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Correspondence and Communications

Vascular-controlled indocyanine green fluorescence angiography for evaluating locoregional flap perfusion prior to pedicle division☆

Dear Sir,

Although free-tissue transfer is widely used, locoregional flaps remain useful in reconstruction; however, they may require a secondary division procedure, and determining flap perfusion and deciding the timing of pedicle division can be challenging. Fluorescence test has been used to acquire real-time tissue perfusion images to help decide the timing of pedicle flap division [1,2]. Technically, pedicle blood flow is temporarily obstructed using rubber bands, custom-made Orthoplast sheets, long-nose locking pliers, intestinal clamps, or a pneumatic tourniquet device to clarify whether the recipient site provides sufficient flap perfusion; [3] unfortunately, flap failure after pedicle division can still occur due to false-positive signals transmitted from the wound bed or perfusion leakage due to failed pedicle clamping. To minimize these errors, we modified the use of indocyanine green (ICG) fluorescence angiography by incorporating the vascular control concept, inspired by the Allen's test [4], which introduced the concept to clarify the circulation of a specific origin. This vascular-controlled ICG fluorescence angiography test has helped us treat patients with locoregional flap reconstruction. We believe this test is useful and simple.

Case 1: A 59-year-old man lost 3 × 2-cm skin on right index finger by an electric saw injury. A 7 × 3-cm groin flap was used to cover the exposed extensor tendon. After 14 days, ICG fluorescence angiography was used to evaluate flap perfusion prior to division. First, the flap blood supply was controlled via the application of an intestinal clamp at the flap pedicle and a finger tourniquet at the proximal phalanx of right index finger. Next, 12.5 mg (0.15 mg/kg) of ICG was intravenously injected, and the SPY® Elite fluorescence imaging system was used to detect fluorescence. When ICG fluorescence was strongly detected in his right hand and digits, the absence of a fluorescent signal within the flap was confirmed, thereby indicating that there was no perfusion leakage from the flap pedicle, and no interference from the background tissues (Figure 1 and Video 1). The finger tourniquet was then released, and ICG fluorescence flooded into the flap close to the intestinal clamp, indicating that the recipient site provided sufficient blood perfusion to the flap. Finally, the flap pedicle was divided, and the flap completely survived.

Figure 1 Indocyanine green fluorescence detected in the right hand and digits but not within the flap, indicating the absence of perfusion leakage from the flap pedicle, and no interference from the background tissues.

Case 2: A 52-year-old man presented with dysphagia and an esophageal mass was found. Biopsy confirmed the diagnosis of squamous cell carcinoma, and he then underwent video-assisted thoracic esophagectomy and gastric tube pull-up reconstruction. Unfortunately, wound healing was complicated by leakage from the gastroesophageal anastomosis. After radical debridement was performed, the left deltopectoral flap was elevated and turned over to cover the 6 × 2-cm wall defect at the gastroesophageal anastomosis site. After 14 days, the vascular-controlled ICG fluorescence angiography test was conducted to evaluate the flap perfusion prior to division. First, the central bridge area of the deltopectoral flap was isolated using intestinal clamps to create a vascular-controlled zone (Figure 2 and Video 2). Next, 12.5 mg (0.17 mg/kg) of ICG was intravenously injected, and the SPY® Elite fluorescence imaging system was used to detect fluorescence. When ICG fluorescence was strongly detected in the outer fields but not in the vascular-controlled zone, it confirmed that there was no perfusion leakage and no interference from the background

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Figure 2 The central bridge area of the deltopectoral flap was isolated by intestinal clamps at both the flap pedicle and recipient sides to create a vascular-controlled zone.

tissues. Then, the intestinal clamp in the recipient side was first released, and the ICG fluorescence flooding into the central bridge area indicated that the recipient site provided sufficient blood perfusion to the flap. Finally, the flap pedicle was divided, and the flap completely survived.

Failed neovascularization from the recipient site is a major concern and predicting flap perfusion prior to pedicle division is helpful in clinical practices. Among the introduced tests, such as ICG fluorescence, laser-Doppler flowmetry, and tissue oximetry, ICG fluorescence is the most widely used owing to its reproducibility, affordability, high detection rate, and diagnostic accuracy [5]. However, its false-positive result caused by perfusion leakage from the flap pedicle or background signal interference remains problematic. Therefore, we modified the ICG fluorescence angiography by adopting the concept of vascular control to overcome this problem. By releasing the recipient side clamp, while leaving the pedicle side clamp in place, the fluorescence flooding into the flap can confirm that circulation of the flap can rely on the recipient site after pedicle division. There are two limitations for this test. First, using the 'vascular bridge' technique in a buried flap may not fully eradicate the false positive test since the area perfused is not the critical part of the buried flap. Second, although ICG has lower complication rates, its use in patients with iodide or ICG sensitivity should be avoided. Nevertheless, it is convenient to use and is readily available, making it easy to repeat at the bedside, which may in turn provide the opportunity for flap early division to shorten patient suffering. In addition, we can evaluate the extent of neovascularized perfusion using this test to facilitate the determination of the flap division level. Where patient and wound factors may impede neovascularization and therefore cloud the usual decision-making process, we believe that this test can be useful for flap pedicle division by judging the division timing and the division level.

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Declaration of Competing Interest

None.

Acknowledgement

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Supplementary material

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.bjps.2020.08.120.

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Kuan-Chih Wang
Division of Plastic and Reconstructive Surgery, Department of Surgery, An-Nan Hospital, China Medical University, Tainan, Taiwan

Yao-Chou Lee
Division of Plastic and Reconstructive Surgery, Department of Surgery, National Cheng Kung University Hospital, College of Medicine, National Cheng Kung University, 138 Sheng-Li Road, Tainan 70403, Taiwan
E-mail address: yclee@mail.ncku.edu.tw (Y.-C. Lee)

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Minimally invasive robotic-assisted harvest of the deep inferior epigastric perforator flap for autologous breast reconstruction

Dear Sir,

Autologous breast reconstruction has markedly evolved since its inception. Surgeons are seeking ways to harvest abdominal free flaps based on fewer perforators and with smaller fascial incisions.[1-4] Several reports in the literature have shown that a minimally invasive approach via laparoscopic harvest of the pedicle is possible.[1,4] Most recently, robotic harvest in a unilateral case has been described.[5]

We present our experience with four patients scheduled for concurrent abdominal robotic-assisted surgery, in whom we used the robot to harvest the deep inferior epigastric pedicle. This is the first report of any bilateral robotic flap harvest at the same time as another procedure. The Da Vinci Xi Surgical System® (Surgical Intuitive, Sunnyvale, CA) was used in all patients. Bilateral single-vessel DIEP (chosen based on preoperative CTA) are isolated, and the robot is re-docked using the same ports as were used in the abdominal procedure. The patient is placed in moderate Trendenlenburg position and the posterior sheath/peritoneal flap is incised above the identified perforator and displaced inferiorly, allowing access to the pre-peritoneal space. Blunt dissection to separate the inferior epigastric vessels from the muscle is performed. Branches to the muscle and surrounding fat are ligated using the vessel sealer, and then the pedicle is harvested at the level of the round ligament leaving a short stump from its takeoff from the iliac vessels. Next, the pedicle is dissected cranially towards the perforator. The peritoneal flap is closed robotically with an absorbable self-locking suture (V-loc 2–0 90-day, Medtronic). The robot is undocked and ports are removed. The final step is dissection of the perforator through the muscle, and then the flap is removed.

Patient one is a 54-year-old woman with bilateral breast cancer who was incidentally found to have a 6×8.5 cm gastric mass on her preoperative planning CT for autologous breast reconstruction. Pre-operative workup showed the mass to be benign. General surgery recommended robotic-assisted resection given its size and location as concerning for obstruction. She underwent robotic-assisted trans-gastric endomucosal mass resection followed by harvest of the DIEP pedicle. Robotic-assisted harvest of the pedicle added an additional 38 min to the case. Her post-operative recovery was smooth and she was discharged on post-operative day ten.

Patient two is a BRCA2 positive 60-year-old woman who presented for bilateral autologous reconstruction and was also offered a prophylactic robotic-assisted oophorectomy by the gynecologic oncologist based on known intra-abdominal adhesions. She underwent robotic-assisted oophorectomy and harvest of the DIEP pedicle, which added an additional 42 min to the case. She was discharged on post-operative day two, per our standard ERAS protocol.

Patient three is a BRCA2 positive 43-year-old woman with left breast cancer who presented for bilateral autologous reconstruction. She was offered a prophylactic robotic-assisted hysterectomy and bilateral salpingo-oophorectomy by the gynecologic oncologist due to intra-abdominal adhesions. She subsequently underwent robotic-assisted hysterectomy, bilateral salpingo-oophorectomy and DIEP pedicle harvest that added an additional 52 min to the case. She was discharged on post-operative day two.

Patient four is a BRCA2 positive 44-year-old woman with left breast cancer who presented for bilateral autologous reconstruction and was offered concurrent robotic-assisted hysterectomy and bilateral salpingo-oophorectomy due to intra-abdominal adhesions (secondary to prior gastric sleeve and cesarean section operations). She underwent robotic-assisted hysterectomy, bilateral salpingo-oophorecomy and DIEP pedicle harvest, which added an additional 48 min to the case. She was discharged on post-operative day two.

In these four cases we successfully performed robotic-assisted DIEP flap harvests for bilateral breast reconstruction when it was already in use for concurrent abdominal surgery. While the use of the robot did approximately double the pedicle harvest time, as usual pedicle harvest takes 15-20 min in the senior surgeon's experience, we expect that with increased experience this time should decrease. Additionally, no patient had any complication specifically related to the use of the robotic system.

With the introduction of any novel technique, there are advantages and disadvantages that must be carefully assessed for each patient and the surgeon must determine when it is appropriate to implement in practice. The advantages of the robotic harvest include increased surgical dexterity, 3D visualization, ergonomic design for the operating surgeon, and motion scaling. The critique of robotic-assisted surgery is whether there is a true benefit to adding operative/robotic time, adding more expense to the patient, increasing the utilization of resources, and determining if this method is truly more effective than conventional methods. Our group believes that robotic-assisted surgery is not indicated for all bilateral free flap procedures, but there are specific circumstances where robotic-assisted DIEP harvest is advantageous for the patient. In all of our cases there was a robotic procedure already being performed at the time of surgery; thus, when combined in this way there is no additional time needed for robot setup and no additional utilization of resources. As robotic-assisted surgery becomes more widespread in abdominal surgery, it is another tool that the reconstructive microsurgeon in partnership with a minimally invasive

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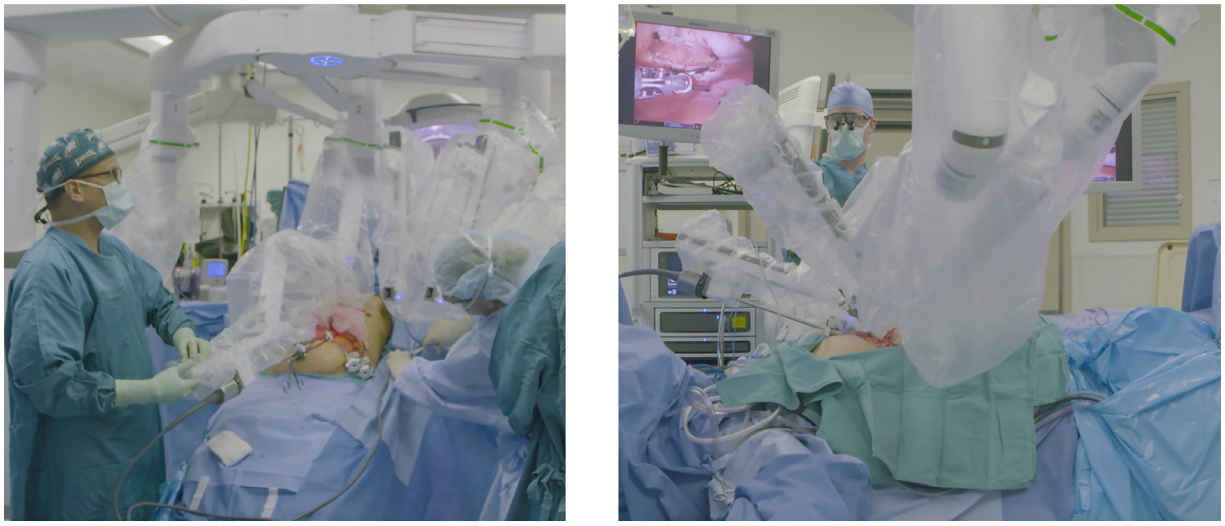

Figure 1 Demonstration of robot positioning after intra-abdominal portion of the procedure has been completed and the DIEP flap has been elevated. The supraumbilical trocar is used for the Maryland-tip Ligasure, the suprapubic trocar is used for a second Maryland dissector, and the third trocar is used for the camera.

robotic surgeon may utilize to enable a minimally invasive approach for DIEP harvest Figure 1.

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Declaration of Competing Interest

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Merisa Piper
Division of Plastic and Reconstructive Surgery, University of California, San Francisco, San Francisco, CA, United States

Cassandra A. Ligh, Sameer Shakir, Charles Messa
Division of Plastic and Reconstructive Surgery, University of Pennsylvania, 3400 Civic Center Boulevard, South Tower, 14th Floor, Philadelphia, PA 19104, United States

Ian Soriano
Division of Minimally Invasive Surgery, University of Pennsylvania, Philadelphia, PA, United States

Suhail Kanchwala
Division of Plastic and Reconstructive Surgery, University of Pennsylvania, 3400 Civic Center Boulevard, South Tower, 14th Floor, Philadelphia, PA 19104, United States
E-mail addresses: merisa.piper@ucsf.edu (M. Piper), suhail.kanchwala@pennmedicine.upenn.edu (S. Kanchwala)

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Modified technique of free composite osteocutaneous flap based on half-circumferential fibula with multiple segments

Dear Sir,

Complex foot injuries are usually the result of high-energy trauma, and characterized by open fractures or comminution of the tarsometatarsal complex, compromise of soft tissues and skin defects. The free fibular osteocutaneous flap is widely used to repair these defects because of its accessibility, composition of cortical bone and well-vascularized skin.[1] Recently, possible complications have been documented, including pain, reduced muscle strength, claw toe, ankle instability, limited range of motion (ROM) of the ankle, contracture of the flexor hallucis longus muscle, and tibial stress fracture.[2-4] Then, we have introduced a modified flap technique based on half circumferential fibula with multiple segments. Here, we mainly describe the surgical technique and evaluate the postoperative outcome.

According to the size of the foot skin defect, a lateral crural flap, nourished by the cutaneous branches of the peroneal vessels, was first dissociated, and the vessels were carefully protected. The flap was rolled backward to expose the lateral side of the fibula. A half-circumferential fibula measuring 5—15 cm was osteotomized by a mini-pendulum saw from the posteromedial part of the middle fibula longitudinally, whereas the anterolateral fibula was left intact to maintain the fibular longitudinal integrality (Figure 1). A small bone chisel was inserted into the sawn bone space and pressed down to pry open the posterior cortex of the fibula to expose the medial periosteum. The operation successfully separated the posteromedial segment of the fibular cortex from the fibular body. The medial periosteum of the fibula was cut open, and the peroneal vessels and half fibular flap were removed together. The peroneal artery and vein accompanying the harvested fibula were protected for the coming vascular anastomosis of the free composite flap. The harvested half-circumferential fibula was then carefully sectioned into 2 or 3 segments, leaving the periosteum and nutrient peroneal vessels intact (Figure 1). The fibular body left in the donor bone and the harvested segments had their own separate blood circulations (observed for at least 30 min in vivo). We cut the periosteum and removed each fibular segment and the skin paddle. The harvested skin paddle was designed parallel to the longitudinal fibular axis, with the same dimensions as the skin defect on the dorsum of the injured foot. After hemostasis, the donor site was closed or recovered by grafted skin. The harvest of the free composite fibular osteocutaneous flap based on a half-circumferential fibula with multiple segments was finished (Figure 1).

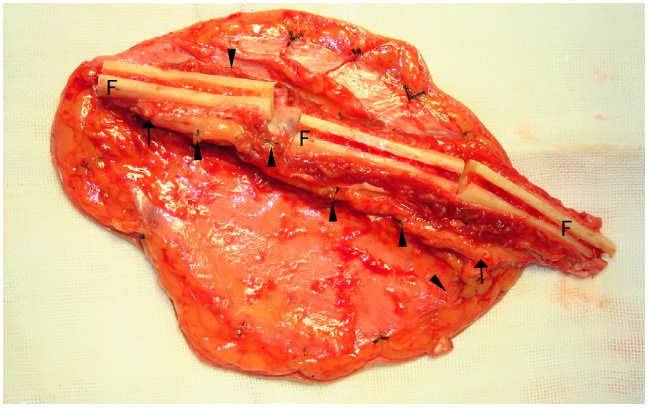

Figure 1 The complete harvest of free composite fibular osteocutaneous flap based on half-circumferential fibula with multiple (3) segments.
F: Fibula
Black arrow: Peroneal a. & v.
Black arrowhead: Arcuate aa.

The fibular segments were grafted into the defect sites of the metatarsal bones to preserve the corresponding toes or assembled into the forefoot defect site (Figure 2). Appropriate gaps between the adjacent segments were created to avoid kinking of the peroneal vessels and facilitate proper orientation of the bone segments. If necessary a small amount of the middle fibular segment was abandoned to prevent tearing the peroneal periosteum. The fibular segments were fixed between the intermediate and lateral cuneiform proximally and the residual metatarsals or proximal phalanges distally. Bone fixation was performed with Kirschner wires under direct vision to avoid any damage to the pedicle of the flap. The peroneal artery and accompanying veins were microanastomosed end-to-end with the dorsalis pedis vessels and one branch of the greater saphenous vein, respectively. The greater saphenous was grafted to form vessels bridges if necessary. Upon completion of the anastomoses, a continuous intravenous pumping of heparin saline was administered. The skin paddle was inset and sutured on the dorsum of the foot.

