3</sup> The 2017 reclassification of firework explosive devices in the UK marked a change in legislation for the purposes of pub-

Data presented at: BAPRAS Winter Scientific Meeting, Monaco, 4-6th December 2019.

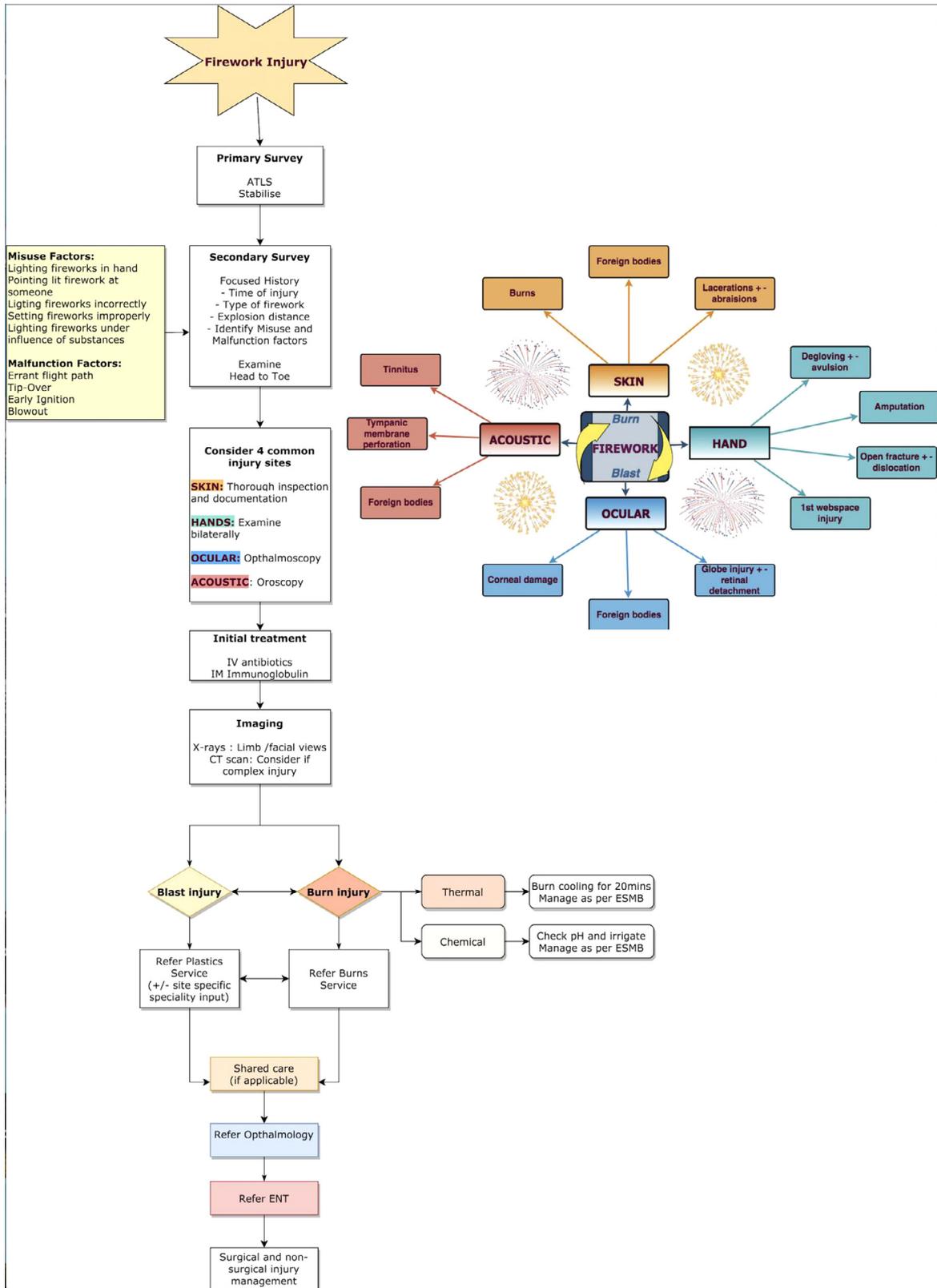


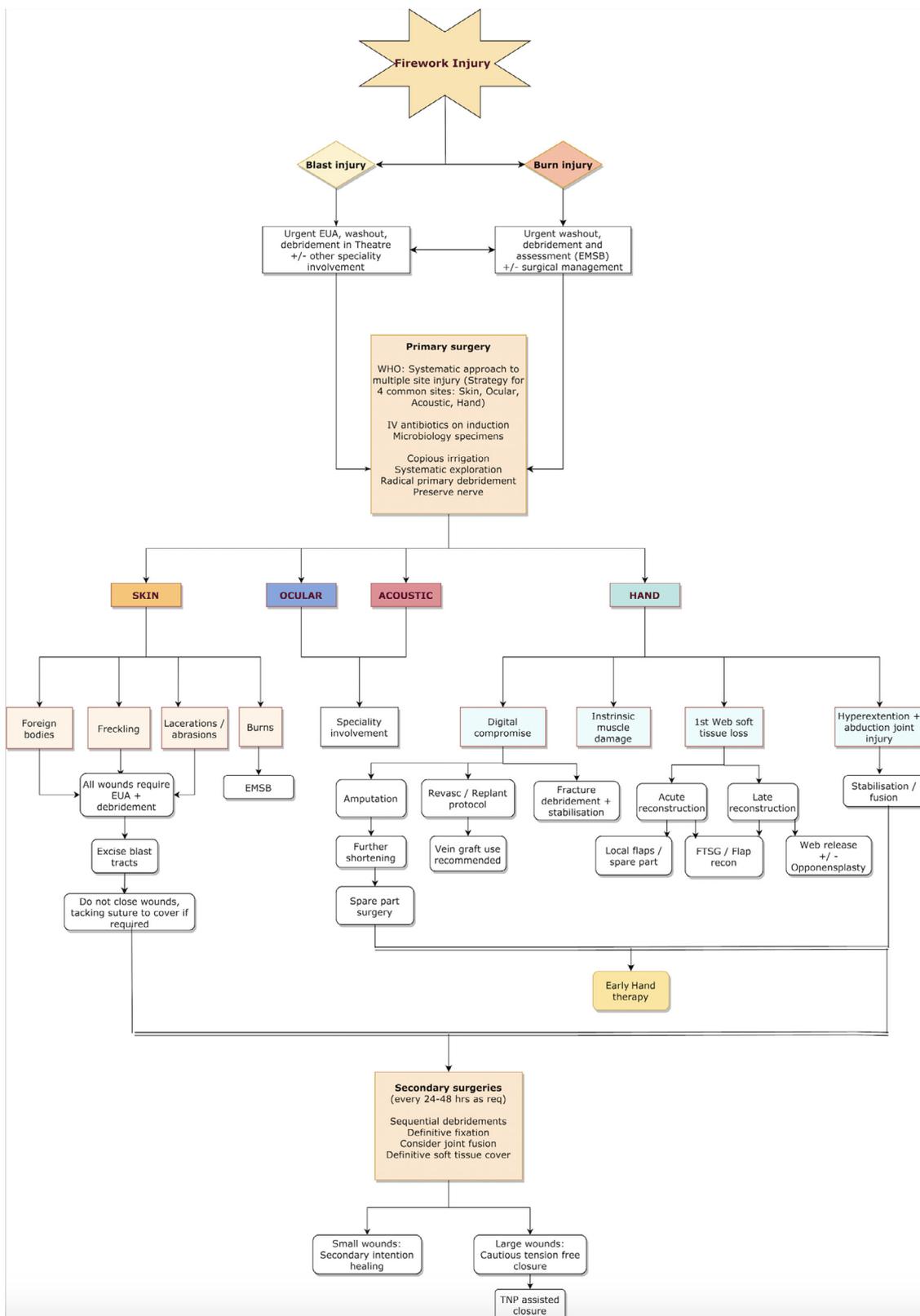
Figure 1 Acute management algorithm for firework injuries.

ATLS: Acute Trauma Life Support

IV: Intravenous

IM: Intramuscular

ESMB: Emergency Management Severe Burns.



**Figure 2** Surgical management algorithm for firework injuries.

EUA: Examination under anaesthesia  
 EMSB: Emergency Management Severe Burns  
 WHO: WHO pre-surgical check list  
 IV: Intravenous  
 FTSG: Full thickness skin graft  
 TNP: Topical Negative Pressure therapy.

lic safety, however, firework related injuries have not reduced.<sup>4</sup>

Fireworks can result in multiple modality injury, which are compounded in close-range explosions.<sup>5</sup> Primary injury resulting from the blast component can lead to direct soft tissue trauma (dissection and avulsion, including digital amputations), ocular injuries (ocular haemorrhage, globe rupture, retinal detachment) and otological injury (tympanic membrane rupture). Secondary injuries represent collateral damage from airborne debris, occurring primarily in the hands, face and eyes. Tertiary injuries are blunt trauma from blast related building collapse. Quaternary injuries include both thermal and chemical burns, psychological trauma and any other injuries.<sup>5</sup> Although the majority of firework injuries result in burns, all modalities should be considered to avoid missed injury.

Between October 2018 - January 2019 we prospectively collected data on all direct contact adult and paediatric firework injuries in Manchester (unpublished data, presented at BAPRAS Winter meeting 2019). Within our case series ( $n=7$ ), all patients were male, had direct hand contact at the time of explosion and suffered bilateral hand involvement, with the holding hand demonstrating more severe injury in all cases. Across the patient group, there were 5 complete and 5 partial digital amputations. 6 patients had first web space damage and 5 of these required first web reconstruction. 6 patients had ocular damage, 2 of which suffered total visual loss in the damaged eye and 2 had temporary visual loss. 6 patients suffered hearing loss secondary to blast injury. The average total burn surface area was <1%. Burns were often associated with foreign body debris. Industrial category fireworks (not legal for non-professional use) were responsible for injury in 4 patients. Substance use at time of injury was reported by 2 patients. Psychological disturbance requiring psychological services affected 2 of our patients.

Using our data, in consultation with the plastic surgery trauma service, Manchester Hand Centre and Manchester Burns Centre, combined with a literature review (PubMed, EMBASE), we designed two algorithms for management of firework injuries. The first, (Figure 1) relates to initial assessment and management at presentation. The second (Figure 2), relates to the surgical management of firework injuries, including operative strategy and reconstruction. Importantly, these algorithms prompt examination of the four most commonly injured regions (skin, ocular, acoustic and hands), thereby enabling identification of multiple modality injury, supporting prompt diagnosis and multidisciplinary management.

## Conclusion

During these unsettled times, social behaviours differ to normal patterns. We predict this 'firework season' will have a high injury burden, requiring significant burns and trauma provision. Fireworks lead to multimodality injuries, which can be complex and require multidisciplinary management.

Although the majority of firework injuries comprise of thermal and chemical burns, direct contact blast injuries represent a complex subgroup associated with multiple site and higher severity injuries. These patients should be managed as major trauma patients under plastic or burns surgery, with input from other specialities to address their complex needs. Support services such as hand therapy, occupational therapy and psychological services must be involved early. Our algorithms address the emergency, surgical and multidisciplinary management of simple and complex firework injuries.

## Ethical approval

N/A.

## Declaration of Competing Interest

There is no conflict of interest or funding to disclose.

