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## Correspondence and Communications

## Preliminary experience using the VITOM-3D system for microvascular anastomosis in DIEP free flap breast reconstruction



Dear Sir,

### Introduction

Free tissue transfer is routine practice in modern plastic surgery and in many situations is the gold standard of reconstruction. One frequently used technique is the deep inferior epigastric perforator flap (DIEP) for breast reconstruction.

Microsurgical development has been intertwined with microscope technology. Further evolution relies in part on technical refinements of such devices.<sup>1,2</sup>

However, even the latest microscopes have shortcomings. They are large, expensive, cumbersome and can be inconvenient to adjust. They also demand that the primary and/or assistant surgeon adopt an often-uncomfortable posture.

Use of a 3D stereoscopic monitor system to perform a microvascular anastomosis was described in 2012 by Cheng et al.<sup>3</sup> There have subsequently been a number of reports of similar systems used in place of an operating microscope. We discuss our initial experience performing breast reconstructions with DIEP flaps using the VITOM 3D system.

### VITOM 3D system

The VITOM 3D system (Karl Storz SE & Co. Kg, Dr.-Karl-Storz-Straße 34, 78,532 Tuttlingen/Germany) is a 3D visualization device consisting of a high-definition 3D camera which projects an image onto a Storz 4 K/3D monitor, showing a live 3D picture. It has a maximum magnification of 30x and can perform indocyanine green scans producing topographical perfusion maps.

The available magnification and reduced size of the system make it an attractive alternative to conventional microscopes. We utilised it to provide the required magnification in two microsurgical reconstructive procedures.

### Our experience

Two consecutive breast reconstruction cases were performed at the Lister Hospital, Hertfordshire, UK. Case 1 consisted of bilateral removal of implants and delayed reconstructions with bilateral DIEP flaps. Case 2 was a right unilateral delayed DIEP flap breast reconstruction. The procedures were performed by the same surgical and scrub team with support from Storz representatives. Full list of VITOM 3D components is listed in Appendix 1.

Fig. 1 is an intraoperative photograph displaying arrangement of VITOM equipment.

The VITOM 3D system was used in place of an operating microscope throughout the procedures both to prepare recipient vessels and perform microanastomoses. The procedure itself was unaltered, the VITOM system purely providing magnification to conduct those aspects where it is required. Arteries were sutured with a 9-0 Ethilon suture (Johnson and Johnson Medical Inc, 1 Johnson and Johnson Plaza, New Brunswick, NJ 08,933, USA) and veins anastomosed with Synovis couplers (Synovis Micro Companies Alliance Inc, 439 Industrial Lane, Birmingham, AL 35,211, USA). Both anastomoses were checked with a conventional operating microscope.

Video 1 demonstrates the output from the 4K 3D camera, suitable to perform microvascular anastomosis.

Both patients had uneventful recoveries and were discharged within five days.

### Capabilities

Descriptions of such systems appear in the fields of neurosurgery and head and neck surgery. Numerous tests of scope in cadaveric specimens and tissue models also confirm that they are not only suitable alternatives to conventional operating microscopes but also provide vastly superior ergonomics and increase in space in operating theatres.<sup>4</sup>

### Breast reconstruction

We identified one report using the VITOM-3D system to perform a breast reconstruction with DIEP flap in 2017.<sup>5</sup> The system utilised a high definition (HD) monitor. The updated system employed by our team included a 4K monitor and updated software.

We successfully performed two breast reconstruction cases using the 3D VITOM system. This is the first such re-

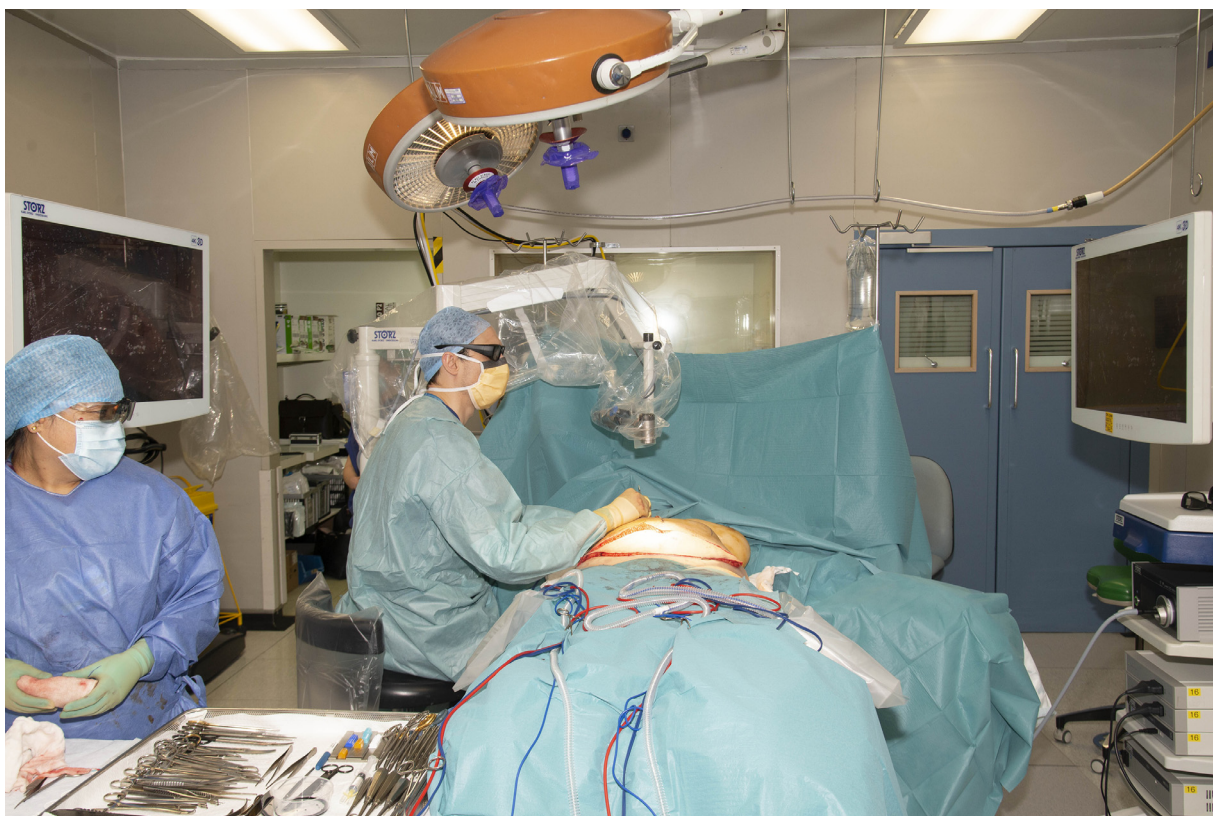


Fig. 1 Intraoperative photograph displaying arrangement of VITOM equipment.

Table 1 Benefits and considerations for use of the VITOM system.

Benefits	Considerations
<ul style="list-style-type: none"> <li>• Reduced size and intrusiveness of hardware into surgical field. Frees up space around operating table.</li> <li>• Increased mobility of camera head vs moving entire operating microscope</li> <li>• Flexibility of setup - monitors can be arranged to suit individual team requirements.</li> <li>• Permits optimal ergonomic positioning of surgeon and assistant whilst using device.</li> <li>• Magnification, image quality and depth perception were equivalent to standard operating microscope.</li> </ul>	<ul style="list-style-type: none"> <li>• System cost is comparable to a new conventional digital operating microscope with ICG capability (c. £125k).</li> <li>• Learning curve associated with performing microsurgery whilst adopting an ergonomically preferable position rather than traditional positioning.</li> <li>• Adjustment to working with 3D images. A period of acclimatisation was required of a few seconds for images to focus. This period reduced on continued use.</li> </ul>

port from a unit in the UK. Table 1 summarises the benefits and considerations for use of the VITOM system.

## Conclusion

Our preliminary experiences with the VITOM-3D device demonstrate that it could prove to be a suitable alternative to the traditional operating microscope when performing free tissue transfer. This equipment also provides signif-

icant space saving and ergonomic benefits, whilst providing images of suitable quality to perform the procedure unmodified.

We believe this and similar devices, are the future of microsurgery and can be safely incorporated into the practice of microsurgeons.

## Funding

None.

## Conflicts of Interest

None declared.

## Ethical approval

Not required.

## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:[10.1016/j.bjps.2021.11.099](https://doi.org/10.1016/j.bjps.2021.11.099).

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# Shaping the future of microsurgery: Combination of exoscope and smart glasses



Dear Sir,

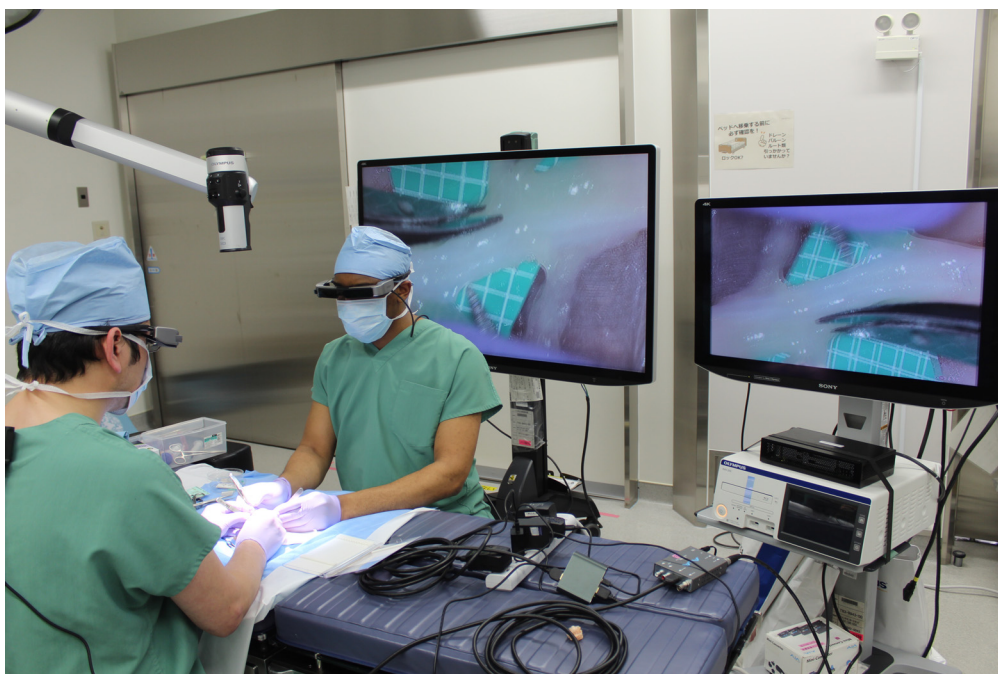
The exoscope is increasingly being used across multiple surgical specialties including plastic surgery, otolaryngology, gynecology, and neurosurgery driven by the growing advancements in 3D video photography technology.<sup>1,2</sup> The compact nature, excellent maneuverability and enhanced ergonomics have positioned it as the future of operative microsurgery.

At present, the most common configuration consists of the exoscope housing the 3D camera and lighting system positioned above the surgical field with the surgeon, the assistant and other surgical staff sharing the image displayed on one or more high-definition monitors.<sup>1,3</sup> While this setup borrowed from laparoscopic surgery may be adequate for several surgical procedures, it presents a challenge when performing fine microsurgical anastomosis. In contrast to the conventional microscope where the assistant is often positioned directly opposite facing the operator, the need for large monitor displays makes this ideal position impossible to attain while using the exoscope. Instead, both the surgeon and the assistant have to face the screen direction with their heads angled away from their hands performing the anastomosis. This posture is less ergonomic contrary to the concept of the exoscope and results in a further learning curve as the team re-adjusts to the new less intuitive position.

To overcome this challenge, we combined an exoscope (Orbeye Olympus, Japan) with two pairs of smart glasses (MOVERIO BT-35E Epson, Japan) to view the 3D image for both the surgeon and assistant. The surgeon viewed the direct image from the exoscope while the assistant viewed a mirrored image (180° rotation) of the surgeon's view transmitted wirelessly via Wi-Fi (Figure 1). The resulting image was bright, clear and virtually indistinguishable from the conventional operating microscope quality. The surgeon and assistant were able to complete synthetic and biologic model vessel anastomosis with a more comfortable and intuitive posture compared to viewing the displays. In addition, the transparent clear screens of the Epson smart glasses allowed the operators to view the surgical field directly, pick up instruments and perform other tasks without the need to remove the smart glasses. However, there were some challenges. First, the field of vision with these glasses was smaller than that of a conventional operating microscope. Secondly, there was a slight time lag on the assistant side while using the smart glasses wirelessly due to limited Wi-Fi connection speeds in our operating room. Nevertheless, both these problems may be resolved with the use of faster connection speeds and larger view smart glasses.

Prior Presentations: None.





**Figure 1** Combination of the exoscope with smart glasses to perform microsurgery. The photograph shows the surgeon performing biologic and synthetic models of vessel anastomosis with the assistant sited 180° opposite the surgeon using smart glasses without the need for a shared monitor. The two display monitors are showing the view seen by the surgeon and the mirrored view seen by assistant.

Intraoperative use of smart glasses and wearable displays such as the Microsoft HoloLens, Oculus Rift, Google Glasses and augmented reality is increasing in plastic surgery.<sup>4,5</sup> Techniques such as displaying near infrared images to identify lymphatic vessels, projection of CT images onto the face and displaying the positions of flap perforators onto the actual surgical field have been described.<sup>4,5</sup> Equally, the advances in exoscope technology continue to improve the microscope. Scaglioni et al. reported performing lymphatic supermicrosurgery using the Robotic Scope (BHS Technologies, Innsbruck, Austria) which consisted of a head mounted display that controls the 3 dimensional movement of the exoscope camera mirroring the head movement of the surgeon in space.<sup>2</sup> This innovation allowed complete hands-free control of the exoscope.

The goal of these technological advances has been to ultimately improve ergonomics and the comfort of the surgeon. Microsurgery operations are particularly long and involve prolonged fixed posturing of both the surgeon and assistant for stability of the fine movements demanded by this technique. This often results in considerable strain more so than with many other surgical procedures. Our approach further improves the ergonomics and comfort of *both* the surgeon and the assistant allowing them to operate in the natural microsurgery configuration positioned opposite each other using smart glasses.

Looking to the future, we expect the digital microscope to develop into a device that can comprehensively cover seamless electronic transition from direct vision, low-magnification loupes, to high-magnification microscopy. Additionally, the use of multiple exoscope cameras, perhaps embedded in the smart glasses of the surgeon and assistants, will allow for multiple people to share different

views which enhances education. Furthermore, such multiple views can be used to construct a virtual 360-degree image of the entire surgical field, as seen in the automotive industry 360-degree camera, allowing the surgeon to operate without blind spots.

To achieve these goals, smart glass developers need to address the following:

- 1) Reduce the weight and excess heat of the wearable devices
- 2) Increase the screen size and field of view
- 3) Increase device communication speeds to reduce time lag
- 4) Consider flexible position of the smart glass camera to focus on the surgical field
- 5) Develop more intuitive software and hands-free device control

In conclusion, combination of the exoscope and wearable smart glasses improves ergonomics for both the surgeon and assistants. This technology is set to revolutionize microsurgery and improve safety, outcomes, and education.

### Financial disclosure statement

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### Ethical approval

N/A.

## Declaration of Competing Interest

The authors have no conflict of interest to declare.

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## Heads up reconstructive microsurgery: Utilisation of the three-dimensional microscope in microvascular procedures



Dear Sir,

Plastic and reconstructive surgery is known for innovation and adoption of new techniques and technologies to facilitate and improve different aspects of patient care.<sup>1</sup> This is especially true for microsurgical procedures. They usu-

ally require high degree of dexterity, eye-coordination skills and long hours of concentration and focus. However, several studies have shown that plastic surgeons are susceptible to a specific pattern of work-related musculoskeletal disorders that may impact productivity and in severe cases may result in surgical interventions and may lead to career interruptions or even termination in some instances.<sup>2</sup> Furthermore, the ergonomics of movement and posture is poorly trained in general, and more is needed to take advantage of new technologies to minimise this occupational risk.

Since the earliest use of the surgical microscope in 1921, several modifications have been made to improve the resolution of the microscope and increase the width and depth of the surgical field. The new generation of three-dimensional microscopes offers high resolution magnification combined with stereopsis.<sup>3</sup>

Traditional Microscopes have limitations as viewing through the eyepiece dictates and limits the surgeon's position. The ocular eyepiece creates a small, round field of view, limiting visibility of the surrounding area and the field of vision is limited to two surgeons. Advances in digital screening and optics have led to the development of exoscopes for surgical magnification.

We present our experience of utilising a the Aesculap Aeos three-dimensional microscope in 9 consecutive microsurgical procedures, complimented by a survey completed by the operating surgeons delineating our experience in this context. Six cases were immediate breast reconstruction using the deep inferior epigastric artery perforator (DIEP) flap, two cases of Immediate lymphatic reconstruction and one case of peripheral nerve sheath tumour excision.

Patients who underwent breast reconstruction utilising the 3D microscope were matched and compared to cases carried out using the traditional microscope (TM). All patients underwent immediate unilateral breast reconstruction. The average operating time was not significant between the two groups (TM = 320 min vs 3DM = 337 min), of note 3 patients in the 3DM group had contralateral symmetrisation procedures to the other breast. Similarly, no significant difference in average Ischaemia time (TM= 80 min vs 3DM = 86 min). It is also worth mentioning that two patients with intraoperative microsurgical complications were in the 3DM group. One patient had an inadvertent injury to pedicle vein which required a repair and the other had an irradiated friable internal mammary artery which required redo of the anastomosis. Therefore, increasing the ischaemia time in these cases. There were no post-operative complications, and no flap were lost in either group.

Four microsurgeons participated in the survey following use of the 3D microscope(3DM). All four found that the 3D microscope provided a good view with better ergonomics to posture and movement when compared to the conventional microscope. It was noted to be specifically useful in cases of lymphatic reconstruction as TM's are usually challenging to adjust in the axilla and groin. The survey also showed a positive response from trainees with regards to teaching as the screen allows visualisation to the whole team. Surgeons reported better engagement of theatre staff during microvascular anastomosis too.

In addition to the aforementioned advantages in improving ergonomics and posture. The 3D microscope also has



**Figure 1** A photograph showing the set up of the 3D microscope and screens in theatre.

an educational and safety benefits, as all the surgeons and nurses in the room can clearly visualise the operating field through the big screens and remain focused during the procedure, an option, that many of the older optical microscopes do not offer.