Reconstructions were achieved in a series of five patients (Table 1). The follow-up period was 9–22 months. At donor site, there was no obvious decrease in the American Orthopaedic Foot and Ankle Society score, ROM, stability and strength of the ankle. And the function score and radiographic examination at recipient site weresatisfied (Tables 2,3). The half-fibular graft with its good blood supply could heal well.

Table 1 The patient characteristics and surgical data.

Case	Gender/ Age	Recipient side	Donor side	Comorbidities	Bone defect site	Skin flap (cm x cm)	Skin graft for donor	Fibular length harvested (cm)	Number of segments*	Sites fibula connected
1	F/45	L	L (ipsilateral)	Multiple MP fracture, MPJ luxation, and LTMPJ missing	3rd, 4th and 5th metatarsals	15 × 9	Yes	15	3	Cuneiform, MP bones
2	M/48	L	L (ipsilateral)	HTMPJ luxation	2nd and 3rd metatarsals	11 × 3.5	No	12	2	Cuneiform, MP bones
3	M/40	R	L (contralateral)	Multiple MP fracture	Forefoot	13 × 9	Yes	8	3	Metatarsals
4	M/42	L	L (ipsilateral)	Lisfranc injury, LTMPJ luxation	2nd metatarsal	10 × 5	No	5	1	Cuneiform, MP bones
5	M/44	R	R (ipsilateral)	Multiple MP fracture	1st and 2nd metatarsals	16 × 12.5	Yes	15	3	Cuneiform, MP bones

* Number of segments osteotomized of the fibula harvested; MP (J); metatarsophalangeal (joint); H/LTMPJ, hallux/lesser toe metatarsophalangeal joint.

Table 2 Evaluation of the foot and ankle in recipient sites.

Case	Complication	Revision	Follow-up	Appearance	AOFAS score				PES	Radiology examination	
			(months)	Bulky flap/scar	AH	MF	HMI	LTMI		Location	Bony union
1	1. Venous crisis 2. Hematoma	1. Exploration 2. Clearance	22	+/−	95	94	93	−	4	Good	Excellent
2	Delayed healing	Dressing change	15	−/+	90	89	89	80	1	Excellent	Excellent
3	None	None	11	−/−	96	99	97	97	5	Fair	Good
4	Dehiscence	Dressing change	10	−/+	94	96	94	50	1	Excellent	Good
5	None	None	9	+/−	96	98	95	−	4	Excellent	Fair

AH, ankle-hindfoot; MF, midfoot; HMI, hallux metatarsophalangeal-interphalangeal; LTMI, lesser toe metatarsophalangeal-interphalangeal.

Table 3 Evaluation of the foot and ankle in donor sites.

Case	Radiology			Great toe	Ankle joint					Nervous examination	
	Fibula	Ankle			Stability			Strength-MS/ROM(D)		Footdrop /claw toe	Sensory limitations
	Sign*	OP	OA	W/DF	HFA	RST	CAD	PF&DF	IV&EV		
1	–	slight	–	–/y	yes	–	–	5/40 5/10	5/30 5/10	–/–	SPN
2	–	–	–	–/y	yes	–	–	4/35 4/10	4/15 4/5	–/–	–
3	–	+	–	–/y	yes	–	–	5/50 5/0	5/30 5/10	–/–	–
4	–	+	–	–/y	yes	–	–	5/50 5/0	5/13 5/8	–/–	–
5	–	+	–	–/y	yes	–	–	5/45 5/0	5/10 5/10	–/–	–

Sign*, osteonecrosis or fracture; OP, osteoporosis; OA, osteoarthritis; W/DF, weakness/dorsiflexion; HFA, hindfoot alignment; RST, rotational stress test; CAD, clinical anterior drawer; MS, muscle strength; PF&DF, plantar flexion & dorsiflexion; IV&EV, inversion & eversion.

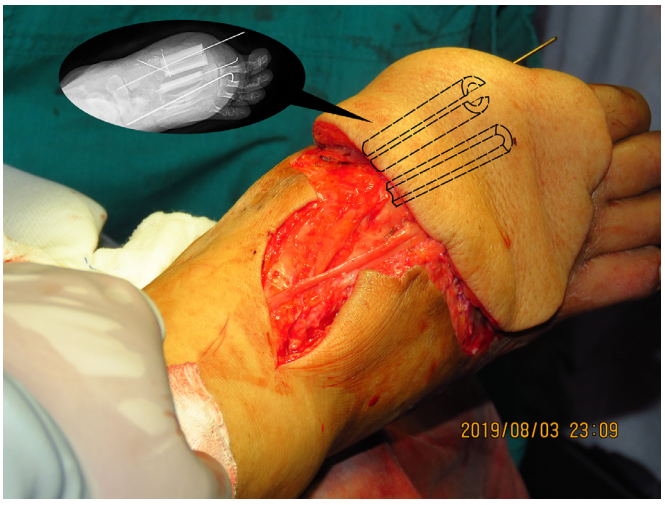

Figure 2 Insetting and fixation of the free composite fibular osteocutaneous flap based on half-circumferential fibula with 3 segments using k-wires.

Modified technique of free composite osteocutaneous flap is mainly based on the harvest of posteromedial half-circumferential fibula cut longitudinally from the fibular body, which keeps the nutrient peroneal artery and arcuate arteries intact in the graft. Meanwhile, in the donor the integrity of the fibular shaft is preserved. It could still play an important role in its original function, for example, a rigid bone in load transfer,[2,3] a site of origin for attachments of the muscle groups,[2] and the axial translation for maintaining ankle stability.[4,5] Furthermore, the half-circumferential fibula is a better match to most recipient metatarsal bones. For patients with forefoot or midfoot defects, the modified technique has proven to be a successful surgical method, which could not eliminate all complications but decrease them greatly. This procedure offers an alternative to reconstructive surgery with functional and appearance restoration of the foot, hand and other salvage surgeries.

Ethical approval

The study was approved by the Medical Ethics Council of Shandong Provincial Hospital.

Declaration of Competing Interest

None.

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Supplementary material

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.bjps.2020.10.023.

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Quanmeng Liu
Department of Hand and Foot Surgery, Shandong Provincial Hospital Affiliated to Shandong First Medical University, Jinan 250021, Shandong, China

Hao Wu, Yu Liu
Orthopedic Department, The First Affiliated Hospital of Shandong First Medical University, Jinan 250014, Shandong, China

Lianjie Cheng, Zhibo Liu
Department of Hand and Foot Surgery, Shandong Provincial Hospital Affiliated to Shandong First Medical University, Jinan 250021, Shandong, China
E-mail address: lzb1967@126.com (Z. Liu)

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Smartphones can be used for patient follow-up after a surgical mission treating complex head and neck disfigurement in Ethiopia: Results from a prospective pilot study

Dear Sir,

Introduction

Successful patient follow-up after short-term surgical missions (STSM) in Africa is challenging, reflected by a paucity of publications detailing long-term outcomes for patients treated on these missions.[1] Common barriers include additional costs, lack of telephone contact with patients after discharge and the extensive distances involved.

Project Harar is a non-government organisation that treats complex head and neck pathology on an annual STSM in Ethiopia. Patients from isolated parts of Ethiopia present with soft tissue or bony disfigurement secondary to tumours, noma (*Cancrum oris*), trauma or burns. Yearly around 30 expert international volunteers assist local Ethiopian surgeons to help restore form and function for patients with the most challenging pathology.

Traditionally, Project Harar has followed-up patients who underwent major surgery or those with post-operative issues flagged up by local officials.

This study aimed to establish if smartphones can be used as a low-cost, reliable method of patient follow-up after discharge from an annual STSM in Ethiopia.

Methods

This prospective pilot study was conducted in rural Ethiopia. In December 2018, ten months following the annual Project Harar STSM, a multidisciplinary team of charity health professionals selected and consented 24 patients (from a possible 49) for follow-up using smartphones. A timeline of the study is summarised in Figure 1. The cohort selected purposefully included a range of ages, pathologies, operation types and locations across Ethiopia. In January 2019, charity field workers already looking for new patients for the 2019 mission followed-up these 24 patients discharged from the 2018 mission in their assigned regions. Field workers acted as intermediates and have some basic medical background (social workers, nurses and administrative staff).

Anteroposterior, lateral and intra-oral (if relevant) photographs were taken using smartphones and six triage questions (Table 1) asked to screen for post-operative issues. Patients provided written consent for the use of photographs. Patient data was de-identified and sent from encrypted storage devices via a secure file-sharing platform to the charity lead, who selected patients requiring further assessment and treatment on the 2019 mission.

Table 1 Triage questions asked to all patients on remote follow-up.

1	Are you happy with the outcome of your surgery? YES/NO If NO, why not?
2	Have you had to attend hospital/doctor after leaving the charity? YES/NO If YES, why? And what treatment did you receive?
3	Do you have any: pain, difficulty eating, difficulty sleeping, difficulty breathing?
4	Are these symptoms new or worse following surgery?
5	Are you back at work or school now?
6	Do you have any questions for the Project Harar team?

This paper has been accepted for podium presentation at the BAOMS Annual Scientific Meeting 2020 (London, UK) and the American Society of Plastic Surgeons Annual Meeting 2020 (San Francisco, USA).

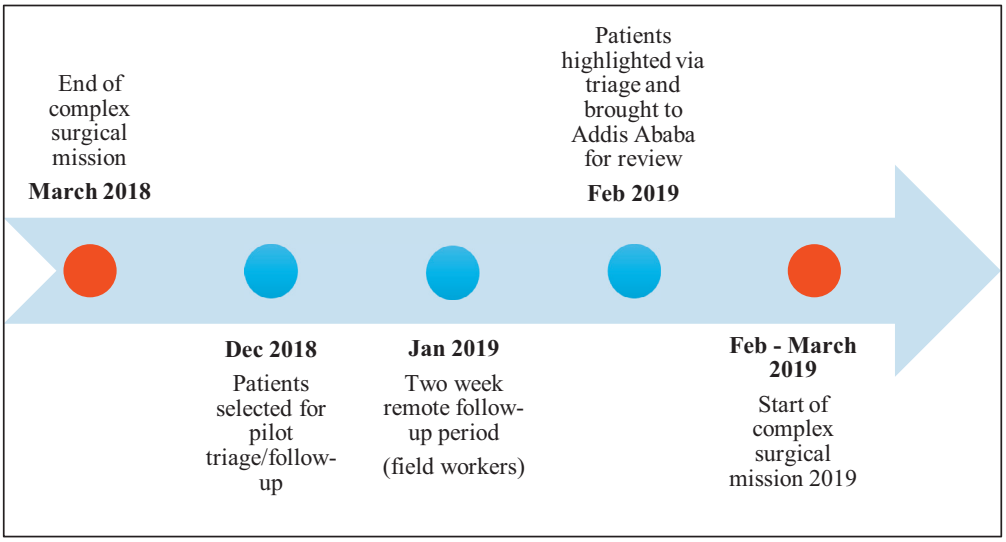

Figure 1 Time line of events for prospective smart phone follow-up protocol.

Additionally, all patients on the 2019 STSM were asked if they had a smartphone capable of taking and sending a picture message for follow-up.

Results

Seventy-nine percent (19/24) of patients were successfully followed up. Five patients were not locatable after discharge. Patient age range was 9–40 years (mean 23). The most common pathologies were neurofibromatosis, noma, ankylosis and benign tumours. Surgical procedures were categorised according to Marck et al.,[2] with 58% ($n=11$) 'simple' (skin grafts, local flaps, debulking), and 42% 'complex' (hemimandibulectomy with rib graft reconstruction, submental flaps) procedures.

Ninety-five percent ($n=18$) of patients were happy with their surgical outcome at ten months. One patient with neurofibromatosis was unhappy, reporting increased eye swelling post-operatively. Twenty-one percent ($n=4$) had sought medical attention post-operatively: three for wound infections, and one for eye-discomfort. Nine patients reported no functional issues whilst others reported pain ($n=9$) and difficulty eating ($n=3$). Ninety-five percent ($n=18$) had returned to work or school. Six complications (31.5%) were detected and these patients managed on the 2019 mission.

Photographs were taken for 95% ($n=18$) of patients. Photographs alone enabled detection of nasal reconstruction breakdown after bilateral v-y advancements, ectropion after submental flap to cheek and orocutaneous fistula ($n=2$). The remaining complications were detected through screening questions. Complications detected were confirmed through face-to-face follow-up.

All patients from the 2019 complex surgical mission were asked whether they had a smartphone capable of taking and sending photographs, of which 23% (13/56) did. Due to logistical difficulties including poor internet access and limited smartphone storage, no patients were identified who could reliably send post-operative photographs for remote follow-up.

Discussion

This pilot study highlights that smartphone technology can be used for reliable, low-cost follow-up for the majority of patients after discharge from an annual head and neck STSM in Ethiopia. Using photographs and triage questions we successfully identified six patients (31.5%) with complications that required further management and discharged the remainder without unnecessary return to Addis Ababa (up to 1000 km from the furthest patient).

A uro-gynecological and cleft charity used telephones for conversational follow-up (without photographs or triage in-person) and achieved follow-up rates of 51% and 54%, respectively.[3,4] A large cleft charity highlighted the benefit of post-operative photographs in evaluating outcomes and identifying complications.[5]

Following encouraging results from this pilot study we have expanded to include all patients operated on during the 2019 Project Harar mission. We have been able to remotely triage all 2019 patients thanks to drivers physically going to locate patients in their villages if uncontactable.

Conclusion

We present a successful, low-cost pilot study using smartphones to follow-up patients after an annual reconstructive mission in Ethiopia. This process is ideally suited for small to medium sized charities operating in low- and middle-income countries that struggle with longer-term follow-up and will continue to be refined and used by Project Harar going forward.

Financial disclosures

None.

Ethics statement

This study is part of an ongoing audit of clinical practice and did not require research and ethics approval.

Declaration of Competing Interest

None.

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D Bradley
Oral and Maxillofacial Surgery Department, University Hospitals Coventry and Warwickshire, Clifford Bridge Road, Coventry, CV2 2DX, United Kingdom

C Honeyman
Department of Plastic and Reconstructive Surgery, Ninewells Hospital, Dundee, United Kingdom

V Patel
Oral Surgery Department, Guys Dental Institute, Guys & St Thomas NHS Foundation Trust, London, United Kingdom

J Zeolla
Nottingham University Hospitals NHS Trust, Nottingham, United Kingdom

L Lester
Department of Plastic and Reconstructive Surgery, Queen Alexandra Hospital, Portsmouth, United Kingdom

M Eshete, Y Demissie
Department of Surgery, School of Medicine, College of Health Sciences Addis Ababa University, Addis Ababa, Ethiopia

D Martin
35 avenue des pins 13013, Marseille, France

M McGurk
Department of Head and Neck Surgery, University College London Hospital, London, United Kingdom
E-mail address: daniel.bradley3@nhs.net (D. Bradley)

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Contemporary evidence of art's relevance to the modern plastic surgeon

Dear Sir,

I read with enthusiasm the article by Baldwin on "The historical relationship between art and plastic surgery: Is this relationship still relevant to the modern plastic surgeon?" This highlighted the role artists have played in the development of plastic surgery, and touched upon contemporary evidence of plastic surgeons continuing to engage with the creative arts.[1] Correspondence by Sepehripour and Henderson contributed to this latter point by describing their interesting research auditing the drawings of 30 plastic surgery trainees before and after drawing tips were provided by the authors.[2] They found this simple intervention produced an increase in an art teacher's estimation of the age of the person producing the drawing, offering preliminary evidence that even a single session of tailored feedback can improve drawing skills. While certainly encouraging, I would caveat this with a note that increased drawing ability does not necessarily imply increased communication of the intended information.

Expanding further upon current evidence supporting modern surgical engagement with drawing, my team and I surveyed 210 adult general surgery patients regarding the materials they were provided to support making an informed decision about whether or not to undergo surgery. Our patients found their surgeons' schematic drawings, which were subjectively crude, to be just as valuable as other visual resources that were provided, such as radiology imaging and professional illustrations in leaflets.[3] This provides evidence that the subjective quality of a drawing (as might be judged by detail or accuracy) does not necessarily correlate with its clinical utility to patients. This study also demonstrated that the provision of all forms of visual media was of greater utility to patients undergoing moderate and complex operations, than those undergoing simple ones like a hernia repair.

