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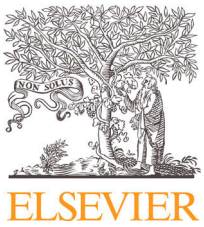

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Correspondence and Communications

# Current practices in peri-operative free flap anticoagulation and post-operative monitoring of microsurgeons in USA

*Dear Sir,*

The free flap composite tissue transfer is a corner-stone operation in the field of plastic surgery. This seemingly impossible surgery, first conceptualized by Harry Buncke in 1964,[1] has become commonplace, with 15,000 free flap surgeries performed in USA annually.[2] These surgeries are paramount to achieving successful reconstruction for defects caused by tissue-deforming wound infections, trauma, and complex oncologic resections. Due to its widespread popularity, free flap surgeries have been adopted by surgeons from various training backgrounds including plastic, oral and maxillofacial, orthopaedic, ear nose and throat, head and neck, and soft tissue sarcoma fields. Due to variety in training, there exists a variation in techniques of performing free flap surgeries. Despite its popular utilization, free flaps continue to carry significant complication rates, reported to be as high as 20.2–40%. Some contributing factors such as prolonged OR time and obesity have been elucidated, however there is currently no consensus on peri-operative management regarding anticoagulation and post-operative monitoring of free flaps.[3]

Numerous methods of monitoring are available: superficial Doppler, implantable Doppler, infrared spectroscopy, laser Doppler, indocyanine green, fluorometer, as well as older methods of tissue pricking, temperature monitoring and visual assessment. While the ideal monitoring method has not been established, recognizing post-operative thrombosis is critical. Salvage rates of thrombosed free flaps are improved drastically by early identification and intervention, with the majority of salvageable flaps identified within 24–72 h post-operatively.[4] While studies have examined the use of peri-operative anticoagulation, its role and overall treatment strategy is not well established.

We surveyed members of American Society of Plastic Surgeons in USA, with a 23% response rate (169/740) and assessed their standard practices. Roughly half of surveyed microsurgeons had been fellowship trained (52.9%), the amount of free flaps performed yearly ranged from <5 (18%), 5–20 (38%), 20–50 (22%), >50 (22%) and years of experienced ranged from <5 (2%), 6–10 (17%), 11–15 (27%), 16–20 (21%) and >20 (33%). We found that majority of microsurgeons do not use pre-operative (79.71%) or intra-operative (56.52%) anticoagulation. Those who use anticoagulation pre-operatively most often use Aspirin, followed by Lovenox and Dextran. Those who are less likely to use pre-operative anticoagulation include microsurgeons who perform >5 flaps/year (38% vs. 13–23%) as well as fellowship-trained microsurgeons (76% vs. 82% of non-fellowship-trained microsurgeons).

From the minority of surgeons who utilize intra-operative anticoagulation, most use intravenous heparin (28.99%), followed by Dextran, Aspirin, and Lovenox. Microsurgeons who perform >15 flaps/year use anticoagulation more often prior to anastomosis (37% vs. 30% of microsurgeons who perform <15 flap/year). Those who perform >50 flaps/year are less likely to use anticoagulation intra-operatively compared to surgeons who perform <50 flaps/year: both prior to and after anastomosis (29% vs 35% and 3% vs 13%, respectively).

However, the majority of surgeons do use anticoagulation post-operatively (71.01%). The post-operative anticoagulant of choice is Aspirin, followed by Lovenox, Dextran, Heparin drip, and Xarelto. The duration of anticoagulation most commonly administered is >7 days (35.51%), followed by 3–4 days, 4–7 days, 1–2 days and <1 day (Figures 1 and 2).

Postoperative free flap monitoring is most often performed by Doppler (43.17% for non-buried and 61.19% for buried flaps), and only a minority (12.95%) are monitored by visual examination alone. Length of post-operative monitoring for both buried and non-buried flaps include 1–3 days (43.88%), 3–7 days, until discharge, and <1 day.