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Natasha Louise Wielogórska  
Robert Ian Stewart Winterton  
Wythenshawe Hospital, Southmoor Rd, Roundthorn  
Industrial Estate, Wythenshawe, Manchester M23 9LT,  
United Kingdom  
E-mail address: [natasha.wielogorska@lthtr.nhs.uk](mailto:natasha.wielogorska@lthtr.nhs.uk) (N.L.  
Wielogórska)

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## Back to basics – Simple simulation models invaluable for complex skills acquisition in surgery



Dear Sir,

Surgical training involves repetitive practice in order to attain an optimal level of proficiency. Lascar et al. notes that residents undergo an abrupt learning curve prior to reaching a plateau in skill level.<sup>1</sup> Trainees have limited resources and often turn to simple simulation models for training. The aim is to establish the utility and existence of skill transference in using simple constructs to acquire competency with complex skills.

All participants of the five-day Microsurgery Training Course in National University Hospital, Singapore from 2017 to 2018 were included. On Days 1, 3, 4 and 5 the participants carried out a standardized microsurgical task using our novel training platform - to place 9 sutures in a prefabricated 4mm elastic strip under the microscope using Digital Surgicals MicroTrainer (see Figure 1). A computer program from Digital Surgicals was used to objectively assess the strips based on suture alignment and density, with the score known as MicroTrainer Strip Store. The method of assessment has been validated and eliminates the possibility of assessment bias.<sup>2</sup> The time taken to place all 9 sutures was recorded for each attempt.

On Days 3, 4 and 5, participants were also asked to anastomose up to 4 rat femoral vessels (2 arteries and 2 veins) each day. The total number of anastomoses completed each day is dependent on their speed - the faster a candidate is, the more likely he is able to attempt and complete 4 anastomoses. Likewise, the time taken for each vessel anastomosis was recorded. Patency of vessels was recorded, with patency defined as good blood flow after 10 min following the completion of anastomosis.

Informed consent was obtained, and all protocols were in accordance with relevant local regulations and review boards.

A total of 77 participants participated, all of whom did not have any prior formal training in microsurgery. 68.8% of participants were male, and 90.9% of the participants were right handed. The average age of the participants is 34.57 years old (SD 5.42).

MicroTrainer Scores improved with scores on Day 5 being higher on Day 3 ( $p=0.001$ ) - mean score 28.18 (SD 6.00) on Day 3 and 30.117 (SD 5.03) on Day 5. More participants were able to achieve patency for vessel anastomosis as the course progresses (see Table 1). The anomaly on Day 3 is a result of only 23 out of 77 participants being able to complete their anastomoses quickly enough to attempt to do 4 vessel anastomoses. There is an increasingly positive correlation between MicroTrainer Scores and vessel patency rate as the course progresses, with  $r=0.331$  ( $p=0.003$ ) on Day 3;  $r=0.384$  ( $p=0.001$ ) on Day 4 and  $r=0.432$  ( $p=0.00$ ) on Day 5. The participants also became faster at strip suturing (Day 3: 21.6 min; Day 5: 18.6 min,  $p=0.00$ ) and vessel anastomosis (Day 3: 42.3 min/vessel; Day 5: 36.1 min,  $p=0.00$ ) as the course progresses. There is also a consistently positive correlation between the time taken for MicroTrainer strip suturing and vessel anastomosis throughout the course (Day 3: 0.505 ( $p=0.00$ ); Day 4: 0.429 ( $p=0.00$ ) and Day 5: 0.549 ( $p=0.00$ )).

The consistently positive correlations between microsurgical strip scores and vessel patency, as well as time taken for MicroTrainer strip suturing and vessel anastomoses, support the important finding that simulation on latex strips correlates with improved skills with actual vessel anastomosis, i.e. a basic simulation model is highly useful in microsurgical skills acquisition.

The standardized latex strip aims to simulate the behavior of a vessel with the thickness corresponding to microvessel wall thickness and the width of the strip corresponding to the circumference of a vessel of 1.2 mm in diameter.<sup>2</sup> As a simple simulation for microvessel anastomosis, the MicroTrainer platform first helps trainees learn correct suturing techniques and enforces accurate suture placement. The skills transference encountered can explain why basic simulations are effective in complex skills acquisition.



Figure 1 Novel training platform with prefabricated strip (4mm width) mounted; Close-up of strip with 9 sutures placed in strip.

**Table 1** Percentage of participants being able to achieve patency in rat femoral vessels.

Day	Right femoral artery	Right femoral vein	Left femoral artery	Left femoral vein
3	92% (n = 77)	71% (n = 77)	85% (n = 48)	91% (n = 23)
4	98% (n = 77)	76% (n = 77)	92% (n = 77)	81% (n = 72)
5	96% (n = 76)	94% (n = 76)	94% (n = 72)	92% (n = 72)

There is evidence in the literature that supports the effectiveness in basic simulation models in complex skills acquisition training. Chong et al. found that participants who underwent basic simulation training for 2 days showed improved acquisition in technical skills and demonstrated better performance in vessel anastomoses compared to those who only did basic simulation for 1 day.<sup>3</sup> Grober et al. demonstrated that simple simulations are inferred to be as effective as complex model training in the acquisition of surgical skills in novices in a urology study.<sup>4</sup>

A key strength of this study is the use of a validated standardized software for objective assessment, which eliminates assessment bias. Further studies are needed to ascertain the optimal duration of basic simulation training before transitioning to sophisticated models.

This finding is critical as basic simulation models offer an accessible and cheaper alternative for novice surgeons keen on acquiring and maintaining their skills. The escalation of simple simulation to more complex simulation before clinical practice also accurately reflects the reality of surgical training.

## Ethical approval

Given by the National Healthcare Group Domain Specific Review Board (Singapore).

## Funding

None.

## Declaration of Competing Interest

None.

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Wendy Z.W. Teo, Jin Xi Lim, Siti Khadijah Bte Mohd Yusoff, Thi Lan Anh Le, Amitabha Lahiri  
 Department of Hand and Reconstructive Microsurgery,  
 National University Health System, 1E Kent Ridge Rd  
 119228, Singapore

Alphonsus K.S. Chong  
 Department of Hand and Reconstructive Microsurgery,  
 National University Health System, 1E Kent Ridge Rd  
 119228, Singapore  
 Department of Orthopaedic Surgery, Yong Loo Lin School  
 of Medicine, National University of Singapore, Singapore  
 E-mail address: [wendy\\_zw\\_teo@nuhs.edu.sg](mailto:wendy_zw_teo@nuhs.edu.sg) (W.Z.W. Teo)

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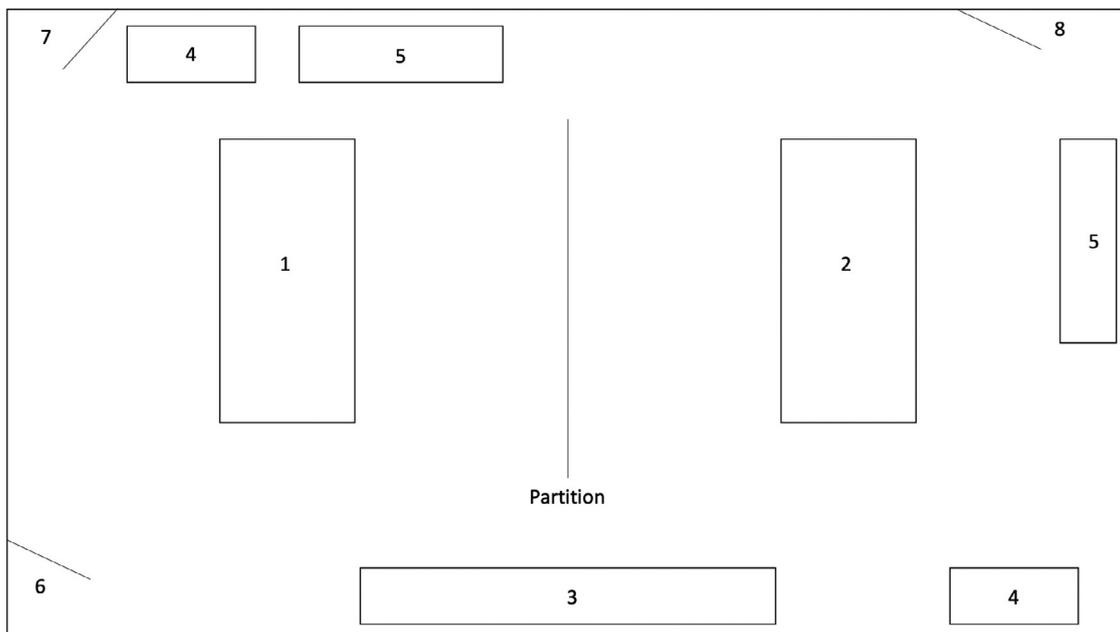
## Hand trauma training using twin table operating theatres



Dear Sir,

Hand trauma forms a significant proportion of the acute surgical workload for plastic surgeons. Becoming competent in managing hand trauma patients is often a linear progression from more basic procedures such as nailbed repair to complex cases such as wrist lacerations with neurovascular or tendon injury. Trainees require supervision in line with their level of experience and competence and we would like to highlight the role of twin table operating theatres in creating the optimum learning environment for hand trauma training. The hand trauma theatre in the Leeds General Infirmary is a large theatre with two operating tables fed by an anaesthetic team run block suite (Figure 1). Consultants typically run a light elective list on the adjacent table to the trauma list to provide support and we believe this arrangement provides an excellent environment for hand trauma training.

Firstly, and of greatest benefit to the trainee, is the opportunity to develop their hand trauma operative competence as the primary surgeon with cases of increasing complexity whilst still under consultant supervision. This is facilitated by the consultant having a lighter elective list to enable the opportunity for assistance if any difficulty arises.



**Figure 1** Hand trauma theatre layout. 1- table one. 2- table two. 3- scrub/gowning area. 4- Imaging monitor. 5- surgeon/scrub team workstation. 6- theatre entrance. 7-prep room door. 8- sluice room door.

Secondly, this arrangement allows for effective theatre list planning. Cases can be reviewed at the beginning of the list and allocated to either the registrar or consultant table in line with the experience of the trainee. In addition, the list order can be adjusted to facilitate the consultant and trainee undertaking more complex cases together as valuable learning events to facilitate trainee progression.

At the same time, training must also be balanced with efficiency, an important consideration with large volume units. By having two tables in the same theatre, time efficiency can be maintained with the support of the consultant table affording the trainee additional time per case. Efficiency and throughput is also facilitated by the adjacent block suite with capacity for three patients to undergo regional anaesthesia simultaneously. During 2019, 2885 cases were performed in the twin table operating theatre with an average of 240 cases per month. This includes, hand trauma, elective hands and also local anaesthetic skin procedures.

In conclusion, twin table operating theatres provide an excellent environment for hand trauma training whilst maintaining efficiency.

### Funding

None received.

### Ethical approval

Not required.

### Declaration of Competing Interest

None.

