Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Correspondence and Communications

Safety and effectiveness of negative pressure therapy on free flaps following lower limb reconstruction: A systematic review

Dear Sir,

We have recently investigated the safety and effectiveness of extrinsic compression on lower limb free flaps[1] and in this literature review explored the use of negative pressure therapy (NPT) on lower limb free tissue transfers.

A PRISMA compliant, PROSPERO registered (CRD42019154393) systematic review was conducted, looking at the use of negative pressure dressings immediately applied after soft tissue transfer to the lower extremities. A search strategy was designed with the aid of an experienced librarian including: “free flap”, “free tissue flap”, “free tissue transfer”, “microsurgical flap” and “perforator flap”; combined with “bandage*”, “compress*”, “wrap*”, “flap training” and “dangling”, “negative pressure”, “vacuum assisted”, along with “lower extremity” and associated terms. EMBASE and MEDLINE databases were systematically searched on the 27th of January 2020 for eligible studies, including randomised and non-randomised controlled trials, cohort and case-control studies, case series and case reports. No filters or limitations for publication time and language were used.

Title and abstract screening followed by full text reviews (JB and LT) and data extraction (PW and LG) was conducted in parallel by two independent authors, with a third senior author (AJ) available to discuss disagreements. Demographic information outcomes and reported complication were retrieved from the eligible articles for analysis. A formal risk of bias assessment for each included article was also conducted.

A total of 847 entries were obtained from the systematic searches, of which 498 were retrieved from MEDLINE and 349 from EMBASE. Following identification of 223 duplicate items, 624 publications were reviewed further. Of these, only 8 met the pre-defined inclusion criteria (Figure 1).

The final list of eligible articles, which included publications between 2008 and 2018 are shown in Table 1. A total of 104 free flaps for lower limb reconstruction were reported among eligible studies. For all these articles NPT was applied intraoperatively and set to continuous suction. Five articles used this technique to secure split skin grafts over muscle flaps, Koulaxouzidis et al. utilised TNP over temporoparietal fascial free flaps covered by skin grafts, and two further articles published by the same research group utilised this modality over fascio-cutaneous flaps. Among all of these, there were only 3 (2.9%) complete flap failures reported for lower limb cases. However, these studies did not include any comparison arms that could prove substantial benefit over standard postoperative management. All the included articles had moderately to high risk of bias.

Topical negative pressure therapy may facilitate wound management by controlling exudate, edema and odor, and may also accelerate the healing process for chronic wounds[2]. Although no benefits have been found for its use as a temporary dressing for lower limb open fractures between debridement and definitive soft tissue cover[3], it may facilitate split skin graft take and reduce local wound healing complications[4], while providing a consistent compression. Our data show that following application of TNP over free flaps free flap failure rate is no different from large lower limb trauma series[5].

Even though our results suggest that the use of NPT is safe, we were not able to find reports of any clinical benefits associated with this intervention. Further conclusions are limited by the quality of the included studies, consisting in non-randomised cohort studies and case series with moderate to high risk of bias. Further studies comparing the use of NPT against standard dressings are needed to answer, ideally using a randomised two-arm study design are needed to better understand the benefits that this approach could have compared to conventional dressings.

A protocol for this systematic review was registered with PROSPERO (CRD42019154393)

Table 1 Included studies in systematic review.

	Reference	Study type	Location of reconstruction	Free flap choice	Modality of compression	Flap failures	Other outcomes	Quality of Evidence
	TNP							
1	Bannasch, et al., 2008	Case series	**Lower extremity ($n = 5$)**	Gracilis, serratus and rectus abdominis flaps	NPT dressing applied intra-operatively (continuous 125 mmHg) over split skin graft	None	In one patient, despite flap survival, diabetic foot complications resulted in a below knee amputation 6 weeks later.	High risk of bias
2	Nelson et al., 2010	Case series	**Lower extremity ($n = 14$)**	Vastus lateralis flaps	NPT dressing applied intra-operatively (continuous 75 mmHg) over split skin graft	1 case		High risk of bias
3	Eisenhardt et al., 2010	Retrospective cohort	**Lower extremity ($n = 26$)**	Gracillis, rectus abdominis and LD flaps	NPT dressing applied intra-operatively (continuous 125 mmHg) over split skin graft	2 cases due to DVT (7.69%)	In one case, intraoperative TNP application resulted in alteration of implantable Doppler signal and was therefore removed. Two patients evolved with unstable skin grafts	Fair

(*continued on next page*)

Table 1 (*continued*)

4	Koulaxouzidis et al., 2011	Case series	**Lower extremity ($n = 4$)**, upper extremity ($n = 2$) and head and neck ($n = 2$)	Temporoparietal fascial flaps	NPT dressing applied intra-operatively over split skin graft	None	No late revisions required	High risk of bias
5	Dornseifer et al., 2016	Prospective cohort	**Lower extremity ($n = 15$)**	Gracillis flaps	NPT dressing applied intra-operatively (continuous 125 mmHg) over split skin graft	None	StO2 measurements using near-infrared spectroscopy and ultrasound doppler flow measurements were documented. Three patients dropped below safe thresholds during dangling regime at POD 3, and therefore flap training was interrupted	Fair
6	Khan et al., 2017	Retrospective cohort	**Lower extremity**, upper extremity and scalp (total $n = 24$)	LD, ALT, TDAP, radial forearm flaps	NPT dressing applied intra-operatively (continuous 125 mmHg)	None	-	Unable to assess - abstract only

(*continued on next page*)

Table 1 (*continued*)

7	Bi et al., 2017	Retrospective cohort	Scalp ($n=5$), **lower extremity ($n=11$)**, upper extremity and hand ($n=8$)	LD, ALT, TDAP and radial forearm flaps	NPT dressing applied intra-operatively (continuous 125 mmHg)	None	-	Fair
8	Settembre et al., 2018	Case series	**Lower extremity ($n=5$)**	Omental flaps	NPT dressing applied intra-operatively (continuous 75 mmHg) over split skin graft	None		High risk of bias

POD: Post-operative day / NPT: Negative pressure therapy / DVT: deep vein thrombosis / ALT: anterolateral thigh / LD: latissimus dorsi / TDAP: thoracodorsal artery perforator /SCIP: superficial circumflex iliac artery perforator / StO2: Tissue oxygenation

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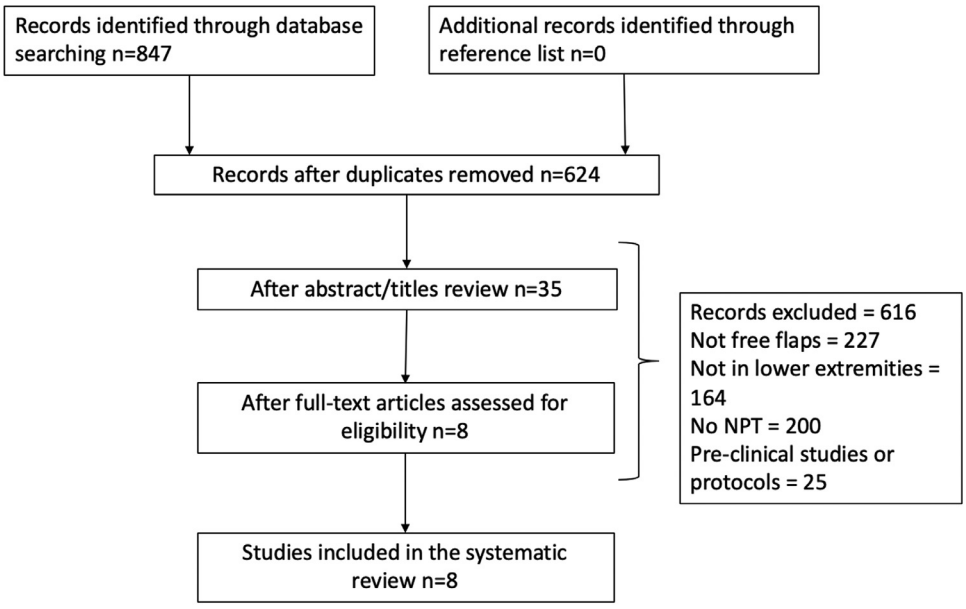

Figure 1 PRISMA flow diagram.

Disclosure

All authors have no conflict of interest.

The study presented in this correspondence article were originally submitted for publication as part of a larger piece[1]. Following peer-review and editorial appraisal it was decided to remove NPT articles from the main manuscript for the sake of clarity and is therefore being submitted as a separate manuscript.

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Defining clinical decision making in the provision of audio-visual outpatient care for acute upper limb trauma services: A review of practice

Dear Sir,

The Covid-19 pandemic has accelerated the widespread adoption of technology-enabled care in the NHS. This has included the use of the *Attend Anywhere* online appointment system, telephone consultations and web based applications for continued healthcare delivery.[1] This transformation has facilitated a significant reduction in hospital and community based in-person consultations thus reducing transmission of the virus and safeguarding patients and staff. Moving into phase two of the response, the continuing use of audio-visual technology is expected, where appropriate, to be integral in the ongoing provision of safe, quality patient care.[2]

As an early adopter of audio-visual consultation, Salisbury NHS Foundation Trust's (SFT) hand trauma team conducted over 540 patient audio-visual appointments for upper limb trauma patients during phase one of the Covid-19 response. For many patients, audio-visual appointments offered a practical, time efficient way of accessing their reconstructive team for assessment, advice and post-operative care. However, a subset of patients was identified by the team as requiring at least one in-person appointment to minimize perceived clinical risk and to optimize quality outcomes. A need therefore exists to establish how trauma teams can determine when clinical care can be safely delivered remotely using audio-visual technology and when there is a need for in-person consultation.

At SFT, during phase one the decision to treat patients in-person or remotely was made using clinical screening criteria. These criteria were developed and implemented successfully, but at pace. They allowed the team to confidently assess that, where necessary, the benefit to the patient of an in-person consultation outweighed the risk of attendance. The criteria used included Covid-19 exclusion factors,[3] professional guidelines[4,5] and clinical criteria of patient specific considerations, including; injury severity, social risk factors, and mental health considerations. At each appointment, these criteria were reviewed to ensure the care plan remained in the patient's best interest.

During phase two of the Covid-19 response and beyond, proactively determining which patients can be managed remotely and which are likely to require in-person contact to recover function post injury will be essential to the success of upper limb trauma surgery. In order to understand more fully the challenges and successes of technology-enabled care to date we conducted a national survey of practice across hand units in the UK. Responses were received from 51 units.

Results from this survey confirmed that prior to the Covid-19 pandemic only 16% of units were offering technology-enabled appointments. During phase one of the response this rose to 76% for new patient assessment and 82% for patient follow-up. The survey found that 73% of units used criteria for determining whether patients were suitable for technology-enabled appointments, but in agreement with our experience at SFT, 92% had concerns with the use of technology-enabled care overall or for certain patients.

Reasons for concern with technology-enabled appointments and need for in-person consultation included:

- *Minimising clinical risk:* Whilst injury severity was considered the main indicator for an in-person patient appointment offered (96.6%), patients with specific factors such as mental health considerations (39.3%) and social risk factors (25.0%) were more likely to be offered in person appointments.
- *Specific injury outcomes:* Specific injuries were noted to progress more slowly and have poorer outcomes than expected by the team when seen audio-visually. These included high nerve lesions, isolated Flexor Pollicis Longus (FPL) tendon repairs and composite injuries that had resulted in the repair of more than one structure in the same anatomical area. Patient anxiety around outcome (52.6%), a need to physically evaluate the injury (i.e. clinical testing of structures) and bespoke splinting required to optimise outcomes (44.4%) were reported as risk factors in these cases for poor outcomes.
- *Staff confidence in decision making:* A range of factors were observed to contribute to decision making, including the experience level of the team, the unique presentation of the patient and the patient's psycho-social ability to engage in therapy remotely. A lack of formal clinical decision-making tools and the medico-legal implications of new practice were reported as staff concerns.

Digital transformation is an essential component of the NHS England five-year forward view and the NHS long-term plan. Critical priorities include the development of digital technologies, innovative delivery of audio-visual care and improvement of remote consultation for assessment and treatment. Building on our findings and the emerging pres-

sure to 'lock in' the beneficial changes of remote consultation,[2] we propose the need to develop nationally agreed screening criteria to determine how and when technology enabled outpatient care can be used in the management of upper limb trauma. We believe the development of these criteria will ensure that individual care plans remain in the patient's best interest, whilst building on the opportunities for digital transformation. A multicentre observational study is currently being undertaken to determine the wider application of these findings and potential benefit of such a tool.

Declaration of Competing Interest

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Ethical Approval

N/A.

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Complications after upper extremity revision amputation and replantation

Dear Sir,

Severe traumatic injuries to the upper extremity can be treated with revision amputation or replantation. Functional outcomes following these treatment types have been well described.[1-3] While it is recognized that replantation carries greater risks and cost as compared to revision amputation, continued development of techniques and protocols may improve their results. Given this, we performed a retrospective study of patients who sustained upper extremity injuries resulting in treatment with either revision amputation or replantation to determine factors associated with their outcomes.

We used the Nationwide Inpatient Sample (NIS) developed by the Agency for Healthcare Research and Quality (AHRQ) under the Healthcare Cost and Utilization Project (HCUP) for 10 years, 2002 to 2011. The NIS is an all-payer inpatient health care database in the United States. For this study, data was analyzed as a 20% stratified sample of US community hospitals. We used the World Health Organization International Classification of Diseases 9th (ICD-9) to identify patients that received discharge diagnoses for upper extremity amputation. These were correlated with ICD-9 procedure codes for either revision amputation or replantation procedures. HCUP data includes hospital characteristics, such as region (northwest, Midwest, south, west), teaching status, and total number of beds available. Patient characteristics data in HCUP includes race, gender, age, median household income, insurance status, and comorbid conditions. Multivariable logistic regression analysis was performed to identify significant risk factors for postoperative complications within each patient cohort. All *P* values less than 0.05 were considered significant.

There were 14,481 patients in the NIS database who underwent a revision amputation or replantation following upper extremity injury between 2002 and 2011. Of the 14,481 patients, 12,502 (86.3%) underwent upper extremity revision amputation and 1979 (13.7%) underwent replantation. The mean (SD) age of the cohort was 44.1 (16.7) years, 86.5% male, 47.8% white, 32.5% had private insurance (Table 1). The most common causes of injury were machin-

Table 1 Demographics, by revision amputation and replantation.