In summation: the current practice of US microsurgeons does not include routine use of preoperative or intra-operative anticoagulation. This practice is accentuated with increased experience in free flap surgery. Postoperative anticoagulation is used by most US microsurgeons, with an increased number used by fellowship-trained surgeons. The majority of US microsurgeons use Doppler for monitoring flaps, for a duration of 1–3 days.

Are current practices of US microsurgeons in line with evidence-based literature for postoperative free flap monitoring? This seemingly simple question is challenging to answer. It is reported that the vast majority of free flaps that are destined to fail do so within the first 24 h (82%), with 96% discovered within 72 h. A minority are discovered up to a week postoperatively, which have lower chances of rescue (33%, compared to 85% salvage of flaps discovered within 72 h).[5] Therefore, it is reasonable to conclude that both active monitoring and anti-coagulation beyond three days is not beneficial. Our survey confirms that current practices for free flap monitoring are in line with this theory, with the majority of microsurgeons monitoring free flaps for 1–3

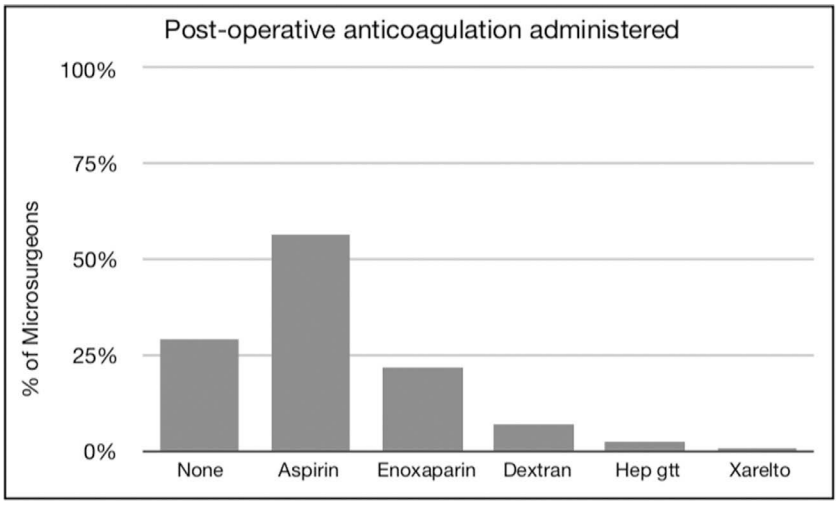


**Figure 1** Post-operative anticoagulation agents administered.

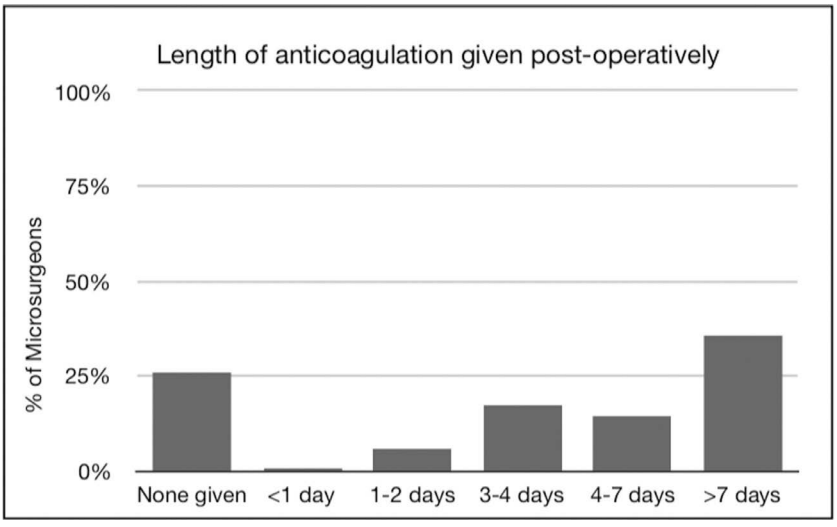


**Figure 2** Length of administration of post-operative anticoagulation agents.

days. However, post-operative anticoagulation is extended to greater than 7 days by most US surgeons, perhaps unnecessarily so.