Elliott Cochrane, Waseem Bhat  
*Department of Plastic and Reconstructive Surgery, Leeds  
 General Infirmary, UK*

*E-mail address:* [Elliottcochrane@doctors.org.uk](mailto:Elliottcochrane@doctors.org.uk) (E. Cochrane)

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## Breaking down training barriers: A novel method of delivering plastic surgery training through augmented reality



*Dear Sir,*

Providing high-quality support and teaching in Plastic Surgery is fraught with unique challenges at all levels of training. As a speciality, early exposure in foundation training is limited and changes in working patterns have led to



**Figure 1** The set-up showing system in use.

the restriction of training opportunities. We present our experience in the merits of delivering an adjunct to plastic surgery training with the use of augmented reality.

In order to maintain engagement and try to meet the educational needs of the plastic surgery trainees, we have developed an interactive live surgery video series. To trial this programme we focused on a single subspecialty that had a constant stream of patients despite the current pandemic. As such, we looked at 6 consecutive lower limb microsurgical free flap reconstructions.

These procedures were recorded over three weeks. The trainees were able to access the live video streams in real-time and interact with the consultant surgeon performing each case through voice and by using the system's bespoke augmented reality (AR) annotation tools.

Proximie is a (HIPAA/GDPR compliant) purpose-built platform that enables the surgeon's remote connection intra-operatively. A simple in-theatre set-up comprises of a laptop, camera and capture card to obtain a live video feed. A wide-angle camera is used in theatres in addition to a loupe mounted personal camera, and a video feed from the microscope (Figure 1).

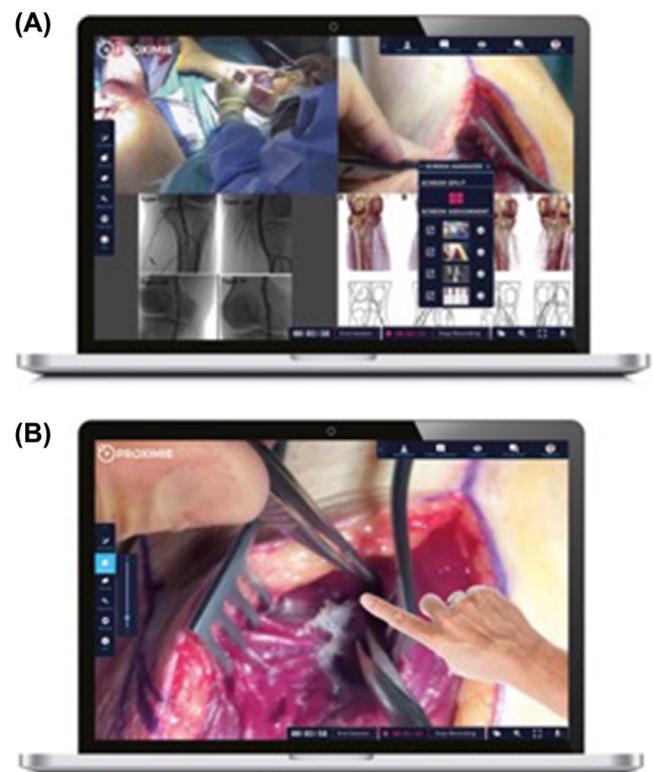
The platform allows a multiscreen view, two screens present the intra-operative view, the other two are utilised for review of scans, and description of the case (Figure 2). Trainees can browse through these screens in their own time and zoom in for closer perusal. The overlay of anatomy diagrams on the live video feed provides an appreciation for specific anatomical landmarks and further highlights the relationship between critical structures and soft tissue.

The platform also allows the moderator to utilise overlay tools in the form of a 3D hand and pointer to identify structures.

The videos can be uploaded to the online library for review by trainees. This fits in with a 3-P system that provides a framework for surgeons to learn, Prepare, Perform & Perfect.

A questionnaire was sent out to all users for feedback and data analytics from the platform used to analyse digital footprint for attendance.

Feedback surveys sent to trainees revealed that all of the respondents found the sessions useful and 80% agreed that



**Figure 2** a,b: Multiview capabilities.

they gained new knowledge applicable to their speciality. All of the respondents would like to see more of the sessions.

Data analytics revealed that over a staggered 4-week period; over 130 subsequent views of the procedures in the library. On average the videos were accessed in the range of 20-23 times by users.

The use of live interactive surgical streaming with augmented reality for plastic surgery residents and trainees has not been described although widely used in some other surgical specialities.<sup>1-3</sup>

Our training initiative at Guy' and St. Thomas' represents an interactive and accessible means of providing operative

teaching to plastic surgery trainees creating an immersive in-theatre experience as an adjunct to hands on training.

Smeeton et al. have demonstrated live surgery for undergraduate medical students utilising similar set-ups to familiarise undergraduates to the workings of an operating theatre.<sup>4</sup> The operative skill demands of a plastic surgical trainee, however, requires in-depth visualisation of the surgical technique.

The virtual platform that we provide gives access to a real-time demonstration, this adds a dimension to learning that cannot be captured and is often inadequately conveyed by other didactic measures, including pre-recorded surgical videos.<sup>5</sup> Critical decision making and demonstration of surgical planes with additional AR tools to highlight anatomical structures has allowed trainees access into the operating room remotely. Feedback from trainees pointed to unanimous agreement on having obtained a better understanding of the procedure as compared to times when being physically present and assisting in the surgery. The recorded sessions allow the trainee to return to visual references, and as they progress through their experience, they can benefit from refining techniques which they might not have appreciated at the beginning of the learning curve.

The use of AR in live surgery provides a framework for learning that truly enables trainees to take ownership of their educational needs and build a portfolio that enables them to visually demonstrate their skills and aptitude, especially at a time where access to the theatre is limited.

Although this has been developed in the time of a pandemic, we believe the educational reach of augmented reality in live surgery demonstrations is beyond this time frame and has the scope to be useful for other training specialities too. The Proximie Platform is not intended to replace learning in practice but is an aide to clinical training.

Teaching initiatives similar to this, provides trainees with interactive and immersive teaching experience and enables them to access surgical education at their convenience, empowering them to take ownership of their training.

## Funding

The equipment used for this pilot was part of surgical tele mentoring solutions provided in kind by Proximie to support COVID-19.

## Declaration of Competing Interest

None.

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Maleeha Mughal

Consultant Plastic Surgeon, Guy's & St. Thomas' Hospitals, United Kingdom

Asmat H. Din, Edmund Fitzgerald O'Connor

Consultant Plastic Surgeon, Guy's & St. Thomas' Hospitals, United Kingdom

Consultant Plastic Surgeon, Kings College Hospital, United Kingdom

Paul Roblin

Consultant Plastic Surgeon, Guy's & St. Thomas' Hospitals, United Kingdom

Victoria Rose

Consultant Plastic Surgeon, Guy's & St. Thomas' Hospitals, United Kingdom

Consultant Plastic Surgeon, Kings College Hospital, United Kingdom

E-mail address: [missmplast@gmail.com](mailto:missmplast@gmail.com) (M. Mughal)

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## Virtual teaching during the COVID-19 pandemic



Dear Sir,

We read the article on the uprising of virtual teaching during the COVID-19 pandemic<sup>1</sup> and found it both insightful and thought provoking.

The authors provide an accurate and timely insight into the impact that the COVID-19 pandemic has had on our healthcare system and particularly on surgical training, with the reduction in operations limiting opportunities for training. We commend their astute acknowledgement of the need for trainees to keep engaged with their individual surgical specialities during a time when service provision and training has been so greatly disrupted. We in turn, sustain the identification that technology is playing an increasing role with facilitating this engagement within plastic surgery.

We appreciate and share the same sentiments with regards to some of the advantages that webinar and virtual

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platforms such as those provided by BAPRAS may provide with regards global connectivity, real-time interactive exchanges, lack of expense and relative convenience. The concept of easier access to 'world-class' surgeons is a significant advantage of the use of remote technology and is a prospect which excites us as trainees and we agree this has the potential to benefit trainees across all specialities.

However we feel that certain areas could be explored further such as the use of virtual reality (VR), augmented reality (AR) and haptic technology in helping to bridge the gap between online education and practical skills. The Royal College of Surgeons (RCS) Future of Surgery project has identified these technological platforms as key for the transformation of surgery over the coming years.<sup>2</sup> Both VR and AR are already being utilised by surgeons to train and rehearse surgical procedures enhancing training and improving access across the global surgical community.<sup>3,4</sup>

The authors suggest that it is not feasible for surgeons in training to obtain necessary skills without 'hands-on' practical experience. Conversely literature supports the use of both VR and AR in surgical training with positive outcomes with regards to the speed of acquisition of new skills and the ability to perform procedures accurately.<sup>5</sup> Of course virtual teaching in any of its guises is not trying to take away or replace 'hands-on' practical experience and nor should it. We feel that such technologies provide an invaluable resource for developing skills, and now in the current pandemic, more so than ever, are necessary though not sufficient for trainees to gain appropriate expertise. Whilst hands-on experience is clearly an essential component of a surgeon's training, technological platforms incorporating practical experiences, even if artificial, are an asset which should be further considered as surgical training evolves to help bridge the gap between theory and practice. It is important to recognise roles of different educational resources and the RCS Future project is looking at all the different elements of the plastic surgery curriculum including how best to deliver them and we welcome this evolution of surgical training.

Lastly we were impressed by the authors' consideration for security and in particular found their points raised about consent quite thought-provoking. This is something that is on the forefront of our minds as trainees given the medico-legal cases revolving around consent. We are in agreement that the consent process needs to be adapted and in fact we would go further and suggest looking at the general data protection regulations (GDPR) guidelines and look to integrate those into obtained consent. Neither of the authors have considered the importance of the explicit consent that would be needed to facilitate live streaming, recorded webinars or even patient details incorporated into other technological platforms, and this is something we as health professionals would be judicious to consider at the earliest possible stage.

### Declaration of Competing Interest

The authors confirm that they have no conflicts of interest to declare.

### Funding

N/A

### Ethical approval

N/A

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Gary Masterton  
St George's Hospital, United Kingdom

Alexander Zargaran  
St Thomas' Hospital, United Kingdom

David Zargaran  
Royal Free Hospital, United Kingdom  
E-mail address: [alexander.zargaran@gstt.nhs.uk](mailto:alexander.zargaran@gstt.nhs.uk) (A. Zargaran)

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## Optimizing intraoral surgery video recording for residents' training during the COVID-19 pandemic: Comparison of 3 point of views using a GoPro



Dear Sir,

The COVID-19 pandemic has been an extremely challenging time for health workers worldwide. Even though



**Figure 1** GoPro attached with a head-strap with an approximate angle of 30°-45° to assure optimal recording.

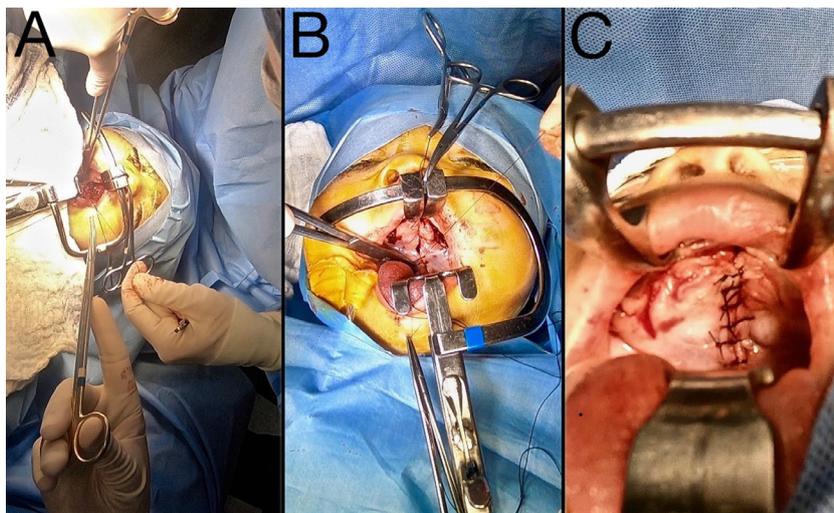
some non-surgical specialties have seen a greater demand in their duties, surgical specialties have shown a significant decline in their activity, focusing mainly on emergencies. Plastic and Maxillofacial surgeons have been especially impacted, not only because of their high percentage of elective surgeries being suspended, but also because they are subject to an increased risk of virus exposure during intraoral surgeries. This has consequently affected residents' surgical training programs with modifications to their rotations and even temporarily redeployment to other areas. In this sense, means of distant teaching like simulation training and webinars have been of increased interest to keep - to some extent - residents' training.<sup>1</sup>

Intraoperative video recordings and live surgery broadcastings have been already explored in literature as ways to improve residents' education. The use of GoPro cameras

(GoPro Inc., California, US) in surgical residents' feedback has shown to be an excellent tool for dynamic education, leading to potential enhancement of technical skills.<sup>2</sup> Some authors have even proposed modifications in order to correct shortcomings like magnification and battery life.<sup>3</sup> Recording videos in intraoral surgery represents a greater challenge due to the depth of the oral cavity and the reduced work space. In this study we compared video recordings in palatal closure surgeries from three different point of views (POVs).