Demographic charateristic	Revision Amputation n = 12502	Replantation n = 1979
Age, Mean (SD)	44.7 (16.9)	40.5 (14.6)
Gender		
Male	10782 (86.2%)	1751 (88.5%)
Female	1638 (13.1%)	206 (10.4%)
Race		
White	6029 (48.2%)	896 (45.3%)
Black	956 (7.6%)	133 (6.7%)
Hispanic	2240 (17.9%)	393 (19.9%)
Asian or Pacific Islander	201 (1.6%)	35 (1.8%)
Native American	85 (0.7%)	12 (0.6%)
Other	489 (3.9%)	91 (4.6%)
Admission Source		
Emergency Department	7126 (57.0%)	1256 (63.5%)
Another Hospital	461 (3.7%)	101 (5.1%)
Other health facility including long-term care	123 (1.0%)	27 (1.4%)
Court/Law enforcement	2 (0.0%)	0 (0.0%)
Routine	1294 (10.4%)	158 (8.0%)
Type of admission		
Emergency	8613 (68.9%)	1322 (66.8%)
Urgent	1163 (9.3%)	181 (9.1%)
Elective	491 (3.9%)	47 (2.4%)
Trauma Center	605 (4.8%)	60 (3.0%)
Admission on a weekend	3060 (24.5%)	502 (25.4%)
Patient Location		
Large metropolitan area	2862 (22.9%)	500 (25.3%)
Small metropolitan area	1370 (11.0%)	224 (11.3%)
Micropolitan areas	585 (4.7%)	102 (5.2%)
Not metropolitan or micropolitan	502 (4.0%)	53 (2.7%)
Median household income		
$1-24,999	63 (0.5%)	14 (0.7%)
$25,000-34,999	290 (2.3%)	37 (1.9%)
$35,000-44,999	317 (2.5%)	56 (2.8%)
45,000 or more	642 (5.1%)	152 (7.7%)
Expected primary payer		
Medicare	305 (2.4%)	109 (5.5%)
Medicaid	254 (2.0%)	101 (5.1%)
Private insurance	1218 (9.7%)	710 (35.9%)
Self-pay	1043 (8.3%)	274 (13.8%)
No charge	13 (0.1%)	21 (1.1%)
Other	204 (1.6%)	759 (38.4%)
Total charges, Mean (SD) USD	33393.20 (64687.80)	55455.70 (62675.30)
Length of Stay, Mean (SD) days	3.7 (6.7)	6.2 (5.7)
Region of Hospital		
Northeast	2156 (17.2%)	337 (17.0%)
Midwest	2180 (17.4%)	399 (20.2%)
South	5345 (42.8%)	681 (34.4%)
West	2821 (22.6%)	562 (28.4%)
Teaching status of hospital		
Nonteaching	4204 (33.6%)	289 (14.6%)
Teaching	8209 (65.7%)	1679 (84.8%)
Comorbidities		
Total Comorbidities, Mean (SD)	0.6 (1.0)	0.5 (0.9)
Alcohol Abuse	568 (4.5%)	51 (2.6%)

(*continued on next page*)

Table 1 (*continued*)

Demographic charateristic	Revision Amputation n = 12502	Replantation n = 1979
Deficiency Anemias	285 (2.3%)	59 (3.0%)
Rheumatoid arthritis/Collagen Vascular Diseases	51 (0.4%)	3 (0.2%)
Chronic Blood Loss Anemia	38 (0.3%)	9 (0.5%)
Congestive Heart Failure	142 (1.1%)	9 (0.5%)
Chronic Pulmonary Disease	625 (5.0%)	81 (4.1%)
Coagulopathy	138 (1.1%)	20 (1.0%)
Diabetes	856 (6.8%)	82 (4.1%)
Diabetes with Chronic Complications	66 (0.5%)	5 (0.3%)
Drug Abuse	327 (2.6%)	35 (1.8%)
Hypertension	2317 (18.5%)	264 (13.3%)
Liver Disease	60 (0.5%)	5 (0.3%)
Lymphoma	12 (0.1%)	2 (0.1%)
Fluid and Electrolyte Disorders	471 (3.8%)	72 (3.6%)
Obesity	297 (2.4%)	42 (2.1%)
Peripheral Vascular Disorders	120 (1.0%)	38 (1.9%)
Pulmonary Circulation Disorders	29 (0.2%)	4 (0.2%)
Renal Failure	112 (0.9%)	6 (0.3%)
Recent weight Loss	92 (0.7%)	7 (0.4%)

Table 2 Complication rates, by revision amputation and replantation.

Type of complication	Revision Amputation *n = 12502*	Replantation *n = 1979*
Complications of reattached extremity or body part	N/A	0 (0.0%)
Forearm	N/A	4 (0.2%)
Hand	N/A	3 (0.2%)
Fingers	N/A	66 (3.3%)
Upper extremity, other and unspecified	N/A	2 (0.1%)
Disruption of operative wound	3 (0.0%)	0 (0.0%)
Post-operative infection	0 (0.0%)	0 (0.0%)
Other post-operative infection	36 (0.3%)	5 (0.3%)
Gangrene	41 (0.3%)	32 (1.6%)
Amputation stump complications	0 (0.0%)	N/A
Unspecified	0 (0.0%)	N/A
Neuroma of amputation stump	1 (0.0%)	N/A
Infection chronic	18 (0.1%)	N/A
Other	10 (0.1%)	N/A
Late effect of traumatic amputation	4 (0.0%)	N/A
Unspecified complication of amputation stump	1 (0.0%)	N/A
Any complication	452 (3.6%)	151 (7.6%)

ery accidents (47.3%), motor vehicle accidents (8.7%), and non-machinery related crush injuries (7.3%).

Of the 12,502 patients who underwent a revision amputation, 71% were fingers, 20% thumb, 5% distal to the elbow, 4% proximal to the elbow. These patients had an overall complication rate of 3.6% (452/12502) (Table 2). Total mean cost of hospitalization for amputation was $33,393 (SD: $64,687) with mean length of stay 3.7 days (SD: 6.7). Of the 1979 patients who underwent replantation, 57% were digits excluding thumb, 37% thumb, 5% distal to the elbow, and 1% proximal to the elbow. These patients had an overall complication rate of 7.6% (151/1979) (Table 2). The majority of complications associated with replantation occurred with the digits, 3.3% (66/1979). The mean cost of hospitalization for replantation was $55,455 (SD: $62,675) with mean length of stay 6.7 days (SD: 5.7). The mean cost of hospitalization for replantation is $22,062 greater than for revision amputation.

There were several factors associated with complications following revision amputation or replantation. Independent risk factors for complications were identified after adjusting for race, patient location, median household income, payer, total charges, comorbidities, length of hospital stay, discharge disposition, hospital teaching status, and injury

type. Independent risk factors following revision amputation included discharge against medical advice vs. routine discharge (OR 7.10 [CI: 1.42, 20.50]), Medicare or Medicaid as a secondary payer vs. private (OR 5.28 [CI: 1.59, 17.50]), pulmonary circulation disorders (OR 4.79 [CI: 1.19, 10.30]), and renal failure (OR 3.50 [CI: 1.14, 20.10]). Independent risk factors for complications following replantation were peripheral vascular disease (OR 8.89, [CI: 3.86, 20.50]), recent weight loss (OR 8.51, [CI: 1.25, 15.78]) and iatrogenic injuries vs machinery injuries (OR 5.29, [CI: 1.79, 15.70].

The most common cause of upper extremity injuries requiring revision amputation or replantation was a machine accident (47.3%), which is similar to existing literature reporting 41% due to this mechanism.[4] Complications were significantly more frequent following replantation (7.6%) in comparison to revision amputation (3.6%). In our cohort, patients with peripheral vascular disease and recent weight loss were at a significantly increased risk for complications following replantation on multivariable analysis, as may be expected given the association of both comorbidities with poorer wound healing and nutritional status. Overall, we found that the majority of amputations were distal, at the level of the digit, and received revision amputation as definitive treatment. For those patients treated with replantation, there was a higher associated cost and longer length of hospitalization, as would be expected with a higher complexity treatment.

There are several limitations to the study including its retrospective design; as such, it is only able to determine associations, not causation. This study uses the HCUP database, which does not include all US hospitals (such as academic trauma centers). Furthermore, the data used are a sample of participating institutions, limiting our ability to provide incidence or prevalence of upper extremity trauma resulting in revision amputation or replantation. HCUP data lacks granularity and limits our ability to consider specifics such as nature of injury (presence of fracture or injury status to neurovascular bundles), associated injuries, pre-hospital care course, transit and limb ischemia times, and details of operation performed including personnel involved. Another major limitation is that we do not separately analyze outcomes and complications based on level of replantation or revision amputation (i.e, single digit versus hand) given the lack of specificity within the data.

Notwithstanding these limitations, the higher rates of complications seen after replantation highlights the importance of considering the myriad of risk factors prior to proceeding with surgery. In addition, further studies are needed to determine why certain payer statuses and admission characteristics maybe risks of and protective against, certain complications.

Author Role

All authors helped with project design, data analysis and manuscript preparation.

Declaration of Competing Interest

No author has any conflict of interest/disclosures on this study.

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Challenges in lower face soft tissue reconstruction: The value of the historical bipedicled scalp flap procedure☆

Dear Sir,

Lower lip and chin reconstructions are challenging, since satisfactory aesthetic and function outcomes in the mouth region are difficult to achieve[1]. Although various techniques for lower lip and chin reconstruction have been described, some cannot be applied in patients with disease recurrence, the failure of previous procedures, or a history of radiotherapy. These particularly unfavorable

☆ This work was presented at the 55th Congress of the French Society of Stomatology, Maxillofacial Surgery and Oral Surgery (September 25th-28th, 2019, Dijon, France)

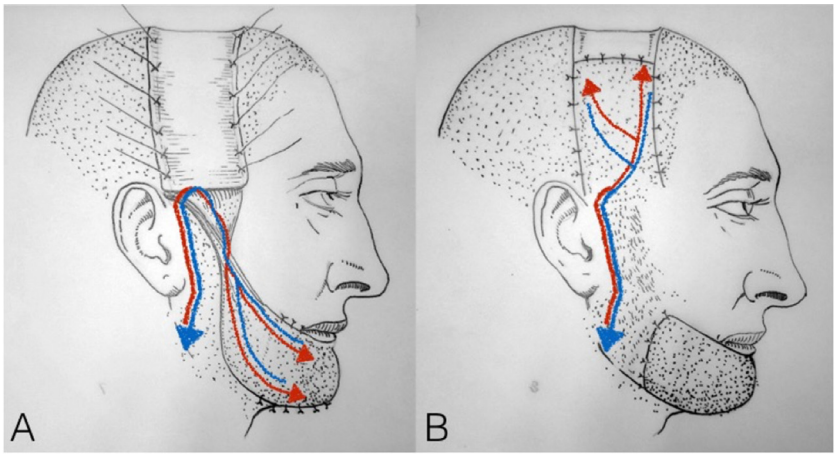

Figure 1 A drawing of the bipedicled scalp flap procedure after positioning in the chin region (A) and after weaning of the pedicles (B). The temporal arteries and veins are shown in red and in blue, respectively.

conditions rule out the use of an additional free flap, due to the lack of donor sites or recipient vessels. The pedicled flaps (deltopectoral, latissimus dorsi, and pectoralis major flaps) used as a second-line procedures are associated with a retractile healing process, resulting in cervical flexion deformity and worsened lip incompetence. In situations lacking a conventional solution, the historical bipedicled scalp flap[2] may therefore be a valuable option.

Historical description

In October 1918, the famous French surgeon Léon Dufourmentel (1884–1957) described a four-step procedure[2] for treating chin defects. The bases of the scalp flap's two pedicles are centered on superficial temporal vessels. The flap is easily harvested in the subgaleal plane as a band of hair-bearing skin from the scalp, rotated 180° to reach the chin, and then (as long as no tension is present) sutured (Figure 1). Seventeen days later, the two pedicles are released, and excess tissue is repositioning at the donor site. Four weeks later, the flap's shape can be adjusted. Four weeks after that, a secondary osteoperiosteal chin graft (using Delageniere's procedure) is performed.

Modern application of the bipedicled scalp flap procedure

Between 2015 and 2019, five patients underwent soft tissue reconstruction of the lower third of the face with a bipedicled scalp flap (Supplemental Material 1). Bone reconstruction had been achieved previously, using free flaps. Although we essentially followed Dufourmentel's procedure, we introduced some notable vascular safety improvements on the basis of our current knowledge of the region's anatomy. Firstly, the patency of the superficial temporal vessels was checked prior to surgery, using Doppler ultrasound. The flap was delayed: firstly harvested and replaced to it donor site for two weeks before mobilization to the chin area. After the transfer the pedicles were then tubed to prevent desiccation or infection.

This was followed by prophylactic treatment with a platelet aggregation inhibitor (DL-lysine acetylsalicylate, 75 mg) and an anticoagulant (dalteparin sodium, 2500 IU/0.2 ml). The pedicles were typically released 3 weeks later on one side and an additional 3 weeks later on the other. From postoperative day 10 onwards, the surgeon performed daily clamp tests on the pedicle. Depending on the flap's vitality, the clamping time was increased by 5 min per day up to a maximum of 60 min. Once this duration had been reached, the pedicle was released. Lastly, the donor site was closed with a skin graft or skin expanders and a local flap.

Discussion

The bipedicled scalp flap was first described at the end of the First World War and was widely used until the 1950s. According to the literature data[3] and our own experience, the bipedicled scalp flap is a reliable surgical option. However, this flap has rarely been used for lower face reconstruction - making it difficult to estimate the number of patients having undergone this procedure.

Historically, the bipedicled scalp flap was superseded by one-step procedures involving pedicled flaps (submental flaps, deltopectoral flaps, or pectoralis major flaps) or micro-anastomosed flaps[4] that made composite tissue transfers possible and provided greater freedom of positioning.

We converted this highly reliable historical technique into a "salvage flap" technique for patients lacking other treatment options. The bipedicled scalp flap's dimensions enable reconstruction of a lower labial strap by upward traction; this contrasts with the cervicothoracic pedicle flap, which accentuates downward lip retraction and cervical flexion deformity.

In male patients, the bipedicled scalp flap enables hair-bearing, resurfaced reconstruction of the lower face and chin[5]; this technique results in a better esthetic outcome by masking imperfections and thus avoiding the "patchwork" appearance that follows conventional reconstruction with a skin paddle.

Conclusion

Historically, the bipedicled scalp flap was specifically reserved for rare, complex cases of lower face reconstructions (e.g. in patients with few available neck vessels after having undergone a large number of operations). The bipedicled scalp flap is a reliable treatment option, with good esthetic and functional outcomes. Transposition of the scalp restores the lip-chin strap, resurfaces the cheeks, and thus hides any scars from previous operations.

Declaration of Competing Interest

The authors disclose no conflicts of interest with regard to the present work.

Supplementary material

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.bjps.2020.08.107.