## Declaration of Competing Interest

None declared.

## Funding

Erie County Medical Center.

## Ethical approval

Not required.

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# Anatomic location of a sensory nerve to the profunda artery perforator (PAP) flap: A novel option for sensate autologous tissue reconstruction

*Dear Sir,*

The field of sensate autologous reconstruction is rapidly expanding. The renewed public interest in providing and expediting the return of breast sensation and the availability of cadaveric nerve grafts have both led to a surge in research. Autologous breast reconstruction typically utilizes an abdominal donor site and the majority of research in sensate autologous tissue has been performed in DIEP or TRAM flaps. However, not all patients are candidates for or desire abdominally-based autologous breast reconstruction. We have previously published our experience in cadaver models demonstrating the reproducible location of sensory nerves to the medial thigh, lateral thigh SGAP and IGAP flaps.[1-3] In this study, we sought to determine the anatomical location and ease of dissection of the sensory nerve(s) to the profunda artery perforator (PAP) flap.

Four bilateral cadaveric dissections were conducted to locate the sensory branch to the PAP flap. The distance between the nerve and pedicle as they exited the muscle fascia was recorded. On the flap surface, the distance from the nerve and pedicle entry points and the distance of the nerve from the midline and the sacrum were recorded. Flaps had one to two sensory nerves which routinely branched from the posterior cutaneous nerve of the thigh. Nerves displayed diversity in regards to direction of travel after branching with some traveling medially prior to entering the flap and others immediately entering the subcutaneous tissue of the flap. Nerves emerged from the muscle on average 6.1 cm (SD 1.0 cm, range 4–7 cm) lateral from the pedicle. When measured on the flap surface, nerves entered on average 8.3 cm (SD 2.1 cm, range 4.5–11 cm) from the midline, 6.2 cm (SD 3.7 cm, range 2–16 cm) from the pedicle and 16.6 cm (SD 1.4 cm, range 14–18.5 cm) caudal from the sacrum (Figures 1 and 2).

Unless a microsurgeon is familiar with the location of a potential recipient sensory nerve to a given flap, the nerve is likely to be transected or sensate reconstruction will not be attempted. The PAP flap utilizes excess skin and fat below the gluteal crease based on a perforating vessel based on a branch from the profunda artery. Cadaveric studies have demonstrated a reliable perforator that pierces the fascia within 8 cm of the gluteal crease.[4] In a study of 96 patients undergoing 164 PAP flaps for breast reconstruction, the average flap weight was 367.4 g and the average pedicle length was 10.2 cm.[5] However, the PAP flap, to our knowledge, has yet to be utilized for sensate reconstruction. In this article, we discuss the reliable location of a