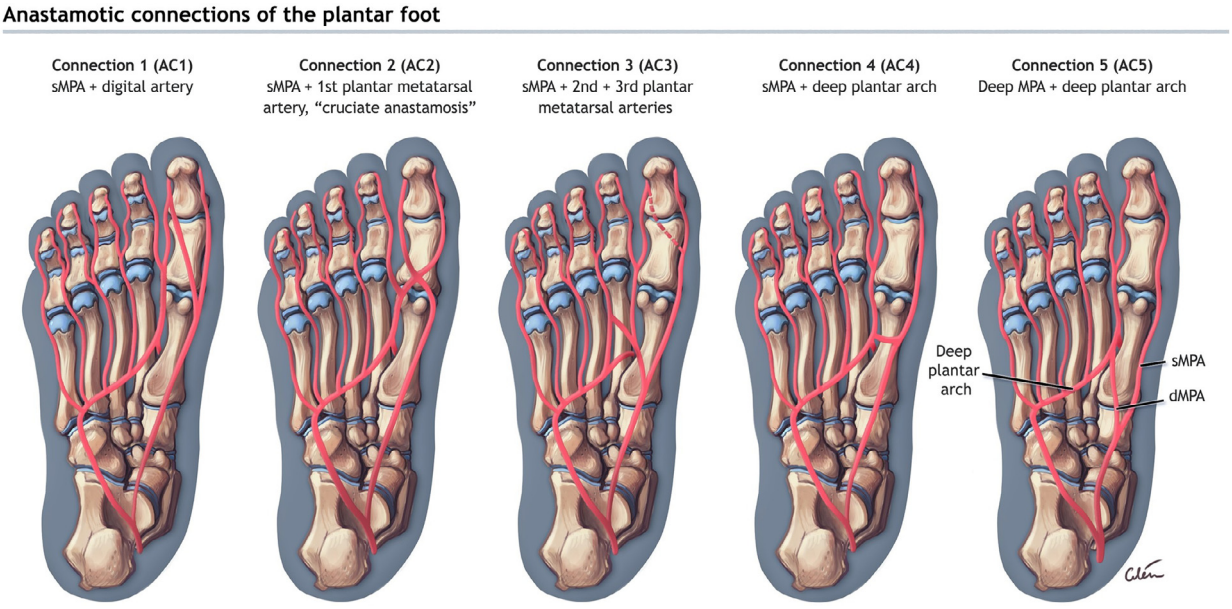

Figure 1 Medical illustrations of anastamotic connections of the plantar foot, pertinent for assessing microsurgical reconstruction options.[5]

In a survey collecting the professional opinions of 100 NHS surgeons, one plastic surgeon commented that "*no drawing with illegible words in an op note are not just unattractive, they can be dangerous too*" reinforcing the role of drawing as complementary rather than an alternative form of communication upon which to rely.[4] Surgeons reported that drawing was valuable when communicating with other surgeons, allied professionals such as physiotherapists, with patients, and indeed with themselves for future reference in operative and clinic notes. Some surgeons used their patient's skin as a canvas, drawing the shape, size, and location of scars that would result from planned surgery. Respondents valued their peers' drawings which used shading to show depth, and perspective to separate structures and indicate three-dimensional form. However, several reported difficulty creating these effects and 71% expressed they would appreciate formal training in drawing skills. This further evidences that drawing techniques are valued within the modern day profession, and that there is demand for further education.

As a medical illustrator with an interest in plastic surgery, I contribute to the field with art supporting research and education (Figures 1 and 2).[5] While the imaging technologies available have evolved to capture precise information rapidly and with ease (e.g. with photography or radiology), the need for illustration persists. Removing unnecessary or distracting details, and accentuating the important differences (such as between vein, artery, nerve, and lymphatic tissues) are cognitive decisions which guide the design of informative art (Figure 2). The expert surgeon sees their operative field differently to the medical student or patient; they know what information is relevant, and can identify subtle differences more clearly. In altering the reality of what a camera might capture, illustration can communicate this 'experts eye' in a simpler and more memorable way. Future study of drawings or other visual media used in plastic surgery might consider evaluating the effectiveness of communication with a validated comprehension measure such as the Quality of Informed Consent (QuIC).

Vision is a key human sense used from birth to absorb information from the world around us. Indeed it is a cause for concern if children do not use drawing implements to create their first scribbles by 18 months, with reading and writing milestones coming later. The earliest cave paintings show that humans have been communicating with images for around 40,000 years. The ability to create and interpret visuals is therefore a universal skill we have been evolving for most of our history, and more natural to us than the use of written language which is only around 5000 years young and needs to be taught. Being woven into the fabric of our DNA, it is not surprising to find that plastic surgeons continue to gravitate towards art and drawing as a means of communication.

Despite playing a thriving role in the practice of plastic surgery to the benefit of patients and peers; drawing remains surprisingly understudied and absent from contemporary surgical curricula. I eagerly anticipate contributions to research in this field, but don't expect art and plastic surgery to diverge any time soon.

Ethical approval

N/A

Declaration of Competing Interest

None.

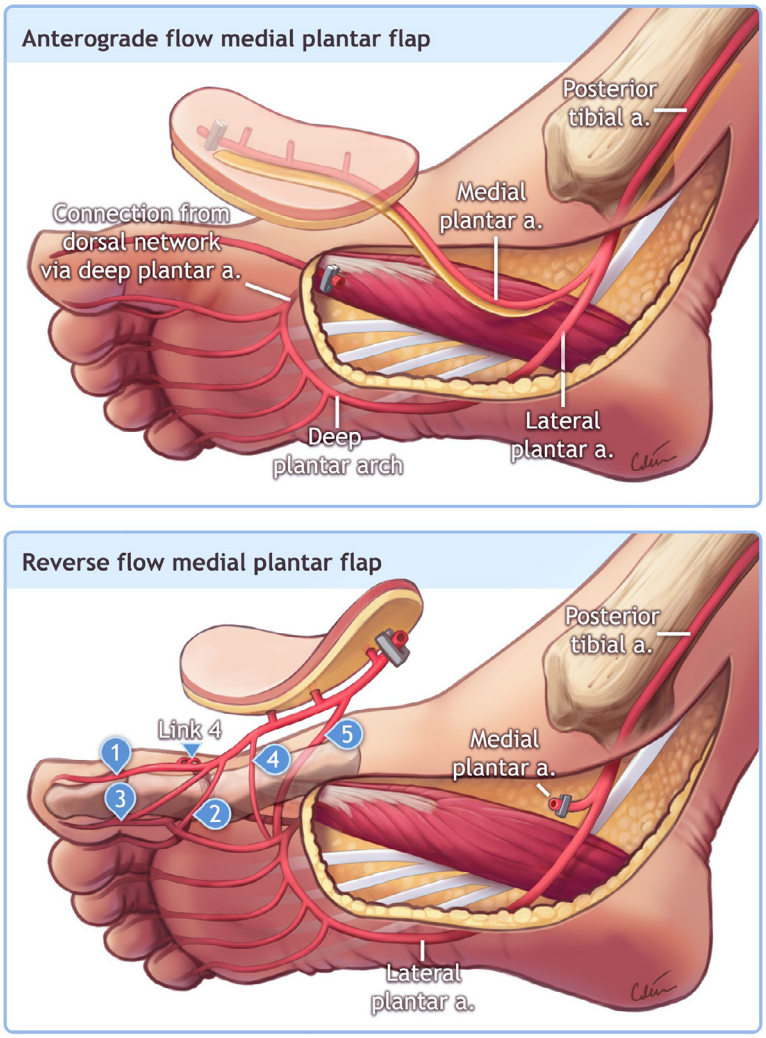

Figure 2 Medical illustration of medial plantar artery flap options.[5]

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Ciléin Kearns*
Medical Research Institute of New Zealand, Wellington Hospital, Wellington 6021, New Zealand
Artibiotics, Wellington, New Zealand

*Medical Research Institute of New Zealand, Wellington Hospital, Wellington 6021, New Zealand
E-mail address: cilein.kearns@mrinz.ac.nz (C. Kearns)

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Is there a role for artistic training in surgery? A multi-institutional assessment of general surgeons and plastic surgeons

Dear Sir,

The comparison between the field of Plastic Surgery and the esthetic and visual arts is frequently drawn and debated, and has been cited across time from ancient literature to modern editorials.[1,2] Plastic surgeons, in particular, are known for their "esthetic eye" and artistic flair in order to improve both cosmetic and functional outcomes. Concepts common to the visual arts including symmetry, proportion, line, balance, harmony, and dimensionality are also deeply rooted in the principles of plastic surgery.[3] With many historic and contemporary physicians in the field who are either keen artists or appreciators of art, it is undeniable that an intimate relationship exists between art and plastic surgery.[1]

Despite the historical portrayal of plastic surgeons as creative and aesthetically-inclined surgeons, a quantitative description of artistic interest, experience, and perspectives in this cohort is lacking. This study characterizes the artistic interest and training experience among plastic surgeons and general surgeons and compares the extent of artistic training backgrounds and attitudes towards the value of artistic training in surgery between plastic surgery and general surgery. Artistic training

General surgeons and plastic surgeons at all stages of training in California academic institutions were surveyed. Institutions were included if they had both an accredited general surgery program and plastic surgery residency program. A short survey on the subjective interest in the visual arts, prior artistic experience and formal art training, such as having a prior art degree, and utility of artistic training in the clinical setting for surgical trainees and faculty was designed. Surveys were emailed to program directors of respective residency programs to distribute within their institutions.

Overall, there was an institution response rate of 75.0% ($n=6$) and 100% ($n=8$) for general surgery and plastic surgery, respectively. A total of 73 general surgery and 40 plastic surgery survey responses were included. There were no significant differences between the two groups in baseline training characteristics (Table 1).

A total of 34.2% of general surgery respondents ($n=25$) and 40.0% of plastic surgery respondents ($n=16$) reported receiving prior artistic training. Amongst the respondents who received formal art training ($n=41$, 36.0%), no significant differences were found between artistic training backgrounds and timing between general surgery and plastic surgery cohorts (Table 2). The distribution of artistic media pursued by the two cohorts were also largely similar.

Both general and plastic surgeons rated overall artistic interest highly and endorsed the frequent use of hand-drawn pictures to explain surgical procedures to patients. However, plastic surgery trainees and faculty rated their artistic abilities significantly higher compared to general surgery trainees and faculty (mean 6.3 vs 5.2, respectively, $p=0.014$) (Table 2).

Table 1 Comparing training characteristics between general surgery and plastic surgery respondents.

	No. (%)		p-value
	General Surgery ($n=73$)	Plastic Surgery ($n=40$)	
Year in Training			
PGY-1	5 (6.8)	5 (12.5)	NS
PGY-2	11 (15.1)	4 (10.0)	NS
PGY-3	9 (12.3)	4 (10.0)	NS
PGY-4	11 (15.1)	2 (5.0)	NS
PGY-5+	10 (13.7)	13 (32.5)	0.018
Faculty	27 (37.0)	12 (30.0)	NS
Pursuing Fellowship			
Yes	40 (54.8)	22 (55.0)	NS
No	4 (5.5)	7 (17.5)	NS
Already completed	28 (38.4)	10 (25.0)	NS
Undecided	1 (1.4)	1 (2.5)	NS
Practice Setting			
Academia	55 (75.3)	25 (62.5)	NS
Private Practice	5 (6.8)	4 (10.0)	NS
Both	9 (12.3)	10 (25.0)	NS
Undecided	4 (5.5)	1 (2.5)	NS

Abbreviations: No., number; NS, not significant.

Of all the respondents, 48% of general surgeons and 65% of plastic surgeons advocated for artistic training during residency. The value of visual arts to surgical training was rated 7 out of 10 for both general and plastic surgeons (Table 2).

While there have been numerous editorials on this topic,[1,2] to our knowledge, this is the first study to systematically evaluate artistic background in plastic surgery trainees and faculty. Those who advocated for artistic training during residency mainly argued for its ability to improve spatial awareness and hand-eye coordination/dexterity, help explain procedures to patients, and be a therapeutic role in burnout. The primary reasons for recommending against artistic training was lack of time and the value of operating and clinical skills training over art. Despite this, most agreed that art training would improve wellness and had some degree of technical value. Interestingly, respondents from both general surgeons and plastic surgeons believed art training was also beneficial in non-clinical aspects of surgery, such as writing book chapters and research publications. Finally, some argued that art training should be recommended but not mandatory, and other felt that art training would be better utilized in the medical school curriculum rather than residency.

A recent survey of plastic surgery trainees by Sepehripour and Patel found that over a quarter of their respondents (26.9%) held formal art degrees and most of their respondents regularly enjoyed art as a hobby.[4] The preponderance of respondents also considered artistic skills to be important in plastic surgery (57.7%), similar to our current study

Table 2 Comparing prior art training and artistic interest between general surgery and plastic surgery respondents.

	No. (%)		p-value
	General Surgery ($n=73$)	Plastic Surgery ($n=40$)	
Formal training in art	25 (34.2)	16 (40.0)	NS
Timing of training	$n=25$	$n=16$	
Prior to high school	6 (24.0)	2 (12.5)	NS
High school	15 (60.0)	9 (56.3)	NS
College	7 (28.0)	6 (37.5)	NS
Medical school	2 (8.0)	0 (0.0)	NS
Length of training (years)	$n=25$	$n=16$	
1-5	18 (72.0)	12 (75.0)	NS
6-10	5 (20.0)	3 (18.8)	NS
>10	2 (8.0)	1 (6.3)	NS
Time dedicated to training (hours/week)	$n=25$	$n=16$	
1-5	15 (60.0)	9 (56.3)	NS
6-10	7 (28.0)	4 (25.0)	NS
>10	3 (12.0)	3 (18.8)	NS
Artistic media	$n=25$	$n=16$	
Acrylics	8 (11.0)	5 (12.5)	NS
Ceramics	10 (13.7)	1 (2.5)	NS
Charcoal	10 (13.7)	8 (20.0)	NS
Oil	7 (9.6)	4 (10.0)	NS
Pastels	6 (8.2)	4 (10.0)	NS
Pencil	14 (19.2)	10 (25.0)	NS
Photography	9 (12.3)	7 (17.5)	NS
Sculpting	7 (9.6)	4 (10.0)	NS
Watercolor	12 (16.4)	4 (10.0)	NS
Other	7 (9.6)	7 (17.5)	NS
Interest in visual arts, mean±SD	7.0 ± 2.0	7.6 ± 1.8	NS
Artistic ability, mean±SD	5.2 ± 2.4	6.3 ± 2.1	0.014
Draw for counseling, mean±SD	7.6 ± 1.8	7.1 ± 1.4	NS
Consider art as hobby, n (%)			
Yes (currently)	14 (19.2)	13 (32.5)	NS
In the past	19 (26.0)	12 (30.0)	NS
Never	40 (54.8)	15 (37.5)	NS
Artistic value in surgery, mean±SD	6.9 ± 2.3	7.0 ± 1.9	NS
Recommend art training, n (%)	35 (47.3)	26 (65.0)	NS

Abbreviations: No., number; NS, not significant.

(65.0%). However, most did not agree that trainees should be assessed in their artistic skills.[4] As such, it is important for there to be a balance; while art may be beneficial to surgeons, not all surgeons must be artists. In an editorial by Swanson, a plastic surgeon with an interest in art, the author argued that plastic surgeons must remember their medical and scientific foundation when considering the importance of art to their practice.[1,5] Guneron et al. initiated a trial of art classes for plastic surgery trainees and found that students improved their attention to detail and developed a greater ability to predict surgical results.[3] Overall, while there is value in incorporating artistic training in surgical residency, it should not be done in lieu of clinical and operative experience.

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Declaration of Competing Interest

None declared

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Allison C. Hu
School of Medicine, University of California Irvine, Irvine, CA 92617, USA

Beatrice J. Sun
Department of Surgery, Stanford University, Palo Alto, CA 94305, USA

Wendy K.Y. Ng
Division of Plastic Surgery, Children's Hospital of Orange County, Orange, CA 92868, USA
E-mail address: allisoh2@uci.edu (W.K.Y. Ng)

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Predicting a leader: Analyzing the presidents of plastic surgery societies

Dear Sir,

Several studies have investigated commonalities among plastic surgery chairpersons and program directors. Findings have shown that the majority of plastic surgery chairpersons and program directors are male, completed fellowship training, earned high h-index scores, and matriculated from top medical schools.[1] However, exploration of these metrics among plastic surgery society presidents is limited, and comparison of findings between these two avenues to leadership remains to be discussed. The authors aim to provide analysis for presidents of eight academic plastic surgery societies over 22 years to determine commonalities between these leaders.

Within this field, the eight largest societies include American Society of Plastic Surgery (ASPS), American Association of Plastic Surgery (AAPS), Plastic Surgery Foundation (PSF), Plastic Surgery Research Council (PSRC), American Society for Aesthetic Plastic Surgery (ASAPS), American Society of Reconstructive Microsurgery (ASRM), American Society of Craniofacial Surgery (ASCFS), and American Society for Hand Surgery (ASSH).

Using available data from organization websites, presidents and presidents-elect of societies with the largest membership from 1999 to 2021 were identified. Information regarding gender, training, certification, academic positions, and publication indices was collected. Measures of research productivity, h-index, h-scopus index, and g-index, were collected for each president utilizing the Scopus database and Google Scholar. As the most representative measure of research productivity is controversial, age-adjusted h- and g-indices were also calculated for each president. Descriptive statistics, univariate analyses, and multivariate logistic regression were performed.

A total of 144 individuals across eight societies over 22 years (1999–2021) were included. Average age was 56.1 years at initial presidency, 59.5 at second presidency, and 57.0 for those who served a third presidency across societies. A statistically significant difference was found in age ($p < 0.001$) between societies, with the highest age at presidency within AAPS (63.8 years).

Of 144 unique presidents, 134 (93.1%) were male, and 10 (6.9%) were female. There were three female presidents each of ASPS and PSF, followed by two female presidents of AAPS, and one female president each of ASRM and ASSH. There was no statistically significant difference between the age of presidents by gender (56.0 vs. 56.5 years; $p > 0.8$).

Regarding medical school education, University of Michigan produced the most society presidents (5; 4%) followed by University of Toronto, Columbia University, and Washington University (4 each; 3%). The greatest number completed residency through New York University programs (11; 7.6%), followed by University of Michigan and Emory University (7 each; 5%). At least one fellowship was completed by 72 (50%) presidents, the greatest number of which were hand (30; 21%) followed by craniofacial (16; 11.1%). Twenty-eight (19.4%) presidents hold an additional degree.

In examining research productivity, subgroup analysis demonstrated higher average h-index for females as compared to males in AAPS (48.5 vs 29.2), ASRM (42 vs 31.3), and PSF (38.7 vs 28.7). ASPS and ASSH demonstrated an inverse relationship with lower h-scopus indices for females as compared to males (4.3 vs 20.2; 20.0 vs 33.1).

PSRC was found to have the highest average h-scopus (34.4), h- (31.3), and g-(47) indices. ASCFS had the next highest h- and g- indices at 27.3 and 46.5, respectively. Age-adjusted h- and g-indices displayed a similar trend, with the highest indices found in PSRC and ASCFS (Table 1).

Twenty presidents were elected to a second presidency, and three presidents were elected to a third society presidency. Age-adjusted h-index was a significant predictor for subsequent presidency (wald 8.8; $p = 0.03$). The most common transition between inaugural and second presidency was from PSRC to PSF. PSRC presidents were statistically more likely to serve a second presidency, with eight PSRC presidents serving a future presidency in another society ($p < 0.001$) (Figure 1).