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Endoscopic assisted craniosynostosis surgery experience from South-East Asia

Dear Sir,

We wish to highlight our experience of the endoscopic assisted craniosynostosis technique in the context of a developing healthcare system. In developing countries, internet penetration is increasing and parents are using the internet to research latest technical advances to seek treatment early. Jimenez and Barone's initially described[1] the minimally invasive endoscopic technique in non-syndromic craniosynostosis. The senior authors (DM and SG) introduced the endoscopic technique for the first time in India in 2015.[2] In the Indian population, the most common sutures involved are anterior (metopic, coronal), rather than sagittal, as seen in the West.[3]

This was a prospective study of all patients with non-syndromic craniosynostosis undergoing endoscopic assisted correction. Three-dimensional head shape was quantified using the Smart Soc 3D device (Orthomerica, Orlando, FL) laser system. 2D video images are captured using a smart phone which is then converted into a 3D model in Curve Capture app. Radial symmetry index (RSI) is the absolute value of the differences of adjacent radii from the centre of the axial plane to the cranium at 15° intervals. Cranial vault asymmetry index (CVAI) is the difference between the two oblique diagonal diameters divided by the larger of the two oblique diagonal diameters.[5]

There were 17 patients in our series, with the mean age of surgery 3.7 months (3–5), mean duration of surgery 68 min (60–85 min), mean blood loss 56.4 ml (60–90 ml) and the mean duration of hospital stay 2.5 days (2–3 days). Eight patients had metopic suture involvement, three had uni-coronal suture and four patients had bicoronal suture craniosynostosis. There were no immediate post-operative

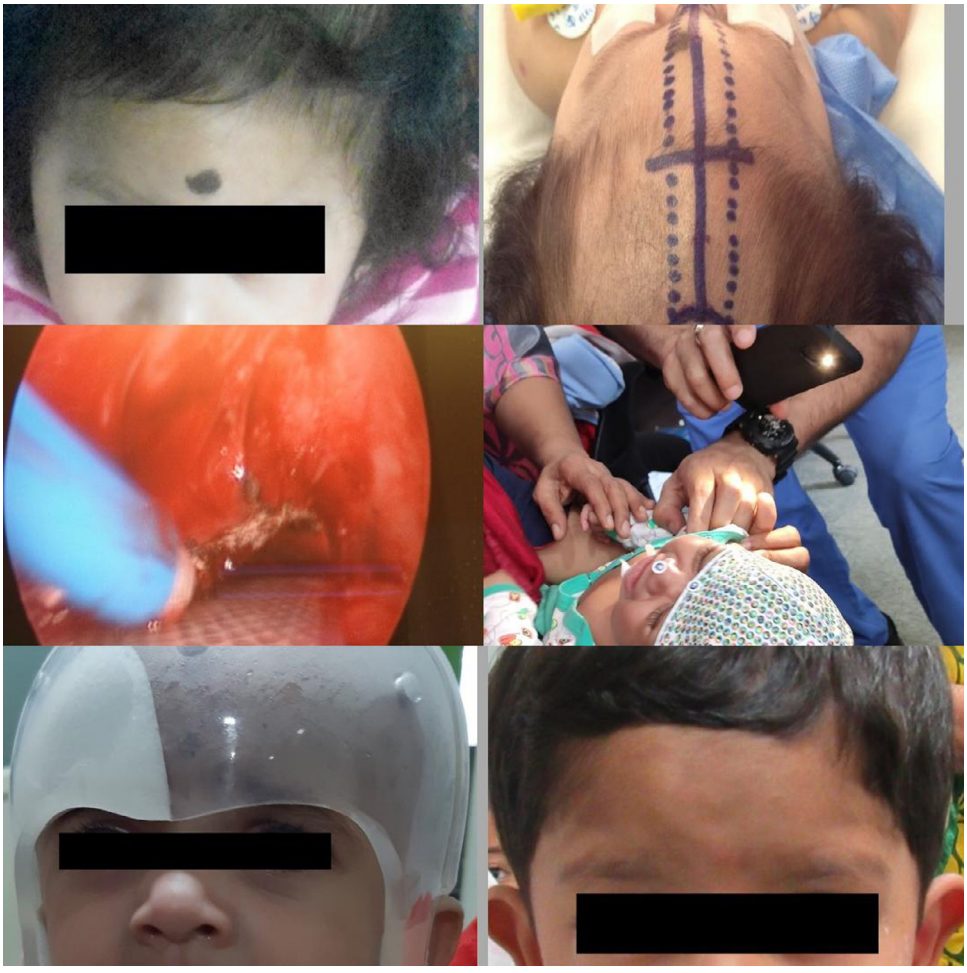

Figure 1 Series of figures demonstrating a patient with metopic synostosis, intra operative markings, endoscopic view, Smart Soc scanning, helmet treatment and 1 year outcome.

complications. None of the patients needed a blood transfusion. Mean number of helmet changes were 2 (2–3 helmets) over a 12 month duration (Figure 1). All patients followed their growth curve on the head circumference charts. Mean cranial vault asymmetry index (CVAI) reduced from 9.3 to 0.6, and mean radial asymmetry index (RSI) reduced from 25 to 4.6 (Figure 2).

Outcome studies from 2 decades of data have comprehensively established the safety profile and effectiveness of this technique.[4] From our experience, careful counselling of parents about the expected benefits and potential poor outcomes from noncompliance, has resulted in improved parental motivation.[2] The indigenous locally made helmets provide a cost saving of approximately 1300 USD. Early referral is key to the success of the technique, and is still a major challenge in developing countries lacking a streamlined referral system.[3] The reduced cost of hospital stay in intensive care, absence of implants and short surgical duration lowers the overall cost of treatment. A gross comparison, including the cost of helmets, outpatient visits and surgery indicates a cost saving of approximately 700 USD compared to the open procedures.

In our experience, the CVAI and RSI are useful parameters to monitor, and provide an indication of the direction of correction. The authors would like to acknowledge the close cooperation of the orthotists. Helmeting is the major driver of success and early decisions on trimming/adjusting the helmet are essential. Maximum correction occurs in the first 6–9 months, and timely intervention is therefore vital to success. We recommend that orthotics members be part of the multi-disciplinary craniofacial team.

Declaration of Competing Interest

None declared.

Funding

None.

Ethical approval

Not required.

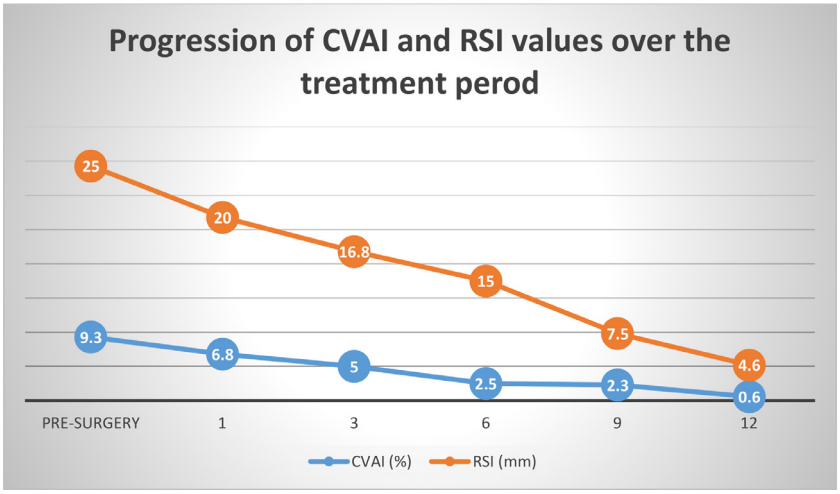

Figure 2 Progression of CVAI and RSI values over the treatment period in months.

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Plastic surgery in a student-run free clinic

Dear Sir,

Student-run free clinics (SRFCs) provide care to the underserved and allow medical students to interact directly with patients under the supervision of attending physicians. The positive impact of SRFCs has led to their growth over the last two decades. As of 2014, three-quarters of U.S. medical schools operated a SRFC.[1] However, less than one-fifth offer any form of surgical services.[2] In our experience, safe, effective plastic surgery can be offered in a SRFC, with significant benefits for the community.

Plastic surgeons are versatile and can safely perform many common procedures in the setting of a SRFC. Our involvement began by performing onsite skin excisions for primary care and dermatology patients, reducing the need for outside referral. Once a plastic surgery presence had been established, we began to receive referrals for common surgical conditions, such as trigger finger, ganglion cyst and keloid, among others. These problems can all be treated under local anesthesia using tumescent technique that achieves hemostasis through epinephrine. Tissue samples are sent to a volunteer dermatopathologist when appropriate.

Students of all levels participate in these plastic surgery encounters at our SRFC (The Shade Tree Clinic: https://www.shadetreeclinic.org/). To start the visit, a pre-clinical student performs a focused history and physical exam under the guidance of a more senior clinical student and presents their findings to the volunteer plastic surgeon. During a procedure, the clinical student performs much of the hands-on work under the direct supervision of the plastic surgeon. This allows for a degree of instruction that can be challenging in the time-sensitive operating room setting. As a SRFC, our patients have universally embraced student participation in their care, and clinic schedules are created to optimize teaching and patient care, rather than absolute efficiency.

Logistical challenges may account for the scarcity of surgical services at SRFCs, but we have found that appointing one or two student directors can effectively facilitate clinic function. Director responsibilities include: maintaining an inventory of donated surgical supplies, scheduling patients, recruiting volunteers, managing clinic workflow, and ensuring timely follow-up regarding results and outcomes.

In conclusion, plastic surgery can be offered safely and effectively in a SRFC, providing underserved patients access to subspecialty surgical care and allowing students to grow in their understanding of plastic surgery. Although logistical concerns must be addressed, such as guaranteeing supplies and coordinating a complex care team, volunteers have the privilege of knowing their work will positively impact the lives of underserved patients and the learning of medical students. While there has been great focus on global surgery, we believe the U.S. plastic surgery community should embrace the SRFC as a model for offering surgical services to those in need domestically, for the benefit of all who are involved.

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.

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Usefulness of a U-shaped vascular clamp for end-to-side anastomosis to the internal jugular vein

Dear Sir,

In head and neck reconstruction with free flap transfer, end-to-side anastomosis (ETS) to the internal jugular vein (IJV) is widely used as a reliable option for recipient vessels. IJV runs through the head and neck region in a longitudinal direction, thus allowing positioning of the recipient vessels at any site along the entire length. In addition, problems related to vessel size discrepancy[1] can be overcome by adjustment of the caliper of the recipient stamp to the exact size of the donor vessel. Secure anastomosis to IJV is important for successful head and neck reconstruction. Conventional methods for clamping IJV involve the use of two Bulldog clamps in a transverse or longitudinal[2] fashion (Figure, Supplemental Material 1). However, these techniques require circumferential dissection of IJV and can result in incomplete clamping with blood leakage into the operative field. The ES-100 (Bear Medic Corporation, Japan; Figure 1) is a U-shaped vascular clamp with a length and weight of 30 mm and 4 g, respectively. The gripping arm is designed with a 5/8 (225°) circle, and the gripping force is 110 g. The aim of the present report was to evaluate the usefulness of the ES-100 for ETS to IJV.

From April 2006 to March 2019, we performed 135 head and neck reconstruction surgeries involving ETS to IJV using the ES-100. Data pertaining to intraoperative findings and postoperative complications were retrospectively investigated for the 135 procedures. Operative technique is as follows (Video, Supplemental Material 2); IJV was dissected for a minimum length of 1.5 cm and over half the circumferential area. Complete circumferential dissection was not necessary. Before clamping, the anastomosis site was marked for the prevention of vessel disorientation during clamp placement. Subsequently, the ES-100 was attached to IJV. After elliptical vesselotomy, the vessel lumen was washed with 1% heparinized saline. The absence of leakage from the clamp was confirmed and ETS was performed using the simple interrupted suture technique (Figure 2). When it was difficult to flip the clamp because of the limited operative field or an insufficient length of the flap's vessel, the back-wall-first technique was recommended. After the anastomosis procedure was complete, the clamp was removed and blood flow confirmed.

The ES-100 firmly clamped all vessels, and there was no blood leakage in any case. Our patients included the cases with previous neck surgery or radiation therapy, however there were no trouble in such cases as well. Furthermore, there were no complications associated with clamp-induced

The 22nd Annual Meeting of Japan Society for Innovative Techniques in Plastic Surgery in Tokyo, Japan (18, February 2017).

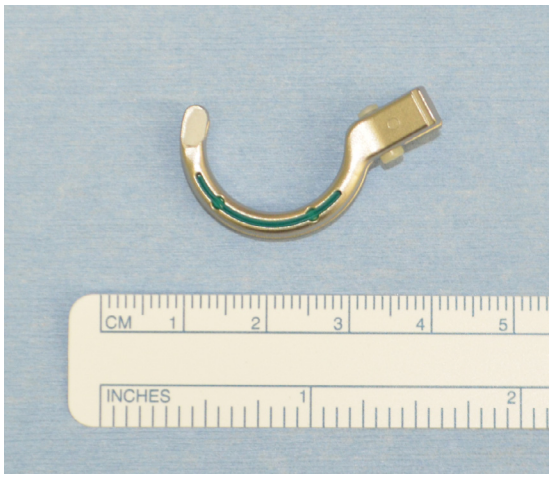

Figure 1 The U-shaped ES-100 (Bear Medic Corporation, Japan) vascular clamp.
The clamp weighs 4 g and is designed with a gripping pressure of 110 g. The U-shaped arm clamps the entire circumference of the anastomosis site and completely prevents blood leakage.

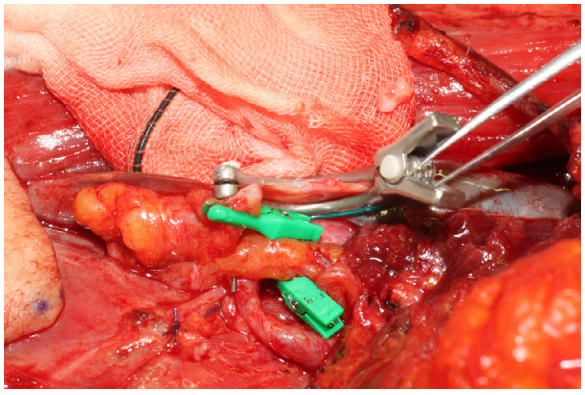

Figure 2 The ES-100 was attached to IJV and provided a clear surgical field by firmly blocking the blood flow.

damage to the vessel wall. None of the cases exhibited venous thrombosis.

In the present report, we evaluated the usefulness of the ES-100 for ETS to IJV. Compared with the conventional Bulldog clamp, the ES-100 is easy to place and provides a clear surgical field by firmly blocking the blood flow. It also allows some blood flow to continue in the IJV, and thus reducing the possibility of cerebral edema. Moreover, it does not necessitate complete circumferential dissection of IJV, which is occasionally difficult in cases with a history of surgery, irradiation, or inflammation in the cervical area. In such cases, minimal dissection of the vessel may reduce the extent of vascular damage.

Other option for vessel clamp to be used for jugular vein is the Satinsky vena clamp with double angled gripping arm which was reported to have no adverse event in 53 cases of head and neck reconstruction surgery.[3] The advantage of this clamp is its ability to facilitate the anastomosis by using the long handle of the clamp to position the recipient vessel, which may also be applicable to ES-100 by utilizing its handle for positioning the anastomotic site. Disadvantage of Satinsky clamp is that it was initially developed for larger vessels, thus it has relatively strong gripping force. Hickman and Mortensen reported that this clamp produced the intimal damage after clamping for 30 min even with minimum lock setting.[4]

In a rat model, we examined histological changes in the inferior vena cava after clamping with the Bulldog vascular clamp and the ES-100 for 30 min. Immediately after release of the clamp, no obvious histological changes were observed in both settings (Figure, Supplemental Material 3). One day later, however, both clamps resulted in inflammatory cell infiltration around the adventitia, which was slightly more prominent with the Bulldog clamp (arrow). The Bulldog clamp also resulted in edema-like lesions in the media, and irregularities in the intima (arrowhead); these features were not evident when the ES-100 was used (Figure, Supplemental Material 4). We think these findings shows suitability of the ES-100 for microvascular ETS anastomosis.

In conclusion, our 135 clinical experiences and animal experiment revealed the feasibility and usefulness of ES-100 for ETS to IJV in that it provides a clear surgical field by firmly blocking the blood flow with minimal vessel damage.

Declaration of Competing Interest

No conflicts of interest declared.

Funding

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Ethical approval

This study was received Nagoya University Hospital Institutional Review Board approval.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.bjps.2020.08.060.

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Reversing venous-lymphatic reflux following side-to-end lymphaticovenous anastomosis with ligation of the proximal lymphatic vessel☆

Dear Sir,

Supermicrosurgical lymphovenous anastomosis (LVA) has become one of the treatment options for treating lymphedema after its introduction by Koshima.[1] Commonly performed LVA included lymphovenous end-to-end (LVEEA), end-to-side (LVESA), and side-to-end (LVSEA). Among them, LVSEA was considered to be the most advantageous.[1] With a single recipient vein anastomosed to the side of the lymphatic vessel, lymph can be drained from both the distal (antegrade) and proximal (retrograde) ends. Nevertheless, venous-lymphatic reflux (VLR) does occur after LVSEA. It should be minimized due to concerns of VLR-related anastomotic thrombosis.[2] In contrast, venous washout (VW) is much more preferable than VLR. In this study, Investigation was done on the feasibility of converting VLR into VW with the ligation of the proximal end of LVSEA immediately after anastomosis, which will essentially change a LVSEA into LVEEA.