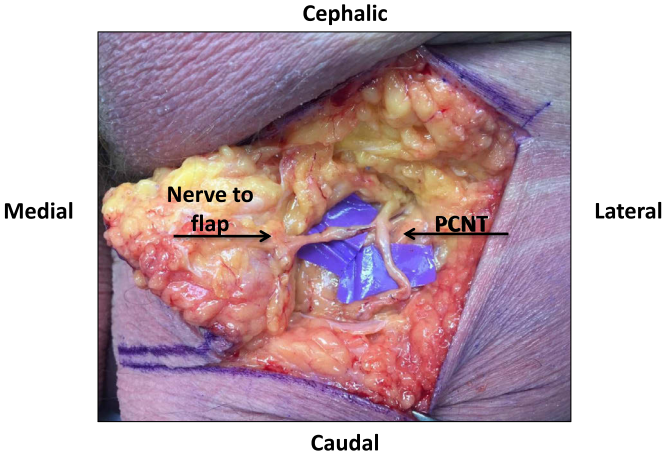


**Figure 1** Location of sensory branch to PAP flap branching off the posterior cutaneous nerve of thigh (PCNT).

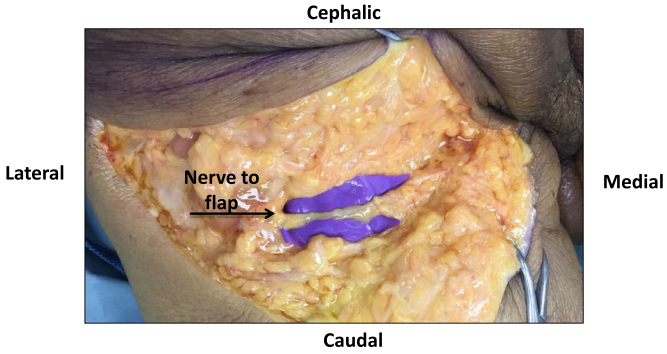


**Figure 2** Location of sensory branch to PAP flap branching off of posterior cutaneous nerve of thigh (PCNT) with long medial course prior to entering flap.

sensory nerve to the PAP flap emerging from the posterior cutaneous nerve of the thigh. Unlike our previous work in SGAP and IGAP flaps, this nerve did not travel with the perforator, but rather, exited the muscle fascia lateral to the perforator. Once exiting the fascia, there was variability of the nerve's route prior to entering the substance of the flap. However, we found the nerve easy to locate when dissection proceeded laterally to medially in the suprafascial plane. In conclusion, this is the first study to report on the consistent location of a sensory nerve to the PAP flap. We hope this report will enable surgeons to expand their options for performing sensate breast reconstruction.

## Declaration of Competing Interest

The authors have no disclosures.

## Funding

n/a.

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# The width of pedicle included in reverse dorsoradial flap of the thumb: As wide as possible?

*Dear Sir,*

A great many causes can result in dorsal soft tissue defects of the thumb. The reverse homodigital dorsoradial flap, initially described by Moschella in 1996, is a useful choice for reconstructing dorsal loss of the thumb. [1] As we observed in our practice, venous congestion was the most prevalent complication which was always ascribed to compression of pedicle. Many studies have indicated that the pedicle should be dissected as widely as possible to secure adequate venous return. [2] However, we believe that it plays a limited role in improving its venous drainage. On the contrary, the bulky pedicle will reduce the flexibility of flap rotation and provide a poor cosmetic result. A better understanding of narrow but suitable width of pedicle will make the procedure safer and more efficient.

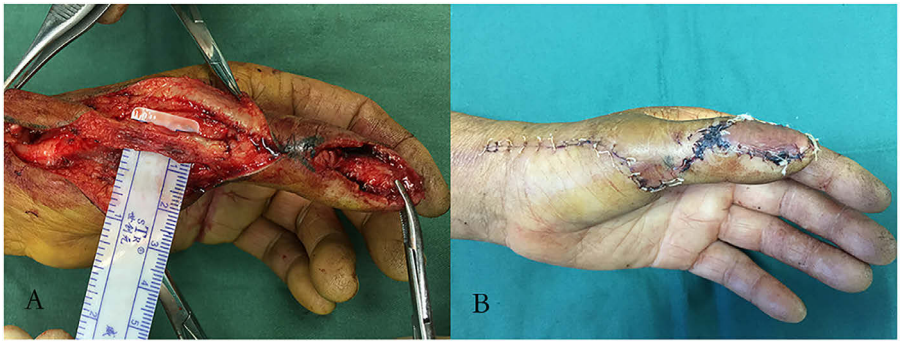


**Figure 1** (A) The narrow but suitable width of pedicle. (B) Postoperative view at 7 days.

In this study, we present our experience on reconstructing dorsal thumb defects by using the homodigital dorsoradial flap with a narrow vascular pedicle and modified incision.