Gender disparities within plastic surgery have received significant attention in recent years.[2,3] As we found no overarching academic differences by gender, this suggests a dis-

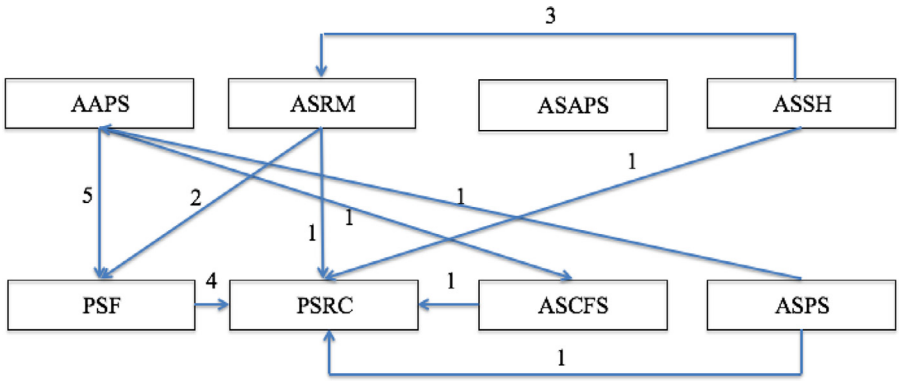

Figure 1 Flowsheet of individuals who achieved a second presidency.

proportional representation of women with the required degree of academic success interested in pursuing presidency positions. As the proportion of female plastic surgeons continues to increase, this may change. Women have seen an increase in plastic surgery resident representation over the past seven years,[4] and ASPS has experienced a 120% increase in female membership since 2000.[3] Within plastic surgery, there is no observed difference in the proportion of males versus females pursuing fellowship, additional research training, or other advanced degrees.[5] Thus, as women continue to become more equally represented in academic plastic surgery, it is likely their lack of presidency representation will also change.

Interestingly, the large disparity in h- and g-indices across societies suggests that research productivity alone is not necessarily predictive of achieving presidency of a society. However, presidents of more than one society consistently had higher h- and g-indexes. For multiple presidency positions, a stepwise progression is evident between societies such as PSRC and PSF to be followed by ASPS, AAPS, and ASRM with the contrary being less common. These findings suggest that factors such as age and reputation likely have a significant impact on candidate success.

Analysis of past presidents of eight major societies in plastic surgery demonstrates great diversity in regards to pedigree, academic position, and publication success. As considerable variation was found among the paths to presidency, it is evident no uniform blueprint is required to be followed. As representation within plastic surgery diversifies and accessibility to leadership positions broadens, mentorship and networking for individuals interested in achieving these positions will be critical for success.

Table 1 Publication success of society presidents.

Society	h-Scopus	h-Index	g-Index	h-Age	g-Age
Overall	26.9375	23.938	39.625	6.194	9.618
ASPS	17.800	16.700	25.800	4.300	6.100
AAPS	31.929	26.714	45.571	6.500	10.786
PSRC	34.348	31.261	47.043	8.435	14.652
PSF	30.333	25.833	40.833	6.389	9.000
ASSH	32.294	25.529	43.882	6.118	8.882
ASAPS	14.182	14.636	30.318	4.591	7.318
ASCFS	25.846	27.308	46.462	6.923	11.077
ASRM	31.941	26.118	42.235	6.529	9.235

Declaration of Competing Interest

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Siddhi Upadhyaya
Department of Plastic Surgery, Cleveland Clinic, 2049 E. 100th Street, Mail Code A60, Cleveland, OH 44195, United States

James Gatherwright
Division of Plastic Surgery, MetroHealth, Cleveland, OH, United States

Rebecca Knackstedt
Department of Plastic Surgery, Cleveland Clinic, 2049 E. 100th Street, Mail Code A60, Cleveland, OH 44195, United States
E-mail address: knacksr@ccf.org (R. Knackstedt)

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ICOPLAST trainees Europe: Uniting plastic surgery trainees around training, research and sustainability

Dear Sir,

The evolvement of plastic surgery is driven by surgical and scientific progress, patient demand and perhaps most importantly collaboration.

We are lucky to be part of a specialty that attracts gifted, innovative and ambitious surgeons worldwide. However, although several more or less official international networks for plastic surgeons have existed for some time, most of these have been centred on research, on a narrow field of plastic surgery or in other ways been difficult to access for trainees and junior consultants. Additionally, in some countries plastic surgery is still a small specialty, contributing to a potentially isolated position for trainees in their training hospitals.

Curiosity, the longing for a sense of community as well as for the benefits of international collaboration around training and research drove a couple of European trainees to found what was to become ICOPLAST Trainees Europe in 2016. What started as a small group of enthusiasts was soon given the chance to prosper when the international confederation took us under its wings.

The International Confederation of Societies of Plastic Surgery (ICOPLAST) was established to be a transparent, dynamic, and proactive confederation.[1] More than 25,000 plastic surgeons across five continents are represented in ICOPLAST through its 60 national member societies.[2]

The trainee part of the organisation originated in Europe, as described above, and has grown quickly in the last two years. The ICOPLAST Trainees Europe group is now organised by a committee of national delegates from the 18 participating countries. Delegates share information, questions, activities and plans to and from their national trainees. The trainee group communicates through a website, social media accounts, and a WhatsApp group with over 250 members.

In September 2019 we organised our first international trainee meeting in Amsterdam, the Netherlands. The meeting was by and for trainees, financially supported by ICOPLAST and national societies. Six months before the meeting, a survey was sent out to all connected European trainees to determine what subjects and areas the participants wanted to see covered, and the meeting was planned according to the results.

The theme of the meeting became 'What Works Well'. The program consisted of three daytime sessions on the topics of research, training and sustainability, each with multiple speakers from different countries and backgrounds. It is worth noting that with sustainability, we refer to the sustainability of the world's finite resources as well as to the sustainability of the physical and mental health of the individual surgeon in an ever-demanding health care environment.

The meeting was set in the informal atmosphere of a renovated university building. The success of and enthusiasm during this meeting culminated in the jointly formed mission statement of the trainee group; *To encourage, facilitate and initiate international collaboration in training, research, and sustainability.* This is well in line with the principal objective of ICOPLAST, which is to support communication and collaboration between plastic surgeons worldwide.[1]

Since the inaugural meeting in Amsterdam, the European trainee group has grown across more countries, and the WhatsApp group as well as the website including its fellowship database are now well-visited platforms for young consultants and trainees when it comes to research and education in particular. The use of apps and social media has facilitated getting in touch with like-minded people worldwide. We encourage and facilitate international research collaborations, for example with the Reconstructive Surgery Trials Network (RSTN) and Plastic Surgery Trainees Association UK (PLASTA UK). Members of our trainee group have been highly active in the formation of the newly launched journal club podcast in collaboration with JPRAS and PLASTA, as well as in the recurring educational webinars by ICOPLAST. In the survey conducted in 2019 we asked what European trainees want to get out of ICOPLAST Trainees. A fellowship database and a calendar of events were rated highest among the respondents (92.3%), which is why our focus in the last year has been to further develop these areas in the new ICOPLAST website.

Plans are now being made for our next European trainee event in 2021, focusing once again on working towards our mission of fostering collaboration in research, training and sustainability within the field of plastic surgery.

We believe the power of our trainee group lies in our straight-forward, easy-access communication channels, and our non-hierarchical collaboration as a group. Everybody is welcome and the floor is open for all who want to reach out and have a say, or ask for assistance. It is our hope that this sense of community and collaboration will be sustained and grow in the future, not only in the European trainee group but in the fast-growing other continental trainee groups.

We encourage trainees around Europe who want to take part of a warm and encouraging international plastic surgery community to contact us at ICOPLAST Trainees EU (Facebook), @icoplast_trainees (Instagram), or @plasticstrainee (Twitter).

Declaration of Competing Interest

None.

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Ethical approval

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Niels A. Noordzij*
Department of Plastic, Reconstructive and Hand Surgery, Medisch Centrum Leeuwarden, the Netherlands

Ebba K. Lindqvist
Department of Molecular Medicine and Surgery, Karolinska Institutet, Stockholm, 17177 Sweden
Plastic and Reconstructive Surgery, Karolinska University Hospital, Stockholm, Sweden

Matthew D. Gardiner
Department of Plastic Surgery, Frimley Health NHS Foundation Trust, Slough, UK

Ernst S. Smits
Department of Plastic, Reconstructive and Hand Surgery Erasmus Medisch Centrum, Rotterdam, the Netherlands

Graeme Perks
Department Of Plastic Reconstructive and Burns Surgery, Nottingham University Hospitals NHS Trust, Nottingham UK

Eva-Maria Baur
Practice/Department of Plastic and Hand Surgery, Murnau/Penzberg, Germany

Hinne Rakhorst
Department of Plastic, Reconstructive and Hand Surgery, Medisch Spectrum Twente, Enschede, the Netherlands

*Corresponding author:
E-mail address: nnoordzij@gmail.com (N.A. Noordzij)

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"The emerging need to characterize the effects of adipose-derived stem cells in atrophic photoaging"

Dear Sir,

The products discussed in the present study are investigational and are not approved by the FDA for any purpose.

Solar elastosis is considered the pathognomonic characteristic of photodamage. This term refers to the degeneration of the elastic network of the dermis, which develops thick, tortuous, and dysfunctional elastic fibers in response to chronic UV damage.[1] Recently, Sachs et al.[2] classified photoaging into two subtypes. In their comparative study, hypertrophic photoaging was characterized by an increased visually assessed skin thickness, increased sallowness, and pronounced elastosis, while atrophic photoaging presented with moderate to severe telangiectasia, redness, and increased susceptibility for skin cancers (see Figure 1).[2] Interestingly, solar elastosis was not found to be prevalent nor severe in patients with atrophic photoaging.

The existence of at least two photoaging subtypes is also supported by the distinction of erythematotelangiectatic rosacea and telangiectatic photoaging as two different entities. In 2015, Helfrich et al.[3] recruited patients fulfilling rosacea criteria and separated them based on the degree of facial flushing and the persistence of facial erythema. Patients with visible telangiectasia but mild flushing were observed to have classic photoaging characteristics, such as facial wrinkling and dyspigmentation, fitting the authors' criteria of telangiectatic photoaging.[3] Additionally, these patients were found to have less mast cell activation and a lower degree of metalloproteinase remodeling of the extracellular matrix.[3] Due to the similarities with Sachs and colleagues'[2] description of atrophic photoaging, it is therefore possible that telangiectatic photoaging and atrophic photoaging are, in fact, the same cutaneous disorder.

The ability of stem cells to treat dermatologic conditions is a topic of increasing interest. Studies have shown that the favorable results obtained with stem cell photoaging treatment are presumably a result of their paracrine actions on dermal fibroblasts through increased collagen deposition via increased synthesis and decreased metalloproteinase activity,[1] and an increase in elastin-degrading enzymes (see Figure 2).[4] A recent study by Charles-de-Sá et al.[1] treated patients with clinical and histologic characteristics of hypertrophic photoaging with autologous adipose-derived stem cells, finding a complete reversal of solar elastosis. These

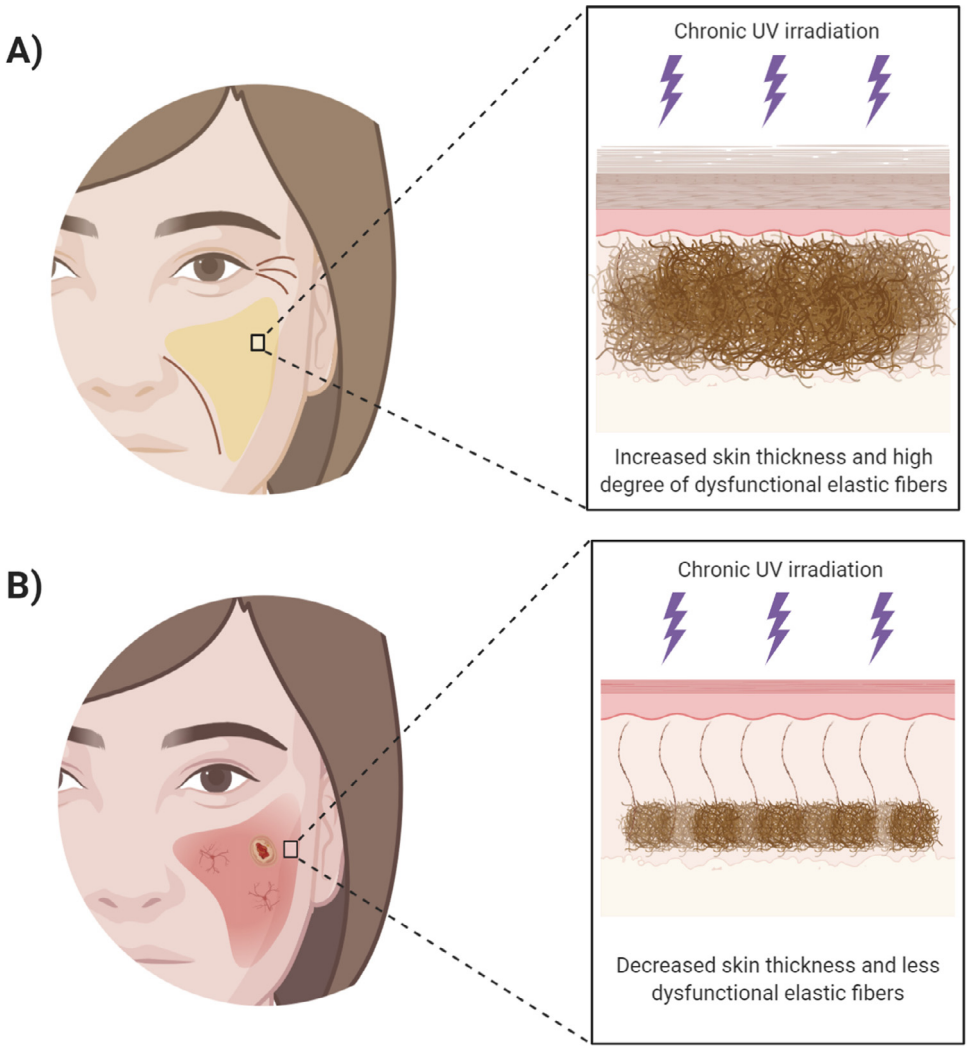

Figure 1 A) People with Fitzpatrick types 3 and 4 are more prone to developing the hypertrophic subtype of photoaging, characterized by more pronounced wrinkles, thicker skin, sallowness (skin yellowing) and more severe solar elastosis in response to chronic UV exposure. B) People with Fitzpatrick types 1 and 2 develop moderate to severe telangiectasia, redness, and skin cancer. Although there might also be solar elastosis histologically, it is not as severe as in the hypertrophic subtype, and most of the elastic fibers preserve their normal architecture. Created with BioRender.com.

findings support the proposed mechanism of action of these cells to treat the hypertrophic subtype of photoaging.

In addition to the remodeling effects of adipose-derived stem cells in the extracellular matrix, it has been previously shown that these cells favor a proangiogenic environment.[5] Considering this, the recognition of atrophic photoaging as a subtype lacking a substantial elastotic component and characterized by telangiectasia, redness, and flushing, therefore, questions the efficacy of adipose-derived stem cells for its treatment. Although collagen imbalance is most likely also involved in its pathogenesis, the presence of a substantial vascular component in atrophic photoaging raises concerns for the worsening of the pathology in the case of an increase in proangiogenic growth factors.

Basic science studies and trials using adipose-derived stem cells have focused mainly on the treatment of solar elastosis. In the context of hypertrophic photoaging-oriented research and treatment, further study of the molecular and genetic dissimilarities between the two photoaging subtypes and the effects of adipose-derived stem cells in the less studied atrophic photoaging is utterly essential to provide appropriate and safe treatment for patients falling in this category.

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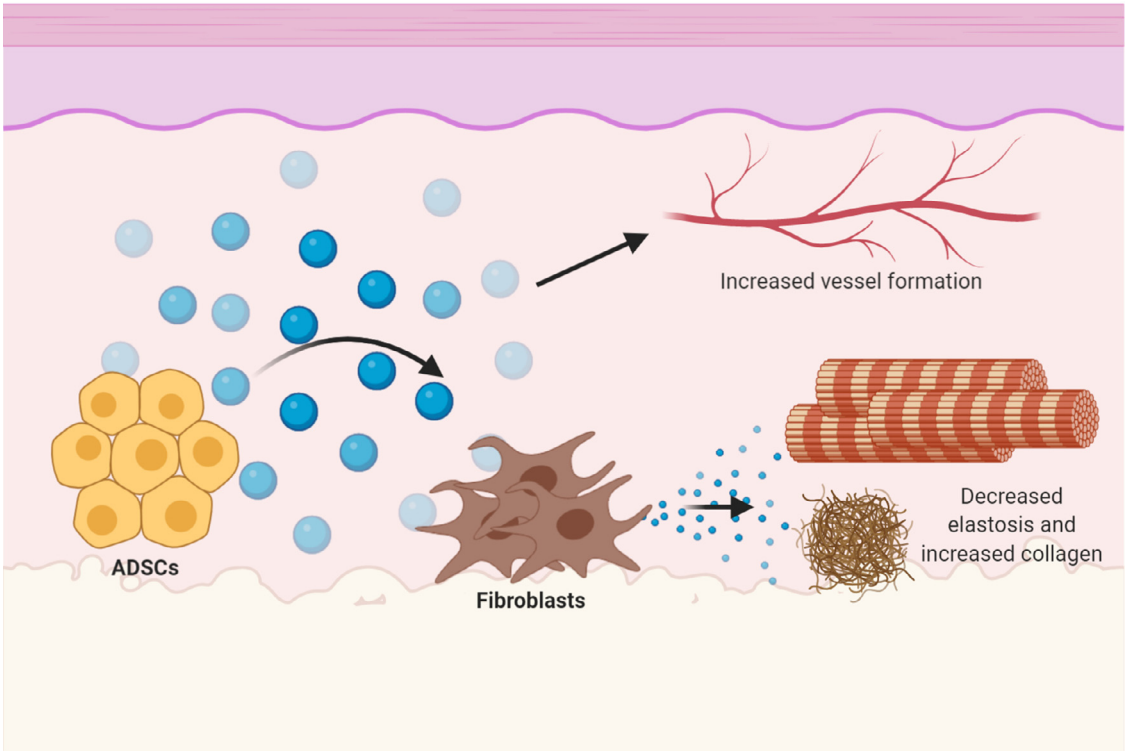

Figure 2 Adipose-derived stem cells secrete, among others, platelet-derived growth factor, basic fibroblast growth factors, keratinocyte growth factor, transforming growth factor beta 1 and 2, hepatocyte growth factor, and vascular endothelial growth factor. Activation of fibroblast promotes up-regulation of types 1 and 3 collagen mRNA and elastin-degrading enzymes cathepsin K and metalloproteinase 12, along with down-regulation of metalloproteinase 1 mRNA. Additionally, adipose-derived stem cells promote vascular formation via angiogenesis and vasculogenesis. Created with BioRender.com.