Table 1 Patient demographics ($N = 100$).

Total Patients	100
Sex	89 females; 11 males
Age	58.6 ± 13.9 years old
Etiology	Gynecologic cancer: 76 (73.7%) Other cancer (e.g. lung/lymphoma/colon): 7 (6.8%) Others (eg. status post varicose vein, liver tranplanation, Hodgkin's diaease, Groin AV fistula): 7 (6.8%) Trauma: 5 (4.9%) Congenital: 5 (4.9%) Infection: 3 (2.9%)
Affected lower limbs: left/right/bilateral	103 (59/40/4)

From March 2016 to October 2018, 100 patients included 89 females and 11 males, averaging 58.6 ± 13.9 years old. Among 103 lower limbs, included 59 left side, 40 right side, and 4 bilateral lower limbs (International Society of Lymphology, stage II-III) were recorded. The major cause was gynecologic cancer (73.7%) (Table 1). From 621 lymphatic vessels and 462 recipient veins, a total of 730 LVA were performed, averaging 7.1 LVA per limb. All LVA was performed by a single surgeon (Yang) using a surgical microscope (Pentero 900, Carl Zeiss AG, Oberkochen, Germany). Of these anastomoses performed, 30 (4.1%) were LVSEA. Among these LVSEA, 7 have showed VLR and 5 was converted to VW successfully with proximal ligation. The proximal lymphatics of LVSEA was clamped temporarily for at least 15 min to ensure the presence of VW prior to permanent ligation, otherwise, the clamp was removed and the LVSEA was left intact with no ligation performed. Significant differences were found (VW rate=0/7 vs 5/7, $p = 0.021$) with Fisher's exact test. No poorer results nor subcutaneous ecchymosis were noticed in the two patients with VLR.

Pressure build-up in the lymphatic lumen due to lymphedema can result in lymphatic ectasia and dysfunctional valves, allowing bidirectional (antegrade/retrograde) drainage in the LVSEA. In LVEEA, only antegrade lymphatic flow can be drained. After the completion of LVSEA, VW was found in 17/24 (70.8%) of the recipient veins in this study. This represented a favorable condition since venous blood was flushed away, indicating strong lymphatic flow. VLR was found in seven LVSEA cases. According to Yamamoto,[3] VLR can lead to inferior long-term LVA patency rates due to anastomotic thrombosis. Rare complications of VLR such as subcutaneous ecchymosis have also been reported by Hara.[4] VLR can be prevented with the use of reflux-free recipient veins identified by a non-contact vein finder preoperatively.[2] Surgical correction such as valvuloplasty has also been reported to minimize venous reflux,[3] but carries the risk of total venous occlusion if not performed properly.

After completion of LVA, the resultant VW or VLR depended on two key factors: the degrees of venous reflux and antegrade lymphatic flow. These two forces competed against each other. Unlike LVEEA, the antegrade lymphatic

Abbreviations: LVA, lymphovenous anastomosis; LVSEA, lymphovenous side-to-end anastomosis; LVEEA, lymphovenous end-to-end anastomosis; VLR, venous-lymphatic reflux; VW, venous washout; ICG, indocyanine green.

☆ This study was presented at the 2nd Taiwan Society of Reconstructive Microsurgery (TSRM) annual meeting as invited speech on January 12, 2019, Taipei, Taiwan.

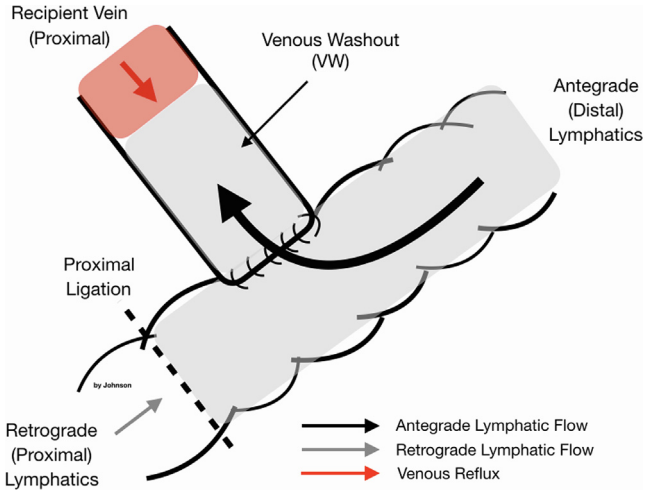

Figure 1 Venous washout (VW) after proximal LVSEA ligation.

flow in LVSEA was not fully directed toward the recipient vein but was partially diverted toward the proximal lymphatic vessel. VLR becomes evident when the force of venous reflux surpasses that of antegrade lymphatic flow. Although the conversion rate from VLR to VW was 71.4% (5/7) (Figure 1), conversion was not always feasible, possibly due to relatively weak lymphatic flow or strong venous reflux.

There are several limitations in this study. First, due to the mixed anastomotic orientation of LVAs performed (averaging 7.1 per patient), the impact of conversion of VLR into VW cannot be isolated and quantified for comparison. It was possible that some of negative effects of LVA with VLR might be offset by the rest of anastomoses with favorable venous washout phenomenon. Second, the number of LVSEA cases with VLR was small. Third, the intraoperative finding of VLR was mainly a static observation. The dynamic effects of an extrinsic pump[5] on the lymphatic system, such as muscle contraction during ambulation remained unmeasurable. But, delayed spontaneous recovery from VLR may occur during dynamic state such as ambulation. This was the main reason why two of the LVSEA were left intact when VW could not be confirmed after temporary clamping. Nevertheless, since VLR is prone to anastomotic thrombosis, we believe that by performing proximal ligation to achieve a VW phenomenon instead of VLR should be beneficial to the improvement of lymphedema. Although this benefit cannot be proofed at this moment, it seems to be a logical decision. LVSEA was typically performed when a relatively larger lymphatic vessel is identified in this study. A near-perfect window can be created on the side of lymphatic vessel to match the recipient vein during LVSEA for a water-tight anastomosis. Although LVSEA is more technically demanding, but the author prefer to deal with LVASEA instead of LVEEA because of the huge size discrepancy between the lymphatic vessel and the recipient vein. This size discrepancy can create problems such as leaky anastomosis and possible hematoma formation which might compress the anastomosis site. The proximal ligation technique offers a unique opportunity to redirect lymphatic flow during LVA. By adopting this novel approach, in selected cases, proximal LVSEA ligation enables conversion of VLR into VW, which may allow better outcomes.

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Supplementary materials

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Utilization of irrigating negative pressure wound therapy for breast implant salvage: Long-term results and success

Dear Sir,

Implant infection is a devastating complication that delays the reconstructive course and causes emotional distress for patients. For most plastic surgeons, implant infection is addressed with explantation, washout, and placement of suction drains. Delayed reconstruction may then occur several months later to allow for full resolution of the inflammation. However, this delay results in contraction of the soft tissues of the breast that often necessitates the placement of a new tissue expander to re-establish the pocket. While there are reports of successful immediate replantation, there is limited data to support this approach.[1] We have previously reported on our technique for managing breast implants necessitating removal with the placement of an irrigating negative pressure wound therapy (NPWT) at time of explant followed by insertion of a new prosthetic within a week.[2] We now report on our long-term outcomes associated with our novel approach in twelve patients and fourteen breasts with a high salvage rate.

When cellulitis of the breast not responsive to antibiotics prompted surgical exploration, patients were treated with explantation and NPWT as previously described.[2] Antibiotic regimens were dictated by intraoperative cultures and cefazolin was utilized when there was no culture growth, unless prevented by patient allergy. The patient was kept inpatient from time of NPWT placement until NPWT removal. All surgeries were performed under general anesthesia.

Abbreviations: LVA, lymphovenous anastomosis; LVSEA, lymphovenous side-to-end anastomosis; LVEEA, lymphovenous end-to-end anastomosis; VLR, venous-lymphatic reflux; VW, venous washout; ICG, indocyanine green.

Twelve patients and fourteen breasts were treated with this approach. Eleven patients had implants placed for reconstruction and one patient had implants placed for aesthetic augmentation. Two patients had undergone radiation. Three patients and two patients had undergone neoadjuvant and adjuvant chemotherapy, respectively. The irrigating NPWT was utilized for an average of 5.2 days (range 2–7 days). Eight patients had intra-operative cultures return as positive with results including *Serratia marcescens, S. aureus, S. epidermidis, S. caprae, Enterobacter, Stenotrophomonas* and *Pseudomonas*. Ten implants were successfully replaced at time of NPWT removal. Three implants in two patients were unable to be salvaged as the tissue was edematous and deemed not suitable. One patient opted not to pursue replantation and a mastopexy was performed. All patients with implants that were not replaced at time of NPWT removal ultimately underwent autologous reconstruction and one patient who successfully underwent replantation chose to pursue autologous reconstruction. There were no instances of repeat infection. For patients who successfully underwent replantation and did not pursue autologous reconstruction, the mean and median follow-up were 322 and 284 days, respectively (Table 1).

There have been many described approaches to manage breast implant infections requiring explantation. Techniques typically include a combination of oral and intravenous antibiotics, operative debridement with varying degrees of capsulectomy, pocket irrigation, possible pocket change or primary closure.[3] However, these approaches all require a delay in final reconstruction and this has shown to be psychologically damaging to patients.[4,5]

While some advocate the possibility of replant at time of washout for an infected breast implant,[1] there is the concern for repeated infection. Thus, long-term follow-up for any approach is required to determine its true success. We have previously reported on our technique for managing breast implants necessitating removal with the placement of irrigating NPWT at time of explant followed by insertion of a new prosthetic within a week.[2] One other case series reported utilizing this approach for severe prosthetic infection with success in five out of six patients. However, long-term follow-up and length of wound NPWT utilization were not reported and implant replantation was only attempted after cultures were negative.[3] Our study with fourteen breasts is the largest cohort of patients treated with this approach with a mean follow-up of almost a year without any additional infectious complications.

In our study, the most commonly identified bacteria were *Staph* and *Serratia*. Importantly, four patients (25%) had negative intraoperative cultures. When intraoperative cultures were negative, cefazolin was utilized. We routinely rely on our infectious disease colleagues to guide our choice on the most efficacious antibiotic regimen for patients while in the hospital and at discharge.

The utilization of an irrigating would NPWT placed at the time of explantation in the context of infection is a novel concept for implant salvage. We have utilized this approach in twelve patients and fourteen breasts with a high success rate and patient satisfaction. We hope this report encourages others to employ this approach to prevent reconstructive delays and the associated sequelae.

Table 1 Patient demographics, oncologic history and reconstructive outcomes. NGTD=no growth to date, DIEP=deep inferior epigastric perforator (flap).

ID	Smoking history	BMI	Laterality of vac	Radiation	Neo-adjuvant chemo	Adjuvant chemo	Number of days vac utilized	Culture result	Antibiotic	Outcome	Length of time from initial surgery to infection, days	Length of time from replant to final follow-up, days
1	Former	20.86	Right	No	No	No	7	*Serratia marcescens*	Ciprofloxacin	Salvage	49	1084
2	Unknown	Unknown	Left	No	No	No	5	NGTD	Clindamycin	Patient opted not to replace	Unknown	Unknown
3	Former	24.37	Right	Yes	No	No	7	NGTD	Ciprofloxacin	Salvage	320	65
4	Never	27.6	Right	No	Yes	No	5	*S. aureus*	Vancomycin/ Pieracillin /Tazobactam	Not salvaged then DIEP	91	498
5	Never	23.4	Right	No	No	Yes	2	NGTD	Cefazolin	Salvage then DIEP	166	382
6	Former	30.6	Left	No	No	No	4	*S. epidermidis*	Ciprofloxacin	Salvage	19	264
7	Never	24.4	Left	No	No	No	5	*Serratia*	Ciprofloxacin	Salvage	44	332
8	Former	22.2	Left	No	Yes	No	5	NGTD	Cefazolin	Salvage	196	323
9	Former	37.4	Bilateral	No	No	Yes	4	*Pseudomonas*	Ciprofloxacin	Salvage	32	284
10	Never	22.5	Right	No	No	No	5	*S. caprae*	Amoxicillin /Clavulanic acid	Salvage	485	13
11	Never	20.6	Right	Yes	Yes	No	7	*Serratia marcescens*	Ciprofloxacin	Salvage	107	212
12	Never	34.5	Bilateral	No	No	No	6	*Serratia, Enterobacter aerogenes, Enterobacter cloacae, Stenotrophomonas maltophilia*	Zosyn/Levo	Not salvaged then DIEP	18	220

Declaration of Competing Interest

None.

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Pain control following alloplastic breast reconstruction with muscle relaxant: A randomized controlled trial

Dear Sir,

Breast reconstruction has been shown to reduce patient oncological anxiety, self-esteem and sexuality.[1] However, post-operative pain is common in patients undergoing breast reconstruction, which can greatly impact recovery and quality of life. In fact, an estimated 50% of patients who undergo breast reconstruction experience post-operative pain syndromes.[2] Sub-pectoral breast reconstruction is specifically associated with high pain levels mainly due to the stretching of the pectoralis major muscle which can lead to muscle spasms that are difficult to control with traditional pain control regimens.[3] Muscle relaxants have been recently shown to improve back pain associated with muscle spasm.[4] However, their effects are not clear regarding post subpectoral breast reconstruction. So, the rationale behind using cyclobenzaprine in this study is to verify their effectiveness in these procedures.

This randomized controlled trial was authorized by the McGill University Health Centre Research Ethics Board. Inclusion criteria included patients undergoing implant-based staged or immediate subpectoral breast reconstruction. Exclusion criteria included patients planned for pre-pectoral technique, had prolonged hospital stays (>1 day), received treatment with monoamine oxidase inhibitors and selective serotonin reuptake inhibitors, and patients who suffered from chronic pain syndromes. Participants were randomly allocated to either the control group, that received 20 doses of 10 mg of morphine equivalents (to be taken as needed) and 1 g acetaminophen orally every 6 h (to be taken regularly) for three days. While the intervention group received the same regimen in addition to oral Cyclobenzaprine 5 mg three times a day for 3 days, as recommended by the literature.[5] Participants were recruited from September 2016 to December 2017. Patients were interviewed by telephone or during their clinic visit three days following discharge by a blinded co-investigator. The primary outcomes of the study were visual analogue pain scores and the total number of opioid pills consumed within the first three days post breast reconstruction. Statistical analysis was conducted using Chi-square test for categorical data, and *t*-test for numerical data.

Forty-one patients were eligible for data analysis, 21 in the intervention group and 20 in the control group. The average age for both groups was 49.8 (12.1). The average ages in the intervention and control groups were 48.1 and 51.6, respectively. Operative characteristics in Table 1 show that the majority of patients underwent immediate breast reconstruction following mastectomy (63.41%), of which 53.8% of them were in the intervention group. Additionally, the majority had reconstructions performed bilaterally 73.17%, of which 46.7% of them where in the intervention group. Volumes of implants/expanders were less in the intervention group averaging 300.1cc (SD 191.91) compared to the control's group average volume of 388.16cc (SD 146.91). Six tissue expanders were used in the control group while three tissue expanders were randomized to the intervention group. Finally, Table 2 compares the VAS pain scores and amount of total narcotics intake between the two groups for the first three days following discharge from hospital. The mean pain score for both groups was 5.7 (SD 1.78) ($p = 0.48$) and total narcotic intake was 9.2 pills (SD 5.75) ($p = 0.8$). Mean Pain scores on POD 1, 2 and 3 are 6.5 (SD 1.78) ($p = 0.29$), 5.8 (SD 1.99) ($p = 0.4$) and 4.8 (SD 2.15) ($p = 0.91$), respectively.