From the economic point of view, the cost of the 3D microscope is comparable to the traditional microscope. However, it does require additional 3D glasses that are reusable, and a big screen is displayed near the operating table at distance and orientation convenient to the operating surgeon (Fig 1).

One potential disadvantage is microsurgical fields with small operative space and challenging position e.g. lower limb microsurgical procedures. We did not experience utilising the 3D microscope in lower limb cases as such procedures are performed at another hospital site.

Heads up microsurgery utilising a three-dimensional microscope has been widely reported in other surgical specialties namely ophthalmic and spinal surgery.<sup>4</sup> However the uptake of this technology in reconstructive plastic surgery is still limited in the United Kingdom. A feasibility animal study on rats showed that the three-dimensional microscopes improved posture and comfort without technical difficulties with good image resolution.<sup>5</sup>

In our experience, utilising the 3D microscope did not increase our operative or ischemia time but provided more comfort to the operating surgeons and improved movement and posture ergonomics.

## Declaration of Competing Interest

None

## Funding

None.

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## Different autologous tissue for stabilization of the pedicle in the presence of acute angulation, compression, crossing, and kinking



Dear Sir,

## Introduction

The common causes of thrombosis at the microvascular anastomosis are (1) external compression, (2) kinking of the pedicle or perforator, (3) crossing between artery and vein, (4) tension at the anastomotic site, (5) acute angulation in size discrepancy, and (6) trauma of the vessels.



The vascular problem can occur due to inadequate arrangement of vessels and not considering the three-dimensional geometry of the pedicle. Splint the vascular pedicle and minimize the turbulence of blood flow have been demonstrated to reduce the different causes of thrombosis, and the only tissue described has been fat graft<sup>1</sup> to correct the orientation.

The large scale studies has reported that compression, thrombosis, and torsion angulation can cause turbulence in blood flow through the pedicle of the flap and turns in a necessity of re-exploration.<sup>2</sup> Kinking of the pedicle may impair the blood flow, specially the vein is at the potential risk of kinking. This change can increase after inset the flap or patient self-movement.<sup>3</sup>

Even though many techniques are useful to manage the discrepancy size between vessels still not the ideal technique for treatment, that is why techniques as splint the vessel with different autologous tissue may help to manage the orientation, angulation, kinking, or even compression.

## Patients and methods

This study was performed under the authorization of the committee of ethics which follows the Helsinki norms.

We included 85 patients after free flap reconstruction between 2004 to 2020. The inclusion criteria were flaps that after the microanastomosis, inset attempt, or in re-exploration presented changes in the orientation of the pedicle, kinking, angulation of the anastomosis, crossing between vein and artery, and compression by the surrounding tissue.

The tissue used to stabilize the geographic arrangement of the pedicle and was classified into (1) soft, such as fat tissue or muscle, (2) semi-rigid, such as split vein graft, and (3) rigid, such as fascia graft.

## Surgical technique

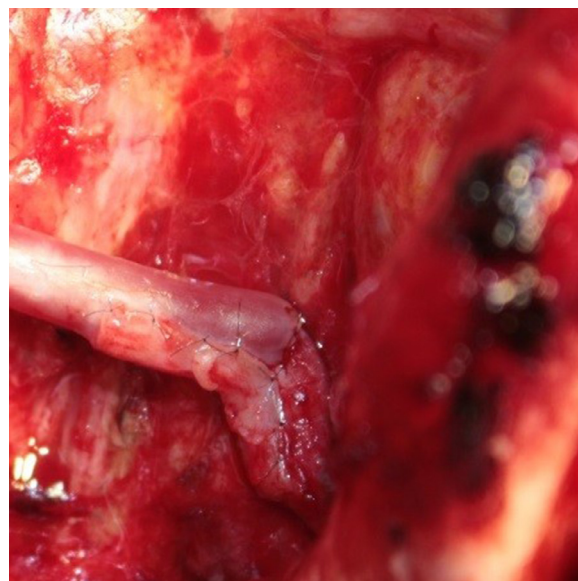
According to the changes observed in the course of the pedicle, we chose the tissue to stabilize the pedicle.

The size of the fat graft and muscle graft was 1-2. cm x 1-2 cm. The graft was sutured around the pedicle or anastomosis with 9-0 nylon. The fascia and split vein graft size were 1.5-2 cm length x 1 cm, the fascia was taken from the flap or donor site, and the vein graft was greater saphenous.

The vein graft or fascia graft was placed at the anastomosis site only to minimize the angulation caused for size discrepancy or turbulence blood flow. The fascia was sutured around the anastomosis, but the split vein graft was sutured on the wall of the pedicle, where the acute angulation was pronounced; taken 1 cm before the anastomosis and 1 cm forward the anastomosis.

## Results

In 29 cases, we used muscle graft; in 35 cases, we used fat graft; in 3 cases, we used fascia graft due to the ves-



**Figure 1** Split vein graft to correct acute angulation between artery flap-vein graft-recipient artery

sel presented at the acute angulation for size discrepancy. In 18 cases, we used split vein graft to 'splint' the vessel in the presence of acute angulation due to size discrepancy, or sometimes vein graft was used due to the augmentation of the turbulence for high pressure in the vein graft between the artery of the pedicle -the vein graft and recipient artery anastomosis.

According to our result, muscle graft and fat graft can be useful to prevent miss orientation, kinking, and compression of the pedicle due to its characteristics such as soft, fluffy, and light. Fascia and vein graft are rigid, but pliable and thin tissue can be useful to prevent acute angulation, none of the tissue showed necrosis or infection when the flap was re-explored, and the fat graft was not suffered reabsorption. Resumed in [Table 1](#)

**Soft tissue:** Muscle or fat graft are soft and pliable tissue easily to be found and to be applied to certain locations such as around the artery which cross the veins, preventing kinking and compression of the pedicle.

**Rigid tissue:** Fascia graft can decrease the acute angulation in the presence of large vessel discrepancy, but it is not easy to find unless the place of an elevation of the flap was subfascial.

**Semi-rigid tissue:** Split vein graft ([Figure 1](#)) can decrease the acute angulation in the presence of discrepancy; however, it is more useful in acute angulation in the presence of turbulence between artery and vein graft.<sup>3</sup>

The common causes of thrombosis at the microvascular anastomosis are (1) external compression, (2) torsion, (3) crossing between artery and vein, (4) tension to vessels at the anastomotic site, (5) angulation, and (6) trauma to the vessels.<sup>4</sup>

Dealing with the pedicle orientation is a common but underestimated issue that surgeon has to face and depends on the inset location, the recipient vessel, and the length of the pedicle according to the free flap chosen<sup>5</sup>



**Table 1** Features, advantage, disadvantage, and indications of the autologous tissue.

Tissue	Advantages	Disadvantages	Indications
Soft tissue: Muscle graft or fat (Figures 2 and 3: Fat graft in crossing vessels)	Soft, easily available, and easy to apply	Too soft and cannot correct the acute angulation in the presence of large discrepancy between the vessels	As a padding (pillow) of vessels for most cases in which there is no acute angle of vessels at the anastomotic site or used to prevent the compression to the vein or the artery, and artery crossing the vein
Rigid tissue: Fascia graft (Figure 4: Fascia graft to correct acute angulation)	Can decrease the acute angle in the presence of large discrepancy between the vessels	Not reality available, concern of its revascularization	Rarely used to correct acute angle for thick artery or correct orientation of the pedicle
Semi-rigid tissue: Split vein graft (Figure 5: Split vein graft anastomosed on the wall of the acute angulation)	Can decrease the acute angle in the presence of discrepancy between the vessels and high turbulence	Must be sutured to the wall of vessels with 10-0 sutures, takes more time to fix the splint	To correct the angulation of vessels at the anastomotic site or to prevent traction of torsion or vessels

## Funding

None.

## Ethical approval

The ethical committee of hospital approved the study.

## Declaration of Competing Interest

None.

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# Multi-pedicled long fasciocutaneous free flaps in complex lower extremity reconstruction



Dear Sir,

Fasciocutaneous free tissue transfer is an established limb salvage modality in complex lower extremity reconstruction. In severe cases, defect coverage is challenging due to the size and extent of the injury which may surpass the dimensions of most commonly utilized fasciocutaneous donor sites. This is further complicated by the considerable length between the recipient pedicle and most distal segment of the defect requiring coverage<sup>1</sup>. Modifications to standard skin paddle designs governed by the level of flap elevation and informed by knowledge of the respective angiosome territory have the potential to maximize the length of fasciocutaneous free flaps when necessary.

Advancements in the understanding of the “choke vessels” between angiosomes and microsurgical techniques enable reconstruction of larger and longer defects with fasciocutaneous flaps<sup>2</sup>. This concept was drawn on from previously established techniques of harvesting chimeric flaps and artificially connecting their pedicles to bridge longer distances between the recipient pedicle and the most distal aspect of the defect<sup>1</sup>. Herein we summarize and present the current available donor sites that allow harvest of long fasciocutaneous free flaps incorporating multiple pedicles with a single skin paddle for complex lower extremity reconstruction, while allowing donor site primary closure.

In our experience with complex lower limb salvage reconstruction, large defects in excess of 40 cm in length, such as those encountered in severe degloving injuries, ranging from mid-thigh to total below knee are amongst the most challenging to reconstruct. In those cases, decision making regarding reconstruction is mandated not only by defect characteristics but also the microsurgeon’s skillset. Skin grafting large areas is technically simple and is commonly utilized in conjunction with free flap reconstruction when the reconstructive ladder is utilized or in extreme cases of polytrauma when skin grafting alone does not suffice. However, it incurs an additional donor site with its potential complications and healing timeline as well as intra-operative manpower and logistical considerations and post-operatively it results in suboptimal scarring and esthetic appearance. In other cases, the challenge is posed by need for definitive fixation for injuries associated with open fractures. If definitive soft tissue cover and skin closure is required such as when an open fracture is accompanied by extensive degloving, the standard designs of single donor site fasciocutaneous free flaps may not adequately cover the defect in its entirety.

An available solution to consider when faced with such defects is raising a single large flap with two or more pedicles. The advantages of this include a single donor site that can be closed primarily, the ability to utilize healthy vessels outside the zone of trauma/injury for microvascular anastomosis and single stage reconstruction. In addition, from a logistical perspective, single flap harvest would theoretically

be more efficient and less resource intensive than harvesting two separate flaps artificially conjoined or performing skin grafts on large areas.

There are three available donor sites that provide such length for fasciocutaneous flaps reported in recent literature. Those are the lateral thoracic, lower abdomen/groin, and lateral thigh regions. A summary of those sites including pedicles, dimensions and case examples is presented in Table 1 and illustrated in Figure 1. The angiosomes for the aforementioned donor sites intersect in an axial fashion and enable single skin paddle flap harvest based on the respective pedicles on multiple perforators maximizing perfusion patterns<sup>3,4</sup>. Yoshimatsu et al. demonstrate the longest fasciocutaneous free flap in recent literature whereby the flap was based on both deep inferior epigastric artery perforators and a single superficial circumflex iliac artery spanning 72 cm in length<sup>3</sup>. Karakawa et al. demonstrated the versatility of the lateral thoracic area as a donor site in reconstructing large defects after sarcoma resection by incorporating based on latissimus dorsi and scapular flap perforator skin paddles, which is split into triple chimeric lobes for gigantic defects. The skin paddle designs were

modified to allow primary closure of the donor site and provide adequate cover to the surgical defect without the need for skin grafts<sup>5</sup>. These options provide adequate cover for any extensive traumatic lower limb defect spanning from thigh to distal foot. The donor sites possess sufficient skin laxity that enables primary closure averting skin grafting and the flap design may reduce the risks and complications from long vein graft harvesting, as two or more suitable recipient vessels may accommodate total flap perfusion from the most proximal aspect of the defect and away from the zone of trauma.

Performing multi-pedicled long fasciocutaneous free flaps is a technically demanding microsurgical procedure as presented in recent literature. It poses several challenges, however offers reliable combinations based on multiple pedicles which can be incorporated to maximize flap dimensions, particularly length (>40 cm), in complex lower limb defect reconstruction whilst minimizing donor site morbidity and logistical considerations.

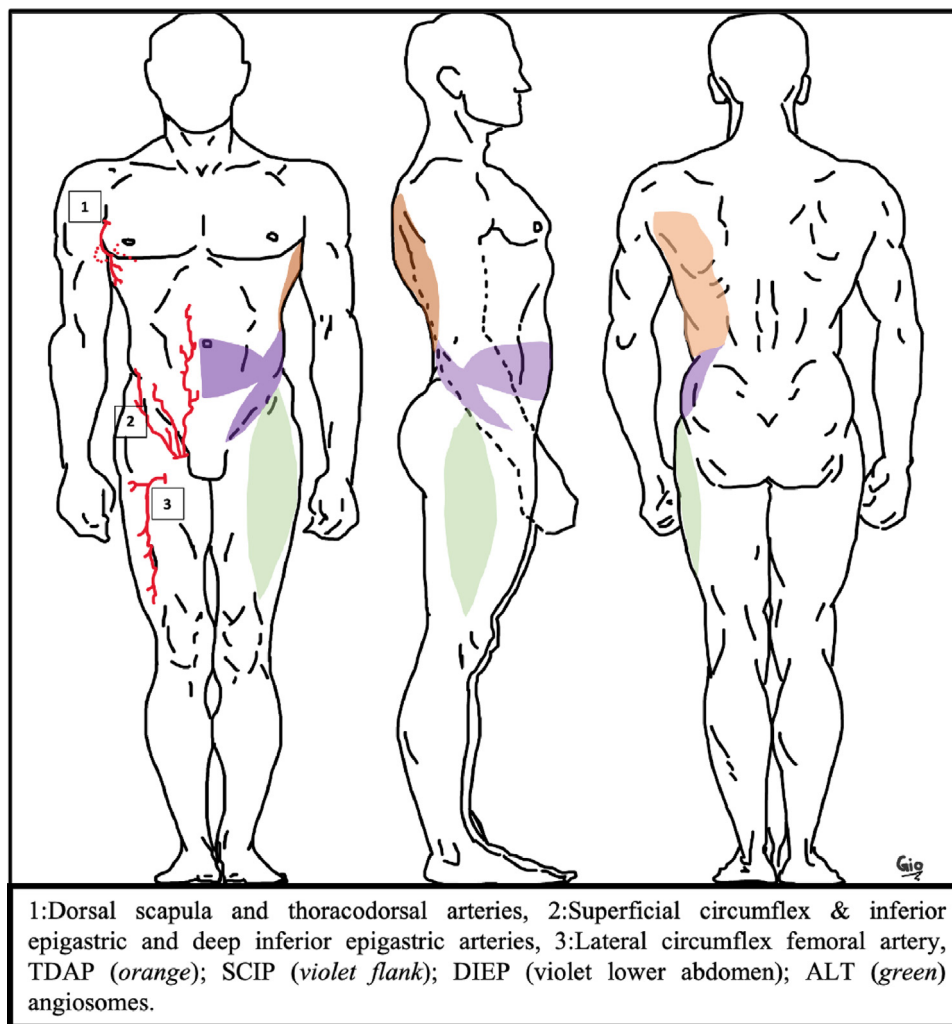


Fig. 1 Illustration of Donor sites designated for harvesting multi-pedicled long fasciocutaneous flaps and their pedicles/angiosomes.

**Table 1** Multi-pedicled long fasciocutaneous flaps donor sites.

Author (Year)	Study Type	Number of Cases	Flap Pedicles	Total Flap Length (L)	Defect Characteristics	Complications (Flap/Donor)
Song D et al. (2021) *	Case Report	1	TDAP + SCIP flap	L = 44cm	Trauma of lower limb	Mid-flap (10%) venous congestion which resolved without intervention
Karakawa et al. (2020)	Case Series	6	TDAP + DSAP flap	L > 40 cm Multi-lobed skin paddles	Free Flaps for lower limb reconstruction (3) and pedicle flaps for locoregional reconstruction (3)	Partial skin necrosis TDAP flap angiosome (Managed conservatively)
Kim et al. (2019)	Case Series	16	TDAP + ALT flap (n = 13) TDAP + DIEP flap (n = 3) (Anastomoses to multiple recipients)	L = 41 cm (Max = 58 cm)	Degloving (n = 5) Crush (n = 1) BKA Defect (n = 1) Defects in leg/ankle/foot (n = 9)	Partial ALT flap loss treated with SSG (n = 3)
Yoshimatsu et al. (2017)	Case Report	1	Bilateral (DIEP) + Left SCIP flap (required intra-flap anastomoses)	L = 72cm	Trauma - Right Open Tibia and Fibula Fractures with Skin/Soft Tissue Loss (20cmx25cm)	None

TDAP; Thoracodorsal artery perforator flap, SCIP; Superficial Circumflex Iliac Perforator flap, DIEAP; Deep inferior epigastric perforator flap, BKA; Below knee amputation, ALT; Anteriolateral thigh flap, DSAP; dorsal scapula artery perforator flap, SSG; Split skin graft,.

\* Case Report in Chinese Language - Chinese Journal of Reparative and Reconstructive Surgery, 2021, 35(3): 399-400. doi: 10.7507/1002-1892.202010.

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## Ethical approval

Not required

## Declaration of Competing Interest

None declared.

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## Reconstruction of midline abdominal defects with a deep inferior epigastric artery keystone-type perforator flap

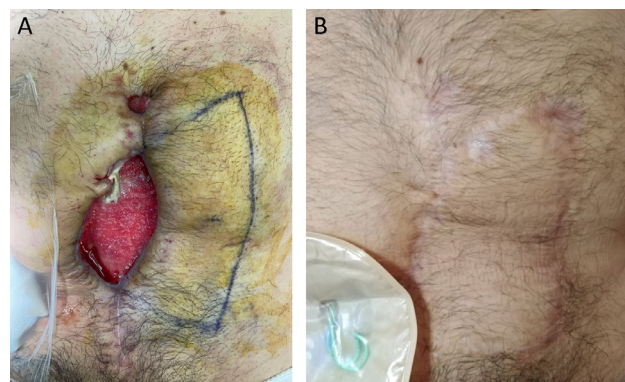


Dear sir,

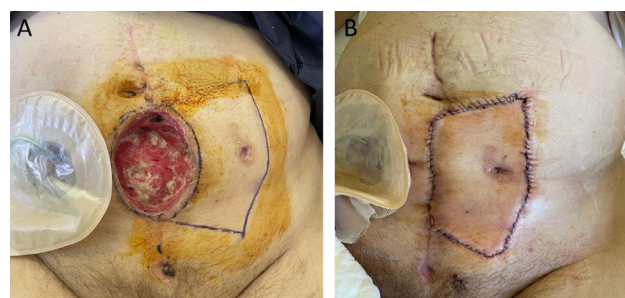
The knowledge of vascular territories enables the use of perforator flaps. Behan et al. described the keystone perforator island flap (KPIF) as an advancement flap, based on multiple fasciocutaneous and musculocutaneous perforators.<sup>1</sup> Several articles have shown its safety, reliability and flexibility in the management of various defects.<sup>2,3</sup> Aim of this article is to present a novel KPIF technique, based on perforators of the deep inferior epigastric artery (DIEA), which is extremely advantageous to the management of sizable midline abdominal defects.