Ethical approval

N/A

Declaration of Competing Interest

The authors have no conflict of interest to disclose.

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Francisco R. Avila, Ricardo A. Torres, Gunel Guliyeva, María T. Huayllani, Antonio J. Forte
Division of Plastic Surgery, Mayo Clinic, Jacksonville, FL, United States

Corresponding author.
E-mail address: ajvforte@yahoo.com.br (A.J. Forte)

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Safety in aesthetic surgery – are we adhering to national guidelines?

Dear Sir,

Patient safety remains a fundamental issue in aesthetic surgery. Hippocrates' dictum, *primum non nocere* – "first,

do no harm" – remains especially relevant in aesthetic surgery, where harm can include morbidity and mortality for patients and litigious repercussions for the provider. In a bid to improve standards and safeguard patients, Professor Sir Bruce Keogh led the UK's Department of Health and Social Care (DHSC) '*Review of the Regulation of Cosmetic Interventions*', published in 2013.[1] The same year, we performed a national audit of the UK's top 50 Google ranked aesthetic surgery providers against these DHSC guidelines and found sub-optimal levels of compliance, albeit these were suggested guidelines and not government policy.[2] The British Association of Aesthetic Plastic Surgeons (BAAPS) included our findings in their 2013 national media campaign for safer aesthetic surgery.[3] More recently, the Royal College of Surgeons (RCS) of England published the '*Professional Standards for Cosmetic Surgery*', with reference to the 2013 DHSC review and relevant General Medical Council standards.[4] Here, we have conducted a national re-audit of clinical and marketing practices in aesthetic surgery, mirroring our original methodology, to close the audit loop and quantify current clinical practice.

Our methodology was chosen to mimic the internet-based route many patients use when seeking information on a provider. By entering the search terms "cosmetic surgery UK" into Google, we identified the top 50 ranked cosmetic surgery providers based in the UK in our re-audit. Non-UK based providers and irrelevant websites were excluded. We assessed compliance against the following national recommendations (Table 1)[1,2]:

Data were sought from the providers' websites in the first instance. Where data were unavailable online, telephone calls were made to the providers to clarify missing information as far as possible. Ethical approval was not required as data were within the public domain. Pearson's Chi-squared test was used to assess actual compliance against a desired 100% compliance with national recommendations, as well as improvement in 2020 versus 2013 data.

Our search was executed on 21st September 2020. From the top 50 Google ranked aesthetic surgery providers in the UK, 37 (74%) were companies while 13 (26%) were independent plastic surgeons. Of the 50 websites, data were obtained for parameters 1 and 2 ($n = 49$), parameter 3 and 4 ($n = 47$) and parameter 5 ($n = 42$). Reasons for data unavailability included insufficient information from the website, failure to establish telephone contact, call handlers unable to confirm all requested information and/or COVID-19 restrictions impairing the provision of full information at present.

The 2020 re-audit results were compared to our 2013 initial audit (Figure 1). Mean compliance across all parameters was 78%, representing a statistically significant improvement of 16% compared to 2013 data (Chi-squared test; $p = 0.0001$). Compliance for the fourth parameter – restricting time-sensitive promotional deals – reached near optimal compliance of 96% (Chi-squared test; $p = 0.17$), whereas compliance for the other four parameters remained sub-optimal against a desired rate of 100% compliance (Chi-squared test; $p < 0.01$).

Initial consultations were offered with non-surgeons by seven providers (14%), including "patient coordinators" and "patient advisors". Nineteen providers (39%) offered free virtual consultation followed by paid face-to-face consultations. Promotional deals were offered by sixteen providers (33%), of which two were time-sensitive (4%). Examples of promotional deals included package deals (e.g. "wedding bridal package"), student discounts, NHS discounts, armed forces discounts and "refer a friend" vouchers. It was encouraging to see that the NHS Choices website [5] appeared as the first Google search result – a government resource providing balanced information for potential patients.

Overall, our re-audit demonstrated significant improvement in compliance with national DHSC guidelines, albeit suboptimal compliance persists. Significant national interventions since our initial audit included national media campaigns led by BAAPS [3] and the publication of the RCS England's *Professional Standards for Cosmetic Surgery*.[4] We observed a seven-year interval for our re-audit to avoid prematurely recording an artificially high compliance rate immediately following these interventions due to the Hawthorne effect.

There may be reasonable explanations as to why some guidelines were not observed by all. The recommended nominal consultation fee is intended to avoid the patient feeling pressure to proceed with the operation, however some providers may feel uncomfortable charging this fee. Larger providers may be unable to offer all initial consultations with the operating surgeon due to their scale and logistics, but may arrange this in a later consultation. However, enticing promotions, particularly time sensitive promotions requiring an early down payment or deposit, may lead patients to rush decisions without adequate opportunity to fully consider the risks and benefits of the procedure. Government level initiatives are recommended to maximise patient safety. Ultimately, the patient's safety and wellbeing must remain at the heart of all decisions in aesthetic surgery, particularly in this current era of COVID-19.

Declaration of Competing Interest

None declared

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Ethical Approval

N/A

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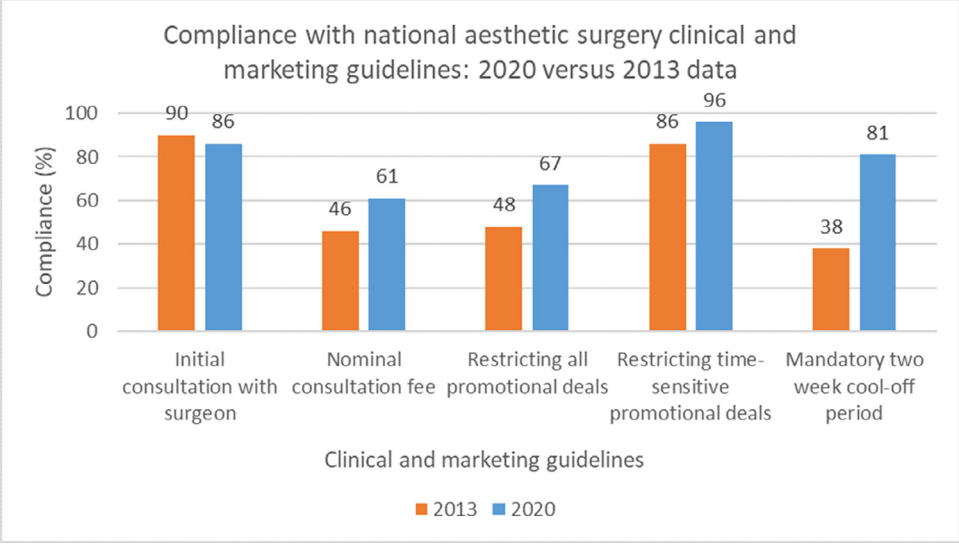

Figure 1 Compliance with national aesthetic surgery clinical and marketing guidelines: 2020 versus 2013 data.

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S.R. Rufai[#]
Craniofacial Unit and Clinical and Academic Department of Ophthalmology, Great Ormond Street Hospital for Children, WC1N 3JH, London, United Kingdom
The University of Leicester Ulverscroft Eye Unit, Leicester Royal Infirmary, Robert Kilpatrick Clinical Sciences Building, PO Box 65, Leicester LE2 7LX, United Kingdom

R. Nour[#]
Renal Unit, Ulster Hospital, Upper Newtownards Road, Dundonald, Belfast BT16 1RH, United Kingdom

C.R. Davis
UCL Division of Surgery and Interventional Science, University College London, Gower Street, London, WC1E 6BT, United Kingdom
[#]Co-first author
E-mail address: chrisdavis959@hotmail.com (C.R. Davis)

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A new instrument for septorhinoplasty "The modified Heidemann spatula"

Dear Sir,

Rhinoplasty and rhinoseptoplasty are very commonand complex surgical procedures whereas the nose plays an important functional role in breathing and an aesthetic role in the mid face.[1,2] Nasal septum deviations are the most common ones amongst nasal diseases and they are the main cause of nasal obstruction.[1] Surgical treatment is used to fix the anatomical deformities and to improve the declined nasal functions by preserving the mucosa, bone and cartilage structures as much as possible.[3] A preoperative diagnosis and planning the surgical steps are very important. Each feature of the nasal anatomy must be analysed including the shape and strength of the lower lateral cartilages, the thickness and features of the skin and of the septal mucosa, the overall columellar length, the anterior septal angle, the size and position of the nasal spine and premaxilla. The final aesthetic and functional results depends on surgical manoeuvres that should be performed harmoniously. Several techniques and surgical instruments were described to perform the septal mucosal lining dissection,and the septal incisions.the treatment should be individualized and the surgical procedures adapted to anatomical variants. The aim of this paper technical note is to describe a new in-

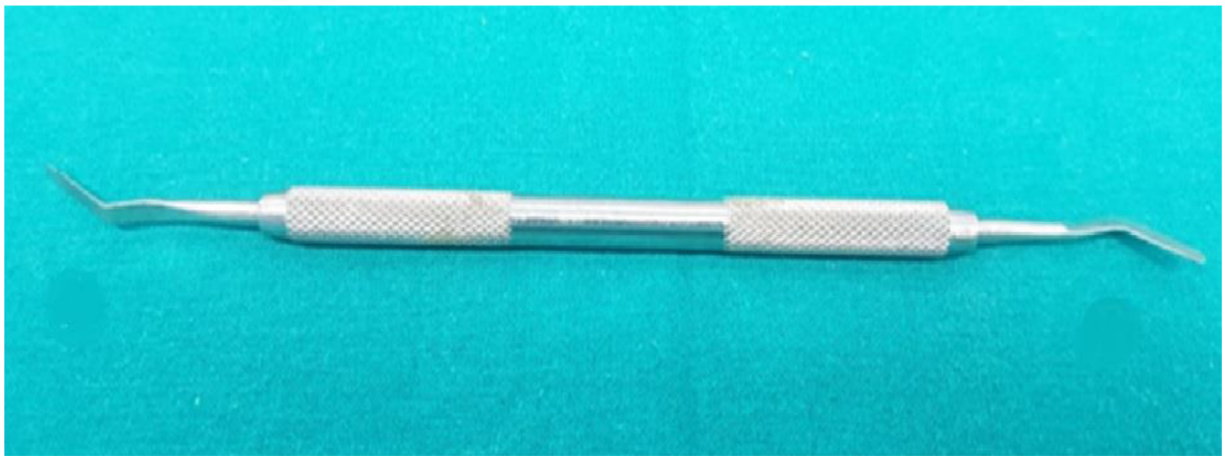

Figure 1 Modified Heidemann spatula showing two ends.

strument used to perform the septal dissection and septal remodelling during septoplasty and rhinoseptoplasty: modified Heidemann spatula.[4]

Material and methods

Surgical technique

Generally, the septoplasty is performed as a single procedure, the incisions are often within the nasal cavity. For difficult septoplasty, or some of them performed with rhinoplasty, a small incision may be made across the columella. The nasal mucosal lining that covers the surface of the septum, is then lifted away from the septum at one side; this is a critical step that must be done carefully, since the lining is fragile, which may result in a tear or hole in the lining as the mucosa is lifted away from the septum.[5] Most of the authors use the Freer dissector that is described by Dr. Freer in 1905 to perform the submucosal resection of the nasal septum, and is one of the contributors to modern septal surgery; this surgeon advocated removing the cartilaginous and bony septum subsequent to raising a mucoperichondrial flap, instead we generally use the "modified Heidemann spatula". Heidemann spatula is a double-ended surgical instrument generally used for inserting and produce various filling materials or other forms of manipulation in dentistry. This instrument is characterised by a hand piece and two faces in the end of the instrument, both of them blunt and each one with a different slant; we have modified the ends of the instrument edging them (Figure 1).

One of the end of the modified Heidemann spatula is used to initiate the separation of the thin caudal mucoperichondrium and the cartilage; once the flap is raised anteriorly, the other end is used to elevate posteriorly. After the membrane is elevated from at least one side, one of the end of Heidemann spatula can be used to incise the cartilage; by gently penetrating, the incision is started at the bony-cartilaginous junction and is carried forward and deflected inferiorly. Resection of a large central septal segment can be done safely, if required to address central septal deflection or if grafting materials are needed for rhinoplasty or other procedures.

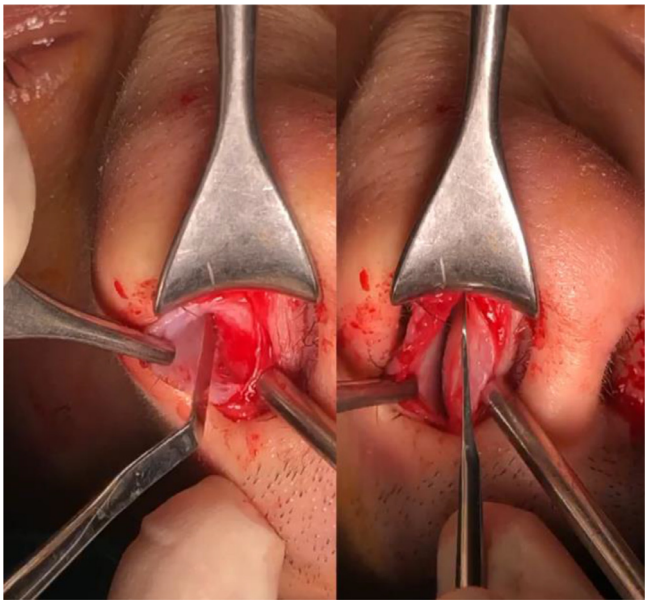

Figure 2 Detachment of the septal perichondrium with both sides of modified Heidemann spatula.

Results

Between January 2016 and December 2018, the senior Author (EF) performed approximately 145 septoplasty and rhinoseptoplasty procedures, open and closed, with this instrument (Figure 2).

He observed excellent functional and aesthetic results.

There have been no significant complications, except the mucosal flap perforation in only one side of the septum in only 3 patients.

The advantages of this instrument are the easy detachment of the mucosa and the submucosalseptal up to the thin caudal perichondrium starting from the columellar region, easily identifying the cleavage plane and then practicing the perichondral dissection of the septum bilaterally without damaging the mucosa.

That is possible thanks to the two ends of the spatula that are very thin and have a double angle. The instrument has been modified by sharpening both ends and this allows the incision of the septal cartilage without resorting to other surgical instruments.

With less "guesswork," operative time is also reduced, because the identification of the point of entry and insertion of the instrument takes only a few seconds, and once this tool is placed, dissection time should be short and precise.

More importantly, manipulation of this innovative tool is easy to learn and master, thus allowing novice and experienced surgeons to achieve improved surgical results.

Discussion

The modified Heidemann spatula, with its two cutting parts, becomes a very valid surgical instrument in septoplasty and rhinoseptoplasty surgery, providing multiple advantages such as the execution time of the practice once the manual has been achieved, the speed with which the surgeon is able to master the instrument, the ease of detachment of the mucosa and submucosa from the perichondrium and the identification of the underlying structures without risk of damage. In case of need to affect, as in the cartilaginous septum resection this step can be carried out safely.

Declaration of Competing Interest

None declared.

Funding

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Ethical approval

Not required.

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Enzo Facciuto
Ospedale del mare Hospital, Naples, Italy

Vincenzo Filomena
Department of Otolaryngology – Head and Neck Surgery, University of Naples – Federico II, Naples, Italy

Elvis Kallaverja, Chiara Spuntarelli, Ciro Emiliano Boschetti
Department of Maxillofacial Surgery – Head and Neck Surgery, University of Naples – Federico II, Naples, Italy
E-mail address: enzofacciuto@libero.it (E. Facciuto)

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Mandibular distraction osteogenesis for Pierre Robin sequence: The Sydney experience

Dear Sir,

Managing the airway in patients with severe Pierre Robin Sequence remains a challenging problem. The 'Gold Standard' of tracheostomy may secure the airway but has significant risks of complications, developmental problems and has a huge economic impact on the health service and the family[1]. The anatomical problem in Pierre Robin is micrognathia which leads to glossoptosis and subsequent airway obstruction. Addressing the micrognathia will correct the reason for glossoptosis and therefore obviate the need for tracheostomy. Mandibular distraction osteogensis is a procedure by which osteotomies are made in the mandible and distractors attached to facilitate the lengthening of the mandible and the laying down of new bone.