The camera used was a GoPro Hero 7 Black (GPH7B). The GPH7B includes a touchscreen and offers high-quality video recording up to 4K with 60 frames per second (FPS), voice command controls and is waterproof down to 10 m deep. It also allows 720p live video broadcasting and offers up to 90 min of continuous video recording. Settings used for our study were 720p, 60 FPS and narrow field of view in order to optimize battery duration. The POVs used were: with a head-strap by the First Surgeon (FS); with a head-strap by the First Assistant (FA) and Hand-held by the First or Second Assistant (HH) after an aseptization process of the camera consisting in a 5 min bath in a 10% povidone-iodine solution (taking advantage of the camera's waterproof properties) followed by rinsing off the povidone with sterile water or saline solution, drying the camera with sterile gauze pads and wrapping it in sterile Tegaderm (3M Enterprise, Minnesota, US) keeping a frontal opening for the lens. When using the head-strap, the camera was tilted in a 30°-45° angle in order to get the most adequately framed image (Figure 1). Voice control commands were used in order to optimize recordings and battery times while keeping surgeons scrubbed in when using the head-mounted camera. No frontal lights were used.

Comparisons of the three POVs can be seen in Supplementary Video 1. In our experience, the quality of video recordings were better when used by the FS and the HH methods (Figure 2). The latter has the disadvantage of occupying one of the assistant's hands, however it offers a unique advantage by being able to record videos practically inside the mouth. Regarding the safety of this innovative method, a previous study by Purnell et al. reported their



**Figure 2** Photographic comparison of the three point of views using the GoPro camera: (A) first-assistant, (B) first surgeon and (C) hand-held.

9-year experience in more than 2000 cases with the use of a waterproof camera previously immersed in 10% povidone-iodine (diluted 1:25 in sterile water) without increasing the risk of infection or contamination, not only in intraoral surgeries (clean-contaminated wounds) but also in clean procedures like cranioplasties.<sup>4</sup> Another device reported to be adapted for POV recording is the use of a head-mounted smartphone, however the entire assembly had a weight of almost 300g compared to the 117 g of the GPH7B which could increase strain during long procedures.<sup>5</sup> The use of video-recording glasses has also been published, being a comparable POV to the FS head-mounted GPH7B, but still poses the same disadvantages when compared to the HH in terms of the versatility of having an aseptized camera in the operating table.

Some surgeons prefer using the operating microscope for intraoral surgeries like cleft palate repair, allowing high-resolution video recording, however this is not available in all centers, especially those of developing countries. In terms of costs, the GPH7B has a current price of US \$329.99 and the head strap US \$19.99 ([www.gopro.com](http://www.gopro.com)), which is reasonable considering the costs of other commercially available intraoperative surgeon POV recording systems.

During these difficult times, alternatives must be explored in order to maintain residents' training within possible. Optimal intraoral surgical video recordings can be obtained with the use of a GPH7B camera, especially by aseptizing it with iodine-povidone, offering a reproducible, safe and low-cost method to improve residents' training during the pandemic.

## Funding

This study was funded entirely by its authors.

## Ethical approval

All procedures performed involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Pictures and videos of patients have parent's signed consent for publication.

## Author contribution

All authors participated in the development, writing and revision of this article.

## Declaration of Competing Interest

The authors declare no conflicts of interest with any of the products, devices or drugs mentioned in this manuscript.

## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:[10.1016/j.bjps.2020.10.068](https://doi.org/10.1016/j.bjps.2020.10.068).

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Alfonso Navia

Section of Plastic and Reconstructive Surgery, Surgery Division, School of Medicine, Pontificia Universidad Católica de Chile, Diagonal Paraguay 362, Santiago 8330024, Chile

Leonardo Parada

Department of Plastic Surgery, Hospital Luis Calvo Mackenna, Santiago, Chile  
Department of Plastic Surgery and Burns, Hospital del Trabajador de Santiago, Santiago, Chile

Gloria Urbina, Claudia Vidal, Carmen Gloria Morovic  
Department of Plastic Surgery, Hospital Luis Calvo Mackenna, Santiago, Chile

E-mail address: [ajnavia@uc.cl](mailto:ajnavia@uc.cl) (A. Navia)

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## Management and outcomes of mammalian bite injuries during COVID-19 and implications for future practice



Dear Sir,

Mammalian bite injuries account for a large number of attendances to emergency departments and approximately 7000 hospital admissions annually in England.<sup>1</sup> There are no

treatment guidelines available and there is clinical uncertainty surrounding their management.<sup>2</sup>

In our department, these patients were often admitted for washout under local anaesthesia in the minor operations theatre, with overnight stay for elevation and intravenous antibiotics.

In March 2020, resources were redistributed to manage the COVID-19 pandemic. Our Plastic and Reconstructive Surgery department took over the minor injuries service and non-COVID-19 admissions and theatre usage were limited to essential cases.

This study aims to assess how constraints imposed by the pandemic impacted management of mammalian bite injuries in our hospital and resulting patient outcomes.

## Methods

During the pandemic, our team prospectively maintained an Excel spreadsheet record of all patients assessed. In addition, a formal clinic letter was dictated, which was uploaded in the electronic patient record system.

The Excel spreadsheet and electronic patient record system were searched in order to identify all patients treated for mammalian bite injuries in our department in April and May 2020.

MC and JTG independently extracted data on the following parameters: patient age and gender, type, location and extent of injury, timing of presentation, treatment administered, follow-up rate, complications and representation to our hospital.

In order to capture representation to other healthcare providers, patients with an available telephone contact were called at the end of June 2020 and asked about complications and need for further treatment.

## Results

37 patients presented with mammalian bite injuries in April and May 2020. Median age was 27 (range 1-75) with equal gender distribution. The majority of patients presented on the day of injury or day after. 78% were dog bites, 14% human and 8% cat. Body parts involved were fingers and hand (21/37), face and ears (8/37), arm and forearm (5/37), thigh and leg (3/37).

6 wounds were superficial (i.e. not penetrating the full-thickness of the skin), while 4 were associated with significant soft tissue damage and/or fracture (2 distal phalanx fractures, 1 extensor tendon injury and metacarpal neck fracture, 1 significant soft tissue loss to a finger).

30/31 non-superficial wounds were washed out under local anaesthesia in clinic; patients received a tetanus booster (if required) and were discharged with oral antibiotics. The patient with extensor tendon injury and metacarpal neck fracture was admitted and treated with intravenous antibiotics and washout in theatre.

In April, 57% of patients were followed-up face-to-face or by virtual consultation, one to two days after initial presentation: no complications were recorded. Follow-up decreased to 26% in May and, again, no complications were recorded.

Patients who were not followed-up were given advice on symptoms and signs to look out for, as well as an email and telephone contact. One patient returned with a wound infection, which was washed out under local anaesthesia in clinic. The patient was discharged on the same day and did not experience any further complications.

Out of 35 patients managed without admission and who did not represent to our department, 27 were contacted by telephone at the end of June 2020 (4 did not have a registered telephone number and 4 could not be reached). None of the patients developed complications or required treatment by another healthcare provider.

## Discussion

Mammalian bite injuries represent a 'growing burden' for Plastic and Reconstructive Surgery services in the UK<sup>1</sup> and overall estimated costs amount to £9.5 million per year.<sup>3</sup> Interestingly, recent evidence suggests that emergency department attendance for mammalian bite injuries has further increased during the COVID-19 pandemic.<sup>4</sup>

Evidence for the management of mammalian bite injuries is limited. A recent systematic review sought to determine optimal wound management to reduce the risk of infection in non-hand mammalian bite wounds: the authors identified only two eligible studies and no clear evidence to define best practice.<sup>5</sup>

In our hospital during the pandemic, the Plastic and Reconstructive Surgery department took over the minor injuries service and assessed the majority of mammalian bites presenting to the emergency department in April and May 2020. We managed 97% of bite injuries with washout under local anaesthesia in clinic and discharge with oral antibiotics and safety net advice, with a complication rate of 3.3% (1/30).

Our experience will help to inform the database development for the Bite Injury Treatment Evaluation (BITE) study. This will be an international prospective multicentre service evaluation of mammalian bite wounds supported by the Reconstructive Surgery Trials Network (RSTN). The aim of the study is to describe the current clinical practice and inform future research and guideline development for the management of mammalian bite injuries.

## Conclusions

Our experience during the COVID-19 pandemic suggests that the majority of mammalian bite injuries can safely be managed with washout under local anaesthesia and oral antibiotics and discharged on the same day with safety net advice. Going forward, healthcare resources can be optimised by taking these results into account.

## Funding

None.

## Ethical approval

N/A.

## Declaration of Competing Interest

None.

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M Chicco  
J Torres-Grau  
M Gardiner

Department of Plastic and Reconstructive Surgery,  
Wexham Park Hospital, Frimley Health NHS Foundation  
Trust, Wexham Street, SL2 4HL Slough, UK  
E-mail address: [maria.chicco@nhs.net](mailto:maria.chicco@nhs.net) (M. Chicco)

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communication entitled  
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Dear Sir,

In our department we have experienced a similar trend of managing bites wounds more conservatively as a result of the Covid-19 pandemic in our Plastic Surgery Unit at the Royal Free Hospital, London.<sup>1</sup>

Presentation: This work has not been presented yet

**Table 1** Bite characteristics and treatment.

	Pre-Covid period Dec 2019-Feb 2020	Covid period April-June 2020
No. seen in trauma clinic	29 patients	43 patients
Average age	49 years	42 years
Female: male	20F: 9M	24F: 19M
Type of bite	Dog - 15 Cat - 10 Human - 4	Dog - 28 Cat - 8 Human - 6 Snake - 1
Location of bite	Face - 5 Upper limb - 23 Multiple sites - 1	Face - 6 Upper limb - 33 Multiple sites - 4
Time between injury and presentation	1.3 days (0-6 days)	1.4 days (0-14 days)
Patient treated in clinic	62% (18/29)	81% (35/43)
Patient admitted	35% (10/29)	11% (5/43)
Antibiotics administered	Oral 66% (19/29) IV 34% (10/29)	Oral 88% (38/43) IV 12% (5/43)
Surgery in operating theatre	38% (11/29)	19% (8/43)
Complications/re-admissions	0%	2% (1/43)

We retrospectively reviewed and compared prospectively collected data on adults referred to our plastic surgery department with bite injuries in the 3 months before and during the Covid-19 national lockdown. Characteristics of both patient groups can be found in [Table 1](#). In the pre-Covid period, we found that 35% were admitted for intravenous antibiotics and 38% were managed in the operating room. However, during a 3 month period at the height of the first Covid wave, this number fell to 11% admitted for intravenous antibiotics and 19% managed in the operating room as resources were diverted to the Covid effort. We found that there was no increase in adverse clinical outcomes, namely infection, between the two groups.