An observational proof of concept study, conformed to the ethical guidelines and adhered to the STROBE statement for cohort studies, was conducted between July 2020 and July 2021. The patients were consecutively enrolled by one surgeon (K.S.) if reconstruction of midline abdominal soft tissue defects was required. Patients unable to undergo an operation due to medical illness or with open abdomen were excluded. If the defect was infected serial debridement was performed along with the administration of intravenous antibiotics based on culture results before the definitive surgical procedure. A prospectively maintained clinic database was used to collect demographics, clinical and surgical parameters of the study population. Outcomes of interest included the total operation time, immediate and delayed complications, total length of stay and patient satisfaction, measured by a 10-point visual analogue scale, evaluated three months postoperatively.

The procedure was performed in four male patients under local anesthesia administered by the surgeon. Following defect measurements, a keystone flap was designed, based on the perforators of the deep inferior epigastric artery (K-DIEP flap). A handheld doppler could locate the medial and



**Fig. 1** Patient with a 5.5 × 10 cm postoperative midline abdominal defect. A. Preoperatively. B. Postoperative outcome at 9 months.

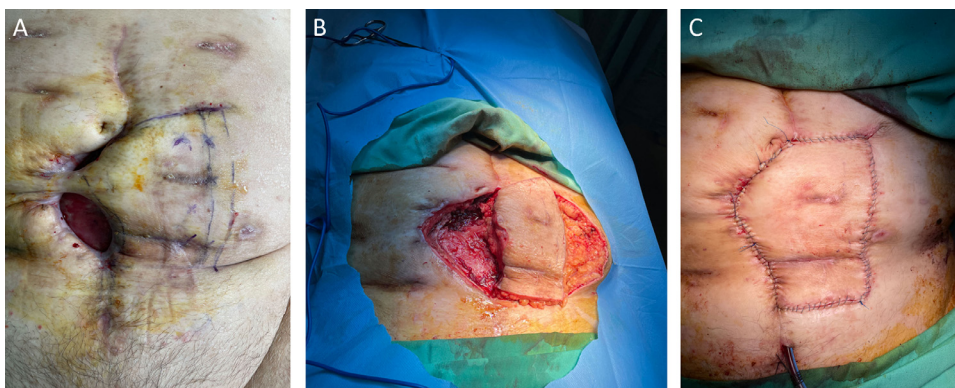


**Fig. 2** Patient with a 6.5 × 11 cm postoperative midline abdominal defect. A. Design. B. Postoperative outcome at 1 week.

lateral row of DIEA perforators, facilitating the planning. A unilateral type I keystone flap was marked on the left side of the abdomen because a cutaneous ureterostomy was often located on the right hemiabdomen. The typical principles of keystone flap were followed, adjusting the diameter of the flap 1-cm longer than the original defect, considering the defect enlargement due to wound debridement (Fig. 1). The flap was incised, and dissection was performed with electrocautery up to the rectus fascia. Then a 1-cm undermining of the medial flap side above the rectus fascia, adjacent to the defect, was performed to facilitate flap advancement. No further dissection or fascia incision was required. Closure was completed in layers, firstly securing the flap centrally, by placing 2-0 absorbable sutures to the Scarpa's fascia, also incorporating the deep fascia. Closure then proceeded from lateral to medial in layers. Each patient was discharged once a drain, placed in the suprapubic area, was removed.

The demographic, clinical and surgical characteristics of study participants are presented in Table 1 (Suppl. Material). The operation was performed successfully under local anesthesia in each case, with complete defect reconstruction without any further intervention required. Total operation time was  $72 \pm 11$  min. No postoperative complications were noted. Mean hospital stay was two days (range 1-3 days). High satisfaction rate (9.8) and reasonable esthetic outcomes were achieved (Fig. 1, Suppl. Material Fig. 2-3).

Traditionally, abdominal wound defects were treated using pedicled muscle flaps with skin grafts. Possible options



**Fig. 3** Patient with a 5 × 12 cm postoperative midline abdominal defect. A. Design B. Intraoperatively C. Immediate postoperative result.

include the rectus abdominis, rectus femoris, tensor fasciae latae, and gracilis muscle.<sup>4</sup> These flaps or the latissimus dorsi, can also be considered for a free tissue transfer.<sup>4</sup> Fasciocutaneous flaps like the anterolateral thigh, superficial circumflex iliac perforator and the DIEP flap constitute more modern alternatives.

Locoregional reconstruction demonstrates valuable benefits, namely a single donor area and the replacement with tissue of similar texture and color for optimal esthetic results. Keystone flap has proved its efficacy in the management of defects on various anatomic locations, with low rate of Clavien-Dindo grade 3 complications.<sup>5</sup> Based on multiple perforators arising from the DIEA, the K-DIEP flap has robust blood supply. This attribute, along with adequate surgical debridement, ensured complete healing in inflamed wound beds and may play a crucial role in other hostile wound environments like irradiated tissue or degloving injuries.<sup>5</sup> Flap harvest is also straightforward, quickly accomplished, without primary vessel identification or microsurgical skeletonization maneuvers.<sup>2</sup> Consequently, short operating times were witnessed, whereas the shallow learning curve enables its use from less experienced surgeons.<sup>5</sup>

Differing from the other flaps applied in abdominal reconstruction, the K-DIEP flap stands out as an operation that can be performed under local anesthesia. Consequently, it's ideal for sparing patients with various comorbidities of extra physical stress and potential complications from prolonged surgery, obviating also the need for complex postoperative monitoring.<sup>5</sup> The reduced postoperative pain contributed to swift rehabilitation and short length of stay.

Despite the small sample size, this proof-of-concept study described a novel keystone technique and indication and managed to demonstrate reliable, safe and repetitive outcomes in consecutively enrolled cases of sizable midline abdominal defects. Entailing multiple advantages, it should be regarded as one of the main options, exploited by the modern plastic surgeon.

## Funding

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## Declaration of Competing Interest statement

The study protocol was approved by the local ethical committee

## Acknowledgements

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## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:[10.1016/j.bjps.2021.11.103](https://doi.org/10.1016/j.bjps.2021.11.103).

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## Transferring three-dimensional mirror image into two-dimensional template for nasal reconstruction



Dear Sir,

Nasal reconstruction with forehead flap is based on subunit principle,<sup>1</sup> using a foil template to mirror the ipsilateral subunit to convert the three-dimensional structure into a two-dimensional template.<sup>2</sup> With the development of 3D technology, we can establish a precise simulation model preoperatively and improve the correctness and accuracy to achieve a better esthetical outcome. However, before we try to apply the flattening 3D method in daily practice, we compare the area of foil template the that of the flattening 3D method in a normal population. This study proposes to flatten the 3D scanning image directly into a 2D template to preoperatively design the forehead flap and compared the results to those of the foil template.

From July 2018 to June 2019, 3 males and 7 females, without any rhinoplasty or nasal deformity were involved in this study to analysis the left side alar subunit in both a whole face 3D scanning and the traditional manual method to obtain the left side alar template.

For the Foil template, we marked the left side alar subunit and transferred the ink marking onto a foil template. For the 3D scanning image, the technician performed a 3D scanner (3D scan, Artex Space Spider) to obtain a high resolutions 3D image at the Chang Gung Medical Augmented Reality Research and Development center, and flattened it into a 2D image(Unfold3D® Polygonal Design, ver9). The length, width, and area obtained by both methods were measured using AutoCAD 2019, and analysis in SPSS.

All 3D images were smaller than those of the hand-made foil templates, especially at the nostril edge and alar base. The difference in the area between two methods was 0.8-14.65%. The maximum difference was 14.65%, which is

equal to 0.35 cm<sup>2</sup>. The minimum difference was 0.8%, which is equal to 0.01 cm<sup>2</sup>. For male volunteers, the difference was between 8.36% ± 3.23%(0.35 ± 0.11 cm<sup>2</sup>), and for females, this difference was 6.45% ± 4.47%(0.19 ± 0.12 cm<sup>2</sup>). The mean percentage of difference in the area was 7.04% ± 4.06% (0.24 ± 0.13 cm<sup>2</sup>).

The nasal aesthetic subunit principle is one of nine distinct territories of the nose that should be replaced in full if there is a defect. The forehead flap has become the gold standard for nasal reconstruction,<sup>2</sup> which provides a robust pedicle and a large amount of tissue to reconstruct almost any defect. One of the difficulties of nasal reconstruction with a forehead flap is flap design.<sup>3</sup> Hand-made foil template for a flap design is high accessibility, easy to adjustment, and a lower cost.

Development of 3D technology has had a profound influence on the daily practice. Yen et al. used a 3D printing model as a contour and framework guide, which is reusable and minimize the potential for human error.<sup>5</sup> The author can design the resection margin following the aesthetic subunit concepts, and directly flattening it into a 2D template for flap designs. The feasibility, predictability, and aesthetic consequences of technical refinements are the advantage of 3D scan-assisted nasal reconstruction.

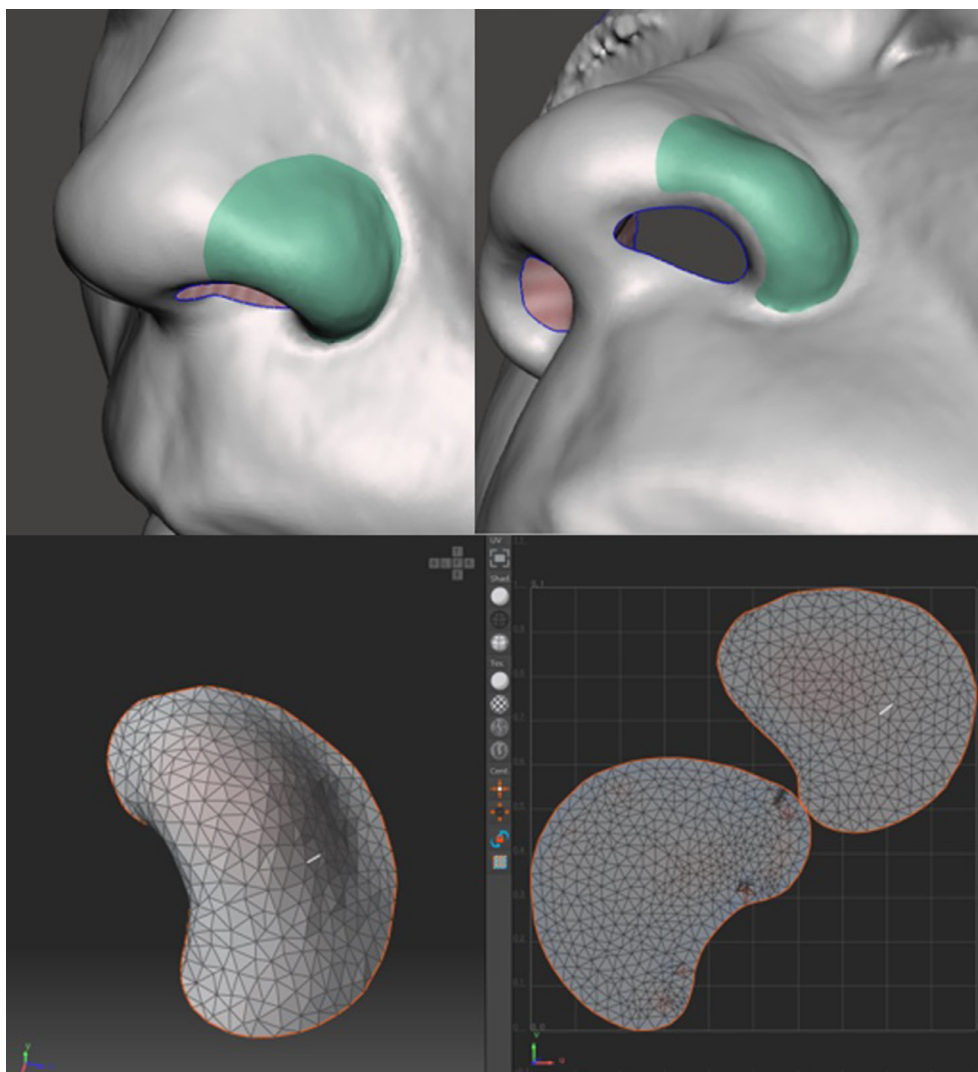
Because the 3D scanner only can screen the surface of soft tissue, the major limitation may be the aligning. The other disadvantage is the reference point of subunits. Without definite anatomical landmark, the areas of greatest difference in the selected subunit between the two methods were at the junctions and edge, such as the nostril edge.

Tissue swelling and flap contracture are other issues for nasal reconstruction. In our experience, a 2-mm difference in the resection margin is enough for secondary and revision surgeries. However, preoperative 3D scanning requires further adjustment for revision.<sup>4</sup> With an average of 7.04% difference between the areas, the flattening 3D method is close to that of the hand-made foil template. The novel flattening 3D method can provide a more customized, feasible approach for nasal reconstruction. Therefore, for the flattening 3D template to be used in daily practice, additional studies should focus on establishing the 3D scanning model at each stage, and soft tissue deformation factor could be employed to accurately determine the size of the flap. In the future, we can apply the 3D scanning to more complex

**Table 1** Results of flattened3D template and the traditional foil template.

No	3D scan image			Traditional Foil template			Difference in area	%
	Length (mm)	diameter (mm)	area (cm2)	Length (mm)	diameter (mm)	area (cm2)		
1	22.40	26.10	4.115	21.80	27.90	4.327	0.212	4.90%
2	20.30	23.80	3.384	19.40	28.40	3.815	0.431	11.30%
3	17.60	19.50	2.679	19.40	21.90	2.816	0.137	4.87%
4	16.90	18.20	2.361	16.10	19.70	2.380	0.019	0.80%
5	19.60	21.70	3.296	20.20	23.50	3.640	0.344	9.45%
6	15.20	18.50	2.149	16.10	21.50	2.518	0.369	14.65%
7	21.40	26.20	4.030	22.10	28.40	4.423	0.393	8.89%
8	17.50	21.80	2.893	15.70	27.00	2.996	0.103	3.44%
9	19.20	23.30	3.331	19.30	26.90	3.547	0.216	6.09%
10	1.93	21.40	3.076	18.90	24.30	3.268	0.192	5.88%





**Figure 1** Above, the 3D scanning image of total nose; Below, The flattening 3D into 2D image using Unfold3D® Polygonal Design, ver9.

nasal reconstructions or even to the total nose reconstruction (Figure 1 and Table 1).

### Funding

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### Ethical approval

N/A.

### Declaration of Competing Interest

N/A.

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## The impact of a See and Treat Clinic on skin cancer treatment time



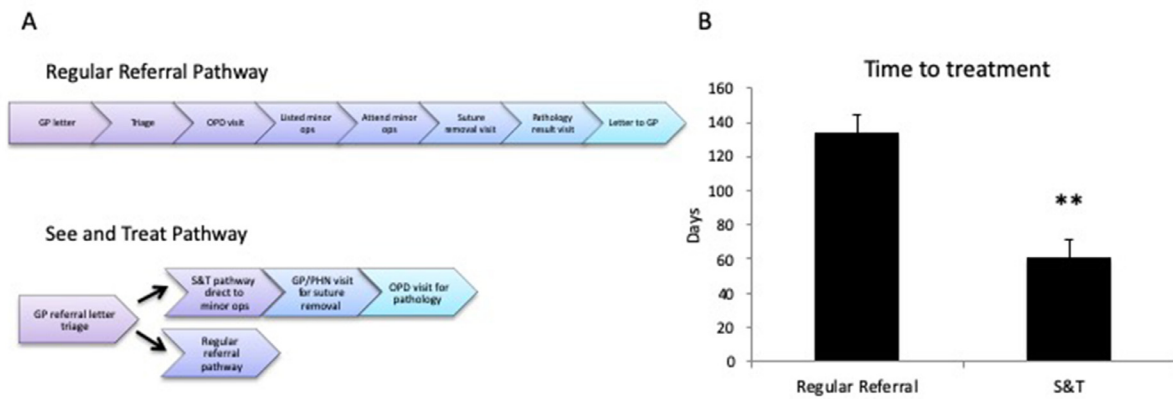
Dear Sir,

A major objective of the public hospital system is to provide efficient, reliable and accessible outpatient services to patients. While these goals seem achievable, major public hospitals struggle under the increasing numbers of patient referrals and the lack of resources to increase capacity. Surgical referrals, in particular Plastic Surgery referrals, are at an all time high, with patients waiting months or years for outpatient appointments. The August 2021 report from the National Treatment Purchase Fund (NTPF) placed the number of patients on Plastic Surgery outpatients waitlists at 17,406.<sup>1</sup> The ever-expanding waiting lists for outpatient services in public hospitals are not being met with comparable increases in capacity or availability of resources. Whether enhanced by economic fluctuations in healthcare funding or indeed the repercussions of a global pandemic such as COVID, Ireland's health service requires simple and effective measures to combat congested waitlists.

The COVID era of medicine is ongoing and has highlighted areas of deprivation in our medical system whether that be shortages of resources (personal protective equipment), healthcare staff burnout or simply an imbalanced ratio of supply and demand within the health sector.<sup>2</sup> A major knock-on effect of an overburdened health system in this time of national crisis is cessation of outpatient clinics and suspension of outpatient procedures and elective treatments. For patients with many time sensitive disorders, including skin cancers, this anxious waiting period may prove disastrous.

Skin cancer is an ongoing area of healthcare concern in Ireland, with increasing numbers of patient referrals for excision of malignant lesions.<sup>3</sup> Time to treatment is a risk factor for increased morbidity and mortality in such cases. With many skin cancers amenable to excision under local anaesthetic, this provides the ideal platform to provide a fast and effective service, potentially through a See and Treat Skin Cancer Clinic. See and Treat clinics aim to improve patient flow, and care pathways have been implemented across a range of surgical specialities to improve patient wait times and department burdens.<sup>4,5</sup> Under the See and Treat model (Figure 1A) patients are referred directly to a surgical day unit where they are assessed by the consultant and if required, undergo a minor surgical procedure under local anaesthetic at the same visit. Comparatively the "Regular Referral Pathway" involves several steps, namely referral to a consultant, referrals triaged according to urgency, and attendance at outpatient clinics for review before being put on a waiting list for surgery, if needed (Figure 1A).