Limitations included a modest sample size in a single center and the short duration of cyclobenzaprine consumption may not be enough to show the desirable effects of pain control. Strengths included a randomized controlled design and the ability of reducing confounding bias produced by the variables mentioned previously by the randomized design, matching and multivariate analysis.

In conclusion, using cyclobenzaprine as an adjunct to oral opioids in the short term post-operative period has not shown statistical significance in terms of reduction of pain levels and consumption of oral opioids. It is still worthy to further study the effects of muscle relaxants in the setting of implant-based breast reconstruction with a larger study sample size, prolonging the period of drug administration and length of follow up after discharge.

Declaration of Competing Interest

The authors declare no conflict of interest.

Funding

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Ethical approval

The study was approved by the McGill University Health Centre Research Ethics Board.

Abbreviations: LVA, lymphovenous anastomosis; LVSEA, lymphovenous side-to-end anastomosis; LVEEA, lymphovenous end-to-end anastomosis; VLR, venous-lymphatic reflux; VW, venous washout; ICG, indocyanine green.

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Table 1 Patient and operative characteristics ($n = 41$).

Socio-demographic characteristics	All	Control		Relaxant		*p value*
	n (%)	n	(%)	*n*	(%)	
All	41	20	48.8	21	51.2	
Age - μ (STD)-	49.8 (12.1)	51.6	(13.30)	48.1	(10.82)	0.36*
Operative Characteristics						
All	41	20	48.8	21	51.2	
Surgery Stage						0.91**
Immediate	27	13	48.1	14	51.9	
Staged	14	7	50.0	7	50.0	
Side operated						0.29**
Right	3	2	66.7	1	33.3	
Left	8	2	25.0	6	75.0	
Bilateral	30	16	53.3	14	46.7	
Implant size/expander volume (STD)	343.2(174.8)	388.5	(146.19)	300.1	(191.91)	0.11*
Fully expanded expanders	9	6	66.7	3	33.3	0.37**
Sentinel Lymph Node (Positive)	4	0	0.0	4	100.0	0.12**

* Significant difference comparing relaxant group to control group as determined by the T-test, $p < 0.05$.
** Significant difference comparing relaxant group to control group as determined by Fischer's exact test $p < 0.05$.

Table 2 Measures clinical outcomes in terms of pain scores and narcotic used ($n = 41$).

VAS score and Narcotics intake	All	Control		Relaxant		*p value*
	n (%)	*n*	(%)	*n*	(%)	
Pain Score						
Day 1 - μ (STD)	6.5 (1.78)	6.84	1.43	6.24	2.05	0.29*
Day 2 - μ (STD)	5.8 (1.99)	6.05	1.47	5.52	2.38	0.40*
Day 3 - μ (STD)	4.8 (2.15)	4.84	1.89	4.76	2.41	0.91*
Mean pain score - μ (STD)	5.7 (1.78)	5.91	1.42	5.51	2.07	0.48*
Total Narcotic Intake	9.2 (5.75)	9.47	6.71	9.00	4.89	0.80**

* Significant difference comparing relaxant group to control group as determined by the T-test, $p < 0.05$.
** Significant difference comparing relaxant group to control group as determined by Fischer's exact test $p < 0.05$.

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Coming out of the crisis: Restarting services after the coronavirus pandemic

Dear Sir,

The first wave of the coronavirus (COVID-19) pandemic was considered to peak in the United Kingdom on 8th April 2020. NHS England guidance advised on the 29th April that within six weeks, all urgent surgery should be provided at pre-pandemic capacity.[1]

The plastic surgery service at Oxford University Hospitals made significant changes to the structure and delivery of services at the start of the pandemic.[2] Hand trauma referrals have been triaged by consultants via telemedicine, in-house patients reviewed by the most senior clinician available and patients requiring surgical intervention allocated directly to a theatre list for a 'see and treat' approach. All elective surgeries were paused, with cancer services continuing on 'clean' sites, using stringent protocols involving pre-operative isolation and swab testing. As of the 25th June, Oxfordshire had 2125 confirmed cases of COVID-19 in a population of 691,000.[3]

There have been limited reports on the outcomes of plastic surgery patients operated on during the pandemic. The COVIDSurg collaborative published its first cohort of 1128 patients, diagnosed with COVID-19 in the perioperative period, reporting a 30-day mortality of 23.8% and 51.2% suffering pulmonary complications.[4] However, only three patients were operated on by plastic surgery services.

A retrospective service evaluation in a single tertiary trauma centre reviewed all patients operated on by our plastic surgery department between the 9th March (two weeks prior to lockdown) and 28th April, covering the peak of the outbreak. The intention was to advise our unit on the safe restarting of services, identifying the potential risk of contracting the virus when undergoing operative intervention. During this period, 349 patients (200 trauma; 149 elective) underwent 370 procedures, across five sites (four maintained as 'clean'). Cases were predominantly under local anaesethetic (LA) or wide awake local anaesthetic no tourniquet (WALANT) technique (62.7%, 232/370). The remainder were under general anaesthetic (GA) (36.5%, 135/370), or regional anaesthesia (RA) (0.8%, 3/370).

Of the 349 patients, 23 underwent COVID-19 PCR testing within 30 days of a procedure; 16 for routine admission testing or pre-operative screening and seven for symptoms or radiology suggestive of COVID-19. None of the patients had suspected or confirmed COVID-19 at the time of operation; one asymptomatic patient was subsequently found to be positive at the time of theatre. Three patients had positive swabs post-operatively; two whilst an inpatient within 14 days of their operation and one on readmission 10 days after discharge. The former two inpatients died from COVID-19 within 30 days of a major GA procedure; both were over 85 years with multiple co-morbidities.

We reviewed records and contacted patients by telephone at least 14 days post- operatively to assess if they had suffered symptoms, required assessment or admission for COVID-19. 144 patients answered, with a response rate of 44.7%. Patients were not contacted if they were under the lead care of another speciality ($n = 17$), lacked capacity ($n = 5$), were admitted ($n = 1$) or deceased at the time of contact ($n = 4$). All other patients could not be contacted, despite multiple attempts, or declined to respond.

Telephone calls identified one paediatric patient who had suspected symptoms three days following an elective GA procedure but did not undergo testing or require medical attention. Review of records identified two further patients who had died within 30 days of a LA day case procedure. One presented to another hospital with respiratory symptoms, but had a negative COVID-19 PCR test three days post-procedure. The other did not present to hospital or undergo testing but suspected COVID-19 was recorded as a cause of death. Both were elderly with a Clinical Frailty Scale score over six.

To our knowledge, 2.6% (9/349) patients developed possible coronavirus symptoms or abnormal radiology following procedures in our department during the COVID-19 pandemic with 0.9% (3/349) having a positive test (two patients with symptoms were not tested). Those with positive tests all underwent GA procedures and were inpatients for over ten days. Overall 30-day mortality of the patient group was 1.1% (4/349), with two of these deaths confirmed as COVID-19 related and one suspected.

Following significant departmental discussion and government guidance, electives have cautiously restarted utilising clear protocols, initially focussing on LA procedures. Elective patients must isolate for 14 days and have negative PCR testing 72 h before their procedure. We will continue to monitor if patients develop symptoms of COVID-19 post-operatively

Our study provides some evidence to suggest that plastic surgery procedures, especially under LA as a day case, carry limited risk of patients developing symptoms of COVID-19, as long as stringent guidelines are followed. Rarely patients may contract COVID-19, and if vulnerable, are likely to have a high mortality rate from the infection, similar to frail elderly patients who develop COVID-19 infection without undergoing surgery[5]. Therefore, we advise caution in elderly patients and those with underlying health conditions.

Declaration Competing of Interest

None.

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Abbreviations: LVA, lymphovenous anastomosis; LVSEA, lymphovenous side-to-end anastomosis; LVEEA, lymphovenous end-to-end anastomosis; VLR, venous-lymphatic reflux; VW, venous washout; ICG, indocyanine green.

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Resuming autologous free tissue transfer for breast reconstruction in the COVID-19 era

Dear Sir,

The Royal College of Surgeons (RCS) guide to surgical prioritisation during the coronavirus (COVID-19) pandemic states that breast reconstruction is Priority level 4 Surgery, meaning it can be delayed for over three months.[1] The 30-day mortality in elective surgery patients diagnosed perioperatively with COVID-19 may be as high as 19.1%.[2] In view of the associated mortality risk, and potential complications such as return to theatre, autologous free tissue transfer for breast reconstruction was withheld in our unit from the 12th March.

It is the view in our regional centre that free tissue transfer for breast reconstruction should not be viewed as complex surgery. We believe in performing the correct operation, for the right patient, at the right time and we strive to adhere to the NHS improvement program GIRFT (getting it right first time).

After widespread consultation with stakeholders both locally and nationally, as of June 3rd we re-started autologous free flap reconstruction. We describe our experience as the first unit in resuming this service during the COVID-19 pandemic.

Stage 1- Discussion stage with key stakeholders

With limited resources and time available, it was important to prioritise patients and maintain discussion of reconstruction on a trust director level agenda. Cases were discussed on an individual basis using the RCS prioritisation as a guideline. Categories of patients that we felt would require reconstruction during Phase 1 were reviewed regularly and highlighted to surgical directors. Our exclusion criteria were adapted according to both the emerging situation within our unit and in the medical literature.

Stage 2- Development of pathway

We developed an evidence based pathway that selected low risk patients and then minimised their potential preoperative and inpatient COVID-19 exposure. The commitment and approval of our nursing and physiotherapist colleagues has been central to the service re-opening. Multidisciplinary ownership of the pathway was key to engaging the senior management team. Furthermore, the nursing staff provided data on the practical availability of trained theatre and ward staff. The enthusiasm of a large group of motivated individuals created momentum to restart the service. Theatre lists were reduced and pooled.

Low risk patients attend a pre-operative virtual forum consultation with surgeons, specialist nurses and physiotherapists. This is where most information is provided, in order to reduce the length of the subsequent face-to-face consultation.

Prioritisation of cases on a Divisional Operations level was based on clinical needs as well as requirement and availability of resources. We expected four hours of operating and did not plan to take breaks or change scrub nurse intraoperatively, thereby reducing personal protective equipment usage. Two plastic surgery consultants were supported by an experienced scrub team. We presented this streamlined theatre plan to theatre managers. This was particularly important as during Phase 2 the theatre workforce was reduced by 30%.

Our enhanced recovery protocol includes patient discharge on day two. Our pathway for restarting DIEPs was presented to the hospital executive board. Whilst the trust directors were considering the proposal, potential low risk surgical candidates were identified.

Abbreviations: LVA, lymphovenous anastomosis; LVSEA, lymphovenous side-to-end anastomosis; LVEEA, lymphovenous end-to-end anastomosis; VLR, venous-lymphatic reflux; VW, venous washout; ICG, indocyanine green.

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Table 1 Exclusion criteria.

Age > 60 years
All smokers and recent ex-smokers (< 2 years)
Patients with a cancer history other than the breast cancer
Pre-operative lymphopenia count
Pre-operative low vitamin D
Cardiovascular disease (AF and previous MI/ stroke/TIA)
Hb < 10
Patients who live in a household with 1) high risk individuals 2) key workers whom are unable to isolate
Patients unable to accept 72-hour hospital stay
BMI > 30
Bilateral (for June)
Poor perforators on CT angiogram
Active respiratory disease

We select low risk patients at a virtual reconstruction MDT jointly lead by breast and plastic surgeons. Any attendance to the hospital is mapped on a 'green route' whereby patients are able to enter and pass through our pre-screened, lowest risk ward. **AF,** Atrial fibrillation; **MI,** Myocardial infarction; **TIA,** Thromboembolic event; **Hb,** Heamoglobin; **BMI**, Body mass index; **CT**, Computerised tomography.

Stage 3- National consensus and support from colleagues

On May 15th, our unit chaired an online meeting to gauge the national viewpoint on breast reconstruction and initiate discussion. This concluded 72% (22/30) plastic surgeons were ready to resume reconstruction within three months. There was particular concern regarding the growing waiting list for delayed DIEPs, safety of surgery and implications for training. There was also recognition of the national variation of COVID-19 effects on hospitals. Our unit had 40% inpatient capacity. Through this meeting we gained support from key stakeholders such as BAPRAS which was essential to resuming our reconstruction service.

Stage 4- Safety and consent

In line with the Montgomery ruling,[3] all forms of reconstruction and associated additional COVID-19 risks were discussed with patients. Our exclusion criteria, shown in Table 1, is based on current best evidence, and our own experience of a DIEP patient with COVID-19.[2,4] Our initial protocol criteria utilises age, comorbidity and body mass index, although we expect to move to using the clinical frailty score as our experience grows.

Our legal team was consulted to discuss how risks of exposure and complications were presented and provided us with patient information leaflets. As a result, we have a dedicated section in our reconstruction virtual forum discussing the risks of COVID-19. We have also devised a procedure-specific consent form for our DIEPs which includes a section on COVID-19 risks and complications.

Stage 5- Service recommenced

We recommenced operating on June 3rd. Initially we booked low-risk patients whom were accepting of the additional hazard of COVID-19.

A powerful tool for resuming reconstruction was the reconstruction forum to discuss cases for immediate autologous reconstruction this allowed categorisation to level 2. We are closely monitoring our service, and depending on the future epidemiology of COVID-19, we will continue to adapt our pathway.

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Ethical approval

N/A.

Declaration of Competing Interest

None.

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Plastic surgery training during COVID-19: Challenges and novel learning opportunities

Dear Sir,

The COVID-19 pandemic has fundamentally changed the way we work and care for patients. We read with interest the correspondence by Armstrong et al. outlining the response of their plastic surgery department in one of the largest teaching hospitals in Europe including leadership strategies, team restructuring and altered patient pathways.[1] However, one vitally important area not discussed is the impact on training. Furthermore, social distancing has necessitated a shift in teaching paradigms and there has been an almost-viral uptake in webinar-based learning opportunities. Notable examples include the Pulvertaft Hand Centre/PLASTA and ICOPLAST series, whilst the inaugural British Society for Surgery of the Hand "Great Debates of Hand Surgery" webinar attracted over 500 attendees. Here we consider the impact of COVID-19 on plastic surgery training and discuss the merits of webinar-based learning including how to best utilise this increasingly important teaching resource.

Impact on training

COVID-19 has significantly impacted training in plastic surgery. Reduced working hours due to illness, changes in rotas to limit exposure to the virus, a reduction in face-to-face patient assessments, an increasingly non-operative approach to common conditions, and a move to consultant-led services have limited learning opportunities for trainees in both acute and elective settings. Furthermore, examinations, educational courses and conferences have been cancelled, as have many fellowship placements. Redeployment of trainees to other specialties during the pandemic will impact training, but whether transferable skills can be obtained remains to be seen; for example, greater experience in critical care may be relevant for burns management.

Responding to the challenge

In response to these challenges the webinar has become king. Whilst widely described in the pedagogical literature, the use of webinars in plastic surgery has received limited attention.[2] Webinars represent a synchronous virtual learning platform and confer a number of advantages. Most importantly, webinars offer geographic flexibility, which not only facilitates compliance with social distancing but also increases learning opportunities from leading experts, often across international boundaries.[3] Many large online events are attended by participants from different healthcare settings, enriching discussions and facilitating the dissemination of information on a global scale. Furthermore, the synchronous setup allows participants to communicate directly with trainers and removes barriers caused by shyness, for example through the use of text-chat boxes.[4] Finally, compared to traditional teaching methods, webinars also offer greater temporal flexibility through recording and storage online for revision.