In the Children's Hospital at Westmead we have carried out 20 mandibular distraction procedures in patients with Pierre Robin sequence since 2011. On admission to the Neonatal Intensive Care Unit any patient with suspected Pierre Robin Sequence is assessed for signs of airway obstruction or increased work of breathing. Mild obstruction can usually be overcome with patient positioning or nasopharyngeal airway, however, more significant obstruction requires further investigation including polysomnography (sleep study) to determine whether the breathing problem is of a central neurological origin or obstructive. If

Presentations: Some of this data was presented at the RACS ASC meeting in 2019.

obstructive then treatment with facemask continuous positive airway pressure (CPAP) is trialled before planning for mandibular distraction osteogenesis if unsuccessful. This decision is made though an MDT involving neonatologists, ENT surgeons, plastic surgeons, sleep specialists and nursing staff. A laryngoscopy, bronchoscopy and oesophagoscopy is carried out to make sure there is no other associated airway abnormalities.

The procedure is carried out under general anaesthesia in an operating theatre. Bilateral osteotomies are carried out in the mandible distal to the angle of the ramus to allow antero-posterior distraction. A glossopexy may be carried out simultaneously if required. Resorbable plates and screws are used so that subsequent removal is not required. The distraction arm is passed through the skin so that it can be accessed externally. The patients are managed on the NICU post operatively and the mandibular distraction starts 24–48 h post operatively. The mandible is distracted by 1 mm each day until the desired distraction is achieved. The distraction arm remains in place for a further 6 weeks to allow consolidation of the bone. This can simply be removed at the bedside or in the outpatient setting. The patient only remains intubated for a short amount of time post operatively.

On review of the patients, 50% were isolated Pierre Robin Sequence and 50% had associated syndromes including Nager, Treacher-Collins and Stickler syndromes. Eighty percent of patients were operated on in the first 3 months of life. The average length of distraction was 20 mm (15–30). There was a significant improvement in the polysomnography post operatively to pre operatively with an average apnoea hypoponea index improving from 43 (severe) to 11 (mild, $p = 0.001$) and an obstructive apnoea index from 32 to 6 ($p = 0.003$). This means the children are oxygenating better and therefore allowing cerebral development. On average the patients remained in hospital for 39 days post operatively (including distraction time), however, this was rather variable in light of their other medical co-morbidities with syndromic patients remaining longer (32 days verses 46 days, $p = 0.09$). The most common complication was infection with 3 patients (15%) requiring antibiotics and 2 patients (10%) needing surgical drainage of the infection. 1 patient required repositioning of the distractor when it moved in the immediate post operative period and 1 patient with corpus callosum dysplasia required a tracheostomy despite mandibular distraction osteogenesis to facilitate ongoing respiratory assistance with BIPAP.

In conclusion, tracheostomy may manage the symptoms of airway obstruction in Pierre Robin sequence but does not treat the underlying pathology: micrognathia and glossoptosis. The decision to carry out a tracheostomy should not be taken lightly as there are serious complications and socio economic implications for the health service and the family. Mandibular distraction osteogenesis is an effective way of addressing the respiratory compromise in patients with Pierre Robin Sequence as it addressed the micrognathia and therefore the glossoptosis and thereby avoiding a tracheostomy. These patients are off respiratory support and out of NICU sooner with better oxygen saturation which is compatible with better cerebral development. They are able to be discharged from hospital without any higher level of care required at home.

Ethical approval

Ethical approval was not required.

Declaration of Conflict of Interest

None

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Jonathan J. Cubitt
Consultant Plastic Surgeon, The Welsh Centre of Burns and Plastic Surgery, Morriston Hospital, Swansea, United Kingdom

Charles Meares
Plastic Surgical Registrar, The Children's Hospital at Westmead, Sydney, Australia

Robert Gates, Peter Hayward
Consultant Plastic Surgeon, The Children's Hospital at Westmead, Sydney, Australia
E-mail addresses: Jonathan.cubitt@wales.nhs.uk (J.J. Cubitt), robert@rjgates.com.au (R. Gates), peterh3@chw.edu.au (P. Hayward)

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Peri-pandemic planning: considerations for the next wave of plastics trainees

Dear Sir,

The effect of Covid-19 on service and the training is far reaching and well documented.[1] As services take tentative steps towards their new normal, we believe it is important to highlight the key impacts on those applying for plastic surgery speciality training and how their careers may hinge on careful and considered future management.

Training

Broadly speaking, training largely takes theoretical and practical forms. The debate around training has been extensive, so much so that the Joint Committee on Surgical Training (JCST) launched a social media campaign entitled #NoTrainingTodayNoSurgeonsTomorrow.[2] Within this, posts explored the training opportunities available in adjusted services, highlighting how education could be optimised. Theoretical teaching has largely persisted, with webinars providing equitable access for aspiring plastics trainees to didactic teaching, something with further potential to be curriculum-based and capable of accelerating SHO-level knowledge. However, the pandemic has largely manifested in reduced hands-on operating experience. Attaining a national training number (NTN) relies on the opportunity to demonstrate specific procedural competencies and total numbers completed, something which has been impeded. As practical opportunities return in a limited fashion, surgeons are embracing all opportunities to operate again, risking those pre-NTN participants becoming more peripheralised. This is compounded by some centres having restrictions on trainee numbers permitted to assist in theatre due to social distancing, directives regarding consultant-led operating, and varied private hospital receptivity to supervised trainee participation in re-located NHS procedures.[1] To prevent further shortfall in operative experience, if NHS trusts are to continue to utilise private hospitals for operating, Training Programme Directors (TPDs) and line managers must be proactive in enabling trainees to have access, either via departmental agreement or individual temporary access arrangements. Adapting pedagogy inside and outside operating theatres will enhance procedural learning and allow operative opportunities to be maximised through formalised feedback.

Courses

Capacity limitations also translate to courses, a setting where trainees traditionally gain intensive exposure to competency learning curves in a facilitated setting. As these return to the calendar, we must consider the impact of decreased capacity on course access, and the financial implications for some courses being able to run at all with reduced numbers. With depleted operative opportunities, there may be increased demand from trainees for such supplementary practical instruction at pivotal career points. Careful venue-selection to maximise attendance in socially distanced settings will help, with increased numbers of courses to accommodate more delegates. Distributing opportunities to those who can evidence greatest trainee-need is a short-term solution to allow courses to be of maximal efficacy to the training population, but this may limit the ability to excel at a crucial time, such as NTN applications.

Assessment

Effective education requires assessment, which currently relies on contact with trainers and theatre exposure. Losing assessment fails to complete or document the cycle of learning or to allow learning target progression. Developing further modes of competency assessment which do not rely on subjective trainer assessment may better facilitate the development of quality of surgical technique rather than quantity. This is supplemented by the return of MRCS/FRCS exams. Theoretically, there is far greater control over an examination environment, making their sustainable reintroduction a realistic goal. The Intercollegiate Committee for Basic Surgical Examinations (ICBSE) has issued statements on the re-introduction of MRCS, with Part A returning remotely in September 2020.[3] MRCS Part B will also return with an adapted format, possibly including video conferencing, and lower capacity. Adapted formats are fine, but projected short-notice changes in delivery method are best avoided to minimise existing trainee challenges.

NTN allocation

In 2020, plastic surgery recruitment in England, Wales and Scotland resulted in National Training Number (NTN) allocation based on self-assessment criteria.[4] There were also significantly reduced NTNs available, and as existing registrars justifiably aim to extend training to account for educational shortfall during Covid-19 with ARCP Outcome 10.2 and fellows aim to remain in post longer, those searching for consultant jobs face an even more uncertain post-CCT world. Recruitment strategies need to be established for all possible restriction states, with early communication to allow for adequate candidate preparation. Adapted application criteria for those who now lack sufficient CST-plastics time to apply due to rotation 'freezing' and/or re-deployment should be considered. Socially distanced and/or video interviews are also a real possibility, best supplemented by e-based portfolios, something that could endure in replacing cumbersome, paper-based, records in the future. In such a state of flux, now more than ever is the time to explore a recruitment approach that remains objective without being algorithmic. Achieving this might take steps towards greater diversity in the speciality, something emerging as a focus for UK surgical practice more widely.[5] Proactive planning to support those seeking entry to plastics who face major compromise will result in more accessible training opportunities, multi-faceted assessment, and equitable recruitment, allowing for greater certainty in an uncertain time.

Declaration of Competing Interest

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Sebastian Tullie
Ross Weale
Lilli Cooper
Department of Plastic and Reconstructive Surgery, St Thomas' Hospital, Westminster Bridge Road, London SE1 7EH, United Kingdom
E-mail address: sebastian.tullie@nhs.net (S. Tullie)

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A customized 3D printed N95 respirator analogue to face crisis capacity scenarios in pandemics such as the COVID-19 and to support surgical personnel during PPE shortages

Dear Sir,

The expansion of the global economy in the last century has been a wide enabler for rapid economic growth and technological development. It can however be said that this interwoven economic fabric has rendered most modern-day societies closely interdependent to one another, rendering them able to function normally only under a very delicate set of conditions. The ongoing COVID-19 pandemic has shown how extraordinary surges in patient morbidity and mortality can result in healthcare crises which manifest to severe economic, social and political disruptions.[1] During the ongoing pandemic, the shortage of Personal Protective Equipment (PPE) has been of alarming concern with medical professionals expressing concern with regards to shortage of surgical masks and N95 respirators.[2]

For a respirator mask to work efficiently, the operator's respiration system has to be physically separated from the surrounding environment via a semi-permeable barrier. As such, air-tight sealing needs to be achieved in the application of this type of mask for it to work effectively. The current recommendation for PPE equipment for health care professionals is to use N95 class masks, defined as being able to retain particles of average size 300 nm at 95% or above retention rate.[3] In the last two month, the authors have noted the emergence of over 30 respiratory designs in various three dimensional (3D) printing repositories all of which fail to fulfill this requirement.[4] Currently adopted reusable respirators that fulfill the requirements are bulky and Plastic Surgeons are frequently faced with inability to use their loupes or other personal equipment with those, causing serious implications on the fluency of the surgical performance.

In our work, we employed 3D printing via Fusion Deposition Modelling (FDM) in order to create a rigid mask body and a filter protective cap (Figure 1). This was built upon a previous design by Lukas Budinsky distributed under an open source license (Attribution 4.0 International license, CC BY 4.0) We built upon the design by designing a 3D printed mold which serves to imprint the contact points of the mask to the face of the operator. A silicone layer was then cast upon the mold and fitted to the mask thereby serving as a sealing gasket. In order to achieve good contact of the mask to the silicone, the mold bears a 4.5 mm mid-plane indentation in order to fit tightly to the rigid mask body. The respirator

Figure 1 Successful application of our 3D printed customised respirator with the use of magnification loupes during hand surgery.

Table 1 Material type, printing settings and cost of manufacturing the customized N95 analogue respirator. Printer and software cost is excluded from this estimate.

	Respirator body	Filter cap	Mold	Silicone sealing
Material	SUNLU, Transparent PLA, 1.75 mm	SUNLU, Transparent PLA, 1.75 mm	SUNLU, Transparent PLA, 1.75 mm	Prepolymer by DecorRom 10 g
Temperature	210 °C	210 °C	210 °C	60 °C
Infill	20%	20%	20%	-
xy speed	68 mm/s	80 mm/s	80 mm/s	-
Time to print	60 mins	30 mins	90 mins	30 min
Cost	1.58 GBP			0.5 GBP

was designed usingfree open-source Computer Aided Design (CAD) software and can be customized in dimensions. Typical prints of the respirator with the settings provided in Table 1 are completed within three hours.

We chose to use segments from a 3 M tie-on surgical mask for the semi-permeable filter. Previous studies have shown that such masks are able to block up to 96.4% of aerosolized Bacillus atrophaeus (diameter distribution: 925-1250 nm) and up to 89.5% of aerosolized MS2 Bacteriophage (mean diameter: 23 nm).[3] Despite the virus particle size being smaller than the pore size of the N95 or surgical mask filters, both are capable of blocking aerosols and performing at the prescribed rate. This is because filtering is achieved by several mechanisms in semi-permeable membranes. For instance, in HEPA filters which employ pore diameters of 300 nm, a NASA study on the 'Submicron and nanoparticulate matter removal by HEPA-rated media filters and packed beds of granular material' suggests that 99,5% of particles of 100 nm in size are filtered.[3]

Based on the quantities of source material used we estimate the cost of mask production to be 2.3 GBP per mask. Provided the mold for the silicone parts is reusable however, PLA filament costs can be reduced for subsequent mask productions to 1.4 GBP per mask (Table 1). We do however caution that if third parties are to use or adapt masks that the necessary contamination control measures are taken, masks are sealed in sterile packaging and allowed to sit for the prescribed timeframe for the virus to be rendered inactive.

In summary, the recommended respirator is customized, ergonomic, reusable, has been validated by fit testing and is especially applicable for surgeons that require the use of loupes for their surgical technique, making it especially useful for Plastic Surgeons and microsurgeons.[5] Recognizing that inter-societal dependency is a one-way street, having a system in place able to rapidly respond and adapt to such spikes of high demand seems necessary. Recent technological advancements such as the advent of 3D printing, printed circuit boards as well as modular mechanical and biological parts have all been enablers to the rise of the 'citizen-led science' movement whereby individuals can make notable contributions to technology from the leisure of their own homes, no longer necessitating access to centralized facilities. In times of global crisis such as pandemics, this movement of individuals could potentially adapt and rise to the challenge in a manner resembling industry 4.0, whereby smart manufacturing of high demand goods can be spearheaded in a joint effort to aid to the cause.

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Declaration of Competing Interest

Dr Papavasiliou and Dr Chatzimichail are co-Founders of Stelth, a company that specialises in 3D printing. The authors declare no interest in commercialising the device described in this article.

Supplementary material

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.bjps.2020.08.111.

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Theodora Papavasiliou
Department of Plastic Surgery, St.Thomas' Hospital, Westminster Bridge Rd, Lambeth, London SE1 7EH, United Kingdom

Stelios Chatzimichail
Department of Surgery and Cancer, Imperial College London, White City Campus, 80 Wood Lane, London W12 0BZ, United Kingdom
E-mail addresses: theodora.papavasiliou@nhs.net, doc.dora@live.com (T. Papavasiliou)

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Reorganisation to a local anaesthetic trauma service improves time to treatment during the COVID-19 pandemic – experience from a UK tertiary plastic surgery centre

Dear Sir,

Wythenshawe Hospital, part of Manchester University NHS Foundation Trust, provides tertiary-referral plastic surgery services to Greater Manchester's 2.8 million population. Our trauma service consists predominantly of hand trauma and complex wound reconstruction undertaking around 2900 emergency procedures annually, with an average 66 h theatre capacity every week. Despite this, theatre capacity is frequently insufficient resulting in patients with ambulatory upper limb trauma suffering waiting times longer than advised by national and regional guidelines [1]. It is in this context that we sought to change the delivery of our trauma service, a transformation accelerated by the widespread changes in surgical services as a result of the COVID-19 pandemic of 2020.

In the UK, lockdown measures were imposed on 23 March 2020 [2]. Our trauma service was rapidly reorganised with a view to long-term change in order to address the risk of poorer outcome of COVID-19 for patients undergoing general anaesthetic procedures [3], and due to reduction in availability of redeployed anaesthetists and theatre staff. We established a consultant-led one-stop wide-awake local anaesthetic with no tourniquet (WALANT) service at a peripheral community hospital. Emergency cases requiring anaesthetic support continued to be treated at the regional centre with prioritisation in competition with other surgical specialties.

We sought to compare the demand on the service and compliance with guidelines on time to treatment during the COVID-19 pandemic with the same 10-week period in 2019.

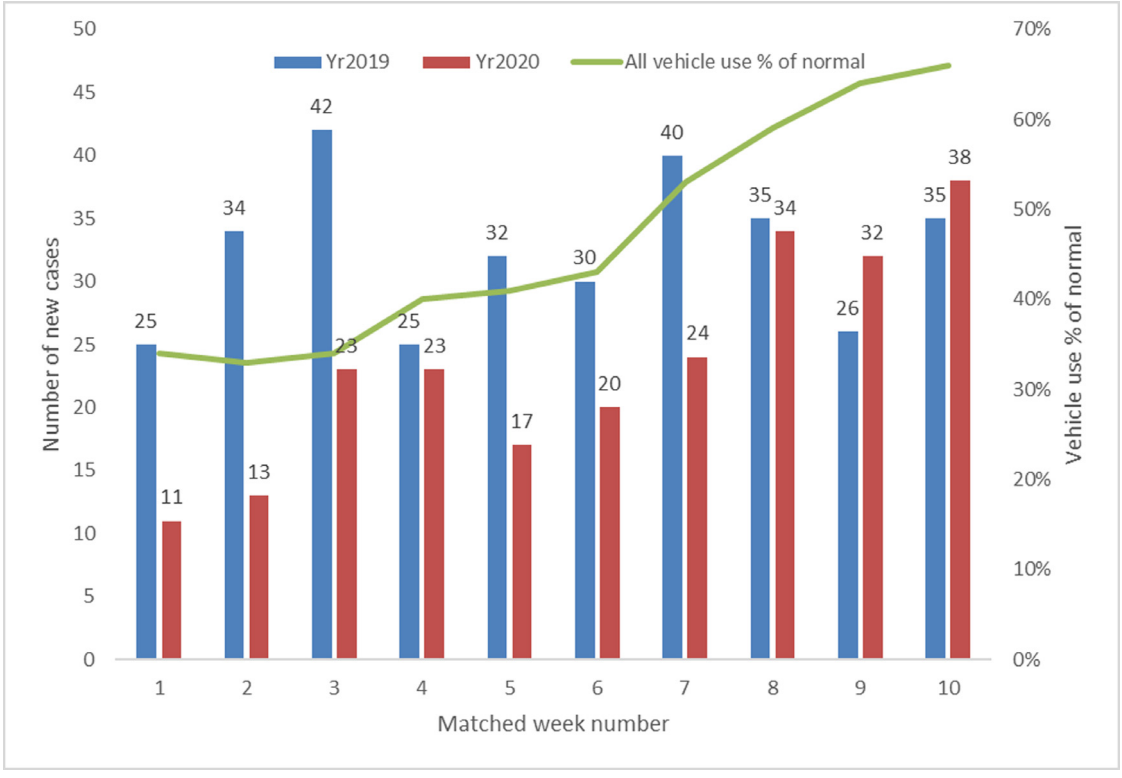

Figure 1 New presentations of Plastic Surgery trauma in 2019 vs. 2020 correlated with Department of Transport official statistics for vehicle use. Week 1 represents week beginning April 1st 2019 vs. 30th March 2020.