We executed a prospective observational study of a See and Treat Skin Cancer Clinic for day case procedures at the Mater Misericordiae University Hospital, Dublin. The primary outcome was time from referral to surgery. The secondary outcomes included histological analysis, rates of complete excision of lesions, financial analysis and patient satisfaction. Prospective data was collected from the period May 2017 to November 2019. We analysed data from 100 See and Treat patients and 100 Regular Referral patients based on our study outcomes. We identified the mean time from referral to date of surgery was 134 days in the Regular Referral cohort, compared to 61 days in the See and Treat cohort. This is a statistically significant reduction of 73 days for time to treatment ( $P < 0.05$  Independent T-test) (Figure 1B). Comparable rates of histological malignancies were identified, with BCC's accounting for approximately 64% of malignant lesions removed during both Regular Referral and See and Treat clinics. Squamous Cell Carcinoma represented approximately 32% of all malignancies excised, while Malignant Melanoma/Lentigo Maligna was excised in 4% of cases. Complete excision of malignant lesions was identified in 95% of the See and Treat cohort. Comparable rates of complete excision were identified in the Regular Referral cohort (93%,  $P = 0.358$  Chi Squared). Plastic Surgery OPD clinic costing was estimated to be €115 per patient appointment and given that the See and Treat pathway cuts out at least one OPD attendance per patient, we estimate that the 100 patient See and Treat cohort in this study provided healthcare spending savings of €11,500 (Table 1). A patient satisfaction questionnaire highlighted that overall the See and Treat service was highly acceptable to patients



**Figure 1** A. Patient referral pathways for skin cancer treatment. B. Analysis of time from referral to surgical treatment (Days).

**Table 1** Analysis of cost saving for the skin cancer See & Treat clinic per year at Mater Misericordiae University Hospital.

Outpatient Clinic Type	Patients attending/year	Average clinic visits prior to surgery	Outpatient Clinic cost per patient (Euro)	Outpatient clinic costs saved/year (Euro)	Consultation time saved/visit (minutes)
Regular Referral	4600	2	115	N/A	N/A
See & Treat	1100	1	115	126,500	17.5

and all patients reported being very satisfied with the treatment received at the See and Treat Skin Cancer Clinic.

With surgical referrals at an all time high and waitlists for minor procedures growing ever longer, a smart, safe and satisfactory service for minor procedures is required. Herein we have shown that a See and Treat Skin Cancer Clinic is an obvious solution to tackle healthcare burden and extended wait times. The changing landscape of healthcare post-COVID, coupled with the already increasing patient referrals to surgical outpatient appointments, highlights the need for innovative clinics and treatments for the most common surgical procedures. The See and Treat clinic model for skin cancers reduces the time between referral and surgical excision without compromising surgical precision and rates of complete excision. Our analysis highlights the potential savings for implementing the service in plastic surgery clinics and was shown to be very well received by patients.

Ethical Approval: Mater Misericordiae Hospital Research Ethics Committee.

## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:[10.1016/j.bjps.2021.11.038](https://doi.org/10.1016/j.bjps.2021.11.038).

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## A retrospective analysis of rates of allergic reaction to Patent V blue dye used in sentinel lymph node biopsies for melanoma<sup>☆</sup>



Dear Sir,

Sentinel lymph node biopsies are a well-established component of the assessment and treatment pathway for patients with cutaneous melanoma in the UK. Triple localisation techniques involve the use of blue dye which has an established risk of inducing allergic reactions in patients. Such reactions can be life-threatening and are an important risk to highlight to patients as part of the informed consent process.

Estimates of the rates of allergic reactions occurring vary widely in the literature, ranging from between 0.07 to 2.7%<sup>1</sup>. This range is in some part attributable to data from the variety of blue dyes that are available and used for this purpose<sup>2</sup>, but also due to the varied administration volumes, techniques and their use in a number of distinct pathologies.

In 2018 the NAP6 report<sup>3</sup>, led by the National Institute of Academic Anaesthesia, published the results of a large prospective study looking at agents linked to perioperative anaphylaxis. Blue dyes were identified as the fourth most common cause, with an incidence of anaphylaxis of 14.6/100,000 administrations.

A previous study focusing on sentinel node surgery in breast cancer patients estimated the overall rate of allergic reaction to be 0.56% with 0.06% of patients developing anaphylaxis<sup>4</sup>. A recent systematic review of sentinel node procedures, including those performed in melanoma patients, estimated the rate of anaphylaxis to be as low as 0.0043%<sup>5</sup>.

We reviewed the rates of allergic reaction in patients who had undergone sentinel lymph node biopsy for melanoma at our centre in Cambridge. Between October 2014 and January 2021, 715 patients received blue dye as part of a sentinel node procedure for melanoma. This population was comprised of 359 males and 356 females with an average age of 59. Patent V blue dye was used in every case with injected volume ranging from 0.1 to 1.2mls.

From this cohort, six allergic reactions were documented, giving an overall reaction rate of 0.84%. Of these reactions, one was anaphylaxis requiring immediate treatment with adrenaline, hydrocortisone and chlorphenamine, the others were localised reactions at the site of injection. None of these patients had a previously documented history of perioperative anaphylaxis. All reactions resolved with treatment, with no long term effects and all sentinel node procedures were successfully completed.

The incidence of anaphylaxis in this cohort was 0.14%, almost 10x that reported by NAP6 and significantly higher than previously reported estimates. Our overall reaction rate is broadly similar to that quoted in previous studies. These results highlight the importance that both surgeons and patients are aware of the significant risks of using blue dye.

We propose several reasons why our results differ from previous estimates. This study has focused only on patients undergoing a sentinel node procedure for melanoma, others have focused on such procedures performed on patients with breast cancer and some have combined the two. The administration technique, volume and anatomical distribution of disease all differ significantly from melanoma, possibly influencing rates and severity of allergic reactions.

### Funding

N/A.

### Ethical approval

N/A.

### Declaration of Competing Interest

None.

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## Fellowship review: Training interface group (TIG) fellowship in mohs surgery



Dear Sir,

Mohs surgery in the United Kingdom has traditionally been performed by dermatologists and as such training and exposure for surgeons has been limited. To address this, a 6-month fellowship in Mohs micrographic surgery has been established for surgical trainees as part of the Training Interface Group (TIG) fellowship programme. This review describes the experience of the first two TIG fellows at the Mersey Supraregional Centre for Mohs surgery.

### Working environment

The Mersey Supraregional Centre for Mohs surgery was established in 2013 and currently has five consultant Mohs plastic surgeons. The service runs from a self-contained purpose-built unit consisting of a day ward, two theatres, a laboratory and a dressing clinic based at St Helens Hospital. The unit has a catchment area of over 4 million people, receiving referrals from areas including Merseyside, Cheshire,

Lancashire, Cumbria and North Wales<sup>1</sup>. It has forged strong inter-disciplinary links and receives referrals from plastic surgery, dermatology, maxillofacial, otolaryngological and ophthalmology services. The regional plastic surgery unit is based at Whiston hospital as part of STHK NHS Trust and hosts one of the UK's largest skin cancer services.

### Fellowship

The fellowship is competency based with the fellow expected to achieve independence in the Mohs surgical technique, decision making skills, processing of specimens, mapping and interpretation of histological slides. The fellowship is open for applications from plastics, maxillofacial and otolaryngological trainees with prior experience of skin cancer excision and reconstruction.

During the 6-month fellowship the fellow gained experience in over 300 Mohs cases, progressing to running their own lists with supervisor unscrubbed. All slides are dual read by the operating Mohs surgeon and consultant histopathologist, a practice found to be particularly advantageous from a training point of view. The side-by-side dual view microscope, with additional viewing screen, enables real-time training as initially the fellow can observe key structures or have pathology pointed out with ample opportunity for questions and one-to-one tuition. With more experience, the fellow reviews the slides first and tests their ability to identify pathology with senior supervision giving immediate feedback. The majority of cases were basal and squamous cell carcinomas, however other rarer pathologies such as microcystic adnexal carcinoma and dermatofibrosarcoma protuberans were also encountered.

The primary aim of the fellowship is competence in the Mohs technique, however the main attraction of the fellowship is exposure to complex reconstructions, especially following resections within the periocular region. Both fellows were able to undertake flap reconstruction of upper and lower eyelid defects utilising Tenzel, Mustarde and Hughes flaps, as well as less common reconstructions such as lateral orbital orbicularis propellar (LOOP) flaps and Scuderi flaps. Reconstruction of complex nasal and auricular defects are also common with a variety of flap techniques performed. Mohs surgery under general anaesthetic is also taught, allowing the fellow to learn the logistics required, including subsequent reconstructions which may involve free tissue transfer.

The fellowship is structured such that the trainee can tailor it in order to meet other aspirations. The first fellow (PG) chose to gain hands-on experience in laser CO2/PDT for the treatment of BCCs, whilst the second fellow (OB) chose to gain further experience in melanoma management including sentinel lymph node biopsy and dissections. Research is strongly encouraged and supported within the department. One day a week is given towards private study and a study leave budget is available to attend relevant meetings and/or training courses [Table 1](#).



**Table 1** Fellowship at a Glance.

Fellowship Title	Mohs Microsurgery Fellowship
Fellowship Chair	Hamid Tehrani
Location	St Helens and Whiston Hospitals, Norfolk & Norwich University Hospital
Accommodation	Private rental accommodation nearby
Length of Fellowship	6 months
Hours	0800-1700
On Call Duty	None
Salary	c. £49,000
Requirements	FRCS or equivalent
Selection process	Online Application/Interview

## Summary

The fellowship offers excellent experience and training in Mohs micrographic surgery. Mohs surgery should not be performed by anyone without suitable competencies in the techniques and it is hoped the fellowship will empower more surgeons to acquire these skills and be able to offer Mohs services. The duration of the fellowship is appropriate for a surgical trainee to acquire the skills and knowledge to safely perform Mohs independently. One of the previous fellows was successfully appointed as a locum consultant with a special interest in Mohs surgery and periocular reconstruction.

The Mohs TIG fellowship is also available at the Norfolk & Norwich University Hospital, giving similar excellent training opportunities whilst working within a collaborative Dermatology/Plastic surgery Mohs team. The fellow is able to expand their skin management interests in a variety of areas including complex head and neck reconstruction, and develop research techniques in a highly active unit.

The TIG fellowships are currently transitioning to become post-CCT placements, and anyone interested in training in Mohs surgery should strongly consider these TIGs.

## Conflicts of Interest

None declared

## Funding

None.

## Ethical approval

Not required.

## Reference

1. STHK NHS trust website. <https://www.sthk.nhs.uk/about-us> 2021

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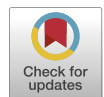
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## Characteristic non-contrast magnetic resonance lymphography findings of secondary lower extremity lymphedema

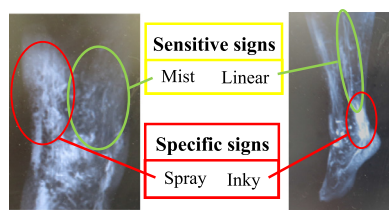


*Dear Sir*

I read the article entitled “Magnetic resonance lymphography as three-dimensional navigation for lymphaticovenular anastomosis in patients with leg lymphedema.” reported by Yasunaga, et al. (J Plast Reconstr Aesthet Surg. 2021 Jun.) with great interest.<sup>1</sup> Their study reported that magnetic resonance lymphangiography (MRL) had high sensitivity and could be a promising modality for lymphatic surgical therapies. I completely agree with the integrity of contrast MRL for preoperative image inspections. However, contrast MRL has risks of skin necrosis and infection due to subcutaneous injection of Gadolinium-based contrast agent and is not allowed in some institutions by ethics committees because of the risks.<sup>2-4</sup> Since lymphedematous limbs are at a high risk of cellulitis or lymphangitis, skin troubles should be avoided as possible. On the other hand, three-dimensional non-contrast MRL (NMRL) has no risk of skin troubles following contrast agent injection and can be another integral tool for evaluation of fluid and fat distribution in lymphedematous limbs. A major limitation of NMRL is a lack of evidence that characteristic findings are yet to be clarified according to pathophysiological conditions of lymph circulation. As considered with the highest sensitivity and specificity to detect abnormal lymph flows among various lymph flow imag-

ing studies, indocyanine green lymphography (ICG-L) seems an ideal control to depict characteristic lymphedema findings on NMRL.<sup>3-5</sup> To clarify characteristic NMRL findings of secondary lower extremity lymphedema (LEL), NMRL findings were compared between affected and non-affected limbs of secondary unilateral LEL patients based on ICG lymphography findings.

Patients with secondary LEL who underwent NMRL and ICG-L between July 1, 2017, and April 1, 2020, were included. ICG-L findings were to define lymphedematous and non-lymphedematous limbs; limbs with ICG-L stage 0 were diagnosed as non-lymphedematous, and those with ICG-L stage I-V lymphedematous.<sup>4,5</sup> Patients with bilateral lymphedema or a history of lymphedema surgery were excluded. NMRL sequences were obtained on a 1.5-T Scanner. (MAGNETOM Avanto, Siemens AG, Erlangen, Germany) 3D-SPACE images of NMRL were used and the patients were placed in a supine position with their feet first. Three successive acquisitions were performed on the lower limb and foot (first station), thigh (second station), and the pelvic area (third station), with six-element phased-array coils. NMRL findings were compared between lymphedematous and non-lymphedematous limbs to clarify characteristic NMRL findings of secondary LEL. Among 35 patients who underwent NMRL and ICG-L during the study period, 8 cases were included for analysis. By comparing NMRL findings between lymphedematous and non-lymphedematous limbs, characteristic NMRL findings were identified; dust, linear, inky and spray signs (Fig. 1). Dust sign is a finding of scattered lesions with high intensity on T2 weighted images (T2WI) around the fat lobules, like dusts in the air. Spray sign is a finding of thick and cloudy lesions with high intensity on T2WI, like sprayed ink. Linear sign is a finding of linear lesions with high intensity on T2WI, like lines drawn with a pencil; frequently seen along the tibia. Inky sign is a finding of wider stripe-shaped lesions with high intensity on T2WI, like stripes painted with a paintbrush. In this cohort, severe LEL patients with ICG-L stage IV-V showed all the characteristic signs. Linear and dust signs were the most frequently seen with the prevalence of 50% and observed also in non-lymphedematous limbs. On the other hand, Inky and spray signs were seen only in lymphedematous limbs.



**Fig. 1** Characteristic NMRL findings were classified into four patterns; dust, linear, inky, and spray signs. Dust sign is a finding of scattered lesions with high intensity on T2 weighted images (T2WI) around the fat lobules, like dusts in the air. Spray sign is a finding of thick and cloudy lesions with high intensity on T2WI, like sprayed ink. Linear sign is a finding of linear lesions with high intensity on T2WI, like lines drawn with a pencil; frequently seen along the tibia. Inky sign is a finding of wider stripe-shaped lesions with high intensity on T2WI, like stripes painted with a paintbrush.

Characteristic findings of NMRL were depicted based on ICG-L findings; linear and dust signs were sensitive, and inky and spray signs were specific for lymphedema. NMRL has the advantage of no risk of radiation, allergy, or regional lymphangitis, which should be applied more commonly for lymphedema evaluation. Although further studies with larger cohorts with a control and follow-up are required to confirm the reliability of the characteristic findings, NMRL can be a useful tool for secondary LEL evaluation without risks due to contrast agent injection.

## Data availability statement

The data other than described in the manuscript are not publicly available due to privacy or ethical restrictions.

## Funding

None.

## Declaration of Competing Interest

None declared.

## Ethical approval

Not required.

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## The mounting role of ultrasound examination in lymphedema evaluation



Dear Sir,

We have read the article with great interest that was written by Akita et al.<sup>1</sup> and recently published in your journal. We thank the authors for having shown that elastography could be used as an ultrasonographic method in the evaluation of lower extremity edema. Using elastography, the authors evaluated the patients they staged according to the amount of dermal reflux in indocyanine green lymphography (at 4 points they determined). They reported that the strongest correlation was detected in the dermal layer and that dermal reflux was strongly correlated with histologically measured dermal thickness.<sup>1</sup>

Herein, we also think that it is important to find and define inexpensive, accessible, non-invasive, and painless techniques when compared with other used methods (which are invasive, painful, and requiring camera equipment) for the early detection and staging of lymphedema.<sup>2,3</sup> For this reason, we wish to call attention to the fact that lymphedema staging can be performed and dermal thickness can be measured by ultrasonography - in addition to its aforementioned various advantages. Indeed, it has already been reported that the USA can appropriately assess the presence and distribution of fluids, cellular infiltration, and fibrotic tissue in limbs with lymphedema.<sup>4</sup> Ultrasonographic evaluation of superficial tissues helps to understand the sono-histological patterns of involvement. For example, dermal edema causes the increased thickness of the dermo-epidermal complex (seen as hyper-hypo-hyperechoic layers) as well as its decreased echogenicity (Supplementary Fig. 1).<sup>5</sup> Staging of lymphedema is important because the fluid distribution pattern in the subcutaneous tissue will create resistance to various treatments. For instance, while early-stage dermal backflow - i.e., dermal edema - is more likely to respond to the complex decongestive therapy (mobilizing water molecules located in the interstitial space); in the advanced stages, fibrotic involution and tissue hardening are considered as negative prognostic factors for conservative treatment response.<sup>4,5</sup> Needless to say, ultrasound examination is a non-invasive method and provides a common language for medical professionals as well as being a powerful tool for early evaluation of the dermo-epidermal complex (for thickness and sono-histological pattern and for treatment planning, when compared with indocyanine green lymphography) .

## Declaration of Competing Interest

The authors have no conflict of interest.

## Informed consent

Informed consent was obtained from all individual participants included in the study.

## Funding

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## Ethical Approval

N/A

## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.bjps.2021.11.006](https://doi.org/10.1016/j.bjps.2021.11.006).

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## The role of plastic surgery in the immune checkpoint inhibitor era



Dear Sir,

Plastic surgeons are frequently involved in reconstructive care of oncology patients. Oncoplastic surgery, an approach that combines tumor extirpation with reconstructive principles, has been increasingly used to improve surgical and cosmetic outcomes for patients with breast cancer over the last decade. Oncoplastic techniques allow for greater volumes of tissue to be removed without sacrificing reconstructive options. Therefore, tumors can be removed with wider tumor-free margins while optimizing functional and cosmetic outcomes. As a result, there are comparable or even superior patient reported outcomes to traditional mastectomy and breast conserving therapy.<sup>1,2</sup> Although oncoplasty has become standard in breast cancer, this approach has the potential for greater utilization in the era of immune checkpoint inhibitors (ICIs).