Optimising training through webinars

The educational benefits of webinars are clear and methods to optimise training in plastic surgery through this novel platform should be explored. Here we present 6 key lessons from our experience:

1. Choose an appropriate platform: A number of different online video conferencing platforms are available including Zoom®, Google Meet®, Microsoft Teams® and Skype®, each with unique features (Table 1).
2. Decide on the size of audience desired: Local or regional webinars would typically have fewer than 20 attendees and can be held in a 'chat-room' format where all participants can see each other, maximising real-time interactions and discussion. On a national or international scale there are often >100 attendees in which case opportunity for in-depth discussion is limited and a formal presentation, followed by a structured Q&A may be more appropriate. Very large events can be live-streamed on YouTube to overcome participant limits on video-conferencing platforms.
3. Advertisement: To reach a wider audience consider advertisement through regional and national networks, and/or social media.
4. Security: Consider using password protection to prevent unauthorised access, and ensure all material does not risk breaching patient confidentiality.
5. Establish a code of conduct: Punctuality and professionalism should be maintained. Participants should be muted when not speaking to avoid background noise and distractions.
6. Encourage participation: Whilst many traditional pedagogical methodologies should be maintained in webinar-based teaching, novel opportunities to engage participants exist. For example, we have used the real-time co-annotation functionality on Zoom to allow trainees to demonstrate the planning of local flaps, and the polling functionality to ask questions, test learning and gather feedback. This would enable one to engage in higher levels of learning including application, analysis, synthesis and evaluation as per Bloom's hierarchy.

Conclusions

The war against coronavirus has challenged training in plastic surgery; however, we believe that in the midst of chaos,

Abbreviations: LVA, lymphovenous anastomosis; LVSEA, lymphovenous side-to-end anastomosis; LVEEA, lymphovenous end-to-end anastomosis; VLR, venous-lymphatic reflux; VW, venous washout; ICG, indocyanine green.

Table 1 Online video conferencing applications.

Software	Compatibility	Cost (per month)	Maximum number of participants	Other free-version limitations	Additional useful features
Google Meet	Windows, Mac Web browsers* iOS, Android	Free	100 for free Up to 250 for G Suite subscribers	Gmail account required	Screen share Video recording Live subtitling Low-light mode Integration with other video conferencing apps
Microsoft Teams	Windows, Mac Web browsers* iOS, Android, Win	Teams - free Basic - £3.80 Standard - £9.40 E3 - £17.60	250, or 10′000 for live events†	8 hour limit on group chat, 4 hour limit on live events† No video recording No hosting	Screen share Background blur File-share and co-authoring documents Integrated apps
Skype	Windows, Mac Edge, Chrome iOS, Android, Win Amazon Kindle/Fire Alexa, Xbox	Free unless making international calls to phone numbers	50	4 hours/chat and 10 hours/day limit on group chats	Screen share Video recording Live subtitling Can call phone numbers not on Skype
Zoom	Windows, Mac Web browsers* iOS, Android, Win	Basic - Fee Pro - £11.99 Business/ Enterprise - £15.99	100 free Up to 1000 depending on plan	40 minute limit on group meetings	Screen share Video recording Virtual background Co-annotation

* Internet explorer, Edge, Chrome, Firefox, Safari.
† Live event limits extended to 20′000 attendees and 16 hours until 1st July 2020.

there is also opportunity. Webinar-based learning may be the norm for weeks or months to come, but also offers a fantastic platform through which educators can reach a wider audience and trainees can access expert teaching. Furthermore, reduced costs, greater flexibility and reduced carbon footprint make webinars an attractive option for the future. Further research should focus on how we can best utilise this powerful educational tool in plastic surgery training, whilst a coordinated approach from different providers could help avoid timetabling clashes and optimise attendance.

Declaration of Competing Interest

The authors declare no conflicts of interest.

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The impact of COVID-19 on medical electives in plastic surgery - A medical students' perspective

Dear Sir,

The June 2020 correspondence by *Armstrong* et al. titled "A plastic surgery service response to COVID-19 in one of the largest teaching hospitals in Europe" provided thought provoking insight into how the COVID-19 pandemic has affected medical training at every level.[1] The reconfiguration of the plastic surgery service in Oxfordshire is a key example of what is happening at the national and global scale. As the UK recovers from the first wave of the COVID-19, the impact of reconfiguration of services on medical education, particularly on senior medical students, is starting to become apparent. With suspended placements and cancelled medical electives over the summer, senior medical students have been thrown into a period of vast uncertainty. Understandably, medical students have been suspended from their placements to reduce the burden on all medical staff involved in training students whilst also preventing students from acting as vectors for COVID-19. With government-issued guidance against travel and sudden announcement of lockdowns, national and international travel has been globally restricted. Keeping these conditions in mind it is no surprise that many, if not all, medical electives for 2020 have been cancelled or postponed to a later date.

Around the world, senior medical students face similar challenges. In a recent study by *Raj* et al., it has been highlighted how cancellation of originally planned medical electives and placements due to COVID-19 has meant that senior American medical students have had to adapt rapidly in order to fulfil interview criteria and training requirements for future competitive plastic surgery posts.[2] Senior medical students in the UK experience a similar situation with regards to medical electives. This paper aims to highlight the importance of national and international medical electives in plastic surgery and the potential alternatives to demonstrating an interest in plastic surgery at the medical student level during the COVID-19 pandemic.

Electives are a significant way to build awareness about plastic surgery among medical students. Given that plastic surgery is not often integrated into the main medical school curriculum, exposure to the speciality as a student can be limited. In this case, electives serve as a career turning point for many students wanting to garner learning experience in the field. Plastic surgery electives can be crucial to career development in terms of gaining mentorship, research opportunities and fostering global networks in addition to giving a better understanding of the vast repertoire of a plastic surgeon.[3] A study has highlighted how electives in plastic surgery had a positive impact on medical students in terms of giving them a better understanding about the work-life balance in the speciality and an appreciation of the amazing variety of sub-specialties within plastic and reconstructive surgery.[4] Electives allow students to demonstrate interest from an early stage allowing development of a competitive application to core training posts.[3] Cancelled electives because of COVID-19 have denied an entire cohort of students, valuable learning opportunities in plastic surgery. While it remains unclear how this will impact future careers, applicants from this cohort could stand to be potentially disadvantaged. Given all the restrictions locally it has been difficult to re-organise clinical experience alternatives to cancelled electives. There is no doubt that COVID-19 will have a knock-on effect on the learning experiences of current senior medical students. Therefore, alternative learning opportunities should be sought by medical students where possible, till they are able to return to theatre to observe plastic and reconstructive surgical procedures safely.

Social media offers a variety of opportunities for interested medical students to gain insight and get involved with plastic surgery. Webinars offered by BAPRAS have paved the way for a new era of learning in plastic surgery for medical students, one that can be safely and remotely availed.[5] Students should also try and contact doctors to try and organise research projects that can be completed online or while maintaining safe social distancing. Each month, JPRAS also offers medical students' opportunities to get involved with visual abstract creation. This serves as an important teaching tool into the latest advances in plastic surgery and fosters networking whilst allowing students and doctors to showcase their creative talent and research interest.

In conclusion COVID-19 is slated to have long term repercussions on medical training. However, the digital age offers an excellent medium to demonstrate interest in plastic surgery and should be used by senior medical students in the absence of in-person medical electives.

Declaration of Competing Interest

None.

Abbreviations: LVA, lymphovenous anastomosis; LVSEA, lymphovenous side-to-end anastomosis; LVEEA, lymphovenous end-to-end anastomosis; VLR, venous-lymphatic reflux; VW, venous washout; ICG, indocyanine green.

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COVID-19 lockdown learning: The revolution of virtual teaching

Dear Sir,

We read with a great deal of interest the article on the "uprising" of virtual teaching during the COVID-19 pandemic[1] leading to upheaval not only in the healthcare system but also in the entire education network. Many different fields have found themselves catapulted into the remote world adapting to the challenge of maintaining learning and research under the constraints of COVID-19.

We commend the authors' recognition of the significance of continued professional development as well as the analysis of telehealth platforms as a means of communication among medical students, registrars and world-class surgeons. Indeed, what is most thought-provoking is that access to a wider variety of teaching surgeons across the globe may lead to even better trained students and registrars as they are exposed to a broader spectrum of surgical techniques being demonstrated by different surgeons drawing on the experience of different healthcare systems. In this sense, distance training for student doctors could be even more engaging due to this wider variety of remote instruction.[2]

However, an area which could have been addressed in more depth is how the authors foresee the development and use of this technology in this current de-escalation period and beyond. Sleiwah et al. mention that webinars may indeed replace face-to-face lectures, but they failed to consider this transitional phase of the pandemic and the potential use of blended learning[3] whereby face-to-face instructional elements are in fact complemented by online modules.

Indeed, despite the undoubted benefits of having a wider access to surgical demonstrations via online platforms, in the long term it is unlikely that it would be feasible for doctors and particularly surgeons in training to acquire the necessary skills without an integration of hands-on practical and clinical elements. Evaluation and assessment of these same skills would also be near impossible. Therefore, a potential solution to this would be combining the two in the short to long-term post COVID-19 stages, while abiding by social distancing measures. This approach, if adopted, could also potentially increase access to remote surgical assistance, education and mentoring for resource-poor or conflict states.

A further valid point raised is most definitely that of security in the use of online platforms to maximise healthcare resources, the authors state the importance of safeguarding confidential information and suggest frequent updates of software. They also cite the use of specifically designed surgical platforms for secure storage and remote telesurgery among surgeons showing the example of free flap tissue transfer. However, what is not taken into consideration under this section is the need to potentially adapt patient consent in these cases. Generally speaking, a patient would consent to recordings being used for medical teaching but mention of consent to live streaming should also be considered and Sleiwah and colleagues would have been prudent to consider not only the student doctor's perspective but the medical-legal perspective of patient consent.

This last point is also relevant as the question of security and privacy extends beyond providing remote learning opportunities but there is also much consideration of virtual consultations and clinics being used both in the public and private sectors and the question of patient privacy will as ever be at the forefront.[4] Proceeding with online consultations (also for teaching purposes), in order to maintain social distancing, opens up new considerations for all kinds of observers who would usually be present in a teaching hospital context (medical students, trainee healthcare practi-

Abbreviations: LVA, lymphovenous anastomosis; LVSEA, lymphovenous side-to-end anastomosis; LVEEA, lymphovenous end-to-end anastomosis; VLR, venous-lymphatic reflux; VW, venous washout; ICG, indocyanine green.

tioners, healthcare communication specialists, researchers) and thinking of ways for this to be developed represent the next stages in this new era of telehealth and learning.

In conclusion, although the authors' choice of "uprising in virtual teaching" in the title was certainly intentional, implying rebellion or revolt, we would assert that the correct term to coin would more likely be a revolution; namely a revolution for all parties involved.

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Upskilling the surgical workforce for vascular access provision during the COVID-19 pandemic – The Salisbury experience

Dear Sir,

In contrast to any other speciality, the COVID-19 pandemic has most severely impacted the anaesthetic and intensive care services in almost every hospital within the United Kingdom. Up until the 5th of July 2020, 285,416 people tested positive for the virus and up to 44,220 deaths were recorded[2]. Within the surgical departments at Salisbury District Hospital (SDH), all non urgent and elective operating had ceased during the lockdown period. The junior surgical workforce had been redeployed to medical areas leaving the registrar body to staff a 24-hour rota but with profoundly reduced workload even with the provision of trauma services. This trend of redeployment of surgical staff was echoed across the United Kingdom.[3]

In order to support and ease the burden of responsibility on our critical care colleagues, plastic surgery and maxillofacial registrars were identified as being readily available and familiar with the anatomical knowledge required, to form a new team that could provide vascular access in the form of mid-lines and Peripherally Inserted Central Catheter (PICC) for hospital inpatients. At SDH, prior to COVID-19, the vascular access team traditionally consisted of anaesthetics doctors and nurses.

Mid-lines and PICC lines allow mid to long term access (30 days and 6 weeks respectively) for the delivery of fluids, medication or parenteral nutrition and phlebotomy.[1,4] These catheters provide robust, longer term vascular access options for patients with difficult venous access who would otherwise require multiple venepuncture attempts.[4] A standard cannula requires re-siting every 72 h and the use of mid to long term lines in the correct patient directly reduces the required clinical input.

Over the course of a single week, 12 plastic surgery and maxillofacial surgical registrars were trained to place mid and PICC lines. The technique was initially taught using a simulation arm model (Peter PICC™) and an ultrasound (USS) machine. Trainees were encouraged to familiarise themselves with the anatomical appearance of relevant structures using the USS machines on themselves and

Abbreviations: LVA, lymphovenous anastomosis; LVSEA, lymphovenous side-to-end anastomosis; LVEEA, lymphovenous end-to-end anastomosis; VLR, venous-lymphatic reflux; VW, venous washout; ICG, indocyanine green.

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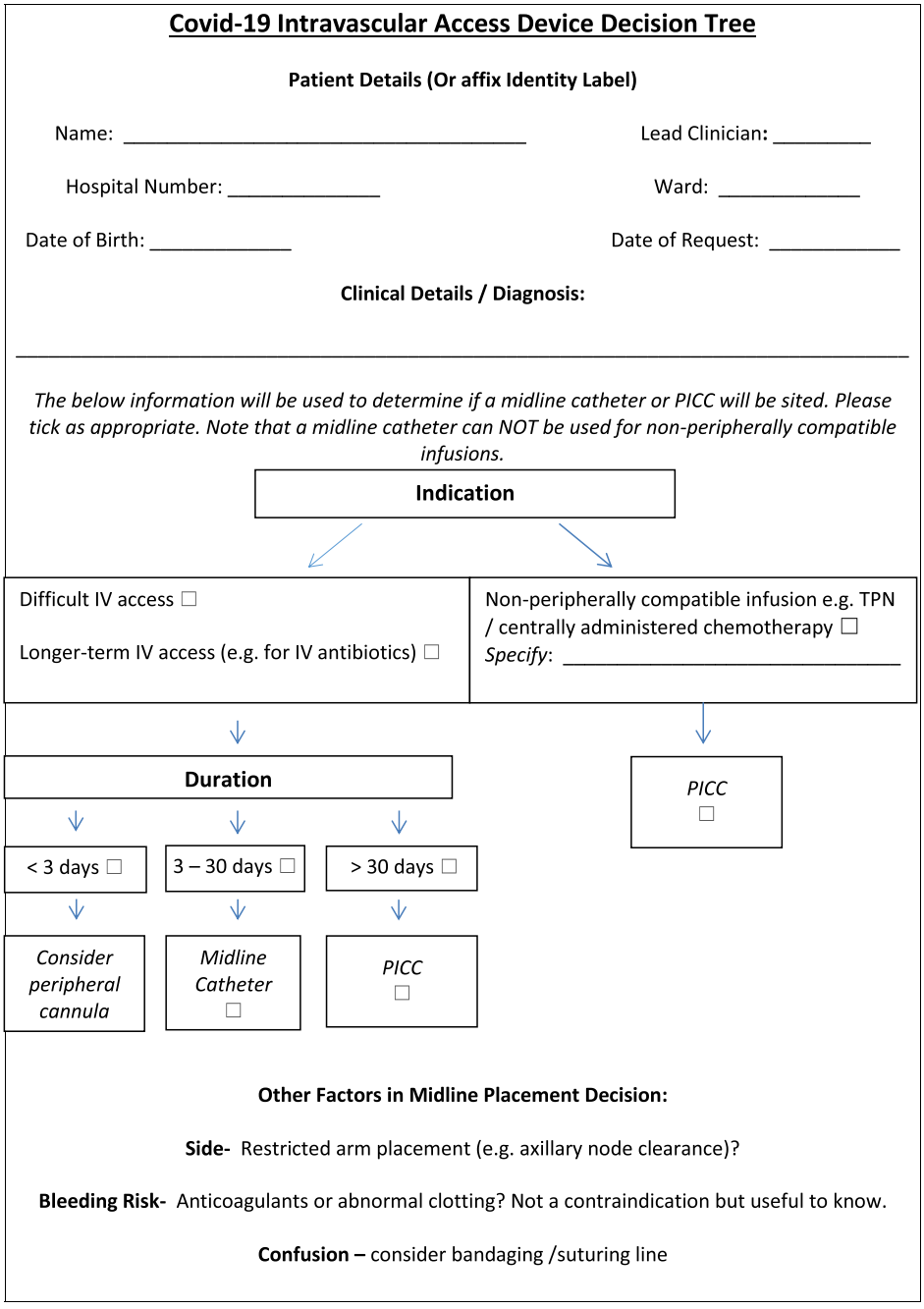

Figure 1 Protocol to aid Device Selection and Indication for individual patients requiring vascular access.

colleagues under the watchful guidance of the anaesthetics consultants. Once deemed competent with the simulation process, all trainees were then supervised placing lines in patients on the wards.