## Surgical technique

The surgical procedure was performed under axillary block with pneumatic tourniquet control. The skin island, according to the size of the defect, was outlined over the dorsal radial side of the first metacarpal. The axis of the flap lied at the radial border of the first metacarpal bone. The rotation point was then drawn on the middle third of the proximal phalanx. The initial incisions were made along the proximal edges of the flap. The flap was dissected down to the level of the paratenon in a proximal to distal direction. A large Z-shape skin incision and a suitable separation under the dermis was used between the defect area and the distal end of the flap. Then a triangular flap was formed with the base at the middle axis of the thumb and the apex at the MP joint crease. The subcutaneous pedicle was dissected beneath the triangular flap. Then, radial branch of the superficial radial nerve should be identified. The nerve is very near the dorsoradial digital artery, so no attempt should be made to deliberately dissect the artery. A strip of subcutaneous tissue 0.7–0.9 cm in width and the radial branch of the superficial radial nerve should be involved in the pedicle (Figure 1(A)). Afterwards, the pedicle was raised to the pivot point and the flap was carefully sutured in tension-free fashion. All the donor-site wound and pedicle area could be directly sutured (Figure 1(B)).

## Discussion

The reverse homodigital dorsoradial flap is a useful procedure for thumb reconstruction. Current literature reports that a wide strip of subcutaneous tissue should be included in pedicle to guarantee venous outflow.[3,4] However, the wider the pedicle, the more difficult it could be directly closed with no compression. Leaving the bare region of the pedicle partially open is a solution to take pressure off the pedicle, but healing by secondary intention prolongs rehabilitation which will limit the activities of the thumbs. In addition, skin grafts can be used to relieve the pressure of the pedicles, however, the bulky pedicle is not aesthetically acceptable to many. Alternatively, a wide skin bridge of the flap could be designed for coverage of bulky pedicle, but it will undoubtedly increase the area of the invalid region, have a poor aesthetic result and damage the donor site. The goals of treatment for thumb should include not only reconstruction of function but also reconstruction of preinjury aesthetic appearance. Awareness of that problem encourages a narrow vascular pedicle of the flap so that the pedicle area is closed primarily and has an excellent cosmetic result. To the best of our knowledge, few reports accurately define the exact width of pedicle, which is a crucial step for the creation of reverse dorsoradial flaps.

In this study, all the pedicle area could be directly sutured. The width of the pedicle was 0.7–0.9 cm and the narrow pedicle had the added advantage of a greater freedom of mobility. The complication rate of venous congestion of the dorsoradial flap in our series (of 18 patients) was 22.2%. Moschella et al. and Sun et al. reported the incidence of complication was approximately 25 and 33.3%, respectively, in their series.[1,2] This finding may suggest that tiny venules and capillaries embedded in this narrow pedicle seem to be sufficient for venous drainage and less prone to compression. Besides, instead of traditional linear incision or lazy-S incision, a large Z-shape skin incision has been performed in our cases. The pressure on the pedicle could also be relieved owing to this modified incision.[5]

The reverse homodigital dorsoradial flap with a narrow vascular pedicle has a greater freedom of mobility and provides a good aesthetic outcome. Besides, the use of a modified large Z-shape skin incision is a simple and effective technique to relieve the compression on the pedicle.

## Declaration of Competing Interest

None declared.

## Funding

None.

## Ethical approval

Informed consent was obtained from the patients.

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# Virtual surgical planning in fibula free flap reconstruction of head and neck defects: Advice to novice surgeons

*Dear Sir,*

I read with interest the paper entitled: "Virtual surgical planning in fibula free flap head and neck reconstruction: A systematic review and meta-analysis".[1] I would like to congratulate the authors on the publication of their remarkable review. Tremendous effort has been made to minimize bias, and great care has been taken in crafting the messages interpreted from the review.

There are a few points worth sharing, however, to aid in planning future studies, to provide fresh perspective, or to caution novice surgeons about the virtual surgical (VSP).[2]

One important point is the conversion of VSP into free hand approach or "failure" of VSP. This is rarely, if ever mentioned in the literature. As a surgeon trained in both techniques, sometimes an error in the VP plan is encountered, or modification in the resection plan occurs, and in other occasions different recipient vessels need to be selected. When this happens, should not be held against VSP? And, if it happens to inexperienced hands, who have not mastered free hand technique, what gets compromised and how much the patient suffers?