The introduction of ICIs has revolutionized oncologic care in many malignancies with previously poor-prognoses, particularly melanoma and other skin cancers. ICIs have altered treatment paradigms for the surgical management of patients in several settings, including within plastic surgery. Herein, we will discuss this evolution in three distinct settings for patients with advanced skin cancers.

First, highly morbid surgeries for advanced primary tumors or regional lymph node metastases may be reconsidered. Prior to the advent of effective systemic therapy, surgical resection was often the only option in many settings. Recent studies have shown that approximately 50% of patients with locally advanced skin cancers (e.g., squamous, Merkel, and basal cell carcinomas) may respond to ICIs.<sup>3</sup> This may obviate the need for highly morbid resections and subsequent reconstructions. Neoadjuvant therapy allows for innovative and less morbid surgical approaches, such as oncoplasty, which can be used more frequently.

Second, the surgical management of local recurrences has evolved. ICIs may be active in this setting as well, or may be an effective adjuvant option following resection. Another intriguing advance, currently only approved in melanoma, is the injectable oncolytic virus Talimogene Laherparepvec (T-VEC). This agent is used in patients with multiple local recurrences and has produced a 64% response rate in injected melanoma metastases. T-VEC may allow for durable local control in patients who previously would have required more surgery.<sup>4</sup>

Third, and paradoxically, the activity of ICIs may facilitate more aggressive surgical approaches to metastatic disease in selected patients. Bello et al.<sup>5</sup> reported significant survival benefits of metastasectomy, with 5-year overall survival being as high as 90% in patients who respond to ICIs and 60% in patients that had isolated progressive melanoma metastases. Our experience is similar, as we have observed high rates of long-term survival following metastasectomies of isolated progression, including skin and soft tissue metastases.

The era of checkpoint inhibition has led to the expansion of several fields such as cardio-oncology. As a field based on surgical principles and techniques rather than specific organ systems, plastic surgery and oncoplastic techniques have applications beyond breast surgery. Lessons learned from oncoplastic breast surgery can be transferred to primary tumor resection of specific locally-advanced primary tumors, resection of local recurrences, and metastasectomy in the setting of immunotherapies. Plastic surgeons and multidisciplinary oncology teams should be aware of these opportunities for collaboration.

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### Ethical approval

N/A.

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## The outcomes of zone 1 flexor digitorum profundus tendon injury: A systematic review and meta-analysis



Dear Sir,

Repair of injuries to the flexor digitorum profundus (FDP) tendon, in surgically fit and compliant patients, is the current standard of care in the United Kingdom. However, achieving satisfactory outcomes is challenging and multiple methods of repair are described. Moreover, the literature on repair and rehabilitation methods are discordant.

To summarise the literature to-date and guide future research, a systematic review was performed (PROSPERO ID CRD42020172227). The methods are detailed in the supplementary materials and within our protocol registered on the PROSPERO platform.

27 articles were included (eFigure 1 and eTable 1 in supplementary materials) which described 401 digits with FDP injuries. The median number of digits in each study was 14 (IQR 4 to 22). The ring finger was most often affected (74, 62%) followed by the little, middle then index. 282 digits were not defined. 385 digits (96%) were managed operatively (Table 1). Most commonly, a mixture of methods was used to repair an injury such as tenorrhaphy with K-wiring (147 digits, 38%), followed by primary tenorrhaphy (128 digits, 33%). Post-operatively, the pooled prevalence of repair

**Table 1** The prevalence of repair techniques.

Types of Treatment	Fingers treated (N)
Non-operative	16
Primary tenorrhaphy with sutures only	128
Primary tenorrhaphy with tie-over button	40
Bone anchor (e.g. Mitek) with core suture	56
Internal fixation only (e.g. hook plate)	14
Mixture of techniques (e.g. tenorrhaphy and k-wiring)	147

failure (rupture, pull-out etc.) was 1% (95% CI: 0 to 3%; 17 studies,  $I^2$  0%, Figure 1); meta-regression did not detect a statistically significant difference between techniques. Following failure of the primary repair, the prevalence of re-repair was 0% (95% CI: 0% to 1%; 13 studies,  $I^2$  0%). In the short term, the risk of reoperation for complications was 1% (95% CI: 0% to 5%; 9 studies,  $I^2$  0%) with no significant differences between internal fixation and other types of repair (OR 1.16 [95% CI: 0.07 to 20.2],  $p = 0.905$ ).

In the long term, the prevalence of tenolysis was 0% (95% CI: 0 to 1%; 11 studies,  $I^2$  0%), When reported, arthrolysis was performed in 10% of cases (95% CI: 0% to 27%; 5 studies,  $I^2$  73%). Ultimately, the mean total active range of motion per finger was 197° (95% CI: 102° to 291°; 2 studies,  $I^2$  100%). There were insufficient data to perform a meta-analysis of the range of motion in the DIPJ.

The post-operative DASH score and time to return to work were reported inconsistently. DASH scores ranged from 0 to 13.5 ( $n = 5$  studies) and time to return to work ranged from 9 to 18 weeks ( $n = 6$ ). Post-operatively, 71% of patients returned to work within 18 weeks (95% CI: 23 to 94). Information on DASH scores and time to return to work enables the surgeon to counsel patients holistically regarding management options and should be considered in future studies.

Most digits included in the studies (96%, Table 1) were managed operatively, which reflects current practice. However, most studies reported only one operative technique and only a small minority of those reporting mixed methods disaggregated their results. It was not therefore possible to clearly elucidate the risks and benefits of each technique. Only one study reported the outcomes of non-operative management, with the outcomes being comparable to surgical treatment. Most patients were men in their third and fourth decades, with ring finger injuries. This is in accordance with previous epidemiological data and reflects greater protrusion of the ring finger in the grasping hand, which makes it susceptible to injury.<sup>1,2</sup> Despite identifying 27 relevant studies, few could be included and fewer still contributed to the meta-analyses due to incomplete data and reporting omissions. In addition, many studies neglected to report important confounders for post-operative outcome such as grade of operating surgeon and compliance with therapy.

We suggest that the lack of literature opens the field to debate about the necessity of primary repair. Further data are required to determine whether primary repair is indeed necessary, cost-effective and what benefit(s) it provides to

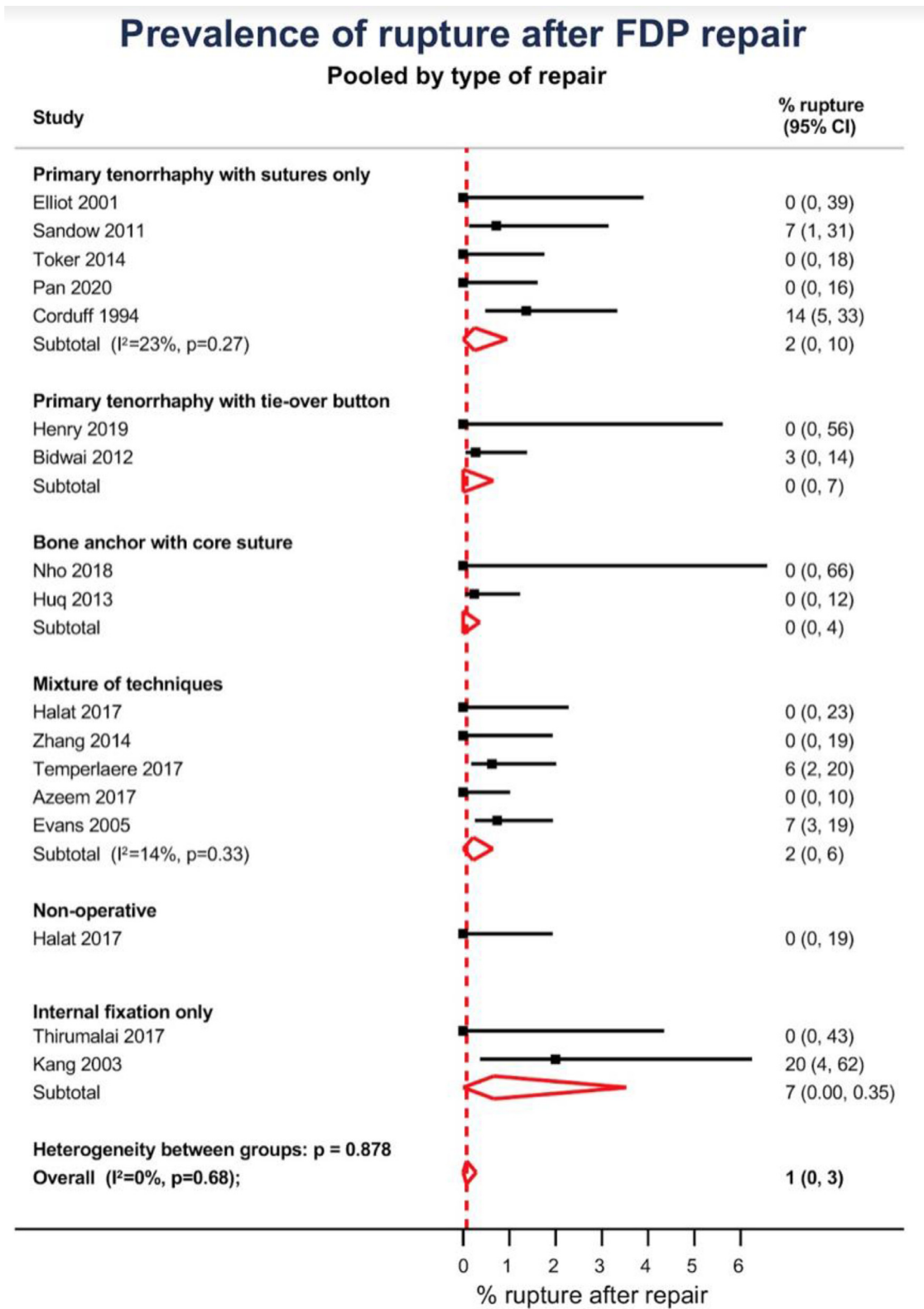


Figure 1 A forest plot showing the prevalence of rupture across studies, subgrouped by the original repair technique.

patients. These issues could be improved with increased adherence to standard reporting guidelines (e.g., STROBE or SAMPL) and peer-review by persons skilled in biostatistics, or by persons willing to cross-check manuscript content with the recommendations of such checklists. The development and uptake of a set of Core Outcome Measures for flexor tendon repair,<sup>3</sup> is currently underway and in time, this will facilitate better evidence synthesis.

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## Ethical review

Ethical review was not required as this is a review of published literature.

## Declaration of Competing Interest

There are no conflicts of interest.

## Acknowledgments

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## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:[10.1016/j.bjps.2021.11.026](https://doi.org/10.1016/j.bjps.2021.11.026).

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## Letter to the editor: Pragmatic and novel approach to E-cigarettes battery related burns



Dear Sir,

E-cigarette (vape) use has increased significantly in the last few years. One risk that has been clearly documented is that of burns arising from e-cigarette batteries [1].

We reviewed our burns database for patients who were referred to our unit with vape-related (e-cigarette) burns. Patient demographics, aetiology, management, hospital stay and follow up data was collected.

We included 17 patients from April 2016 to October 2020. 15 out of 17 patients were male. Age ranged from 11 to 56 years old. Burn surface area ranged from 0.1% to 6% with an average of 2.55%. 11 patients were assessed as having mixed depth burns, 1 patient with superficial thickness burns and 2 patients with deep dermal burns. The aetiology documented was mostly of flame burn due to battery explosion 76.47% (13 patients), two patients' burns were considered secondary to chemical burn and two patients were considered to have combined chemical and flame burns. The thigh was the most commonly injured site in this report (12

patients). However, we also reported patients with burns affecting the lower leg, buttocks, wrist, hand, knees and lower lip.

Eight patients were managed as inpatients. Seven patients underwent Bromelain-based Selective Enzymatic Debridement (NexoBrid®) debridement and allograft. They were inpatients for 1-4 days. One patient had debridement and skin split-thickness grafting. 9 patients were managed conservatively with dressings. In the latter group, only one patient was admitted for one day and had 5% mixed depth burns and the patient chose to have conservative treatment. The healing time ranged from 3 days to 56 days with a mean of 24.88 days.

The NexoBrid® enzymatic debridement (ED) group (Fig 1) had 7 patients with mixed dermal burns ranging from 1.5%–6%. The number of appointments for follow up ranged from 1 to 10 appointments with an average of 9 appointments for the ED group. NexoBrid® was applied between the day of injury to 5 days post injury (average 2.3 days). On follow up, one patient, who had ED, developed cysts secondary to epithelialisation over allograft. Only one ED patient required split-thickness skin grafting (SSG) 47 days later

In comparison, patients with mixed dermal burns in the conservative management group had a burn surface area ranging from 0.2% to 5% with a maximum follow up of 24 days and a minimum of 10 days with an average of 14.33 days. It is worth noting that none of these patients had comorbidities that may have affected their healing.

Our current protocol for ED includes patients having a chlorhexidine-soaked dressing a day prior to applying the enzyme. The following day patients undergo ED under local anaesthesia or regional anaesthesia as a ward base procedure. NexoBrid® is removed 4 h later. The following day allograft skin are applied to the wound.

The potential combination of flame and chemical burn injury has led to a dilemma in the first aid management of such burns as water irrigation for flame burn injury may exacerbate the chemical injury because of the presence of lithium. In such a circumstance it has been suggested that physical/surgical debridement may be more appropriate though others recommend the use of Diphoterine® or Mineral oil in this kind of chemical burn [2-4]. However, access to either of these is limited and physical removal of any battery contents may be the only thing possible in the early post burn period. Our approach is more pragmatic.

We would advise physical removal of any battery contents as a matter of urgency followed by copious irrigation with water as this is likely to address the main type of injury. There is little value in pH assessment as it does not alter management.

Our series also highlights a different approach to the management of these burns. Traditionally they have been treated by early skin grafting or a conservative approach with the option of delayed skin grafting. More recently ED has been introduced to help reduce the need for skin grafting or reduce the area skin grafted for burns in general. Our experience of vape battery injuries shows that it is possible to successfully treat these burns with ED. This approach is especially useful in mixed depth burns and indeed our broader experience shows that areas diagnosed by clinicians as full thickness still have viable dermis after such treatment. Our series is the largest cohort of ED treated patients for this type of injury reported in the literature.

As the numbers of e-cigarette users increases it is important to not only be aware of the potential injuries that can occur but their optimum management. We feel that ED has an important part to play in the management of these burn wounds and it is our primary approach for such burns that are deeper.

## Declaration of Competing Interest

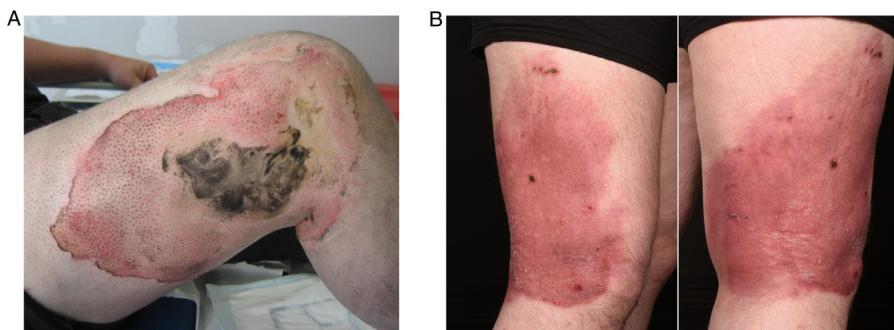
Ahmed Hagiga, Mohamed Shalabi and Balijt Dheansa declare that they have no conflict of interest.

## Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

## Patients consent

Patients signed informed consent regarding publishing their data and photographs.



**Figure 1** Flame Burn for patient who had NexoBrid.  
(Figure1A: Before applying NexoBrid. Figure1B: 2 months follow up after applying NexoBrid).



## Ethical approval

None.

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## A brief report on the landscape of facial reconstruction for domestic violence survivors in the wake of the COVID-19 pandemic



Dear Sir,

### Introduction

Nearly all domestic violence (DV)-related injuries are maxillofacial injuries, including fractures and facial lacerations<sup>1</sup>.

These injuries are primarily zygomatic, mandibular, orbital floor, and nasal fractures.<sup>1</sup> Consequently, surgeons who perform facial reconstruction after trauma are often involved in the care and repair of these injuries.<sup>2</sup>

The national average of reported DV increased by 8.1% throughout the United States during the Stay At Home (SAH) mandate between March and May of 2020.<sup>3</sup> Since the end of SAH orders, hospitals have seen a concerning trend of 33-36.1% increases in maxillofacial injuries related to intimate partner violence (IPV)<sup>4,5</sup>. In a recent study, Gosangi et al. found that radiologists in Boston diagnosed patients with more severe DV-related injuries in 2020 than years prior. Additionally, the incidence of high-risk abuse was two times greater in 2020 than in previous years<sup>6</sup>.

Programs like Face to Face (FTF) serve to match surgeons who have the training and interest to manage DV-related facial injuries with victims in need of these services. While some patients present to an emergency department or doctor's office upon initial injury, many DV survivors suffer years of repetitive injury without seeking medical attention. Although these victims have lacerations or fractures that heal without intervention, they often do not heal properly and cause deformity. FTF provides secondary care in the form of pro-bono facial reconstructive surgery to survivors of DV who remain with cosmetic or functional deformities years after their primary incident.

With the assistance of FTF, our study accessed national data to provide an assessment of facial reconstructive surgery utilization shortly before and during the pandemic. The aim of this study was to investigate the trends in survivor presentations to the FTF program so that surgeons may better understand and prepare for the care of this vulnerable population.

### Methods

We retrospectively reviewed records of 102 applicants to the FTF DV Program, stored in an anonymized/de-identified database. The study included applicants between January 2017-May 2021. Records that had documentation dating errors were excluded. This project was approved by the New York Medical College IRB with an exemption waiver.

### Results

Before the pandemic, FTF received 87 applications for DV-related reconstruction needs between 2017 and 2019, with an average of 29 cases/year. This number decreased to 12 applications during 2020 and 4 applications thus far in 2021. Between 2017 and April 2021, 114 DV-related injuries were evaluated: scarring (43%), nasal fractures (39%), ear trauma (6%), mandibular fractures (4%), orbital fractures (4%), and zygomatic fractures (4%). Before the pandemic, the average time between first injury and application to FTF was 9.26 years.