We also noted a 48% increase in the number of bite injuries presenting to our department during the 3 month Covid period compared to the 3 month pre-Covid period. This can be explained by the increased pet contact as Covid forced people to spend more time inside their homes.<sup>2</sup>

Following these results we have modified our departmental guidelines when managing bite injuries to a more conservative approach. We continue to aim to see all patients with bite injuries (human or animal) on the day of injury or referral to provide treatment before complications develop. All bites should be excised and washed out under a local anaesthetic at the time of initial review to remove the source of infection (this may be in our trauma clinic or in the emergency department). All patients should be commenced on a course of antibiotics (though evidence for prophylactic use in the literature is weak), receive a tetanus booster if required and have early wound checks in the Plastic Dressings Clinic. Unless in the face, we leave excised bite injuries open to heal by secondary intention, but as for prophylac-

tic antibiotic use there is no consensus in the literature on this matter.<sup>3-5</sup> Only patients who present with signs of infection, complex injuries with underlying structural damage and those who are immunocompromised are considered for admission for intravenous antibiotics or surgical intervention in the theatre environment. This approach aims to protect the use of our inpatient beds and operating lists without compromising patient management or outcomes.

From our experience, we support the authors' conclusion that the majority of patients with bite injuries can 'safely be managed with washout under local anaesthesia, oral antibiotics and discharge on the same day with safety net advice.' All patients reviewed in our clinic were patients referred by regional A&E departments, this might explain our higher admission and/ or theatre washout numbers compared to the authors as they reviewed all bite injuries presenting to the Minor Injuries' Unit.

We suspect that many other Plastic Surgery Units across the country will have had similar experiences. It is interesting that in some aspects of our care we may find Covid-19 has been beneficial in de-medicalising management of certain patient presentations such as this which were classically treated with inpatient admission and a visit to the operating room. When resources are limited you find out what is truly required for optimal patient outcomes.

We look forward to the outcomes of the Bite Injury Treatment Evaluation (BITE) study and development of national guidelines so treatment of bite injuries can be more evidence based.

Yours Sincerely,  
T.R. Friebe, S. Gardiner, C. Southall, M. Akhavan

### Declaration of Competing Interest

None.

### Funding

None.

### Ethical approval

N/A.

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T.R. Friebe  
S. Gardiner  
C. Southall  
M. Akhavan

Department of Plastic and Reconstructive Surgery, Royal Free NHS Foundation Trust London, Pond Street, Hampstead, London, NW32QG, United Kingdom  
E-mail address: [t.friebe@nhs.net](mailto:t.friebe@nhs.net) (T.R. Friebe)

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## The COVID-19 facemask: Friend or foe?



Dear Sir,

Few would disagree that the global COVID-19 pandemic has been the "Great Disruptor."<sup>1</sup> All of us have had to postpone elective cases unless there would be a significant potential for future morbidity or mortality.<sup>2</sup> To slow the spread and minimize the impact, society recommen-



**Figure 1** Snuggly fit ear loop facemask with nasal bridge fabric coinciding with the upper boundary of inset median forehead flap.



**Figure 2** With mask removed, dusky lower half of inset flap proved to be non-viable secondary to compression. Complications are that all “providers should wear personal protective equipment, including a minimum of face masks and face shields for all patients.”<sup>2</sup> In spite of these guidelines, we must still be the innovators and the leaders typical for our specialty for maximizing risk/benefit solutions for those other problems that have not taken a vacation. This is exemplified by a “routine” case where cartilage exposure of the nasal tip and columella followed Moh’s surgical excision of a sebaceous carcinoma. Coverage using a standard median forehead interpolation flap appeared totally perfused 2 days postoperative. However, a week later the patient arrived for suture removal now wearing his protective face mask (Figure 1). When unveiled, the distal half of the flap was non-viable (Figure 2), obeying Vasconez’s Second Law: “All of the flap will survive except the part that you need.”<sup>3</sup> Adjustment of eyeglasses from the nasal bridge always is advised to prevent forehead flap pedicle compression,<sup>4</sup> but today we must remember that a mask must also be adjusted to eliminate pressure on the inset flap itself or perhaps use a face shield as a substitute. Complications take no holiday; and in spite of the COVID-19 crisis, we must still be the problem solvers—it is indeed our responsibility!<sup>5</sup>

#### Declaration of competing interest

None.

#### Funding

None.

#### Ethical approval

N/A.

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Geoffrey G. Hallock  
 Division of Plastic Surgery, St. Luke’s Hospital, Sacred  
 Heart Campus, Allentown, Pennsylvania USA  
 E-mail address: [gghallock@hotmail.com](mailto:gghallock@hotmail.com) (G.G. Hallock)

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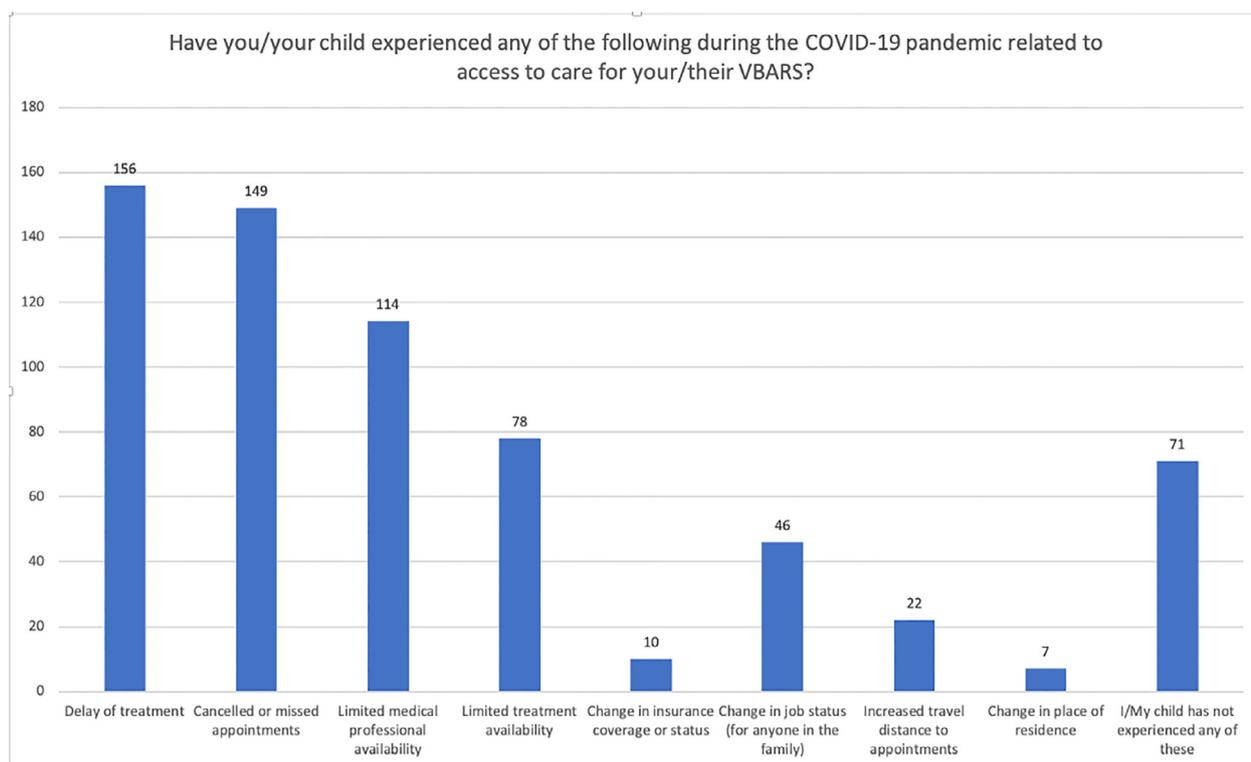
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## Assessing the impact of COVID-19 on individuals and families affected by vascular anomalies: The VBF COVID-19 survey



Dear Sir,

The Vascular Birthmarks Foundation (VBF) was established to network patients into treatment and to close the gap between patient and physician knowledge regarding vascular birthmarks, anomalies, and related syndromes (VBARS), which represent a spectrum of disorders from a simple “birthmark” to life threatening hemorrhagic tumors.<sup>1</sup> As the COVID-19 virus began to spread across the globe in early 2020, families affected by a VBARS informed VBF that their appointments for laser treatments, minor surgeries, and drug therapy were being cancelled or delayed. Institutions issued strict policies to discontinue these appointments until further notice, as they considered them nonessential. The VBF COVID-19 Impact Survey was created to measure and quantify the medical and psychosocial ef-



**Figure 1** Combined data for reported access to care barriers during the pandemic for adults and children.

fects of the pandemic on adults and children (under age 18) affected by one of the nine primary VBARS types listed on the VBF website. This study took inspiration from the health consequences caused by the hurricane Katrina.<sup>2</sup>

The VBF COVID-19 Impact Survey was a novel, mixed methods self-reporting instrument created using SurveyMonkey. The survey was available to both adults with a VBARS and caregivers of minors with a VBARS. Caregivers answered questions according to the experiences of their child. There were 705 completed responses (66% caregivers, 34% adults). Most adults had simple Port Wine Stain Birthmarks (56%) followed by Port Wine Stain Birthmarks with Sturge-Weber Syndrome (21%). Nearly half of children (47%) had Hemangiomas followed by Port Wine Stain Birthmarks (29%).

Fifty-six (23%) adults with a VBARS and 251 (54%) of caregivers of children with a VBARS sought care during the COVID-19 pandemic. Sixty-one percent of adults and 67% of caregivers said they experienced skipped, delayed, or cancelled medical care for their or their child's VBARS due to the pandemic. Children who experienced disrupted care were significantly more likely to have a Port Wine Stain or a Port Wine Stain/Sturge-Weber Syndrome combination and less likely to have a Hemangioma ( $p < 0.05$ ). Children between 0 and 1 years old were significantly less likely to experience disrupted care ( $p < 0.05$ ), whereas children between 2 and 5 years old were significantly more likely ( $p < 0.05$ ). Forty-seven percent of adults and 32% of caregivers who experienced skipped, delayed, or cancelled medical care reported that their or their child's VBARS got worse as a result. The most common reported VBARS medical exacerbations were inflammation, pain, and recurrence of

Port Wine Stain. Children who did not experience disrupted medical care were significantly more likely to have experienced no medical exacerbations ( $p < 0.05$ ). Sixty-eight percent of adults and 70% of caregivers experiencing disrupted care were contacted in a timely manner by health-care providers about rescheduling care. Delay of treatment, cancelled or missed appointments, and limited medical professional and treatment availability were the most common barriers to care (Figure 1). Interestingly, 52% of children received telemedicine care, while only 25% of adults did. Children who experienced disrupted care were significantly less likely to have received telemedicine ( $p < 0.05$ ). Despite experiencing a comparative lack of telemedicine, 52% of adults seeking care had resumed in-person appointments for their VBARS since the pandemic began. Out of these adults, 48% reported that the pandemic had a negative impact on the experience of in-person appointments. Fifty-eight percent of caregivers seeking care had resumed in-person appointments for their child, and 45% reported a negative impact on them.