Another element is the fibula flap design itself. Which group included more cases of fibula with soleus muscle? The point is while clearly VSP aids in making a complex reconstruction simpler, this simplified complexity could be limited to the number of osteotomies. But when it comes to complex defects requiring multi-component flap transfer, we have no answer.

Accuracy is "a given" in VSP, but how much accuracy do we need? Is a seamless contact a must for bone union? Are multiple osteotomies mandatory for adequate functional outcomes and good QoL? And, are there other important factors? Hidalgo and Pusic pointed out that the soft tissue status plays an important role in patient's satisfaction whether the skeleton was symmetrical.[3] So, are we overemphasizing the strengths of VSP while omitting its weaknesses? It could be worth investigating which of the approaches, free style vs. VSP, was utilized more in extensive oromandibular defects? Soft tissue remains a challenge to us, the experienced, not bony reconstruction, neither contouring of the fibula.

The review has not omitted reporting on the possible impact surgeon's experience and complexity of cases could have had on outcomes, and I strongly believe that any meaningful comparison study should only be performed by those who are equally experienced in both, in cases of comparable complexity.

Finally, and this is a recommendation to novice and young surgeons, there is no short cuts in learning oromandibular reconstruction with vascularized bone. Yes, it is good to find an easy way to do it, but if you do not learn the conventional method, you are cheating yourself, and you are denying yourself the privilege to refine VSP and CAD-CAM technologies to a next level.

Once again, I commend the authors on their work, and thank the journal for the opportunity to provide a different perspective, and I hope readers will find the papers and comments useful.

## Declaration of Competing Interest

The author has no conflict of interest to declare.

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# The impact of rhinoplasty on observer attention before and after rhinoplasty

Despite the development of several ideal angles and ratios, how the face is perceived by a naive observer is not clear. Eye tracking technology offers an objective method to track the viewer's attention. This is the first study using an eye tracking system to compare observer attention to faces before and after rhinoplasty from different profile views.


## Material and method

A total of 88 adult subjects (44 male) were included. The color profile photographs of 7 women and 7 men were randomly selected from the database. SensoMotoric Instruments system and BeGaze software was used. Areas of interest (AOI) were defined (Figure 1). Total count and duration of fixations in each AOI were calculated. Higher fixation frequency on particular area can be indicative of greater interest in that area.

### Fixation counts

Analysis of fixation counts and duration (Table 1) demonstrated that before rhinoplasty, dorsum, tip and left eye were top major areas of interest in the anterior view. After rhinoplasty, the average fixation counts on dorsum decreased significantly and dorsum was the third major area of attention.

In the inferior view, tip, infra lobular and upper lip, were the major areas of attention before and after rhinoplasty.

In the left lateral view, medial cheek, lower eye lid and eye were the top areas of interest before and after rhinoplasty. The average fixation count on dorsum decreased significantly in this view.

In the right lateral view, medial cheek, lateral ala and upper eye lid were the top three areas before and after rhinoplasty. The average fixation count on dorsum and lateral nasal wall decreased significantly and this index on ala and columella increased significantly.

The average fixation count of all AOIs located in the right side of the viewer (left hemi face) both in the anterior and inferior view were higher than the correspondent AOIs located in the left side (right hemiface) before and after rhinoplasty. Moreover, in the lateral view, the AOI located in the right side of the viewer had higher average fixation count compared to the correspondent AOI in the opposite side before and after rhinoplasty.

### Fixation duration

Based on fixation duration, tip, left eye and dorsum were the top three areas of attention before rhinoplasty in anterior view. After rhinoplasty, tip, left eye and right upper eye lid were major areas of attention. The average fixation duration on dorsum decreased although not statistically significant. The average fixation duration on left ala was significantly increased.