### Discussion

The intention of this communication is to identify the timeline of DV presentations prior to the pandemic to propose

a timeline for patients who sustained DV-related injuries during the pandemic. As with other aspects of healthcare that saw decreases in utilization during COVID, the authors pose concerns that despite the increase in reported domestic violence, there has been a paradoxical decrease in presentations to the FTF program for DV-related injuries. While increased severity of injuries has been reported, to the authors' knowledge, data on DV-related mortality during the pandemic has not been published. It is possible that patients who would have presented to care, may have died as a consequence of more severe injuries or COVID itself.

However, the most likely explanation for the decrease in applications is patients' inability to leave their domestic circumstance as a result of housing or financial instability, SAH mandates, and fear of illness. We hypothesize as a result of the drop in applications during 2020 and 2021 combined with the average 10 year delay to secondary reconstructive care, facial reconstruction surgeons may see an increase of DV-survivors in their clinics over the coming decade. This compounded number will be twofold due to (1) the difficulty of access to medical care during the pandemic and demand to catch up on this pent-up need for services, and (2) the reported increase in IPV during the pandemic, with increased severity of injuries, and preexisting delay (9.26 years) to care for this vulnerable patient population<sup>4-6</sup>. If the trend noted in our data continues, it may take almost ten years for pandemic-related DV survivors to present for reconstruction.

## Conclusion

This letter aims to disseminate information of a pro-bono program to bring attention to the anticipated need for DV-related facial reconstruction related to the Covid-19 pandemic. Interested surgeons are encouraged to join programs such as FTF and donate their time and resources to help IPV survivors.

## Funding information

Funding was not received by agencies or institutions while completing this project.

## Author's contributions

V.G.Z. and M.T.A. conceived of the presented idea. V.G.Z. and J.W.C performed the analysis. M.T.A. encouraged V.G.Z. to investigate trends in maxillofacial injury during the Covid pandemic and supervised the findings of this work. V.G.Z. and S.G. wrote the manuscript, and M.T.A. was responsible for developing this article. M.T.A. and S.G. edited the manuscript. All authors discussed the results and contributed to the final manuscript.

## Author disclosure statement

No competing financial interests exist.

Institutional Review Board Approval: This project was approved by the New York Medical College Institutional Review Boards (IRBs); IRB no. 14,587.

Data Sharing: The data used in this study is in possession of FACE TO FACE. Access requests for the data can be made to the program directly.

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## Mild trauma surgery has decreased due to the COVID-19 pandemic



Dear Sir,

We read the article of C.M. Sugrue and P. Sullivan (The effect of the ongoing COVID-19 nationwide lockdown on plastic surgery trauma caseload? *Journal of Plastic, Reconstructive & Aesthetic Surgery* (2020), and would like to congratulate the authors on their interesting study<sup>1</sup>. They investigated 48 patients who attended one plastic surgery trauma clinic during the lockdown due to the COVID-19 pandemic for 25 days, and concluded that the pattern and volume of trauma remain similar to preceding years. However, we feel that the number of consultations for trauma patients has decreased.

In Japan, the first COVID-19 patient was recognized in February 2020, and the number of patients has increased rapidly, so the government has declared a state of emergency three times: from April 15, 2020, to June 30, 2020, from July 20, 2020 to September 24, 2020, and from December 17, 2020 to February 28, 2021. Thus, the stay-at-home (SAH) order period lasted for 5 months in 2020. During this period, restrictions on daily life were requested, such as school closures and refraining from participating sports and concerts, and hospitals were also asked to postpone surgery for non-urgent patients. We investigated the transition of trauma patients who visited in 2020 when COVID-19 was widespread at 12 regional core hospitals that treat emergency patients. We performed a retrospective review of a prospectively maintained trauma database at 12 general hospitals: Fukuoka Tokushukai Hospital (Kasuga City), Ehime Prefectural Central Hospital (Matsuyama City), Nagasaki Harbor Medical Center (Nagasaki City), Oita Tsurumi Hospital (Beppu City), Oita Nakamura Hospital (Oita City), Matsue Red Cross Hospital (Matsue City), Yamaguchi Prefectural Grand Medical Center (Hofu City), Sasebo City General Hospital (Sasebo City), Miyazaki Konan Hospital (Miyazaki City), Kitakyushu General Hospital (Kitakyushu City), Kitakyushu City Yahata Hospital (Kitakyushu City), and National Nagasaki Medical Center (Omura City), that have more than 350 beds and are responsible for regional emergency medical care. Patients undergoing plastic trauma surgery from 2015 to 2020 were evaluated. The number of plastic emergency surgery patients receiving general and spinal / local anesthesia before the COVID-19 pandemic was counted (2015-2019), and compared with the 2020 surgical patients of the COVID-19 pandemic institutions. A total of 23,293 patients with injuries underwent surgery in 5 years. Among them, 903 patients were operated on under general anesthesia, and 19,628 received spinal or local anesthesia (Figure 1).

The average number of emergency trauma patients in the 12 hospitals from 2015 to 2019 (before the COVID-19 epan-

dem) was 4279.4, with a 95% Confidence Interval (CI) of 3768.4-4790.4, and that in 2020, the COVID-19 pandemic period, was 4065, a decrease of 5.0%. This indicates that the number of trauma patients was not significantly reduced during the COVID-19 pandemic. Among them, the average number of patients who underwent surgery under general anesthesia before the COVID-19 pandemic was 953.4 with a 95% CI of 419.2-1485.6, and that in 2020 was 1005 (+5.5%), which did not also show a significant difference. On the other hand, the average number of patients who underwent surgery under spinal or local anesthesia before the COVID-19 pandemic was 3374.8 with a 95% CI of 3215.5-3534.1, and that in 2020 was 2820 (-16.4%) which showed a significant decrease. (Table 1)

Researchers in the United States and the United Kingdom reported that the number of emergency injuries decreased by 35-6% during the SAH order period.<sup>2,3</sup> In our study, the reduction in surgical cases before and during the COVID-19 pandemic was only 5.0% throughout the year. Since the SAH order period was 5 months in a year, it can be estimated that the rate of decrease in the number of surgeries during only SAH period is large. During the COVID-19 pandemic, it was recommended to avoid general anesthesia as much as possible to minimize the risk of exposure to aerosol development procedures<sup>4</sup>. However, this study did not show a significant decrease in the number of surgical cases involving general anesthesia. Therefore, the reduction in the total number of surgeries may be due to a significant reduction in the number of minor trauma treated with local anesthesia, rather than the number of serious injuries requiring general anesthesia.

One of the reasons for the decrease in minor trauma surgery is speculated that the COVID-19 pandemic and accompanying SAH orders reduced the chances of going out and drinking alcohol, physical altercations, and participating in sports activities, which contributed to the reduction in the number of minor injuries.

### Ethical considerations

The procedures followed were in accordance with the ethical standards of our institutional committee on human experimentation and with the Helsinki Declaration of 1975, as revised in 1983.

The protocol for the research project has been approved by a suitably constituted Ethics Committee of National Hospital Organization Nagasaki Medical Center. The relevant Judgement's reference number is 2021055

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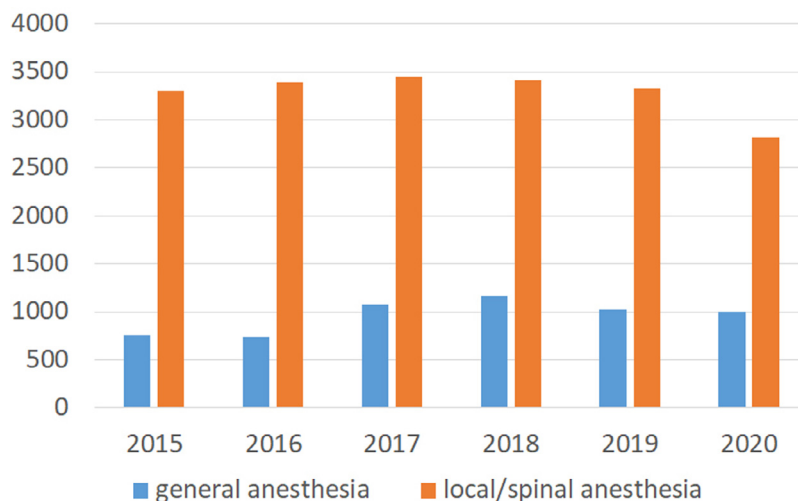


Figure 1 Number of trauma surgeries in 2015-2020.

Table 1 Number of emergency trauma surgeries before the COVID-19 pandemic and in 2020

	2015-2019 (Before the COVID-19 epidemic)			2020
	Mean	Standard Deviation	95% Confidence Interval(t distribution was used)	
General anesthesia	953.4	192.5	419.2-1485.6	1005
Spinal/local anesthesia	3374.8	57.5	3215.5-3534.1	2820
Total surgeries	4279.4	184.5	3768.4-4790.4	4065

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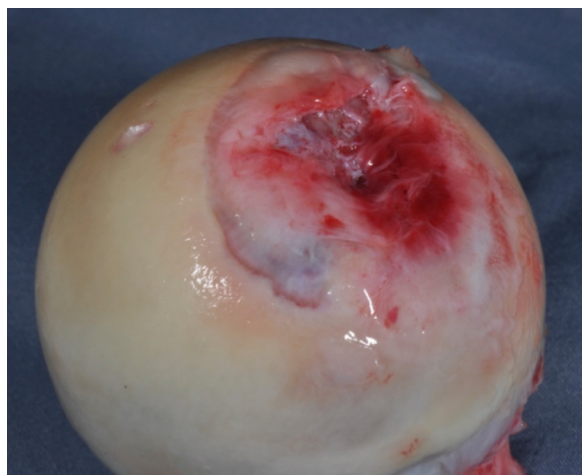
## Gluteal biopolymers and aggressive synovitis of the hip joint: A new reported association



Dear Sir,

Synthetic substances called biopolymers used for aesthetic purposes in the gluteal area have become a common





**Figure 1** Photography of the femoral head during hip replacement where erosion and congestion of the cartilage surrounding the femoral head is evidenced.

practice in the past decade<sup>1</sup> and several cases have been reported in which biopolymers produced both local and systemic adverse reactions. The magnitude of this problem is evident since the incidence of application of biopolymers in the gluteal area corresponds to 72% of the patients receiving modeling interventions. To our knowledge there are not existing reports of articular complications related to injection of these substances in the gluteal region. Autoimmune/inflammatory syndrome induced by adjuvants (ASIA) is a recently described syndrome in which an increasing immune response resulting from a reaction to an external substance, could explain the adverse local and systemic effects suffered by these patients.<sup>2</sup> Lately, a modification of the term to ASIA-MO, indicates the infiltration of oily type modeling substances for cosmetic purposes that cause a chronic granulomatous inflammation with increase of proinflammatory cytokines.<sup>3</sup> We treated five cases of young women without relevant medical history complaining of symptoms characterized by: locking of the hip, joint pain, loss of range of motion and marked functional impairment. The common denominator among these patients was the application of biopolymers for gluteal augmentation with cosmetic purposes. These young patients presented with an aggressive hip synovitis after the injection of biopolymers in the gluteal region. None of them had an evident articular pathology which could explain the clinical presentation. In the MRI, the joint alteration was characterized by an increased volume of synovial fluid and ligamentum teres as well as cartilage erosion around the fovea of the femoral head. A joint replacement surgery was recommended in all the patients because of marked functional impairment (Figure 1).

There is no demonstrated etiology to explain the pathophysiological mechanism for this type of joint injury. It has been described that biopolymers can act as adjuvants in the development of a systemic inflammatory response mediated by T lymphocytes<sup>3</sup> in genetically predisposed patients. This contrasts with the information given by biopolymer manufacturers, who state that these materials are inert

and that adverse reactions are rare.<sup>4</sup> Recent findings have indicated that the number of adverse events has increased. A narrative review found that almost 45% of patients with foreign body modelling agents are in risk of developing an autoimmune disease with at least one local manifestation.<sup>5</sup>

Although adverse reactions mainly occur locally and are characterized by formation of nodules, induration and infection; the migration of these substances through the lymphatic system, blocking the deep and superficial inguinal nodes causing a retrograde flow, could explain the appearance of these characteristic lesions in the femoral head (Figure 2). This migration hypothesis is enhanced by considering that the local external compression which occurs around the gluteal region during repetitive sitting or walking activities could exert a positive pressure over the lymphatic system increasing the risk of migration.

This report should raise awareness on both plastic and orthopedic surgeons to early and interdisciplinary approach patients with history of injection of biopolymers and pathology of the hip.

## Funding

None.

## Ethical approval

The study was approved by the Ethical Committee of the Hospital Universitario Fundación Santa Fé de Bogotá.

## Declaration of Competing Interest

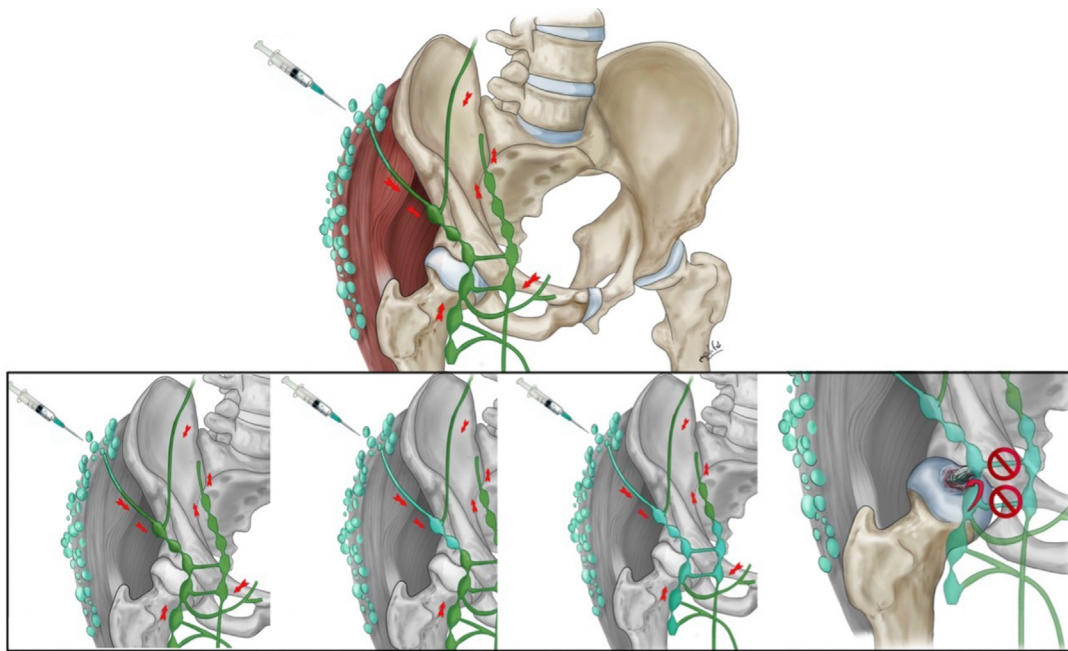
None.

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**Figure 2** Illustration of the mechanism by which biopolymers may cause cartilage injury lesions.

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## A novel and cost-effective method of breast implant-pocket salvage after implant infection - Pilot



Dear Sir,

### Short communication

The incidence of breast implant infection after reconstruction in the literature varies from 1% to 35%.<sup>1</sup> Once infected, implant loss rate is extremely high. This has a significant financial implication due to readmission, long inpatient stay, long courses of antibiotics, often for many weeks, and often multiple operations with implant failure at the end. There are, of course, psychological implications for the patient due to the setback and the morbidity of losing the implant. Whilst different implant-pocket salvage techniques are described and used,<sup>2-5</sup> there is no widely established method to manage implant infection.

**Table 1-** Demographics for patients who underwent the new technique.

No.	Primary Surgery	Time between primary surgery and diagnosis of implant infection	Interval between removal and of re-insertion of new implant	Cultures from implant-pocket	Follow up duration
1	Change of implant (capsular contracture) June 2017	7 weeks	48 h	Citrobacter koseri	27 months
2	Right Mx + SLNB + Recon July 2017	8 weeks	1 week	S. aureus + Streptococcus	19 months
3	B/L Mx, right sided infection February 2018	5 weeks	2 weeks	S. aureus	13 months
4	Right Mx + SLNB + Recon July 2019	10 weeks	72 h	No growth	12 months
5	Right Mx + SLNB + Recon July 2019	4 weeks	48 h	No growth	12 months

In 2017 we introduced acute surgical intervention instead of a conservative approach with prolonged antibiotics, to salvage an infected implant-pocket. After extensive review, this procedure has not been described in the literature previously. Here we present the pilot data of our technique.

Once the clinical diagnosis of implant infection is made, patients are admitted for intravenous antibiotics for three to five days: receiving both Teicoplanin and Gentamicin. If they have renal impairment, the dose of Gentamicin is adjusted to a renal dose with regular monitoring of Gentamicin levels. Patients unresponsive to systemic antibiotic therapy, are offered an implant-pocket salvage operation. This procedure was not offered to patients with poorly controlled diabetes or those who presented with mastectomy flap necrosis which happened occasionally in smokers.

During this procedure, the implant is removed, the cavity is thoroughly washed out and a watertight closure was obtained by closing the subcutaneous fatty layer using continuous Vicryl-Rapide sutures and the skin with a subcuticular continuous Monocryl suture. This was followed by application of skin glue. The cavity is then filled by injecting it with an antibiotic solution containing Saline, Teicoplanin and Gentamicin (400 mg and 160 mg respectively in 500 ml of saline) to keep the implant pocket stretched. This serves as a cost-effective, infection free, tissue expander. Lately, distilled water is being used instead of saline for filling the pocket as it takes longer to reabsorb. After 48-72 h, the cavity is reopened under general anaesthetic, a further thorough cavity washout is done, and a new implant is inserted. Post-operatively intravenous antibiotics (Teicoplanin and Gentamicin) are given for two more days. The patient is discharged on oral antibiotics for another three days.

Between 2017 and 2019, 93 implants based reconstructions were performed and 15 developed infections. Five patients did not have any exclusion criteria, were offered the new technique for re-insertion and consented to the procedure. Table 1 describes the patient details. All patients had implant infections detected within 12 weeks of primary surgery (Range 4-10 weeks). In four out of five patients the primary surgery was a mastectomy and immediate recon-

struction, one had a change of implant for capsular contracture.

Three of the five have had implants re-inserted in 48-72 h. Two patients had delayed insertions at one week & two weeks respectively. In one of these patients the delay was due to surgeons' unavailability at 72 h and in the second case it was due to unavailability of the patient. Three of the five had positive cultures from the wound (Table 1). Two patients' cultures showed no growth, but these were confirmed infections based on clinical features and presence of pus intra-operatively. All patients have been followed up at least for 12 months (Range 12-27 months). In all five patients the implant-pocket was salvaged successfully.