For adults and children without a mental health diagnosis, 25% and 10% respectively said the pandemic made their mental health, specifically regarding their VBARS, worse. Adults who reported worse mental health were significantly more likely to report having an adverse effect on their VBARS from wearing a mask ( $p < 0.05$ ). Children with no change in their mental health were significantly less likely to experience any of the access to care barriers in Figure 1 ( $p < 0.05$ ). Both adults and children who reported that the pandemic had no difference on their mental health were significantly less likely to report medical exacerbations to their VBARS ( $p < 0.05$ ). Sixty-three percent of adults

Participant	Theme	Quote
Adult	Facial Appearance	"Masks means no one stares"
Adult	Facial Appearance	"A mask hides the [Venous Malformation] on my nose and lip."
Adult	Facial Appearance	"The mask is hiding my face...for the first time in my life people don't stare"
Adult	Facial Appearance	"It has been difficult and stressful having to wear a mask as I use makeup that rubs off to cover my PWS daily."
Caregiver	Access to Care	"All laser treatments were stopped and medical trial was put on hold he has started to have more bleeds from his PWS as a result "
Caregiver	Access to Care	"Been ignored treatment since birth in feb 2020. "
Caregiver	Access to Care	"Multiple appointments cancelled r/t COVID. Hemangioma has grown significantly since."
Caregiver	Access to Care	"Unable to travel for treatment"
Adult	Medical Exacerbations	"I feel my PWS has become darker and more swollen. Could be because it's summer and i'm getting more sun exposure, but working at the ER I wear a N-95 mask that suctions to my face, creating a tight seal, that I feel has made changes to my PWS."
Caregiver	Medical Exacerbations	"Additional stress and lack of access to specialists has meant break through seizures when they were under control before"
Adult	Psychosocial Effects	"I am terrified and anxious to get info about whether I am at increased risk of clotting."
Adult	Psychosocial Effects	"It has made me feel more vulnerable and mistrusting of medical professionals (lots of unknowns with covid which is similar to my [Venous Malformation] diagnosis)."

**Figure 2** Table of selected quotes from adults and caregivers in response to the question, "Has the COVID-19 pandemic had a profound effect on your/your child's VBARS experience? If yes, please explain." Four main themes emerged: Facial Appearance, Access to Care, Medical Exacerbations, and Psychosocial Effects. Responses were a mixture of positive and negative, but predominantly negative.

and 50% of children with a pre-pandemic mental health diagnosis reported that the pandemic made their condition worse.

When asked qualitatively what the most profound effect of the pandemic was on their/their child's VBARS experience, adults and caregivers differed greatly (Figure 2). Thirty-five percent of adults identified their facial appearance as the most profound, especially being able to cover their VBARS with a mask. Seventy-three percent of caregivers identified lack of access to care as the most profound, primarily the inability to get treatments for their children.

The VBF will continue advocating for health care providers and insurance companies to amend their policies so that all VBARS diagnostic and treatment codes are classified as a medical necessity. Treatment experts should also be informed, through this study, of the negative impact from

the lack of access to treatment as well as the psychosocial effects of living with a VBARS.

### Online resources

[www.birthmark.org](http://www.birthmark.org) "Types of Birthmarks" retrieved August 11, 2020. <https://birthmark.org/types-of-birthmarks/>.

### Declaration of Competing Interest

None.

### Ethical Approval

N/A.

## Funding

None.

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Linda Rozell-Shannon

*Vascular Birthmarks Foundation (VBF), Latham, NY, United States*

Jasmine Leahy

*Duke University, United States*

Gregory M. Levitin

*Vascular Birthmark Center of New York, United States*

Riccardo Nocini

*Department of Otorhinolaryngology, University Hospital of Verona Italy*

Giacomo Colletti

*Vascular Birthmarks Foundation (VBF), VBF Europe Co-Director; VBF Italy Medical Director (VBF Italy, Milan, Italy), VBF, Milan, Italy*

*E-mail address: [giacomo.colletti@gmail.com](mailto:giacomo.colletti@gmail.com) (G. Colletti)*

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## Comment on: “Thumb carpometacarpal joint osteoarthritis: Is there a role for denervation? A systematic review”



Dear Sir,

It is with great interest, that we read the systematic review by Teo I. and Riley N. on denervation in thumb carpometacarpal joint osteoarthritis<sup>1</sup>. Undoubtedly, denervation of the first carpometacarpal (CMC-1) joint represents

a promising treatment alternative for patients suffering from CMC-1-joint osteoarthritis, resistant to conservative treatment measures, as underlined in this review. Although representing a purely symptomatic treatment approach, the advantages of denervation are clear: minimal invasiveness, short recovery, no need for splinting, preservation of functionality and strength, no constraints for further surgeries in case of inadequate treatment response. However, postoperative outcomes are still ambiguous, as are surgical techniques and indications. In order to strengthen the role of denervation in the treatment of CMC-1-joint osteoarthritis and promote its general acceptance, the establishment of a standardized and reliable procedure is necessary.

## Indication

As is well elaborated in this review, inclusion and exclusion criteria differ among the nine studies included or are not mentioned at all.

“Failed conservative measures” was stated as an inclusion criterion in seven out of nine studies. We would go one step further and state that failed improvement of pain after conservative measures should be an indication for any surgical therapy, but not necessarily denervation. Ehrl et al. excluded Eaton and Littler stage I and IV osteoarthritis<sup>2</sup>. However, pantrapezial arthritis, hence an Eaton-Littler stage IV, without instability or disabling deformity does not automatically exclude denervation. In these cases an extension of the procedure to a radial or total wrist denervation might lead to sufficient pain reduction.

The Eaton and Littler classification is a valuable and well established tool for radiological severity assessment of CMC-1 osteoarthritis. Nevertheless, this classification does not consider metacarpal subluxation. Hence, this classification alone appears not sufficient for therapeutical planning with regard to denervation. While clinical findings should always be foregrounded, Dell’s classification e.g. might be a helpful complementary tool for evaluating subluxations and deformities. If persistent, these would rather indicate a trapeziectomy. Nevertheless, Giesen et al., including all stages of the Dell’s classification, did report less favorable outcomes among the more severe stages of CMC-1 osteoarthritis<sup>3</sup>.

Besides instabilities and deformities, endosteal pain transmission in severe arthritis is discussed as another potential reason for poorer denervation outcomes<sup>4</sup>. Although still too little is known about bone marrow innervation and its role in arthritic pain, previous studies confirm a bone marrow involvement in arthritis<sup>4</sup>, suggesting the existence of endosteal pain transmission.

## Skin incision

Surgical techniques of CMC-1-joint denervation within the referred articles show great variances. While incisions vary between single and double incisions, also the number of denervated nerve branches differ clearly. Dellon et al. denervated only the volar aspect of the CMC-1-joint, which was preceded by an accurate preoperative pain localization<sup>5</sup>. This approach, however, requires high expertise, entailing

This work has not been presented in any meeting.

the risk of missing a dorsally located CMC-1-joint pain by less experienced hand surgeons. Moreover, in own anatomical studies (not yet published) we identified variations of connecting branches between the superficial branch of the radial nerve (SRN) and the palmar cutaneous branch of the median nerve (PCBMN), which could lead to pain persistence or recurrence after a solely volar denervation.

Since it might be hard to reach the very palmar and dorsal nerve branches innervating the CMC-1-joint with a single incision only, we would personally recommend a double incision.

## Surgical technique

Regarding the specific nerve dissection, we definitively recommend to denervate the articular branches to the CMC-1-joint of the SRN, the lateral antebrachial cutaneous nerve, the PCBMN as well as the thenar branch of the median nerve, which we could consistently identify in own preliminary anatomical studies. As we further identified branches of the posterior interosseous nerve (PIN) to the CMC-1-joint, we would also recommend to include a PIN-denervation. Among the included articles, only Giesen et al. performed a denervation of the PIN<sup>3</sup>. We do not see the need for a standardized joint lavage and imbrication within CMC-1-joint denervation, such as performed by Ehrl et al., as this involves the additional risk for joint infections<sup>2</sup>.

## Conclusion

Denervation represents a very promising, minimal-invasive additional treatment option for early stages of CMC-1-joint osteoarthritis. Our department has a scientific focus as well as long-time clinical experience with wrist denervations, including the CMC-1-joint in occasional early stages of osteoarthritis. In case of joint instability or grave functional impairments, we consider trapeziectomy still the gold standard therapy. Apart from these contraindications, we attribute high therapeutical potential to CMC-1-joint denervation, which should be preferred over trapeziectomy as a first line therapy in selected cases of CMC-1 osteoarthritis.

If no severe instability is present in a stage IV panarthrosis, an additional radial wrist denervation might result in more satisfactory outcomes. However, a potential endosteal pain transmission, as a negative prognostic parameter, has to be considered and discussed with these patients.

To reduce the risk of missing articular nerve branches and unsatisfactory outcomes we would recommend denervation of the entire CMC-1-joint via a double incision.

## Declaration of Competing Interest

None.

## Ethical Consideration

None.

## Funding

None.

## Acknowledgment

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Viola-Antonia Stögner

Nicco Krezdorn

Peter Maria Vogt

Department of Plastic, Aesthetic, Hand and Reconstructive Surgery, Hannover Medical School, Carl-Neuberg-Straße 1, 30625 Hannover, Germany

E-mail address: [stoegner.viola@mh-hannover.de](mailto:stoegner.viola@mh-hannover.de) (V.-A. Stögner)

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## Letter to the editor: International survey on arterial spasm during free flap surgery



Dear Sir,

Arterial spasm may be responsible for anastomosis revisions and for an increased operative time during free flaps which became the new reference in reconstructive surgery all over the world. We therefore conducted a study through a survey to offer an international overview on arterial spasm during free flaps.

<b>French</b>	<b>58</b>	
Yes	50	86%
Non	8	14%
<b>International</b>	<b>102</b>	
Yes	91	89%
No	11	11%
<b>Total</b>	<b>160</b>	
Yes	141	88%
No	19	12%

**Figure 1** Arterial spasm's occurrence.

One hundred and sixty maxillo-facial, plastic and ENT surgeons from around the world answered our survey allowing to highlight the importance and the frequency of arterial spasm since 88% of surgeons have already experienced vasospasm (Figure 1).

Globally, small diameter of the recipient artery is one of the main factors of arterial spasm, while 89% of microsurgeons realise end-to-end arterial anastomosis (Figure 2). Performing end-to-side anastomosis on vessel with bigger diameter may therefore limit the occurrence of arterial spasm.