In the inferior view, columella, tip and left ala were major features of attention before and after rhinoplasty. The average fixation duration on the columella increased significantly after rhinoplasty. No statistically significant change was observed in lateral views.

The average fixation duration in AOIs located in the right side of the viewer in all views were higher than the correspondent AOIs located in the left side before and after rhinoplasty.

## Discussion

Eye tracking studies showed that the preferred fixation areas on face are eyes, nose and mouth. Hsiao showed that the center of the nose was the preferred viewing area in face recognition.[1] Kelly found that while Caucasians prefer to look towards the eyes and mouth, Asians prefer to look at the nose.[2]

The general assumption is that facial deformities are distracting to the observers. Godoy showed that there were no differences in attention to the nasal area between the postoperative crooked nose and the normal noses.[3]

In this study, as predicted, the first fixation point was located at the center of the image. Analysis of fixation counts showed that after rhinoplasty, the attention that was directed to the dorsum significantly decreased in the anterior and lateral views. This is interesting, given a recent study by Most that demonstrated the importance of dorsal reduction in social perception, in comparison to manipulation of the tip in lateral view.[4] Analysis of fixation duration revealed an

**Table 1** Analysis of fixation counts and duration.

| AOI | Fixation counts (mean) | | | | | | | | Fixation duration (mean) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Anterior | | Inferior | | Right | | Left | | Anterior | | Inferior | | Right | | Left | |
| | Before | After | Before | After | Before | After | Before | After | Before | After | Before | After | Before | After | Before | After |
| 1. Left upper eyelid | 8.90 | 9.40 | 5.70 | 5.54 | - | - | 10.64 | 10.92 | 331.64 | 328.59 | 290.50 | 289.58 | - | - | 385.50 | 416.23 |
| 2. Left lower eyelid | 5.55 | 6.14 | 4.35 | 4.81 | - | - | 12.88 | 11.62 | 328.92 | 323.24 | 312.87 | 273.91 | - | - | 336.60 | 343.73 |
| 3. Right upper eyelid | 6.95 | 7.45 | 5.34 | 5.61 | 11.02 | 11.07 | - | - | 310.73 | 362.88 | 316.52 | 267.27 | 373.08 | 413.83 | - | - |
| 4. Right lower eyelid | 3.92 | 4.27 | 3.44 | 3.67 | 10.09 | 10.21 | - | - | 272.87 | 275.01 | 302.29 | 262.43 | 325.64 | 329.35 | - | - |
| 5. Right lateral cheek | 0.87 | 1.02 | 0.75 | 1.10 | 6.56 | 5.67 | - | - | 109.24 | 163.58 | 95.75 | 110.48 | 307.63 | 249.68 | - | - |
| 6. Left lateral cheek | 1.40 | 1.55 | 1.32 | 1.56 | - | - | 5.63 | 4.72 | 162.71 | 219.85 | 107.28 | 153.64 | - | - | 278.81 | 278.70 |
| 7. Right eyebrow | 3.96 | 4.09 | 2.02 | 1.47 | 5.04 | 4.47 | - | - | 252.57 | 250.83 | 203.92 | 145.67 | 276.46 | 320.07 | - | - |