Drawbacks of this technique were that the patient undergoes one additional procedure under general anaesthetic. Furthermore, the implant-pocket displays some contracture due to inflammation, depending on the duration between removal and re-insertion of implant. This may require downsizing of the new implant. But despite this, it has been found to be more acceptable to patients than complete implant removal.

Our method has shown a 100% salvage rate in a small number of five patients. This procedure was conceived out of desperation in a patient who had no other reconstructive options but has been repeated in four other patients successfully. It involves careful case selection. By saving the implant pocket and therefore the cosmesis preferable to patients, it reduces the psychological effects and is not perceived as a setback. It is a less expensive alternative compared to the use of expensive temporary tissue expanders. It reduces the hospital stay from 2 to 3 weeks to 10 days. Given the lack of definitive and successful treatment options for management of infected implants, this is a simple and cosmetically acceptable solution for patients.

This technique needs to be used on more patients, by different surgeons in more centres, to further assess its utility and reproducibility. In our hands, this procedure was carried out safely. The implant-pocket was successfully salvaged, with good cosmetic outcomes and follow up for at least 12 months duration post-operatively, albeit on a small cohort.

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## Ethical approval

Not required.

## Declaration of Competing Interest

All authors concurred to the work and approved the manuscript. There are no conflicts of interest for all authors actual or potential.

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## Presented at (partly)

- 1) Oral presentation at West midlands chapter of ABS annual meeting November 2019
- 2) Poster presentation at Association of breast surgeons Conference (Virtual) June 2020

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## Validating the Body Dysmorphic Disorder Questionnaire-Aesthetic Surgery in a German rhinoplasty population



Dear Sir,

### Introduction

A major aspect compromising patient satisfaction after rhinoplasty is body dysmorphic disorder (BDD). It is a psychiatric disorder characterized by excessive concern with one's appearance and patients are overly preoccupied with non-existent or slight defects in their physical appearance.<sup>1</sup> As nasal shape is a typical area of concern, BDD is common but yet underestimated by rhinoplasty surgeons.<sup>2</sup> The use of validated BDD screening instruments may help identify these patients and prevent disadvantageous postoperative results. The only questionnaire validated in a rhinoplasty population is the BDD Questionnaire-Aesthetic Surgery (BDDQ-AS).<sup>3</sup> The aim of this study was the cross-cultural adaptation and validation of the BDDQ-AS to primarily provide a screening tool for rhinoplasty patients in German, following the current Consensus-based Standards for the selection of health Measurement Instruments (COSMIN) guidelines.<sup>4</sup>

### Patients and methods

Ninety-four patients seeking functional septorhinoplasty in 2018 and 2019 at the university hospital Heidelberg were included. The control group consisted of 44 non-rhinoplasty patients. The questionnaire's design was not changed. Translation was performed respecting the COSMIN guidelines. The final questionnaire is shown in Table 1.

The screening is positive if the patient reports concern with his appearance and preoccupation because of these (questions 1 and 2 "yes") and at least moderately disturbance of areas in daily life (question 7 "yes" or questions 3, 4, 5 or 6 at least "3").

Internal consistency was established with Cronbach's  $\alpha$  coefficient. For test-retest reliability, 47 patients completed the questionnaire repeatedly after four weeks before surgery. Test-retest reliability was assessed by Cohen's  $\kappa$ .

For structural and cross-cultural validity, a confirmatory factor analysis (CFA) was conducted. We used the maximum



**Table 1** German version, possible answers and factor loadings of the confirmatory factor analyses for BDDQ-AS.

Item	Possible answer	Factor loading
1. Sind Sie in irgendeiner Form sehr besorgt über Ihr Aussehen?	Yes/No	0.78
2. Beschäftigen Sie diese Sorgen? D.h., denken Sie viel darüber nach und würden sich wünschen, sich weniger Gedanken darüber zu machen?	Yes/No	0.74
3. Verursachen diese Sorgen viel Kummer, Qual oder Schmerz?	Likert Scale (1-5)	0.91
4. Haben diese Sorgen Beeinträchtigungen in Ihrem sozialen oder beruflichen Leben oder einem anderen wichtigen Lebensbereich hervorgerufen?	Likert Scale (1-5)	0.92
5. Haben diese Sorgen häufig Ihr Sozialleben wesentlich beeinflusst?	Likert Scale (1-5)	0.89
6. Haben diese Sorgen häufig Ihr schulisches oder berufliches Leben oder Ihre Funktionsfähigkeit signifikant beeinflusst?	Likert Scale (1-5)	0.82
7. Gibt es Dinge, die Sie wegen dieser Sorgen vermeiden?	Yes/No	0.75

BDDQ-AS = Body Dysmorphic Disorder Questionnaire - Aesthetic Surgery.

**Table 2** Goodness of fit measures for confirmatory factor analyses for initial BDDQ-AS assessments.

Measure	BDDQ-AS	Acceptable fit
Chi <sup>2</sup>	73.117 ( $p < 0.001$ )	$P > 0.05$
Chi <sup>2</sup> /df	5.223	$< 2$ or $< 3$
RMSEA	0.175	$< 0.06$ to $0.08$
CFI	0.93	$> = 0.95$
TLI	0.896	$> = 0.95$
SRMR	0.05	$< = 0.08$

BDDQ-AS = Body Dysmorphic Disorder Questionnaire - Aesthetic Surgery, CFI = comparative fit index; RMSEA = root mean square error of approximation; SRMR = standard root mean square residual; TLI = Tucker-Lewis index;  $\chi^2$  = chi-squared test statistic;  $\chi^2/df$  = chi-squared test statistic normed by degrees of freedom.

likelihood approach to fit all models and estimated means and intercepts to obtain standardized factor loadings. All models were fitted with one latent variable (BDD).

For convergent validity, screening results of BDDQ-AS were compared with the results of the Dysmorphic Concern Questionnaire (DCQ) using Cohen's  $\kappa$ . A DCQ score  $\geq 11$  was interpreted as positive screening. For discriminative validity, the screening results of BDDQ-AS in the rhinoplasty and control group were compared using the Chi-squared test.

## Results

The BDDQ-AS was positive in 38 of 94 rhinoplasty patients (40.4%). Cronbach's  $\alpha$  was 0.92 (95% CI: 0.91-0.93). Test-retest accuracy was 95.6% and a Kappa of 0.83 (95% CI = 0.6, 1.0) confirmed the high agreement of both assessments and a good test-retest reliability.

BDDQ-AS and DCQ showed moderate agreement (Kappa 0.5; 95% CI = 0.3, 0.7) as fewer patients (23 of 80; 28.7%) were screened positive with the DCQ. The rate of positive screening in rhinoplasty patients (38 of 94) was significantly higher compared to the control group (4 of 44;  $p < 0.001$ ), indicating good discriminant validity.

Table 1 shows the factor loadings for the BDDQ-AS of the CFA. Goodness-of-fit data for all four models are summarized in Table 2. The model showed a modest fit but confirmed the assumed factor structures.

## Discussion

This study provides the first screening tool for BDD in an aesthetic surgery setting in German language. It is a short and practical tool and showed good reliability and validity.

The CFA showed moderate "goodness-of-fit" values. These might be explained by the binary response scale of three of the seven items. In general, items with more response categories will lead to greater variability resulting in larger factor loadings.

Convergent validity showed moderate agreement of positive screening with the BDDQ-AS (40.4%) and the DCQ (28.8%). The rate of 40.4% of patients with possible diagnosis of BDD appears high but is even exceeded in the original population with 47.4%.<sup>3</sup> In current literature, screening methods and percentages vary. In a 2016 review, BDD prevalence was found to be 13.2% in general cosmetic surgery and 20.1% in rhinoplasty patients.<sup>5</sup> Taking into account the lower screening rate of the DCQ, there might be an overestimation when using the BDDQ-AS.

Our study suffers limitations. A higher number of screened patients would be desirable to establish valid results. For confirmation of a BDD diagnosis, the gold standard would be an interview with a psychiatrist. In clinical practice, this is very difficult to accomplish. Patients who were screened positive were further evaluated regarding their concerns and, in case of substantial suspicion, referred to

the university hospital's Department of Psychiatry and Psychosocial Medicine on a voluntary basis.

BDD is still under-recognised and undertreated.<sup>1,2</sup> As BDD patients are prone for aesthetic surgical treatment, especially rhinoplasty, surgeons should be aware of this condition and its implications. The BDDQ-AS can help surgeons in psychological patient evaluation to further discuss dysmorphic concerns prior to surgery. When suspicion arises for BDD, the surgeon should refer the patient to a specialist instead of performing surgery for further assessment and, in case of confirmation of the diagnosis, cognitive behavioural therapy.<sup>1</sup>

## Declaration of Competing Interest

None.

## Funding

None.

## Ethical approval

The Ethics Committee of the University of Heidelberg granted approval to conduct the study (reference number: S-575/2018). All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki declaration and its later amendments.

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## Response to “cosmetic tourism amidst the Covid-19 global pandemic”



Dear Sir,

In relation to the recently published letter by Long et al. [1], we have also observed a steady flow of patients presenting with post-operative complications following cosmetic surgery during the COVID-19 pandemic. 8 patients presented to our regional Plastic Surgery Department between September 2020 and February 2021. 5 had cosmetic surgery abroad and 3 in another area of England. This confirms that cosmetic tourism is creating an additional burden on an already saturated NHS throughout the UK, not just in Northern Ireland.

8 patients presented acutely to our Plastic Surgery Department with complications resulting from cosmetic surgery outside our region. The cohort consisted of 7 female and 1 male patients. Our patients were aged between 25 and 45; 2 of these 8 patients attended our unit with complications of cosmetic tourism previously (2019 and 2018). Suggesting, that a previous negative experience was not a deterrent. Half of the patients had travelled to Turkey for their procedures. 3 out of 8 patients (37.5%) travelled to other areas of the UK. (Figure 1.)

Our patients underwent various procedures; including cosmetic breast augmentation (4), lipofilling/lipomodelling (2), abdominoplasty (1) and facelift (1). Patients presented an average of 5 weeks post-operatively. Some complications were managed conservatively, others required surgical intervention (Table 1).

**Table 1** Summary of Cosmetic Tourism Complications During COVID-19 2020.

Location of Surgery	Surgery Performed	Complication	Treatment Offered	Outcome
*Turkey	Bilateral breast augmentation.	Wound dehiscence, infection, and implant exposure	Removal of infected breast implant and washout of infection. Antibiotics and admission	Patient declined operative treatment within the NHS, took antibiotics for MRSA grown from wound swabs and planned return to Turkey for implant exchange and further buttock surgery.
UK	Bilateral breast augmentation and mastopexy.	Wound dehiscence and nipple necrosis	Dressings management through plastic surgery outpatients	Patient Did Not Attend multiple follow up appointments offered.
Poland	Facelift	Infected haematoma	Drainage of haematoma, antibiotics.	Dressings clinic follow up
*Greece	Breast reduction, mastopexy and implants	Nipple necrosis and wound infection	Dressings and oral antibiotics	Dressings clinic follow up
Turkey	Abdominoplasty	Large seroma and wound dehiscence	Dressings and ultrasound guided drainage arranged.	Dressings clinic follow up. Patient did not attend appointments for drainage.
Turkey	Abdominoplasty and liposuction	Seroma	Managed at local referring unit with drainage and dressings	Local follow up
UK	Bilateral augmentation and mastopexy	Haematoma requiring return to theatre.	Offered evacuation of haematoma and removal of implant on NHS.	Transferred back to private clinic for implant salvage surgery.
UK	Abdominoplasty	Infected seroma, fat necrosis. Sepsis.	Emergency admission under general surgery for IV antibiotics 4 weeks post op, then emergency admission to plastic surgery for debridement and washout of infected seroma 7 weeks post op.	Theatre for washout of infected seroma and debridement. Theatre for second look washout and VAC dressings. Inpatient stay for 1 week. Follow up in private sector.

\*these patients had complications in previous years.

Of particular concern is that two patients had previously required NHS treatment of cosmetic tourism complications. With one patient electing to undergo further surgery at the same unit in Turkey. During the time that our patients presented to hospital (September 2020-February 2021) the UK was still subject to COVID-19 restrictions with a large NHS COVID-19 burden. We note that 3 out of 8 (37.5%) patients declined recommended NHS treatment or did not attend follow up.

Travelling for cosmetic surgery is not a new phenomenon. A BAAPS survey in 2009 highlighted the extent to which the NHS manages complications of cosmetic tourism [2]. However, patients travelling abroad during the COVID-19 pandemic for aesthetic surgery is alarming. Despite our relatively small cohort, the lack of local cosmetic surgery avail-

ability seems to have driven patients abroad at a time when the NHS is under critical strain. This lack of individual responsibility needs to be highlighted, to protect the NHS.

Surprisingly, we found 3/8 patients had travelled within England for their aesthetic procedures during the COVID-19 pandemic, despite guidance on avoiding non-essential travel. Local availability of aesthetic surgery varies geographically. It is our recommendation that, advertising campaigns and social media posts to entice patients to travel for surgery within the UK should be temporarily banned when COVID-19 is prevalent.

The strain of COVID-19 on healthcare systems has varied locally and globally during the COVID-19 pandemic. A BAAPS press release on the 6th January 2021 supported the resumption of aesthetic surgery where it can be safely pro-

vided without impacting on the national effort or NHS resources. A recent paper by Kaye et al. lead to proposed guidelines from the leading aesthetic associations around the world, on how to safely reintroduce aesthetic surgery [3] with EASAPS emphasising the role of surgeons behaving ethically during the pandemic and COVID-19 consent [4]. The ISAPS page on cosmetic tourism recommends staying in the area where the surgery was performed for at least a week, depending on the procedure - though this may not be enough to avoid an NHS burden [5]. Additionally, the resumption of aesthetic surgery in the UK coincides with an anecdotal increase in the demand for certain cosmetic surgery procedures, the 'Zoom Boom', i.e. the demand for facial procedures driven by increased awareness of ones appearance on screen. Additionally, exercise restrictions are likely to increase demand for contouring procedures.

As the national COVID-19 vaccination programme ramps up and restrictions ease we must ensure the NHS is able to cope with the backlog of postponed treatments. An increasing burden of patients with complications from cosmetic tourism needs to be avoided at all costs. We propose a national aesthetic complications database to audit trends and improve patient safety by feeding back to the provider any complications.

## Funding

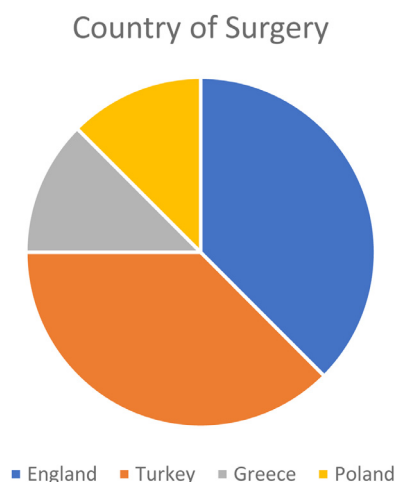
None

## Ethical approval

N/A.

## Declaration of Competing Interest

N/A.



**Figure 1** Pie chart showing location of cosmetic tourism.

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## How do we ensure diversity and maximise inclusion across all 10 surgical specialities?



Dear Sir,

In 1858, Elizabeth Blackwell was the first female doctor to be on the UK medical register. After numerous rejections, she was accepted by Geneva Medical School, providing that her male colleagues unanimously voted for her acceptance. She became the first woman to gain a medical degree in the United States in 1849. Her work and dedication set a precedent for medical school entry based on merit rather than gender. Nearly 200 years later, the proportion of women in medical schools in the UK is 5% higher than their male counterparts.

Despite the rapidly increasing diversity in the medical field, surgery remains a male-dominated speciality. A study in 2018 has estimated that only one in five surgeons is female.<sup>1</sup> Understanding the factors that have led to this discrepancy is necessary to implement the requisite steps to improve it.

Surgery requires acquisition of skills which are gained over a prolonged period of time. A well-recognised notion states that acquiring an elite level of expertise in any field requires 10,000 h of practice.



However, with the recent introduction of NCEPOD and working time directives, the number of hours spent operating are limited. This has led many surgical trainees to attend theatre lists on days-off to gain the confidence and experience required to be a consultant surgeon. The implication that the trainee is responsible for their own training does not take into account rota gaps and inflexibility which has made the surgical profession unattractive to female trainees with familial commitments. The new move to a competency-based training system has the potential to aide skilled female trainees compared to the previous system which measured training in years of practice with set dates for ARCP.

Unequal opportunities due to ethnicity, religion, and socioeconomic status are prominent issues in our current society. Not long ago, the "Black Lives Matter" movement gained traction; the movement highlights structural inequalities and systemic racism in the USA, one of the most developed countries in the world. When translated into the medical world this issue is equally prevalent; the medical profession has historically attracted the most resilient, determined and motivated people and must continue to do so to advance care.

The NHS is the biggest employer in Europe and a large proportion of the staff are migrants. In 2019, 13.3% of the staff in hospitals were reported to be of non-British nationality, with nearly half of the doctors falling into this group.<sup>2</sup> A study in 1993 demonstrated that doctors with English names were twice as likely to be shortlisted for jobs at SHO level. Twenty-seven years later, data from the GMC has shown that doctors from ethnic minority backgrounds were still less successful at securing speciality training posts.<sup>3</sup> The current recruitment system, Oriel, has made blinding of applicant demographic data easier but does not remove bias at national interviews. The use of recorded online might prove useful in the long-term by giving applicants the option to appeal with evidence.

Remuneration discrepancies between white and non-white consultants remains a prevalent issue, with white consultants earning 4.9% more than their non-white colleagues.<sup>4</sup> Though these discrepancies in pay could be due to white consultants being more senior, there has been no further investigation into this. Furthermore, there is an under-representation of ethnic groups in leadership roles such as trust board members. Encouraging diverse individuals to take up these positions can provide non-white surgeons representation, empowering them to voice racial injustices.

Surgical training comes with hidden costs. Attendance to conferences, sitting exams and participating in courses are essential to make applicants favourable in national training selections and consultant interviews. Study budgets have been created to offset this cost; however, they are not implemented in the same way nationally and there is a discrepancy in the amount of money allocated to each trainee. The median study budget of a speciality trainee in the UK is £600 per year. A study published by ASiT shows that by the end of training, surgical trainees have spent an average of £13,726 on courses and conferences which have not been reimbursed. This cost does not include an average cost of £7500 for exams.<sup>5</sup> With increasing student debt and cost of living, it is imperative that exams and mandatory courses

be offset by the study budget at full cost to not discourage trainees from lower socioeconomic backgrounds.