Table 1 Time to treatment for specific injuries against guideline recommendations.

Target met	Flexor (within 4 days)	Extensor (within 7 days)	Nerve (within 4 days)
2019	31 (60%)	19 (70%)	29 (39%)
2020	36 (78%)	28 (100%)	57 (84%)

Figure 2 Time from injury to treatment (%).

Approval to collect data was granted from the hospital audit department. Data was collected retrospectively for the period of 1 April to 14 June 2019 from electronic patient records for all trauma patients undergoing surgery. Time from injury to treatment was calculated and benchmarked against the regional guidelines based on national guidelines for specific injuries [1]. These were flexor tendon injuries (4 days), extensor tendon injuries (7 days), nerve injuries (4 days), fractures requiring fixation (24 h if open; 7 days if closed). For the period 1 April to 14 June 2020 data in the same fields was collected prospectively. Time from injury to treatment was considered only in primary cases, whilst lower limb orthoplastic trauma and burns injuries were not included as provisions for their treatment are through a separate pathway.

Prism 8.4.2 (GraphPad Software, San Diego, CA) was used to conduct statistical analyses. Mann-Whitney U test was employed to compare 2019 data versus 2020. Department for Transport traffic data during the pandemic was used as a surrogate measure of human activity and Pearson's correlation coefficient used to correlate with the number of new presentations to our service [4].

There was a reduction in trauma patients requiring surgery (2020 $N = 284$; 2019 $N = 398$) with significantly fewer new presentations week-to-week in (2020 weekly median = 23; 2019 weekly median = 33; $p < 0.0136$) (Fig. 1). The number of trauma cases in 2020 reached a similar level as experienced in 2019 by May 11th (or week 7) and remained at a similar level for 3 weeks.

The anaesthetic requirement changed in keeping with delivery of a WALANT service (2020 90%, $N = 255$; 2019 40%, $N = 158$). The time from injury to treatment was significantly less (2020 median = 2 days; 2019 median = 5 days; $p < 0.0001$). A greater proportion of patients were treated within 4 days from date of injury (2020 83%, $N = 212$; 2019 47%, $N = 179$). Analysis of specific categories of injury against pre-defined standards for time from injury to treatment demonstrated greater compliance in 2020 (85%) compared to 2019 (53%) (Table 1 and Fig. 2).

The COVID-19 global pandemic in 2020 required innovative solutions to meet the trauma demands of plastic surgery in Greater Manchester. We report an early reduction in the incidence of trauma requiring surgery attributable to lockdown and social distancing measures which permit-

ted reorganisation of services and a greater number of patients meeting target wait times for treatment. Critically, this has persisted despite returning to 2019 levels of demand in trauma. We attribute this effect to efficiencies afforded by WALANT [5] and more complex cases have been performed under LA when previously GA had been used; revascularisations ($n = 4$), replantation ($n = 1$), arterial repairs ($n = 5$) and hand fractures ($n = 32$).

Towards the end of lockdown, there was a gradual rise of trauma to normal levels. Week 7 (11 May 2020) coincided with easing of measures to allow people back into work if they could not work from home and 'unlimited' exercise In Week 10 (1 June 2020), the schools started to reopen and the public were allowed to meet different households. The rise in trauma demands correlated with the relaxation of lockdown measures and public activity ($r = 0.90$, Figure 1). The efficiencies of a one-stop assessment and treatment clinic continue to see cases being treated within a desirable time window despite a return to normalcy. We foresee that our service will continue and encourage other units considering or already having reorganised their service to WALANT to develop efficiencies within this new normal.

Declaration of Competing Interest

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Local approval granted

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W.S. Khor, D.J. Lazenby, T. Campbell, J.D. Bedford, R.I.S. Winterton
Department of Plastic Surgery & Burns, Wythenshawe Hospital, Manchester University NHS Foundation Trust, Manchester Academic Health Science Centre, Manchester, UK

J.K. Wong, A.J. Reid
Department of Plastic Surgery & Burns, Wythenshawe Hospital, Manchester University NHS Foundation Trust, Manchester Academic Health Science Centre, Manchester, UK
Blond McIndoe Laboratories, Division of Cell Matrix Biology and Regenerative Medicine, School of Biological Sciences, Faculty of Biology, Medicine and Health, The University of Manchester, Manchester Academic Health Science Centre, Manchester, M13 9PT, UK
E-mail address: weesim@gmail.com (W.S. Khor)

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The inertia effect of lockdown: Managing the new normal

Dear Sir,

Introduction

The UK went into lockdown on the 23rd of March 2020. Unprecedented but necessary safety measures were forced upon our personal and professional lives. As the Covid-19 pandemic alters the trajectory of this generation, in all likelihood permanently, and with a second wave and/or circuit breaker lockdowns on the horizon, we are forced to come to terms with the reality that our lives may never be the same again. This forces us to comprehend what we may now be faced with; 'the new normal'.

Adapting to survive

As healthcare professionals we have already faced enormous operational changes, which forced us to adapt quickly, in order to keep services afloat and avoid hospitals from being overwhelmed. Within acute care, entire units were transformed to treat Covid-19 patients, operating theatres were repurposed as ICUs.

Within specialties, significant changes had to be made to ensure essential services could still be delivered in a manner safe for both the patient and healthcare staff. A new triaging system, and a higher 'operating threshold,' dramatically reduced trauma workload. While trauma lists still con-

tinued, albeit at a fraction of normal, the vast majority of elective and even some cancer operations were halted. A large proportion of surgeons were left in limbo — relieved of clinical duties, awaiting redeployment to the Covid-19 effort – with this perpetual state of waiting running the risk of causing a serious state of inertia within healthcare.

The effect of workload and stress on performance

Yang et al. identified six variables and several elements affecting the performance of employees — workload being chief amongst them.[1] Workload shift has important implications for several occupations, especially fields in which employees encounter varying workload levels[2]; none more so than the medical profession. It is well documented that variations in this workload results in a change in stress levels. Workloads can be an opportunity for employees to go beyond their comfort zone, learn and develop skills, gaining experience enriching their exposure and as a result prospering more quickly. It is also viewed that employees with an adequate workload remain more active and energetic, while those without tend towards a state of inactivity and laziness.[3]

Studies examining the sudden changes in workload level found that performance was significantly impaired in both increased and decreased workload situations with a decrease in workload causing greater detrimental effects.[4-5] Many researchers empirically conclude that Performance = Abilities + Opportunities + Motivation.[6] As discussed previously, the Covid-19 pandemic has significantly reduced operating and hence had an instrumental effect on opportunities available to trainees and as a result may impact motivation as well. As per the model above, this is likely to result not only in a decrease in performance but also in trainee satisfaction which in turn may be a catalyst for increased stress levels

The pandemic and lockdown have already resulted in various stressors. The changes in workload and satisfaction as described above synergistically compound this stress — resulting in allostatic load. Allostatic load is used to describe the wear and tear on bodies as a result of living in a constant state of stress response. The continuous release of adrenaline and cortisol for prolonged periods of time has well documented effects on our physical health such as hypertension, inflammation and insulin resistance. However, allostatic load can also result in a feeling of fatigue, fogginess and lack of motivation.[7] The Health and Safety Executive (HSE) report quantified the economic burden caused by stress to UK employers at an estimated £26 billion per annum, with approximately 12.8 millions work days lost.[8] Having periods of intermittent recovery within stressful environments is essential to reduce allostatic load. However, the pandemic has made recovering more difficult as we are not able to destress in ways which we may previously have relied upon.

The effect of the pandemic on plastic surgery

Plastic surgery departments have taken initiatives to reduce hospital footfall, restructure teams and utilise final year medical students.[9] UK surgeons with national leadership roles have rapidly adapted guidelines to assist in the management of hand trauma. Ambulatory antibiotic services have also been bolstered to reduce hospital admissions for soft tissue infections. Within the confines of the advice from NHSX regarding information governance,[10] telemedicine has been employed within departments to advise minor injury units on simple procedures, to follow up wounds, perform hand therapy and promote patient led post-operative care. For patients potentially requiring surgery, they are assigned directly to a theatre list and managed on a 'see and treat' basis. All these measures have helped reduce the links in multiple practitioner human-chain.

Amidst this rush of change, a backlog of long-term conditions and elective cases has resulted in over 4 million patients waiting for surgery. This is already having serious effects on workload and it is now more important than ever to have a primed and ready, motivated work force to increase productivity and tackle the backlog.

A new model of leadership

So how do one go about tackling the issues highlighted? Prior planning and adaptable strategy are key in order to tackle the issues caused by this pandemic. However, as Moltke famously stated "no plan survives first contact with the enemy,"[11] thus flexibility, teamwork and dynamic leadership are crucial in order to succeed. Covid-19 has forced teams to change, demonstrate versatility and become surgical 'start-ups' creating innovative solutions. To harness such energy there has to be a move away from the NHS leadership of old[12] and instead towards a shared and distributive leadership style; setting clear purpose and direction, but leaning towards collaboration and consensus. To maintain this momentum in an ever-changing world, it is essential to empower surgeons of all grades recognising that each person within a team may be a specialist in their own right: an educator, an innovator or tech expert. No doubt this dynamic may feel alien to some and must be achieved without a sense of undermining. After all, we work in a high-risk profession, which requires a clear hierarchy for critical leadership decisions.

The need for support and structure

Stress has played a major role in the inertia effect being experienced within the healthcare systems. The uncertainty accompanying further changes to work systems and personal lives moving forward may exacerbate this. It will be absolutely crucial to look after the physical and emotional wellbeing of the workforce. The Royal College of Surgeons (RCS) and PLASTA stress the importance of a robust plan in place to support the surgical workforce as well as offering mentoring and coaching.[13] Where possible, innovative training opportunities should be identified, which may deviate from conventional surgical teaching.

The role of technology

The importance of digital health care solutions has been made clear in these challenging times. Better access to communications bandwidth, several easy to use apps and the need for social distancing has resulted in virtual appointments being more acceptable to both clinicians and patients. Virtual teaching sessions, meetings and support seminars have not only proved to be effective but have also offered a huge reach and an environmentally friendly way to function in a well-connected world. Telemedicine and digital health technology as a whole has already proven their aptitude and efficacy in this crisis and need to become a mainstay in the post pandemic healthcare setting, moving the point-of-care to the patient. However we recognise that nothing can replace the power of the human touch and empathy, thus in certain situations face to face contact will remain an essential practice as a doctor.

Conclusion

The Covid-19 pandemic will come to an end and a strategy is required to establish a 'New Normal,' which is energetic and efficient. We have been inspired by the innovation and resourcefulness of our peers and modern leadership styles of senior surgeons. Above all, we are assured that with strong leadership and support, the creativity within our dynamic field will conquer the inertia effects of Covid-19 and establish a 'New Normal' which is exciting to be part of.

Ethical approval

N/A.

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Declaration of Competing Interest

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Y.V. Verma
A. Armstrong
Plastic Surgery Department, West Wing, Oxford University Hospitals, Headley Way, Oxford OX3 9DU, United Kingdom
E-mail address: yash.verma@ouh.nhs.uk (Y.V. Verma)

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Consent, decision-making and operative planning in plastic surgery during the COVID-19 pandemic

Dear Sir,

The General Medical Council set out updated guidance effective from November 2020 highlighting the importance of consent and decision making.[1] Traditionally, consent relies upon a capacitous individual having a conversation with the healthcare professional and receiving sufficient information that includes but is not limited to a discussion pertaining to the associated risks and benefits of the procedure. The COVID-19 pandemic has precipitated a paradigm shift in medical workflows, mitigating risks of SARS-CoV-2, and with regards to consent, we need to develop a dynamic and more fluid process whereby patients' legal and ethical rights are safeguarded through appropriate consideration of

material risks. With the recovery of surgical services initiative, particularly within plastic surgery, consideration must be given to consent, quantification of risk, and organization of services to accommodate patient throughput.

The Montgomery vs Lanarkshire Health Board case in 2015 established the test for materiality of risk as "if a reasonably prudent patient in the situation of the patient would think it significant",[2] superseding the previous application of Bolam's principle which defined risk in reference to what would be considered important by a responsible body of medical opinion.

The salience of risks of hospital-associated transmission of SARS-CoV-2 for members of the public is axiomatic, and for the medical profession it is fraught with uncertainty. The reproduction number (R) estimates of SARS-CoV-2 in England ranged from 1.1–1.6 within individual NHS England regions in the third week of October 2020, which illustrates the dynamic and changing rates of SARS-CoV-2 infection and by extension, associated risks to patients of contracting the infection.[3]

Within plastic surgery, early studies have explored the associated risks of SARS-CoV-2 related complications, with a prospective cohort study of 729 plastic surgery patients undergoing elective, trauma or burns surgery finding no 30-day post-operative complications of SARS-CoV-2 related deaths. SARS-CoV-2 positive tests were found in 5.9% of burns patients, 3.0% of trauma patients and 7.1% of non-operatively managed patients with no significant differences seen between groups.[4] There remains a paucity of literature on quantification of material risk of contracting SARS-CoV-2 in plastic surgery. The Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) estimates the risk of contracting SARS-CoV-2 in patients undergoing urgent surgery at 0.45% if they have close contact with SARS-CoV-2 positive patients in hospital, based on multiple early studies in America; however, they highlight that this depends on local infection rates.[5]

Therefore, we feel it is important that within the consent process, local variations in prevalence of SARS-CoV-2 are explained to patients, and perhaps the latest local R rate for the local NHS region should be quoted as standard practice, with an explanation of the possibility of increased risks to patients undergoing plastic surgery. Furthermore, on a hospital level, consideration should also be given to local Intensive Care Unit capacity, given the known increased risk of 30-day-mortality and pulmonary complications arising from SARS-CoV-2 infection in surgical patients. This will necessitate a joined-up-approach towards consent and decision making, between the patient, the plastic surgeon, and other hospital services to ensure that both the patient, and the surgical team make informed decisions regarding the risk-benefit trade-off and best course of action for the patient.

Further work may also explore, using larger sample sizes, the safety profile of local versus general anaesthetic use in plastic surgery procedures, and associated SARS-CoV-2 complications. The novel and widespread disruption caused by SARS-CoV-2, to traditional and entrenched ideas about operative planning, decision-making and consent mandates an open-minded and dynamic approach of critically examining long-held practices with a new perspective. Leveraging the many recent advances and innovations in technology including virtual and e-consenting to enhance workflows has the potential to redefine the way we approach decision-making, consent and operative planning.

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

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Alexander Zargaran
Department of Medicine, St Thomas' Hospital, Westminster Bridge Rd, Lambeth, London SE1 7EH, United Kingdom

David Zargaran
Department of Plastic Surgery, Royal Free Hospital, Pond St, Hampstead, London, NW3 2QG, United Kingdom

Gary Masterton, MBChB, MRCS, PGCE, FHEA, MPharm, PGDip
Department of Plastic Surgery, St George's Hospital, Blackshaw Rd, Tooting, London, SW17 0QT, United Kingdom

Afshin Mosahebi
Department of Plastic Surgery, Royal Free Hospital, Pond St, Hampstead, London, NW3 2QG, United Kingdom
E-mail address: alexander.zargaran@gstt.nhs.uk (A. Zargaran)

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Impact of COVID-19 outbreak on plastic surgery: Taken precautions, distribution of surgical procedures and changes in admissions to outpatient clinic

Dear Sir,

We live extraordinary times due to the COVID-19 outbreak, an emergency situation that spread over the world in a short time. This acute situation forced the national health services of countries to take strict measures in health care to provide effective care for COVID-19 infected patients as well as to maintain emergency and mandatory healthcare.[1] Although there are differences between countries, the main measure has been the postponement of health services that are not urgent or mandatory.[2] In addition to reducing viral transmission between patients and healthcare providers, it is aimed at medical resources and healthcare services to focus on the COVID-19 outbreak. Eventually, this has affected plastic surgery practice, and the distribution of the patient population admitted to plastic surgery clinics.[2] The present study aims to provide some information about the effect of the COVID-19 pandemic on a plastic surgery clinic and patient distribution during this period. Although some of these results and their impact on plastic surgery are predictable, to take adequate measures against the crisis circumstance, it is paramount to demonstrate the population to be served and the healthcare services to be given during an extraordinary situation related to the medical field.

The first case of COVID-19 was recorded on March 10, 2020, in Turkey.[3] As of May 25, the total number of COVID-19 cases was 157,814, and 4369 deaths were recorded.[3] This rate of spread of the outbreak and the taken measures have dramatic effects on plastic surgery, as in all health branches. To analyze these effects, following the approval of the ethical board, medical data of patients applied to Ankara Training and Research Hospital Plastic Surgery Clinic in two different periods were reviewed retrospectively. The timeframe between March 19, 2019, and April 22, 2019, indicates the data of the routine period (RP) of the plastic surgery clinic as a control group. In Turkey, elective surgical interventions were officially postponed throughout the country on March 17, 2020.[4] Therefore, the time frame between March 17, 2020, and April 21, 2020, demonstrates the pandemic period (PP) of the plastic surgery clinic. The data of admission to the outpatient clinic, surgical intervention, hospitalization, personnel and resource redistribution, and educational activities of this two-time frame were reviewed and compared to each other. A two-sample *t*-test between proportions was performed to statistical analysis of the rates of changes in data between RP and PP.