The service was coordinated on a daily basis by the existing 4 plastic surgery trauma coordinators who are nurses by background. Coordination responsibilities include identification of all available doctors against a register taken daily, as well as, review of all referrals using an effective protocol to determine device selection and indication illustrated in Figure 1.[3,4] PICC tip placement length was calculated using the Lum forumula.[5]

Over the course of the pandemic, the placement of the lines progressed to rely very little on the anaesthetic team with the majority of lines eventually placed unsupervised by the surgical trainees across the entire hospital as illustrated in Figure 2. The anaesthetics team still provided support, where necessary, in determining patient suitability, type of line required as well as review of post PICC insertion radiographs. For these, an anaesthetics doctor was available

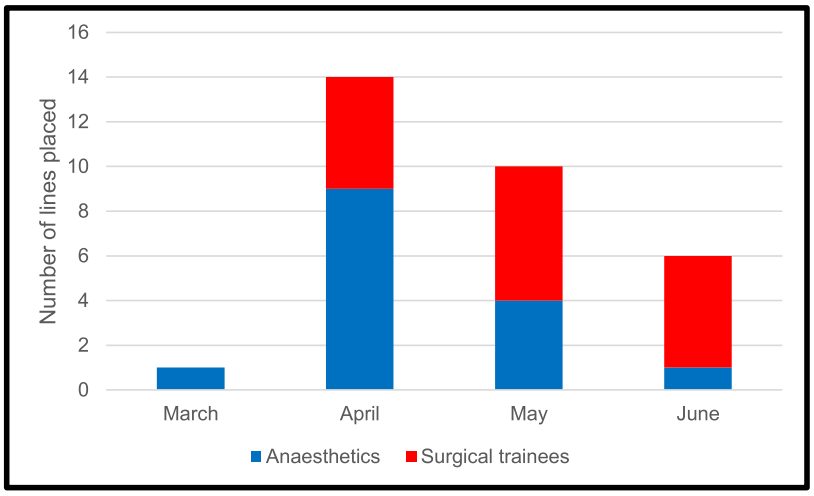

Figure 2 A Comparison of the number of Mid/PICC lines placed by speciality over the course of the Covid-19 Pandemic.

over the phone but could be available in person if the need arose.

From April to June 2020, 31 lines have been inserted (17 mid lines and 14 PICC lines). Following a request for line insertion – if deemed suitable, time to placement was less than 24 h. An entry pertaining to the insertion was left in the notes and an audit proforma filled out on each occasion in line with existing anaesthetics practice. Line placement had a 97% success rate overall with only one line thrombosis two weeks post placement.

It is evident that the workload for vascular access has remained steady throughout the COVID-19 pandemic. The surgical workforce upskilling to provide this service has significantly reduced the workload for our critical care colleagues and will remain the model of provision for as long as COVID-19 creates unprecedented demand on the intensive care services within our hospital. Surgeons already possess the fine motor skill required for line placement and coupled with their understanding of the anatomy, makes them the obvious choice for this role. The development of the team has been received positively and enthusiastically by the surgical registrars, particularly whilst their own training has been restricted during the pandemic. The success of the new team affirms the adaptability of the medical workforce to transfer skills beyond the domain of specialised practice. We hope that our practice and an 'all hands on deck' approach to the utilisation of baseline skills within the existing workforce will inform other departments to help ease the burden as we progress through the next stages of the COVID-19 pandemic.

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Declaration of Competing Interest

None

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COVID-19 lockdown and beyond: Home practice solutions for developing microsurgical skills.

Dear Sir,

Current COVID-19 restrictions present significant challenges to Plastic Surgery training. Numerous obstacles exist; including the necessity for social distancing, global PPE shortages, virtual clinics decreasing trainee exposure to pathology, reduced face-to-face clinical teaching, and limited time in theatre.[1] Furthermore, suspension of non-urgent elective reconstruction work, including breast reconstruction, limits microsurgical training opportunities. Surgical training relies on multiple sequential practice sessions, to allow deep encoding into "muscle memory"[2], this is particularly relevant for microsurgery where fine motor skills need to be developed.

The authors present multiple practical and cost-effective solutions that allow trainees to practice microsurgical techniques from home and "upskill anywhere". These practice options are transferrable to other periods away from clinical practice, including research time and maternity leave, and can also be used to supplement clinical experience during unpredictable on-call rotas. In climates of economic instability, these techniques may prove particularly beneficial.

A basic microsurgical instrument kit may be purchased online from multiple platforms at a relatively low cost (e.g. AliEx-press™, £34). The cost of microsurgical sutures can be a limiting factor to microsurgical practice (e.g. 9.0 AliExpress™, £0.93 each) and in the context of the COVID-19 pandemic, precarious supply chains necessitate preservation of resources. Luangjarmekorn et al. describe the use of human hair and insulin needles (BD Ultra-Fine Pen Needles 4 mm × 32 G, expresschemist.co.uk, £0.13 each) to make homemade microsurgical sutures (Table 1). Feedback from trainees in their study suggested that human hair sutures (Figure 1) was a "good-excellent" standard for microsurgical practice, equal to that of standard sutures[3]. This is reflected in our experience; we find that a hair of dark colour, mid length, coarse texture and wavy consistency works best.

There are multiple models for microsurgical practice described in the literature, including live animal models (predominantly rats), non-live animal models such as chicken wings or thighs, pig leg, placenta vessels, and cold stored vessels. Additionally, a number of non animal models exist including, rubber glove, gauze, silicone tubing and fresh leaves. All have specific advantages and disadvantages[2].

Abbreviations: LVA, lymphovenous anastomosis; LVSEA, lymphovenous side-to-end anastomosis; LVEEA, lymphovenous end-to-end anastomosis; VLR, venous-lymphatic reflux; VW, venous washout; ICG, indocyanine green.

Table 1 How to make a homemade microsurgical suture[3].

What you need:
Insulin pen needle (eg BD Ultra-Fine Pen Needles 4 mm × 32 G)
Human hair (ideally dark in colour, mid length and wavy/coarse texture)
Microforceps
Fine smooth pliers
Loupe magnification
Scissors
How to:
Set up a light source (eg balance phone with torch on, on top of loupes/insulin needle box)
Remove wrapper from insulin pen needle
Don loupes
Identify hair follicle end of hair
Excise hair follicle with scissors
Thread the hair through the insulin needle, follicle end first, using the micro forceps until 5 mm of hair protrudes through the needle
Use fine smooth pliers to compress needle around hair proximally and form a smooth curve distally
Cut off 5 mm of protruding hair from distal end
Use smooth pliers to remove suture from insulin pen needle casing

Many courses, including the Canniesburn Microsurgery Masterclass (https://www.nhsggc.org.uk/about-us/professional-support-sites/canniesburn-plastic-surgery-and-burns-unit/courses-at-canniesburn/microsurgical-workshop/) feature live animal models, which may better simulate real life microsurgery and allow testing of anastomosis patency and flow. A bag of saline infused with blue food colouring, running at a rate of 10 drops per minute (Zeng et al.) may be considered as a method of anastomosis testing in other models.[4] For home practice, the authors favour non animal models, due to ease of access, cost effectiveness, infection control and compliance with the "3R principles" in accordance with the National Centre for the Replacement, Reduction and Refinement of Animals in Research.

We describe the use of a novel flower petal model (Figure 1) as it is readily available, requires meticulous handling and poses minimal environmental impact. Simple analysis scripts on open source image analysis software such as FIJI™ (Fiji.sc) can be utilised to analyse microsurgical suture placement. Another alternative model favoured by our group is the use of silicone tubing (Pocket Suture™, £9) or a MicroTrainer strip (DigitalSurgicalSkillsAcademy™).

The key benefit of the MicroTrainer™ and accompanying software/app is that it provides objective assessment of accuracy of suture spacing, orientation and progress over time. This method is currently used in the RCSEd microsurgical skills course (https://www.rcsed.ac.uk/events-courses/event-entry?diaryId=2712).

In our department, we have been running supplementary microsurgery training sessions by senior trainees and consult-ants, using microscopes and screens to allow for social distancing. The use of social media, such as the Interna-

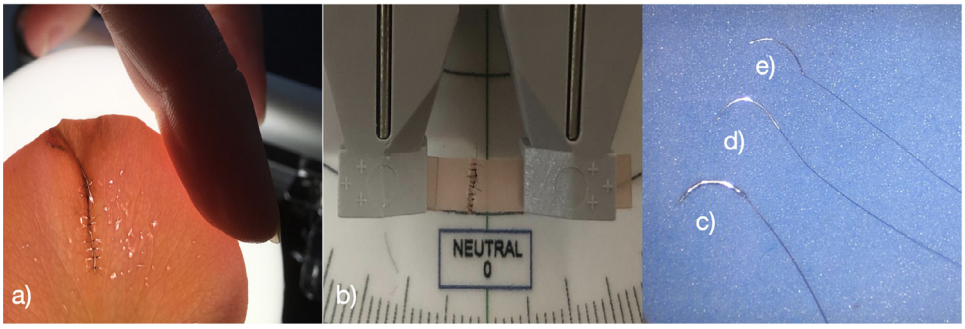

Fig. 1 a) Flower petal model b) Microtrainer™ model test strip, scoring 29/35 c) Homemade suture made from insulin pen needle and human hair d) 9.0 Ethilon™ suture e) 11.0 Ethilon™ suture.

tional Microsurgery Club (Tang et al.) can also provide peer learning and communication with experts in the microsurgical community, whilst working remotely[5].

Therefore; there are many innovative, low-cost options for suture material, microsurgery models, and assessment of microsurgical skill progression. These solutions may be utilised to develop microsurgical skills during periods of remote working.

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All of the staff, past and present, of the Canniesburn Plastic Surgery and Burns unit, who are committed to delivering excellent microsurgical care for the benefit of their patients.

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PLASTA National Webinar Series: A developing model for remote surgical education

Dear Sir,

We enjoyed the recent publication on the growth of high-quality webinar-based teaching from the Plastic Surgery Trainees Association (PLASTA)[1] and would like to offer some reflections. We agree webinars have many advantages in terms of cost, accessibility, convenience as well as the ability to place experts in niche areas of Plastic Surgery right into the homes of trainees. Even illustrious educational institutions[2] hark that web-based teaching is a welcome evolution of the humble lecture, but returning to this format after the war against coronavirus may seem like a step backwards. The exciting and high quality webinars that have been produced at speed by organisations including PLASTA, British Association of Plastic Reconstructive and Aesthetic Surgeons (BAPRAS), The British Society for Surgery of the Hand (BSSH) and the Pulvertaft Hand Centre amongst others is commendable and has been a welcome escape from the frustrations of cancelled teaching sessions, limited trainee-operating and re-deployment.

However, webinars are a single tool in a Plastic Surgeon's educational toolbox. Those who have delivered a web-based teaching session will appreciate the solitude of the connection: the software programmes give little back to speakers; most viewers watch with the camera off and the microphone muted; the nods, grimaces or confused faces of the audience are lost; the platforms do not facilitate question and answer freely, as in a traditional lecture theatre. Interaction between more than two people is challenging and the engaging ruckus of a live debate is numbed. Features like the survey function allow people to anonymously engage by

Abbreviations: LVA, lymphovenous anastomosis; LVSEA, lymphovenous side-to-end anastomosis; LVEEA, lymphovenous end-to-end anastomosis; VLR, venous-lymphatic reflux; VW, venous washout; ICG, indocyanine green.

voting, but clearly limits people to the choices in front of them.

Educational theory states that a multitude of teaching techniques can improve participant learning: some students prefer to read, some to listen, others to watch a video. This approach is likely an effective learning strategy to only a subset of learners, as those who prefer to learn through sequential[3] or kinaesthetic[4] methods can attain more using different techniques. Face-to-face meetings also offer a myriad of networking opportunities through the chance to meet with colleagues on the rotation, make new connections, or introduce yourself to your future boss!

Finally, and potentially the biggest flaw of webinars, is that they do not mandate reflection. Consider the last movie you watched with friends: do you remember the story, or your reflections afterwards? All of this can be lost with webinars, along with the non-verbal communication offered by the speaker and fellow meeting attendees. Let us not forget that 'Man is, by nature, a social animal'[5]: we have an innate need to connect with each other. A handshake, a nod, an appreciation of subtle facial movements, or an encouraging roar of laughter.

Can these be overcome? Of course. Through watching the webinars as a group, or discussing them post-hoc with peers we will deepen our educational experience. Furthermore, having a local consultant present to guide the discussion, and facilitate discussion between local trainees changes the potential passive nature of webinars to an active process, where knowledge can be readily applied to local circumstances. In the post-COVID-era, let us harness the value of webinars, and encourage educational authorities to do so also: but as part of the learning toolbox.

Declaration of Competing Interest

VG has organised the Imperial International Webinar Series.

Funding

None.

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Letter to the Editor regarding: "Poorly differentiated cutaneous squamous cell carcinomas (SCCs) have high incomplete excision rates with UK minimum recommended pre-determined surgical margins"

Dear Sir,

We read with great interest the recently published "Poorly differentiated cutaneous squamous cell carcinomas (SCCs) have high incomplete excision rates with UK minimum recommended pre-determined surgical margins".[1] This paper looks at a tertiary Plastic Surgery unit's excision margins and histology, concluding that clinically high-risk SCCs should be excised with a margin greater than 6 mm. Preventing skin cancer recurrence through achieving high complete clearance rates and managing incompletely excised tumours, is a concern of importance to all plastic surgeons. The UK minimum recommended surgical margins are described in the British Association of Dermatology (BAD) guidelines,[2] which are currently being updated. We argue that the conclusions drawn from the data discussed in this paper to be unjustified.

The authors argue that following current BAD guidelines increases the likelihood of incompletely excising poorly differentiated SCCs. On retrospective examination of their histological margins the authors found close or involved margins for 5/38 (13.2%) poorly differentiated SCCs compared to 3/99 (3%) well differentiated SCCs, a difference found to be statistically significant. This is used as evidence that current BAD guidelines are insufficient for high-risk SCCs, however, the authors do not differentiate between lesions excised with different clinical margins and included those excised with margins less than recommended.