Surgery is a highly competitive and rewarding speciality, which should continue to attract individuals with the resilience to deal with the commitment, stress and long hours needed to provide the best quality care. It is crucial to recognise that these individuals can belong to a diverse population and equity should be implemented by breaking barriers between societies, genders and religions. Through education and focus on our common goals as surgeons rather than our differences, we can slowly but surely allow diversity to flourish.

## Declaration of Competing Interest

None.

## Funding

Not applicable.

## Ethical Approval

Our article does not involve any human or animal subjects.

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## The Click



Dear Sir,

“We’re here!” Out of the dusty bus window, was an abandoned building with dirt floors and a makeshift roof resembling tin foil. I thought to myself, this *cannot* be the clinic. Nevertheless, we hurriedly hung bed sheets to connect the erect slabs of concrete that would serve as our patient rooms. Time flew in that dusty, hot room with a sticky, bright red, plastic chair beneath me. People would peek from behind the bed sheet and enter the space with childlike wonder. Curious eyes searched around the room until I introduced myself, in Spanish, as the interpreter for the day. I never grew tired of seeing the patient’s shoulders relax and the smile appear on their face. Before I knew it, we were holding hands, laughing, and crying together in this small room, now a sanctuary. This was my first clinical experience with the *click* - that moment of understanding when someone sees themselves in another person.

Several years removed from my time interpreting in Ecuador, I am now a medical student and aspiring surgeon. Today, the *click* results not just from a shared language, but from having a similar educational background, acquaintance of a surgeon, or same hometown. With these connections, patients open portals to new encounters. I see the same cues of the patient’s shoulders relaxing and that familiar smile appearing on her face as I did in Ecuador. There is beauty and magic in this choreographed dance as her surgeon explains biological mechanisms, treatment options, and potential outcomes. These encounters leave me with a sense of satisfaction from witnessing the perfect *click*.

Unfortunately, not everyone is privileged to have this experience. Many patients enter the room with disorientation and confusion that doesn’t leave their faces. These patients often do not have the “right” education, background, or appearance to achieve the *click*. In my short white coat with my back against the wall, I look into the eyes of these patients and too often, they look just like me. In the moment, I feel powerless to change the trajectory of the encounter. I want to sit with them like I did in that sticky red plastic chair to untangle the medical jargon that appears to fall on deaf ears. I want to jump out of my skin and scream, “Ask a question! He has a PowerPoint” or “She has a video!” but some of the surgeons only show it to the “right” people.” Instead, I stand against the wall and dream of how to have that *click* with my patients.

Racial and ethnic inequities in the United States healthcare system are widespread and longstanding.<sup>1</sup> While

progress has been made, the racial and ethnic inequities in COVID-19 mortality rates reaffirm how far we still have to go.<sup>2</sup> The etiology of these healthcare inequities is the result of several interconnected systems. Improvement requires increasing the numbers of physicians of color alongside society-level improvements in education, housing, sanitation, nutrition, environment, and bias. While anticipating these improvements, we often place the burden of remedying injustices on the victims - our patients, who are left to overcome their own disadvantages and seek healthcare from a system with both implicit and explicit biases against them.

The impact of biases on the clinical care we provide is real.<sup>3</sup> As a first-generation black, female surgeon in-training, my experience of institutionalized racism makes me especially protective during clinical encounters. Seeing the mistreatment of people from my community makes me wonder about my biases and how they may affect the way I care for patients. Instead of waiting for society-level improvement, it is important that we examine how we can contribute to a better system now. Novel curricula could potentially address this deficit in my education and in the education of my classmates. Just as I used the Spanish language to connect with patients in Ecuador, I challenge medical education to provide linguistic tools to resolve these injustices. Acknowledgement of implicit bias paired with improvement in communication patterns among physicians - and not just health literacy on the part of patients - could potentially address health disparities.<sup>4</sup> If we improve education at all levels, we will see our own limitations and confront our biases to intentionally change this system.

It is time to recognize that we live in a society founded in racist ideology. With almost 20 years since the initial Institute of Medicine publication on racial and ethnic disparities in this country,<sup>5</sup> medical professionals ought to take ownership of our own contributions to this broken system. As my white coat goes from short to long, I will no longer scream silently in the background. I will help to shape a courageous medical community that takes responsibility for the prejudice we perpetuate and discrimination our patients endure.

### Declaration of Competing Interest

N/A.

### Funding

N/A.

### Ethical approval

No human or animal subjects were involved in this study

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## “Twitter and plastic surgery: Reconstructing traditional concepts of mentorship in the digital age”



Dear Sir,

The emergence of COVID-19 has resulted in decreased in-person training and fewer networking opportunities for physicians. These setbacks have opened discussions on surgical training during the pandemic through telemedicine and livestreaming, as well as facilitation of mentorship through virtual communities.<sup>1,2</sup> We propose that engagement through Twitter may provide plastic surgery trainees exposure to valuable mentorship opportunities.

A microblogging service founded in 2006, Twitter enables users to create an account and post messages within a 280-character word limit (“tweets”). Messages can be directed toward a target audience with the use of hashtags preceding key words or phrases, therefore creating discourse within

communities interested in specific topics. Twitter bypasses physical and geographical limitations, allowing trainees (especially those with constraints such as lack of a plastic surgery home institution) direct contact with potential mentors.<sup>3</sup> Furthermore, the forum-type discourse spurs conversations between people at any level of training without the rigidity of traditional hierarchies. Although Instagram and TikTok currently have great influence in plastic surgery, Twitter has the unique potential to foster professional networking amongst plastic surgeons, peer-reviewed journal accounts, and trainees. Because Twitter has less of an emphasis on large images and videos than Instagram and TikTok, the platform is more text-based, inviting more academic exchanges.

The potential of Twitter to facilitate academic connections has been demonstrated in various fields. Zheng et al. discussed the influence of the specialty-specific hashtag #DermTwitter for identifying mentorship in the form of research collaborations and scholarship opportunities.<sup>3</sup> Furthermore, Friedman et al. #OrthoTwitter expanded upon the utility of this platform to foster collaboration.<sup>4</sup> Unlike in dermatology and orthopedic surgery, the use of Twitter as a collaborative tool in plastic surgery is sparse. On one hand, the commonly utilized hashtag #PlasticSurgery features patient health educational content, research, and academic communities. However, the broad nature of content within the #PlasticSurgery hashtag may dilute opportunities for mentorship and career building. Conversely, #PlasticsMatch specifically focuses on the Plastic Surgery Match process, which is often relevant only for fourth year medical students, and therefore too narrow to foster a community for trainees at all levels (Table 1). Although opportunities for mentorship in plastic surgery exist on Twitter, these resources are difficult to identify. Pertinent information could be consolidated through a designated specialty-specific hashtag (e.g. #PRSTwitter) for plastic surgery trainees.

Although we strongly encourage the development of traditional in-person connections with mentors, there is benefit to building virtual relationships with colleagues and mentors as medical education transitions into a new, increasingly digital age. The adoption of remote workflows due to the COVID-19 pandemic underscores the continued importance of digital mentorship.<sup>5</sup> Although opportunities for virtual mentorship currently exist in the “Twitterverse”, there is no established community for plastic surgery trainees to seek consolidated information. Fostering an online community that goes beyond traditional paradigms of face-to-face mentorship provides the framework for trainees to connect with potential mentors and coworkers in the present day and future.

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## Declaration of Competing Interest

Conflict of interest: none

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## Letter to the editor regarding “Evolution of the body image perception of people with obesity on the pathway from bariatric surgery to body contouring lift surgery”



Dear Sir,

**Table 1** Examples of mentorship Twitter accounts and hashtags.

Hashtag	Benefits	Shortcomings	Example Tweet
#PlasticSurgery	Most common hashtag for plastic surgery content.	Includes a wide variety of information about plastic surgery that is not exclusive to mentorship.	“Interested in applying to Plastic Surgery Residency? Come hang with us!! We’ll dropping some gems & sharing our application experiences with SNMA*.”
#PlasticsMatch	Network for fourth-year medical students applying to Plastic Surgery residency.	Mostly relevant to rising fourth year medical students only. Does not include general mentorship advice for younger medical students.	“For #PlasticsMatch applicants: The majority of ranked-to-match students on rank lists and current residents were either home students or away rotators at their respective program. Performing well on an away rotation appears to confer significant benefit to the applicant”
#MedTwitter	Well-known mentorship platform for medical students.	Not specific to those interested in plastic surgery.	“Hello #MedTwitter and #plasticsurgery twitter. I’m starting as a plastics SHO in August. Can people recommend some prep ahead of this? Books to read, procedures to know of, any other advice?”

\*SNMA = Student National Medical Association, student-run organization supporting the needs and concerns of underrepresented minority medical students in the United States.

\*\*SHO = Senior House Officer, a junior position for graduate doctors in the United Kingdom.



We read with great interest the article entitled “Evolution of the body image perception of people with obesity on the pathway from bariatric surgery to body contouring lift surgery”. by Proczko M, et al.,<sup>1</sup> in *Journal of Plastic, Reconstructive & Aesthetic Surgery*. In this article, they got to identify the satisfaction level of the corporal image of patients submitted to the different stages of the bariatrics surgery .

Obesity is a problem of public health that has doubled in recent years,<sup>2</sup> increases risk of chronic non communicable diseases and the suffering of other health problems, decreases the quality and expectations of life, and clearly generates an impact in the mental health of these people.<sup>3</sup>

Although bariatrics surgery is not the only treatment used for obesity, it is the most employed, especially in high-income countries with high success rates.<sup>4</sup> We believe that such studies are very important to consider, since they generally are simply used studies that focus on security and success rates postoperative, without focusing on the satisfaction level of each patient.

It was not very clear if the patients in the study were all women or if they were also men patients, because in them also demonstrated the psychology and care effects in his states of obesity. It should consider, in addition, as the author says, the patients with most educations, have greater economic possibilities, more weight control and physical condition, since an adequate postoperative, feeding and constant physical activity, can be developed in the best way if there is an economy that allows it, seems pertinent to try to do this same study in other treatments used for obesity, especially for low-income countries, where there are people with less access to surgical treatments and those poor self-esteem, to try to search solutions accords with the each person’s satisfactions.<sup>2,5</sup>

Another important point is to look in-depth the investigation into the six women who left the study because of “embarrassment”, since, this makes us think in two possible reasons why they abstained from following in the investigation and they must be clear to address these cases in the best way: first, their poor self-esteem and the disease awareness, the physical or mental consequences they may be going through at the moment, which does not allow them to openly express their feelings. Second, the taboo that is still observed in the society around aesthetic plastic surgery, that may arouse this embarrassment feeling, since currently it continues to be viewed as disdain for procedures that, as clearly demonstrated in the article, improve people’s quality of life.

In addition, it was more interesting to extend the time (one year more) the observation of patients who passed for a post-bariatric surgery lipoabdominoplasty, to understand if persist in time the high level self-esteem and lower stress and depression shown in the study over time, although patients obviously have a less projected, flat and aesthetic abdomen, they may present stretch marks after skin resection and flap stretching, and more complications secondary to the incision that may, in some degree, alter patients’ perception of their own body sometime after recovery from procedures.<sup>4</sup>

Finally, the results obtained in this study are as expected and are consistent with the similar studies. The strate-

gies allow us to conclude that aesthetic plastic surgery can change peoples’ lives, and patients often need a first push in which direction to have a healthy lifestyle, so this change is more likely to be sustained over time.

## Funding

None.

## Ethical approval

Not required.

## Declaration of Competing Interest

None declared.

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## A reply to: “Evolution of the body image perception of people with obesity on the pathway from bariatric surgery to body contouring lift surgery”



Dear Sir,

We read with great interest the study “Evolution of the body image perception of people with obesity on the pathway from bariatric surgery to body contouring lift surgery” by Proczko et al.<sup>1</sup> The authors have demonstrated that the self-perception of obese patients is impacted by the stage of the bariatric treatment, and that body contouring lift surgery (BCLS) can significantly improve the women’s self-confidence.

We share the researchers’ recommendations for a systemic solution allowing treatment reimbursement at any time and for improving access to BCLS, acknowledging the role of BCLS in the holistic care of the patient’s physical and mental state. The researchers found that BCLS had a positive effect on the participants’ self-perception. Previous research on the topic has also shown that BCLS not only improved quality of life but also enhanced the weight-loss effects of bariatric treatment.<sup>2,3</sup> This is important given the researchers’ findings that better education and financial circumstances correlated with higher self-perception levels, and given the rising trend in people seeking bariatric surgery.<sup>4</sup> Improving access to BCLS should be a priority for this patient population.

However, the study methodology has some caveats which we would like to further discuss. While it was found that physical health and psychological comfort improved after bariatric therapy, it should be noted that the researchers opted to question different participants at different stages of the bariatric therapy. Perhaps following one cohort of participants over time could have been more beneficial to assess the changes in self-perception before and after bariatric operative therapy, and also to see who benefits most and why. The group undergoing BCLS was disproportionately small, of only 28 patients, compared to other groups, meaning the sample might not have been fully representative of this patient population.

We acknowledge the authors’ implementation of a control group of healthy individuals as this allowed for a comparison of the contributing factors to body image perception. However, we would appreciate justification for the inconsistencies in the exclusion criteria between the control and study groups. The patients with any existing disordered eating behaviours and psychiatric diagnoses were

excluded from the control group, but the remaining groups were not subject to the same exemptions. Considering that obese women are already at higher odds of depression than their non-obese counterparts, this could lead to a bias in results.<sup>5</sup> This also brings into question the statement made by the authors that “compared to people with normal body weight, obese persons feel worse, less attractive, suffering more often from depressive disorders.” We would recommend the use of consistent and unified inclusion and exclusion criteria to objectively support this finding. In addition, the study would further benefit from adding information on patients’ clinical characteristics, such as age, body mass index, as well as other pre-existing comorbidities.

In conclusion, the authors have conducted an important study that highlights the significance of BCLS in holistic bariatric care. Future studies may benefit from following one cohort of patients throughout their entire bariatric journey, having clearer inclusion and exclusion criteria, and implementing a larger sample of patients undergoing BCLS. We look forward to further research in this exciting field.

### Funding

None.

### Ethical approval

Not required.

### Declaration of Competing Interest

None declared.

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## RE: “Letter to the Editor Regarding “Evolution of the body image perception of people with obesity on the pathway from bariatric surgery to body contouring lift surgery”



Dear Sir,

We want to thank Lady Lorena Betancourt-Arias and colleagues for their letter to the editor<sup>1</sup>

Regarding the study population. In our study<sup>2</sup> we focused on woman because it created a homogeneous group. But also because the population of female patients is approximately 70%. We fully agree with the authors that investigating a group of men will be indeed interesting. This will be part of future study.

Regarding the six woman who left the study we had some follow up talks with them to find out the reasons behind the “Fat Stigma”, but unfortunately it was for this group not possible to find this out.

In every study there is a cutoff point in time. We agree with the authors that extending the period of research might give other interesting findings. Because of this comprehensive study we consider doing a follow up in the next year.

### Declaration of Competing Interest

None

### Funding

none

### Ethical approval

N/A

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## Response to letter to the editor regarding: "Long-term outcomes of latissimus dorsi flap breast reconstructions: A single-center observational cohort study with up to 12 years of follow up"



Dear Sir,

I read with interest the article in press titled Long-term outcomes of latissimus dorsi flap breast reconstructions: A single-center observational cohort study with up to 12 years of follow up. <sup>1</sup> This comparative series reports breast reconstruction outcomes following the use of either Implant-based Latissimus dorsi myocutaneous flap (LDMF) or LDMF alone. The BREAST-Q, a validated Patient Reported Outcome Measure (PROM) tool, is used to assess outcomes.

As surgical techniques for breast reconstruction advance, patient satisfaction measures are of key-importance when assessing the outcomes of a technique. Publication of mean PROM scores for each breast reconstruction technique provides a ‘benchmark’, against which we may evaluate our own performance and technical modifications. Despite a 37% increase in publications reporting PROMs in breast reconstruction in the last five-years, LDMF techniques are underrepresented in the published BREAST-Q outcomes data;

the majority of papers reporting implant-only techniques or abdominal tissue reconstruction. For this reason, this is a useful paper.

Recent meta-analyses of Breast Reconstruction PROMs outcome scores have combined autologous techniques, which limits their applicability to the individual patient.<sup>2-4</sup> A logical goal in breast reconstruction outcomes analysis is to establish a PROMs standard for each separate technique. If we are to do this, studies such as the one above must be presented in a way that facilitates meta-analysis and BREAST-Q scores must be reported using published guidelines. Doing so will ensure that the accumulation of BREAST-Q data by the research community can be brought together to inform further clinical research.<sup>5</sup>

When using the BREAST-Q, there is no overall or total Q-score, only scores for each independent scale. However, the above paper presents overall scores for the Breast-Q and illustrates these in Fig. 2. This is misleading as combined scores are not validated<sup>5</sup>.

On a similar theme, the authors report significantly higher 'overall satisfaction' in implant-based LDMF compared to LDMF alone. This statistic is misguided. Their results demonstrate that Satisfaction with Outcome was significantly higher in implant-based LDMF but Satisfaction with Breast was not. There is no BREAST-Q scale for 'overall satisfaction'. As a reader I can only presume the authors used a combination of some, or all, of the satisfaction domains relevant to LDMF reconstruction to produce an overall satisfaction score.

The 'satisfaction with outcome' scale has now been removed from the BREAST-Q V2-0. This scale questioned how patients' expectations were met and whether they would encourage others to undergo breast reconstruction, regardless of technique. A higher score could reflect better preparation or information provision, rather than a superior result.

Finally, this paper displays BREAST-Q scores for each scale as a box-and-whisker plot. This makes it impossible to accurately extract the mean, standard deviation and number of respondents for each scale and thus limits future meta-analysis.

I commend the authors for their project. Distribution of 199 surveys will have taken a significant amount of time and a mean follow-up time of 7 years (2-12) is an achievement. Personally, I wish more of the data collected had reached publication in numeric form, rather than illustrated in graphics. I would have liked to see presentation of the mean and standard deviation 'Q-scores' for each BREAST-Q scale, as well as number of respondents per scale separated into implant-based LDMF and LDMF alone. I hope the authors will be given the opportunity to submit this additional data for publication.

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## Ethical approval

Not applicable.

## Declaration of Competing Interest

None.

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