Excessive manipulation of the vessel is another cause of arterial spasm well described in the litterature.<sup>1</sup> An atraumatic dissection and a smooth manipulation of the recipient and flap arteries are therefore important preventive methods of arterial spasm described by surgeons who answered our survey. The surgeon experience performing the anastomoses is paramount, that is why supervising a young surgeon during surgery as complex as free flaps should be essential.

Moreover, 67% of surgeons declare that an arterial spasm may occur several times on the same patient. A typical patient at risk of spasm remains to be defined. In our study, it appears that men above 50 years of age with active smoking are more inclined to develop arterial spasm.

Lots of techniques described in our survey and in the literature attempt to release the arterial spasm such as "wait and see" attitude which consist in wait at least 15 min (some

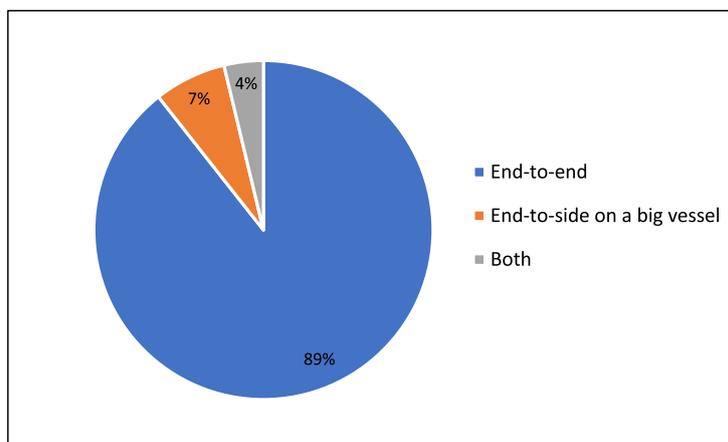
surgeons have a break/coffee) and see if the spasm still persists or irrigating the artery with warm saline solution, increasing the blood pressure (the average blood pressure has to be more than 80 mmHg) and finally using in local application different drugs such as lidocaine, papaverine, beta-blockers, nimodipine, or magnesium sulphate. But a clear protocol is missing as surgeons use different dilutions, or different combinations between vasodilating drugs and no study showed significant evidence.

These techniques were found to be effective in 73% of cases, even if in 51% of cases, anastomosis revision was eventually realised. According to these results, some surgeons have certainly considered that anastomosis revision was a first-line treatment of vasospasm.

Only local treatment of vasospasm was described in the survey results but none intravenous. A recent study<sup>2</sup> led by Jin SG and Al in Korea shows with significant difference that lipo-prostaglandin E1 (L-PGE1) administration increases the maximal blood flow velocity after anastomosis during free flaps. L-PGE1 was continuously administered in intravenous with the rate of 0.4 µg/h and did not show any complications after administration. The question "could L-PGE1 be used to prevent arterial spasm during free flaps?" remains to be clarified.

Arterial spasm or thrombus? That is the question ... It appears that make the difference between the two is not always easy since 39% of surgeons finally discovered a thrombus after revision of their anastomosis that is why intravenous heparin may be considered as treatment after failure of local application of vasodilating drugs before redoing anastomosis.

Last but not the least, only the intra-operative period was underlined in our study. We must not forget that spasms can also occur in the post-operative period,<sup>3</sup> especially if spasms have occurred during the microsurgery. Sacak and Siringlu described a method<sup>4</sup> consisting in injecting 1 mL lidocaine every two hours during two days after surgery by an IV canula placed next to the anastomosis during the operating time. Their method has already been tried on 50 patients. They explain that this is a cheap and versatile method to prevent postoperative vascular spasm in microsurgery but the type of patients who may benefit from this method remains to be determined.



**Figure 2** Repartition of the most realised anastomosis during free flaps.

To conclude, arterial spasm in free flaps is thus very well-known from surgeons of the whole world. An adequate congruence between the recipient and the flap's arteries, an atraumatic dissection of the vessels and the upkeep of a high blood pressure are good spasm preventive measures. Local application of vasodilating drugs seems to be the best way to release an arterial spasm even if a clear protocol is missing and remains to be found. Prospects for reducing spasm seem to exist, especially by changing the type of anastomosis (more end-to-side anastomosis on big vessels), but prospective studies must be done.

## Funding

None.

## Declaration of Competing Interest

None declared.

## Ethical approval

Not required.

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Jeanne Rosette, Rachid Garmi  
Department of Maxillofacial and Plastic Surgery, Caen  
University Hospital, 14000 Caen, France

Mariam Boutros  
Department of Anaesthesiology, Caen University Hospital,  
14000 Caen, France

Mikhail Sinelnikov  
Sechenov University, Moscow, Russian Federation

Hervé Bénateau, Alexis Veysié  
Department of Maxillofacial and Plastic Surgery, Caen  
University Hospital, 14000 Caen, France  
Normandie Université, UNICAEN, BioConnecT, 14000 Caen,  
France  
Medicine Faculty of Caen, University of Caen Basse  
Normandie, 14032 Caen Cedex 5, France

E-mail address: [rosette-j@chu-caen.fr](mailto:rosette-j@chu-caen.fr) (J. Rosette)

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## Response to a letter: “Plastic surgery in a student-run free clinic”



Dear Sir,

We read with interest Makhoul's et al. correspondence entitled 'Plastic surgery in a student-run free clinic' (SRFC).<sup>1</sup> Clinics are traditionally a well-proven setting for such supervised learning and the opportunity to empower students, both preclinical and clinical, in the well-supported surrounds of SRFCs is to be commended. Expanding student-run clinics to incorporate operative lists is certainly an interesting proposition. Student years can be a period where practical skill development is very much secondary to theoretical learning. A lack of exposure to surgery can not only limit interest in pursuing a career in the field, but also compromise the overall medical training of the individual. However, we believe student operating, even in a controlled setting such as that described, requires careful planning and we would value further exploration of the hurdles that must be overcome to develop a sustainable model of care and education.

The rigorous nature of medical education and assessment requires those practising to surpass an established threshold of knowledge in order to practice competently.<sup>2</sup> Though the authors state there is close supervision by qualified surgeons, there is no mention of pre-determined standards of theoretical and/or practical competency required to perform plastic surgery in SRFCs. We would advocate that those implementing such programs have a clear set of proven competencies that students must satisfy prior to being able to engage in SRFCs. Though the procedures undertaken may be reasonably low risk in patients who are systemically well, without such assessment there will likely be significant variability in the standard of operative care delivered. Furthermore, those seeking freely available care represent a more complex patient cohort, where existing knowledge of comorbidities may be limited or inaccurate.<sup>3</sup> There should be awareness of this and students should have the ability to deal with a wider set of patient complications, even in what may be initially judged to be a minor procedure. Also, though expanding the remit of care delivery is admirable, freely accessible care should not change the standard of care delivered. Hence, prior teaching and assessment will improve both care delivery and the educational value of the program offered to students.

Proven competency also lends itself well to being able to properly consent patients for operative procedures in plastic surgery. Consent is a complex issue that is central to the burden of litigation that remains prominent in plastic surgery.<sup>4</sup> If students are to be able to operate securely then they need confidence in the litigative support that they should receive in circumstances where it may well be required. Our current understanding is that university coverage is sufficient for students acting within the remit of their educational curriculum, but we would find this an unlikely source of indemnity should students require legal support post procedures performed in SRFCs. We would value an exploration of how those overseeing SRFC plastic surgery plan to provide sufficient indemnity to students should complications arise. Perhaps if the level of supervision is sufficient then those voluntary clinicians might assume legal responsibility for the cases overseen but could their indemnity extend to such work? If so, then this would be positive in supporting operating students, but we fear this might limit those wanting to engage in such a model should they bear the burden of responsibility for cases not performed by themselves.

Maintaining such adequate operative supervision is key and could be challenge in the long-term. However, the limits of this supervision need to be clearly defined. Otherwise the follow-up of SRFC patients may be compromised if students or surgeons do not take ownership of the surgical caseload and their subsequent care. This is particularly pertinent in a setting where student turnover has traditionally proven to be high.<sup>5</sup> There will also be limits to what SRFCs have the capability to provide in follow-up care to patients and provision should be made for how best to facilitate further care, either via SRFCs or partner institutions.

Plastic surgery often requires multi-disciplinary care pre and post-operatively. This might represent a significant logistical hurdle. Amongst the authors' acknowledged challenges are the logistics of student volunteers coordinating resources and operative lists. The current model for performing plastic surgery in the SRFC described is in a time rich, pressure free, setting. If this model of care delivery is successful then might this be subject to change? As a freely available service, it is hard to envisage it remaining unnoticed or under-utilised. Will the capacity be able to mimic anticipated increases in demand? If not then it risks becoming a more pressured service and a robust plan for supporting student coordinators of SRFC plastic surgery is required.

We applaud the progressive nature of SRFCs and their provision of freely available care and believe that they can have an excellent role in the development of plastic surgery service provision and education.

## Declaration of Competing Interest

None

## Funding

None

## Ethical approval

N/A

## Acknowledgments

N/A

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Sebastian Tullie

Oliver Bloom

Ian King

Department of Plastic and Reconstructive Surgery, St Thomas' Hospital, Westminster Bridge Road, London, SE1 7EH, United Kingdom

E-mail address: [sebastian.tullie@nhs.net](mailto:sebastian.tullie@nhs.net) (S. Tullie)

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## Reply to comment on "Plastic surgery in a student-run free clinic"<sup>☆</sup>



Dear Sir,

We thank Tullie et al. for their interest in our correspondence titled "Plastic Surgery in a Student-Run Free Clinic."<sup>1</sup> In their response, Tullie et al. raise several important considerations, including the degree of student involvement, liability concerns, and challenges to continuity of care.<sup>2</sup>

<sup>☆</sup> **Disclosures:** No direct funding was provided for this study. The authors declare no financial interests that pose a conflict of interest related to this manuscript.

The Society of Student-Run Free Clinics advises that a student-run free clinic (SRFC) establish a legal relationship with its affiliated academic medical center (AMC), so that for the purpose of medical education, the site becomes an extension of the AMC.<sup>3</sup> The implications of this relationship are two-fold. First, student involvement in patient care is akin to that of any AMC setting. The Liaison Committee on Medical Education (LCME), the accrediting body of U.S. medical schools, makes clear that this involvement must be “appropriate to the student’s level of training” and “supervised within the scope of practice of the supervising health professional.”<sup>4</sup> In the context of plastic surgery at a SRFC, a clinical student can be expected to assist the supervising surgeon as they would during any plastic surgery clinic procedure - the difference being additional time for learning and instruction, not less supervision or greater autonomy.

Professional liability coverage varies by policy, institution, and jurisdiction. A risk management specialist should be involved in the establishment and operation of any SRFC. However, faculty members and students are generally covered by their AMC professional liability policy while acting within the scope of their AMC duties or educational program. Therefore, an established legal relationship between the SRFC and the AMC must exist prior to offering any form of plastic surgery services.

As Tullie et al. discuss, continuity of care can be challenging in the SRFC setting, given the high rate of student turnover. To ensure longitudinal care, clinic must be managed by directors who facilitate continuity of all plastic surgery patients. While preclinical and clinical volunteers may change frequently, clinic directors should serve for a minimum of one year. Their primary responsibility is to maintain an accurate patient list and coordinate all appropriate follow-up care, both within the SRFC and the broader AMC system. Additionally, careful handoff of the patient list to incoming directors is crucial to ensuring continuous patient care. Moreover, longitudinal involvement of faculty and residents promotes continuity similar to any traditional academic plastic surgery practice.