Abbreviations: LVA, lymphovenous anastomosis; LVSEA, lymphovenous side-to-end anastomosis; LVEEA, lymphovenous end-to-end anastomosis; VLR, venous-lymphatic reflux; VW, venous washout; ICG, indocyanine green.

The current guidance for high-risk SCCs, which include poorly differentiated SCCs, recommends a 6 mm or greater margin.[2] With the assumption that lesions in which the margins were not recorded were excised according to BAD guidance, of the poorly differentiated SCCs excised according to current guidance 2/24 (8.3%) had close or involved margins. If lesions with unknown margins are excluded this drops to 1/17 (5.9%). Of the well differentiated SCCs excised according to BAD guidance 1/45 (2.2%) had involved margins, if lesions with unknown margins are excluded this is 0/29 (0%). These figures represent a very small number of SCCs, making it difficult to draw meaningful conclusions or comparisons. The difference in incomplete margin rate is less between the two groups, but is of unknown statistical significance.

It was not possible to include all the authors data, as peripheral margins are presented in a bracket of $\leq$ 4mm, which for well differentiated SCCs includes both lesions excised according to guidelines and lesions excised with less than recommended margins. We have not included this bracket in our figures due to this. The authors do not explain why some lesions in this study were excised with a margin of less than 4 mm, and the presentation of data in this format is inappropriate given the papers context.

Along with poor differentiation, lesions measuring greater than 2 cm in diameter are also classified as high risk SCCs. The authors describe 90 such lesions, but do not include excision margins or outcomes for this subgroup. Including these outcomes may have given more evidence to support the authors claim that high-risk SCCs require greater excision margins. This highlights the importance of including all data regardless of its perceived significance.

It is difficult to derive meaningful conclusions from documented excision margins "in real life". Determination of the precise clinical margins can be difficult with some cutaneous cancers. Free hand margin drawing is inherently inaccurate and inconsistent. It is impacted by both the thickness of the marker used as well as the tension with which the surrounding soft tissue is handled during the marking.[3] As the authors acknowledge only 1-2% of the actual margin is checked histologically using the 'bread-loaf' or step sectioning technique for conventional excision specimens.[4]

The authors conclude that clinically high-risk SCCs should be excised with a peripheral margin of greater than 6mm, and that UK guidelines should be increased. They have not interpreted their data to support this. The data does show that poorly differentiated SCCs are more likely to be excised with an incomplete margin, and it is for this reason that BAD advises excising high risk lesions with a margin of 6mm or greater.

Declaration of Competing Interest

None.

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The Glasgow microsurgery fellowship

Dear Sir,

Fellowships have become the most structured way to prepare for a plastic surgery consultant career in most chosen sub-specialties. High profile microsurgical fellowships in Europe are few and far between, though new fellowships are sometimes developed and merit highlighting. We would like to take this opportunity to highlight our experience, as we were reconstructive fellows with different subspecialty interests in Glasgow, in the hope that other senior trainees with an interest in reconstructive surgery may find this helpful.

Specialisation field - reconstructive microsurgery

Finding an English-speaking fellowship relatively close to Switzerland is difficult, so we targeted the United Kingdom as the best option within the Commonwealth. Whilst Australasia also has great microsugical fellowships, many

Abbreviations: LVA, lymphovenous anastomosis; LVSEA, lymphovenous side-to-end anastomosis; LVEEA, lymphovenous end-to-end anastomosis; VLR, venous-lymphatic reflux; VW, venous washout; ICG, indocyanine green.

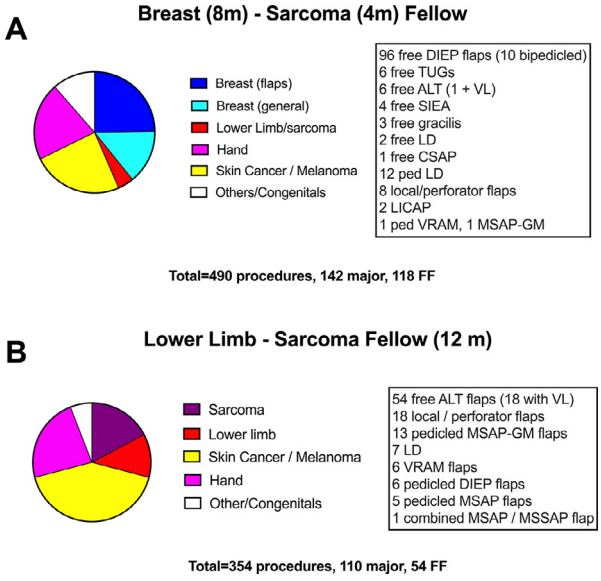

Fig. 1 Thematic distribution of cases amongst fellow.

of these focus on head and neck surgery rather and less on breast reconstruction. The reconstructive fellowship in Glasgow offered high patient's volumes and a bespoke training that could be tailored to the individual's requirements to include elements of other sub-specialties. In particular, Glasgow offers modern breast reconstruction, upper extremity reconstruction including brachial plexus surgery, orthoplastic lower extremity reconstruction, and multidisciplinary sarcoma treatment.

Canniesburn Plastic Surgery Unit is one of the larger units in the UK with a fantastic history having achieved some of the milestones of modern plastic surgery. Their unit has 17 consultants (of which 7 specialise in microsurgical breast reconstruction), all keen to facilitate training at every level.

Whilst the Canniesburn fellowship system has been running for decades and trained many of the current UK and European consultants, it has now been developed to focus on bespoke reconstructive fellowships. The department offers three reconstructive clinical fellow posts per year. These fellowships can be tailored according to the fellow's preferences through allocation to the appropriate consultant surgeons within the desired subspecialties.

Operative exposure and casemix

When analysing our operatory experience It needs to be considered that every fellow may have different surgical seniority and focus on branches that have not necessarily the same operative microsurgical flaps load. Said that, on the same 12 months fellowship time, the breast-sarcoma fellow (BS, PGdS) performed 118 free flaps as primary surgeon, with a total of 142 major procedures (major pedicled or perforator flaps), while the Lower limb-sarcoma fellow (LLS, RO) performed 54 free flaps out of 110 major procedures (Figure 1 for case distribution). Out of all of the reconstructions we could raise 85% of the flaps, performing microsurgical anastomoses in over 75% of cases, no free flaps failures were reported in either of our series as fellows, with only 3% revision rate. On the other clinical days we were mostly either assisting other complex cases as second surgeon or attending clinics of chosen specialist interests. Particularly the LLS fellow could benefit of a clinic of over 1200 patients/year (including 34% of sarcoma cases and 18% of patients in multidisciplinary orthoplasty clinic). The BS fellow attended clinic of a volume of nearly 1000 patients/year (with 70% of breast reconstruction patients).

Concerning on-calls, we were involved in registrar's on-call rota (and salaried on the upper registrars pay scale), with roughly one on-call night/week and one full day-time trauma week/trimester (involving mainly hand surgery and traumatic accidents).

To resume, whilst we came to UK already able to perform free flap procedures, we learnt in Canniesburn how to do these much more efficiently by improving skills, confidence and decision-making. Learning from multiple consultants doing similar procedures in slightly different ways helped to take different pieces from each consultant's practice and thus further develop our own.

Established connections and research

We were also encouraged to visit other microsurgical units and were actively supported by being put in contact with other specialist unit members across the country. The Canniesburn consultants were particularly helpful in introducing us as visitors to renowned units such as the breast reconstruction unit in Chelmsford and the lower limb reconstruction unit in Bristol. In addition to sharing the registrar's on call duties, we also found time and opportunities to further enhance our CV's by engaging in research projects and setting up our own resulting in quite a few articles in peer reviewed journals.

Overall, the unit has a important microsurgical workload, produces regularly innovative ideas and constitutes the perfect opportunity to spend the final year of training before applying for a consultant post. This fellowship has built links and friendships, which continue to provide us with help and support and after all represent an ongoing fruitful dialogue with the British Island, as we are now well-established consultants in reconstructive surgery at University Hospitals.

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Declaration of Competing Interest

None.

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Letter comments on: Combination of mesenchymal stem cell-conditioned medium and botulinum toxin type A for treating human hypertrophic scars

Dear Sir,

We have read the article **"Combination of mesenchymal stem cell-conditioned medium and botulinum toxin type A for treating human hypertrophic scars "**,[1] and in our point of view and depending on our clinical experiences, there are some points that should be illuminated.

The plain language used throughout the article has increased comprehensibility. The evaluation of hypertrophic scar samples taken from patients in both in-vivo and in-vitro experimental environment has enriched the study. Including the histological evaluations in detail has increased the reliability of the study. I congratulate you for your contribution to science.

Intralesional corticosteroid injections, used for the treatment of pathological scars since the mid-1960s, continue to play a major role in the regression of hypertrophic scars and keloids.[2] Injection of steroids (triamcinolone) is widely used as an initial treatment for keloids and hypertrophic scars and is commonly applied in conjunction with other modalities including surgical excision to decrease scar recurrence rates.[3] We would appreciate if you could give information about why intralesional steroid injection is not included in the control groups in your study. Despite few randomized, prospective studies, there is broad consensus that injected triamcinolone acetonide (TAC) is efficacious and it is the first-line therapy for the treatment of keloids and the second-line therapy for the treatment of hypertrophic scar if other, easier treatments have not been efficacious.[4] If control groups included triamcinolone, efficacy comparisons could be made with the other treatments.

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Combination of mesenchymal stem cell-conditioned medium and botulinum toxin type A for treating human hypertrophic scars: Reply

Dear Sir,

We thank Dr. Samet Kaya, Dr. Can İlker Demir, Murat Şahin Alagöz for their interest in our article entitled **"Combination of mesenchymal stem cell-conditioned medium and botulinum toxin type A for treating human hypertrophic**

Abbreviations: LVA, lymphovenous anastomosis; LVSEA, lymphovenous side-to-end anastomosis; LVEEA, lymphovenous end-to-end anastomosis; VLR, venous-lymphatic reflux; VW, venous washout; ICG, indocyanine green.

Abbreviations: LVA, lymphovenous anastomosis; LVSEA, lymphovenous side-to-end anastomosis; LVEEA, lymphovenous end-to-end anastomosis; VLR, venous-lymphatic reflux; VW, venous washout; ICG, indocyanine green.

scars",[1] and for drawing our attention to the issue on intralesional corticosteroid injections.

The intra-lesional injection of steroids (triamcinolone) is currently the first-line therapy for the treatment of keloids and hypertrophic scar which is commonly applied in conjunction with other modalities including surgical excision to decrease scar recurrence rates as well despite the randomized and prospective studies are limited.[2] Thus, they suggest we could include intralesional steroid injection in the control group in our study for further efficacy comparisons with other treatments.

As the 30 years' experience of treatment of keloid and hypertrophic scar in Chang Gung memorial hospital , intralesional steroid injection remained the first-line therapy for hypertrohic scar according to The International Advisory Panel on Scar Management recommandation.[3] However, in our observation, there are multiple adverse effects caused by steroid injection, including skin atrophy, telangiectasia, and pigmentary changes, which are not acceptable by most patients.[4] Because of these side effects, we considered reducing the dosage and combining it with other drugs, such as interferon, calcium channel blocker or botulinum toxin type A, for clinical use. This is the reason why we started experiments and clinical studies for different single or combination therapy for hypertrophic scar since 1990's.[5-11]

In our previous study, we compare botulinum toxin type A ,steroid and combination of both and we found botulinum toxin type A have better effect than steroid in animal study and the combination therapy even better than single therapy.[4] To further decrease the usage and side effects of steroids, we considered directly shifting to a combined regimen (mesenchymal stem cell-conditioned medium and botulinum toxin type A), therefore, we did not use steroid as control group in current study since we already know the efficacy between botulinum toxin type A and steroid according to our previous study. That being said, our findings are limited to pre-clinical study so far; the clinical trial is being planned to compare intra-lesional steroid injection , botulinum toxin type A and combination treatment.

Ethical approval

N/A.

Declaration of Competing Interest

On behalf of all authors, I made the declaration that there is no conflict of interest in this Letter of Response. Oscar Lee.

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Comment on: "A structured pathway for accelerated postoperative recovery reduces hospital stay and cost of care following microvascular breast reconstruction without increased complications"

Dear Sir,

We read with great interest a recent article by O'Neill et al.[1] on the implementation of an accelerated postoperative recovery protocol following DIEP flap breast reconstruction. Our department has formally introduced a DIEP Enhanced Recovery After Surgery (ERAS) Pathway in May 2019. We would also like to share the findings of a closed-loop audit that we recently completed, which reviewed the effectiveness of this pathway and the surgical outcome of our patients.

Although in a much smaller sample size, our results were similar to this article and we would agree with the authors' conclusion that implementation of such protocol could effectively reduce the length of inpatient stay (LoS) and cost of care, without compromising patient care nor increasing complication rates. Prior to the introduction of ERAS Pathway, 28 of our patients who had DIEP between November 2018 and May 2019 had an mean LoS of 7.1 days (median 6 days, range 5–21 days); whereas 27 patients who experienced the ERAS Pathway between May and December 2019 had an mean LoS of 4.8 days (median 5 days, range 3–7 days). The cost of inpatient stay in a normal ward at our hospital is approximately £232 per patient per day. Prior to the COVID-19 pandemic, there are an estimated of 60 DIEP performed annually at our department. If we extrapolate our result, by reducing an extra 2.3 days of inpatient stay on these 60 patients, the Trust could save at least an average of £32,016 per annum.

Interestingly, we note that amongst the authors' patient cohort, there were patients with BMI up to 46 and active smoker who received microvascular breast reconstruction in both pre- and post-protocol groups. In our department, only patients with BMI less than 32 and who have stopped smoking for three months would be listed for DIEP. This is because both of these factors can significantly increase the perioperative risks and surgical complications.[2,3] For our patients who do not meet these criteria, our Breast Reconstruction Clinical Nurse Specialists would direct them to the right resource and closely follow them up. Once they reach their target range, they would be reviewed at outpatient clinic and listed for the surgery.

We also do not routinely commence Aspirin for our DIEP patients post-operatively, as the authors did for 6 weeks. Our patients would only receive low molecular weight heparin (LMWH) whilst they are inpatient post-operatively as a form of venous thromboembolism (VTE) prophylaxis and this would be discontinued upon discharge. None of our patients had pulmonary embolism nor deep venous thrombosis. There was one patient in each pre- and post-ERAS group who had haematoma and required evacuation; one patient with bilateral DIEP in pre-ERAS group who unfortunately had total flap loss. In a systematic review and meta-analysis, Lee and Mun[4] concluded that the use of antithrombotic had no significant effects on free flap survival and in fact, they could increase the incidence of haematoma. On balance, we think that the early mobilisation that ERAS advocates and the use of prophylactic LMWH are sufficient as VTE prophylaxis in this group of patients. By adding another antithrombotic agent, it might in return increase flap complications.

We do acknowledge the different healthcare system, clinical practice and patient cohort between UK and Canada might explain some of the difference in the delivery of patient care. The optiFLAPP study[5] published in 2018 has also demonstrated a marked variation in the perioperative care of women undergoing abdominal-based microvascular breast reconstruction in the UK itself. However, what we would like to highlight to our readers are the benefits and effectiveness of this multimodal, patient-centre and evidence-based ERAS. This, perhaps, should be the standard of care for all patients who undergo microvascular breast reconstruction in the future.

Abbreviations: LVA, lymphovenous anastomosis; LVSEA, lymphovenous side-to-end anastomosis; LVEEA, lymphovenous end-to-end anastomosis; VLR, venous-lymphatic reflux; VW, venous washout; ICG, indocyanine green.

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Declaration of Competing Interest

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