There is inevitably a decrease in elective and non-urgent surgical interventions and outpatient applications during the global crisis, the COVID-19 pandemic. Operations of 342 patients scheduled before the outbreak were postponed due to the COVID-19 pandemic. The majority of these surgeries were excision of superficial skin lesions (75%) (Figure 1). Besides, compared to the RP, there was a general decrease in admissions to the outpatient clinic (from 3511 to 490), number of surgeries (from 793 to 129), number of hospitalizations (from 252 to 45) and consultations from other clinics to plastic surgery clinic (from 548 to 201) in the PP. However, the rate of some plastic surgery healthcare services increased statistically significantly in the PP. There was a statistically significant increase in consultation rates from the emergency department and the surgeries of patients admitted from there (traumatic hand injuries and maxillofacial trauma (MFT)) ($p = 0.036$). Moreover, there was a significant increase in the admission rates of MFT and follow-up admissions to the outpatient clinic ($p < 0.001$). As expected, a statistically significant decrease was observed in the proportion of admission with aesthetic complaints ($p < 0.001$), elective hand issues ($p = 0.026$), and superficial skin lesions ($p < 0.001$) during the PP. Consistent with that, a statistically significant decrease in the surgical intervention rates of aesthetic surgery and excision of skin lesions was observed ($p < 0.001$). On the other hand, the increase in the proportion of MFT and hand trauma surgical procedures during PP was statistically significant compared to RP ($p = 0.032$ and $p < 0.001$, respectively) (Table 1).

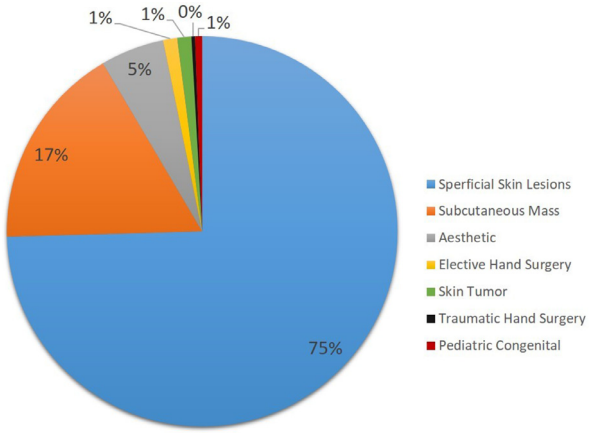

Figure 1 Surgeries planned in the pre-pandemic period and postponed due to COVID-19 pandemia.

In parallel with the decrease of health care services in the plastic surgery clinic, the work schedule of plastic surgeons and nurses has been rearranged to provide reinforcement to different clinics that needed medical staff in COVID-19 patients care. Furthermore, to prevent viral transmission, the educational program of the residents was reorganized and mostly held as video conferences during the PP.

The present study examined the effects of the COVID-19 pandemic on plastic surgery in some respects. The significant increase in the proportion of traumatic hand surgery and MFT surgery among plastic surgery healthcare services is remarkable in the extraordinary situation that we live in nowadays. In conclusion, the importance of traumatic hand surgery and MFT surgeries should be taken into consideration while taking precautions such as personnel redistribution, regulation of clinical infrastructure, and use of medical resources in crisis management.

Table 1 Distribution of surgical procedures during the pandemic period.

	Aesthetic surgery	Hand trauma	Maxillofacial trauma	Excision of skin lesion	Oncologic surgery	Elective hand surgery	Wound reconstruction	Microvascular tissue transfer	Pediatric congenital	Other	Total
Routine period	97 (12.2)	132 (16.6)	10 (1.3)	397 (50.1)	40 (5.0)	29 (3.7)	8 (1.1)	2 (0.2)	3 (0.4)	75 (9.4)	793 (100.0)
Pandemic period	0 (0.0)	100 (77.5)	5 (3.9)	9 (7.0)	4 (3.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	11 (8.5)	129 (100.0)
Rate of change	12.2%	60.9%	2.6%	43.1%	1.9%	3.7%	1.1%	0.2%	0.4%	0.9%	
***p*-Value**	< 0.001	< 0.001	0.032	< 0.001	0.035	0.027	0.232	0.611	0.472	0.744	

Note. Other surgical interventions: nail sticking surgery, circumcision. Data are presented as *n* (%).

Declaration of Competing Interest

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Ethical approval

The present study does not involve human or animal subjects.

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Murat Kara
Burkay Akduman
Yahya Melih Işık
Koray Gürsoy
Ugur Koçer
Department of Plastic, Reconstructive and Aesthetic Surgery, Ankara Training and Research Hospital, Ankara 06230, Turkey
E-mail address: mailsmurat@gmail.com (M. Kara)

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Operation mode of plastic surgery during COVID-19 epidemic: The experience of the department of plastic surgery in Zibo Central Hospital

Dear Sir,

The Coronavirus Disease 2019 (COVID-19) outbreak in December 2019 has changed the way of life for all humanity[1,2]. All walks of life around the world are deeply affected by COVID-19[3]. The impact of COVID-19 on plastic surgery is also huge. It directly changes the way plastic surgery works and the way plastic surgeons work[4].

Recently, we read the published study by A. Armstrong and J. Jeevaratnam on a plastic surgery service response to COVID-19 in one of the largest teaching hospitals in Europe[5]. We strongly agree with some of the measures that the authors suggest in their article about plastic surgeons responding to the COVID-19 epidemic. The authors took steps to reduce the number of hospitalized patients to reduce the risk of COVID-19 infection among patients and medical staff. They used telemedicine to reduce direct contact between doctors and patients. When doctors had face-to-face contact with patients, they wore special protective equipment. The movement of inpatients within the hospital was restricted. After the patient was discharged from the hospital, follow-up treatment was conducted as far as possible through telemedicine. Communication between plastic surgeons was also through online social media. These measures coincided with the measures taken by our plastic surgery department in Zibo Central Hospital in response to COVID-19.

1. In the early days of the COVID-19 outbreak, in order to prevent COVID-19 infection among medical workers, Zibo Central Hospital decided to temporarily close its plastic surgery department and stop all cosmetic and plastic surgeries.
2. In order to maintain the communication between plastic surgeons, we set up a WeChat group to conduct work and academic communication within the WeChat chat group. In addition, we will spread some learning materials and surgical materials about plastic surgery in WeChat chat group, so that plastic surgeons can learn from each other and make progress together.
3. In order to take care of patients as well as possible, we use the Internet to communicate with patients, answer their questions, and develop personalized plastic surgery plans for patients. It not only avoids the risk of removing COVID-19 from the patients, but also ensures that the department of plastic surgery can work quickly after the COVID-19 epidemic is under control.
4. We used online social media to conduct plastic surgery knowledge and technology competitions. These activities not only enriches the lives of plastic surgeons in the period of home isolation, but also strengthen their professional knowledge and skills.
5. After COVID-19 was largely under control in China, the plastic surgery department of Zibo Central Hospital resumed operations. For patients in need of treatment, we strictly tested the COVID-19 and isolated patients suspected to be infected with COVID-19. We strictly controlled the number of patients admitted daily and minimized direct contact between medical staff and patients. We arranged separate wards for each inpatient and controlled the patient's range of activities to prevent direct contact between the patient and the patient. We used social media to follow up patients who had been treated. After completing the daily work of plastic surgery every day, we will sterilize the wards and office area strictly.

At present, the department of plastic surgery in Zibo City Central Hospital is in an orderly operation. As a result of our effective measures, no plastic surgeon has been infected with COVID-19. And no patient was infected with COVID-19 in the department of plastic surgery in Zibo City Central Hospital. We believe that our experience can serve as a reference for our plastic surgery colleagues.

Declaration of Competing Interest

None.

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Ethical approval

Not applicable.

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Ailing Yang
Department of Plastic Surgery, Zibo Central Hospital, No. 54 The Communist Youth League Road, Zibo 255000, Shandong Province, China

Limin Zhu, Jing Zuo
Department of Surgical Anaesthesia, Zibo Central Hospital, No. 54 The Communist Youth League Road, Zibo 255000, Shandong Province, China

Xue Yao*
Department of Ophthalmology, Zibo Central Hospital, No. 54 The Communist Youth League Road, Zibo 255000, Shandong Province, China

*Corresponding author.
E-mail address: zbyaoxue@163.com (X. Yao)

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In response to: 'Comparison of patients satisfaction with aesthetic outcomes following lower extremity reconstruction: Muscle vs. fasciocutaneous free flaps'

Dear Sir,

We would like to thank Seiydova et al.[1] for their recent article investigating patient satisfaction with aesthetic outcomes of muscle versus fasciocutaneous flaps following lower limb reconstruction. It's important to acknowledge the impact of patient satisfaction and aesthetic effect in procedures which primarily aim to restore function yet can significantly alter our patients' appearance – in some cases, 20% of patients undergo aesthetic refinements of their lower limb post-reconstruction.[2] However, the evidence base regarding patient reported outcome measures (PROMs) on aesthetic effects following lower limb reconstruction is limited.[3]

Expanding this research into a multicentre, possibly international study would increase the power of Seyidova et al. findings and potentially shed light on additional patient perspectives. Larger sample size would enable further investigation of patient satisfaction for muscle vs fasciocutaneous flaps in subgroups such as gender, age or socioeconomic background. Moreover, it would allow results to be stratified according to co-morbidities such as diabetes mellitus which interfere with wound healing and therefore could affect the aesthetic result.[4]

The authors rightfully pointed out that only one factor – flap texture – showed a statistically significant satisfaction difference ($p = 0.003$) between the two procedures. However, the questionnaire administered by Seyidova et al. was developed by another group for use in hand reconstruction using the Likert Scale.[5] As such, the questionnaire might not accurately reflect patient perspectives on the aesthetics of lower limb reconstructions. Factors of importance in hand reconstruction might not be as significant in lower limb procedures. It is also worth noting that no patients who had undergone a muscle flap procedure were "strongly satisfied" with any of the PROMs, further suggesting that the outcomes of interest for lower limb reconstruction might differ from these included in the questionnaire utilised by Seyidova et al.

The study by Seyidova et al. highlights the importance of striving to develop a standardised reporting tool for PROMs specifically for aesthetic aspects of lower limb reconstructions.[3] As patients become more involved in the decision-making process, it is vital to include their perspectives in developing such a questionnaire. As we move towards achieving excellent functional outcomes, we must also emphasize the aesthetic effects of procedures, to ensure patient satisfaction.

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Julia K Komor[†]
Michal Kawka[†]
Department of Medicine, Imperial College London, South Kensington Campus, London SW7 2AZ, United Kingdom
[†]Joint first authors – contributed equally
E-mail address: julia.komor15@imperial.ac.uk (J.K. Komor)

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Reply to letter Re: Single VAC dressing for pedicled groin flaps prior to second stage division

Dear Sir,

We thank Kazzazi and King[1] for their comments on our recent article. [2] We have not had issues maintaining the VAC dressing for 4 weeks. In some areas we found it useful to place stoma paste to fill in gaps and help maintain a seal. Placing the adhesive dressing proximally on the arm and extending it significantly beyond the boundaries of the wound and flap also helped to create an effective seal. If the VAC dressing is placed well initially, we have had not had issues maintaining a good seal over a longer period of time.

Maceration over intact skin, in our experience, was related both to sweating and exudate from the wound. This often led, in our practice, in a hot and humid climate, to secondary fungal infections. Adjacent intact skin when moist, may also rub, leading to further skin breakdown. By covering exposed surfaces with the clear adhesive dressing, maceration and skin contact is prevented and also any excess fluid is sucked through the sponge into the VAC canister. The VAC sponge itself is only applied around the wound and the flap.

We have been able to monitor parts of the flap by direct visualization through the clear adhesive dressing. However, the perfusion of the groin flap is extremely reliable and should not require regular monitoring if the flap perfusion is assessed to be adequate intraoperatively and good surgical technique is followed in raising the flap. If an issue were to arise with the flap, this would be venous congestion and the VAC dressing would help promote venous outflow and alleviate this issue. Care of course, should be taken during placement of the VAC dressing, to avoid compression of the pedicle. We have similarly used the VAC dressing immediately postoperatively for free flaps [3,4] and this has not compromised outcomes.

When the VAC dressing is placed over a raw surface, an option is to place an interposition nonadhesive barrier dressing and this prevents damage to the pedicle of the flap by indirect trauma. The VAC dressing has further advantages serving as a splint to keep the flap in proper position and preventing inadvertent detachment of the groin flap from the wound it was used to resurface. The risk of inadvertent flap detachment and damage to the pedicle is reduced with immobilization of the pedicle and the flap with the VAC dressing. Shoulder and arm braces are useful to keep the flap in good position but may not be as effective as a VAC dressing in completely immobilizing the area around the flap and the wound.

We do agree with the importance of maintaining finger motion where possible. This may not be possible if the objective is to resurface multiple digits or a defect close to the digits. In these instances, constant finger movement would increase the risk of an accidental flap detachment. The VAC dressing can be modified if needed to leave certain digits free for passive movement. In the two examples presented this was not an issue. In the first case the patient had no active movement in the hand following forearm replantation and in the second case the abdominal flaps were used to resurface the tips of multiple amputated digits in a syndactylized fashion and range of motion exercises with the flaps in place would be detrimental to wound healing. Ultimately application and use of the VAC dressing has to be customized to the requirements of the defect and the flap used for coverage, to optimize outcomes.

Declaration of Competing Interest

None.

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None.

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Harvey Chim
Division of Plastic and Reconstructive Surgery, University of Florida College of Medicine, 1600 S.W. Archer Rd, Gainesville, FL 32608, United States
E-mail address: harveychim@yahoo.com (H. Chim)

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Response to letter regarding: Poorly differentiated cutaneous squamous cell carcinomas have high incomplete excision rates with UK minimum recommended pre-determined surgical margins

Dear Sir,

We thank the authors for their interest[1] in our work, and to the Editor for the opportunity to respond. As the authors recognise, and we discuss in our paper, the data upon which current excision margin guidance for cutaneous squamous cell carcinomas (SCCs) is limited[2]. We sought to improve the available data with the largest published series of peripheral and deep margins focussing on a high risk group (poorly differentiated SCCs). The last update of the British Association of Dermatology/British Association of Plastic, Reconstructive & Aesthetic Surgery (BAD/BAPRAS) guidance from 2009 suggests 6 mm or more peripheral margins for poorly differentiated SCCs, with no details on deep margin[3]. International guidelines updated since suggest that this may be inadequate, although this is based on expert consensus opinion.

The authors suggest limitations in our data reporting of the peripheral margin clearance of SCCs. This is based on our categorisation of peripheral margins as $\leq$4 mm which could either represent an excision of an SCC under current guidance (if considered low risk) or outside guidance if clinical margins of excision were $<$4 mm. We acknowledge this could lead to some ambiguity, so have revised Table 1 below to distinguish this, including all lesions excised with a 4 mm peripheral margin in a 4-5 mm category.

We found 28 lesions were removed with margins $<$4 mm (8 lesions with 2 mm margins, and 20 lesions with a 3 mm clinical margin). The reasons for smaller margins than recommended were if clinical suspicion was not a SCC, or in some anatomically constrained sites such as the medial canthus of the eye. Of these 28 lesions, none had an involved deep margin, and only 1 had a close peripheral margin (0.8 mm margin for a microinvasive SCC at the base of a keratin horn).

This revision strengthens the point we make which is that well differentiated SCCs excised by the current guidance ($\geq$4 mm) has good clearance rates, but poorly differentiated SCCs have a higher overall incomplete peripheral margin of excision.

We had also not analysed lesion size larger than 2 cm separately, which is another category of risk in SCCs[3]. The measured tumour size in our paper reported follows histological fixation, and therefore includes a degree of shrinkage of approximately 15% compared to in situ dimensions[4]. We therefore advise caution before recommendations based on this.

However, we performed regression analysis of our data including the variables of site, histological grade, surgical margin, and tumour diameter both as the subgroups of $\leq$2 cm/$>$2 cm and as a continuous variable. Tumour diameter $>$2 cm did not demonstrate a statistically significant effect on the likelihood of peripheral margin status ($p = 0.091$ involved-clear, $p = 0.152$ close-clear), or deep margin status ($p = 0.477$ involved-clear, $p = 0.264$ close-clear). This was also the case for diameter as a continuous variable, with the exception of deep margin status ($p = 0.005$ involved-clear but odds ratio only 1.09).

We commend the work of the UK Reconstructive Surgery Trials Network (RSTN) and their ongoing audit on NMSC management in the UK.[5] From March to July 2020, they have collected the data from 32 UK plastic surgery units, including 2636 excisions, of which 746 have been confirmed to be SCCs (Personal communication). Analysis of the final dataset from this national audit is likely to improve the gaps in our knowledge to manage the second most common malignancy worldwide, and inform efforts such as the revised BAD/BAPRAS guidance which is underway.

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Table 1 Breakdown of peripheral pathological margins by histopathological grade of cSCC. [Revised from Table 5[2].

Clinical peripheral margin	Well differentiated clear/close/involved	Moderately differentiated clear/close/involved	Poorly differentiated clear/close/involved
<4 mm	11/1/0 91.7% clear	13/0/0 100% clear	3/0/0 100% clear
4–5 mm	53/1/0 98.1% clear	47/2/2 92.1% clear	8/2/1 72.7% clear
6–9 mm	13/ 0/0 100% clear	35/0/1 97.2% clear	7/0/0 100% clear
≥ 10 mm	4/0/0 100% clear	15/1/0 93.8% clear	9/0/1 90% clear
Not known	15/0/1 93.8% clear	25/1/0 96.2% clear	6/0/1 85.7% clear

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J. Kiely
Department of Plastic Surgery, Cambridge University Hospitals NHS Trust, Cambridge CB2 0QQ, United Kingdom
Department of Plastic Surgery, Bradford Teaching Hospitals NHS Foundation Trust, Bradford BD9 6RJ, United Kingdom

A. Roshan
Department of Plastic Surgery, Cambridge University Hospitals NHS Trust, Cambridge CB2 0QQ, United Kingdom
Cancer Research UK Cambridge Institute, University of Cambridge, Li Ka Shing Centre, Robinson Way, Cambridge CB2 0RE, United Kingdom
E-mail address: amit.roshan@addenbrookes.nhs.uk (A. Roshan)

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