In conclusion, the highest standards of care and professionalism must be observed wherever plastic surgery is practiced, including at a SRFC. Many of our patients believe that the care provided at our SRFC is the best they have ever received,<sup>5</sup> and offering safe, timely surgical services allows us to deliver on that promise. While Tullie et al. are correct to point out theoretical limits to our patient capacity, we feel we must do all that we can to fulfill an unmet need in our community. Furthermore, we hope this sustainable model for instructive altruism will continue to grow and find favor among plastic surgeons at institutions around the world.

### Ethical approval

N/A.

### Declaration of Competing Interest

None.

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Alan T. Makhoul  
Vanderbilt University School of Medicine, D-4207 Medical  
Center North, 1161 21st Avenue South, Nashville, TN  
37212, United States

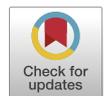
Kianna R. Jackson, Galen Perdakis  
Department of Plastic Surgery, Vanderbilt University  
Medical Center, Nashville, TN, United States

Brian C. Drolet  
Department of Plastic Surgery, Department of Biomedical  
Informatics, Center for Biomedical Ethics and Society,  
Vanderbilt University Medical Center, Nashville, TN,  
United States  
E-mail address: [alan.t.makhoul@vanderbilt.edu](mailto:alan.t.makhoul@vanderbilt.edu) (A.T.  
Makhoul)

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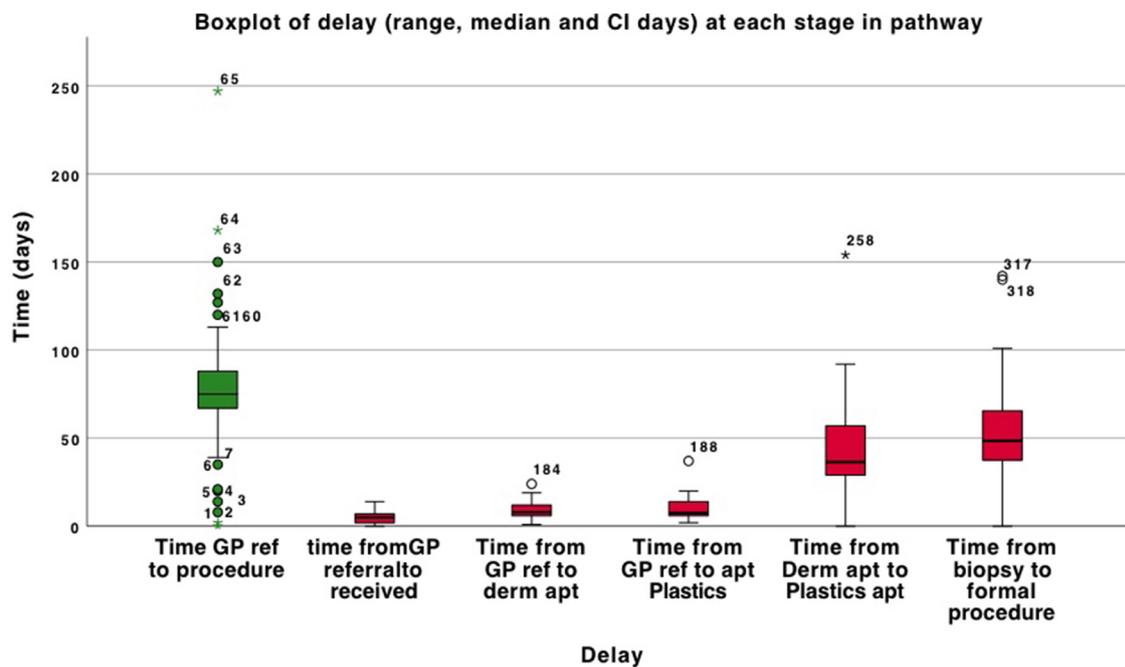
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## Achieving 62-day targets in the management of skin cancer: Lessons learned and future directions for the post-COVID era



Dear Sir,

For the past 20 years, the delivery of skin cancer care in the United Kingdom (UK) has been governed by a 62-day target to achieve the first definitive treatment from the time of referral. This objective was set out by the Department of Health in the National Health Service (NHS) Cancer Plan 2000<sup>1</sup> and adjusted in the 2007 Cancer Reform Strategy<sup>2</sup> to include an expected compliance of 85%.



**Figure 1** Boxplot showing median delay and range in days at each stage of the 62-day pathway, with the total time from GP referral to first definitive treatment in green for all patients who breached between 2017-2019.

Now, in the year 2020 where the world as we know it has been drastically upended due to Coronavirus-2019 (COVID-19), how too will the delivery of cancer services change?

While the provision of skin cancer surgery has varied considerably from unit to unit across the country during the pandemic<sup>3</sup>, there are some centres who will experience a considerable backlog of referrals, resulting in subsequent breaches. The Royal Stoke University Hospital was one centre which continued delivering skin cancer surgery throughout the ‘peak’ of the pandemic. As a baseline, we reviewed the reasons for delay in skin cancer treatment in the two years (2017-2019) prior to COVID-19 as a means of preparation for how best to streamline the service should the system become stressed by a pandemic backlog.

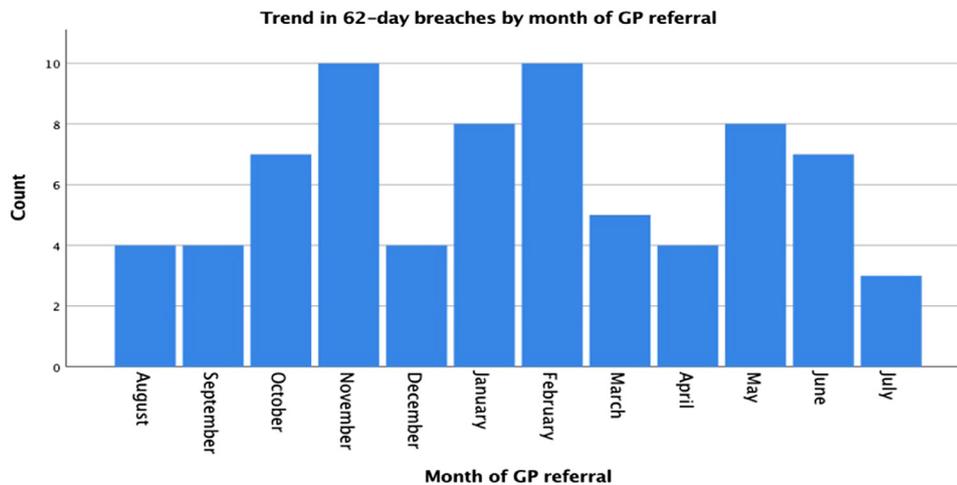
- During this 2-year period, 72 patients (mean age 79 [SD 10.9]) with 65 SCCs and 7 melanomas breached the 62-day target. This represented 10% (72/713) of the skin cancers treated for the time period.
- The median time from referral to procedure in patients who breached was 75 days (IQR 68-90).
- The longest delays were from initial diagnostic biopsy (69/72 patients) to formal procedure (mean 49.6 days [SD 30]) or for those who had an initial appointment with dermatology and were subsequently referred to plastic surgery (mean 41.7 (SD 25) days), as shown in [Figure 1](#).
- Where a reason was coded for delays, these were most commonly due to inadequate operating capacity (29%), followed by delays due to patient fitness for surgery (26%).
- In accordance with summer being the busiest time for referrals in our centre, the peak of breaches occurred in November, and additionally in February following a

decrease in service provision over the Christmas period ([Figure 2](#)).

How, then, will this information equip us and other UK skin cancer units to face a potential influx of referrals during and following second and potential subsequent ‘waves’ of the pandemic, while resources may be limited? It is evident that answer, as suggested across the subspecialties in the post-COVID era<sup>4</sup>, is to streamline the service. From our analysis of pre-pandemic problems, we have identified three key areas to target to reduce waiting times:

1. First, appropriate triaging of patients to either plastic surgery or dermatology (or other specialties as relevant) in order to reduce delays caused by inter-specialty referrals. This may be done at the GP referral stage or upon receipt of the referral by specialist teams. The use of electronic 2-week-wait forms with mandatory fields may provide the evidence needed to decide which lesions are best managed directly by plastic surgery, for example suspected skin cancers greater than a certain size or lesions in the head and neck. This information can then arm administrative staff to book the patients for either plastics or dermatology review in accordance with an agreed protocol. This has been implemented at our centre at a preliminary level for lesions in the head and neck, where location of lesion is adequately described by the referrer.

Telemedicine, through telephone and video consulting has proven beneficial in the triage process - both in increasing the number of patients administrators can book to be seen in a session, and acting as a second line of triage to remove patients who do not likely have a cancer from the pathway. Teledermatology following the COVID-19 outbreak



**Figure 2** Seasonal variation in 62-day breaches of skin cancer patients.

may already be decreasing the two-week-wait time for the specialty.<sup>5</sup>

- Secondly, combined dermatology and plastic surgery clinics would allow any patients who are deemed to benefit from plastic surgical input to avoid waiting 49 days for a second appointment. We have implemented “parallel” clinics where dermatologist and plastic surgeon are consulting in adjacent rooms. In very busy clinics, extra time may be allocated to allow cross-specialty review of any patients immediately.
- Lastly, streamlining may be achieved at an individual patient level by combining or reducing steps in the diagnostic pathway. Patients referred directly to plastic surgery may not need an initial incision biopsy, for example, if it is not likely that the lesion will require graft or flap reconstruction. To this end, the decision can be made not to proceed with incision biopsy after the initial consultation. Sixty-nine of the 72 patients in this cohort had an incision biopsy which in our minds highlights it as a key target for change. Where there is a clinical need for incision biopsy, these should be fast-tracked for pathology so that their definitive surgery can be undertaken in a timely manner.

With the above efforts, these authors believe that both the number of patient encounters with the healthcare service and the length of time they spend waiting for diagnosis and treatment of skin cancer will be reduced. Perhaps a hopeful prospect of the tragic events of 2020 may be that it served as an alarming reminder to re-evaluate our National Health Service and innovate for our future population.

### Declaration of Competing Interest

None declared.

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### Ethical approval

Not required.

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Ailbhe L. Kiely  
*Department of Plastic and Reconstructive Surgery, Queen Elizabeth Hospital, University Hospitals Birmingham NHS Trust, Mindelsohn Way, Edgbaston B15 2TH, United Kingdom*

Chantal Patel, Amir Ismail  
*Department of Plastic and Reconstructive Surgery, Royal Stoke University Hospital, Newcastle Rd, Stoke-on-Trent ST4 6QG, United Kingdom*

*E-mail addresses:* [ailbhe.kiely@nhs.net](mailto:ailbhe.kiely@nhs.net), [kielya1@tcd.ie](mailto:kielya1@tcd.ie) (A.L. Kiely), [chantal.patel@uhnm.nhs.uk](mailto:chantal.patel@uhnm.nhs.uk) (C. Patel), [amir.ismail@uhnm.nhs.uk](mailto:amir.ismail@uhnm.nhs.uk) (A. Ismail)

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