| 8. Left eyebrow | 5.52 | 4.98 | 2.25 | 2.00 | - | - | 5.52 | 5.67 | 308.38 | 289.89 | 180.00 | 163.39 | - | - | 291.61 | 325.34 |
| 9. Forehead | 12.61 | 10.13 | 4.03 | 2.85 | 6.97 | 6.37 | 10.42 | 8.70 | 290.54 | 297.53 | 268.79 | 199.37 | 309.70 | 263.93 | 285.49 | 319.58 |
| 10.Right medial cheek | 1.65 | 2.25 | 1.39 | 1.70 | 21.28 | 20.04 | - | - | 186.74 | 208.18 | 147.44 | 169.46 | 283.99 | 268.54 | - | - |
| 11. Left medial cheek | 4.36 | 5.11 | 2.37 | 2.02 | - | - | 26.79 | 25.96 | 250.08 | 252.74 | 226.23 | 186.06 | - | - | 283.29 | 275.28 |
| 12. Columella | - | - | 12.35 | 12.51 | **2.12** | **2.88** | 2.89 | 3.39 | - | - | **457.19** | 541.12 | 379.90 | 341.74 | 307.79 | 310.25 |
| 13. Philtrum | 5.10 | 5.43 | 7.17 | 7.39 | - | - | - | - | 314.58 | 353.33 | 362.35 | 370.21 | - | - | - | - |
| 14. Right lateral upper lip | 1.03 | 1.52 | 0.67 | 0.84 | 6.45 | 7.38 | - | - | 156.22 | 190.29 | 147.87 | 155.33 | 351.47 | 329.63 | - | - |
| 15. Left lateral upper lip | 2.39 | 2.64 | 1.87 | 2.05 | - | - | 4.86 | 4.89 | 245.32 | 240.09 | 213.71 | 232.35 | - | - | 292.65 | 307.67 |
| 16. Radix | - | - | - | - | 4.35 | 4.10 | 3.68 | 3.90 | - | - | - | - | 339.13 | 329.48 | 313.56 | 331.59 |
| 17. Dorsum | **17.09** | **14.70** | 1.67 | 1.52 | **5.88** | **4.45** | **3.95** | **2.64** | 354.84 | 326.02 | 255.70 | 298.02 | 360.97 | 330.58 | 295.50 | 253.25 |
| 18. Right nasal side wall | 3.90 | 4.00 | 0.53 | 0.56 | 8.71 | 6.36 | - | - | 275.14 | 273.86 | 104.42 | 100.81 | 346.70 | 341.91 | - | - |
| 19. Left nasal side wall | 6.44 | 5.54 | 0.89 | 0.95 | - | - | 9.03 | 8.80 | 321.68 | 299.49 | 130.56 | 151.37 | - | - | 313.56 | 334.86 |
| 20. Tip | 15.21 | 15.31 | 14.20 | 13.19 | 5.10 | 4.89 | 3.70 | 3.52 | 393.83 | 398.73 | 454.80 | 442.50 | 322.97 | 349.86 | 300.04 | 321.98 |
| 21. Right ala | 0.60 | 0.95 | 8.05 | 7.72 | **12.44** | **15.01** | - | - | 103.43 | 162.03 | 325.27 | 357.29 | 378.70 | 421.21 | - | - |
| 22. Left ala | 1.85 | 2.25 | 11.87 | 11.25 | - | - | 10.55 | 11.19 | **178.37** | **266.49** | 384.87 | 404.97 | - | - | 395.07 | 383.69 |
| 23. Upper mucosal lip | 3.70 | 3.57 | 11.97 | 12.02 | 2.21 | 2.85 | 2.03 | 2.15 | 298.94 | 301.90 | 344.05 | 349.29 | 305.49 | 317.01 | 233.13 | 279.88 |
| 24. Lower lip | 6.10 | 6.37 | 8.62 | 9.93 | 3.62 | 4.40 | 3.34 | 3.55 | 318.91 | 327.11 | 306.76 | 312.56 | 292.35 | 324.60 | 286.01 | 297.65 |
| 25. Mentum | 1.19 | 0.90 | 5.42 | 4.59 | 1.07 | 1.01 | 0.87 | 0.80 | 165.60 | 131.35 | 313.68 | 299.45 | 145.84 | 134.67 | 88.82 | 96.08 |
| 26. Right eye | 8.97 | 10.34 | 9.56 | 9.42 | 9.63 | 10.39 | - | - | 353.60 | 344.43 | 348.01 | 352.05 | 473.22 | 454.11 | - | - |
| 27. Left eye | 14.43 | 15.25 | 10.57 | 10.23 | - | - | 10.76 | 11.31 | 373.11 | 380.75 | 344.92 | 357.92 | - | - | 465.69 | 482.66 |

*Statistically significant changes are highlighted.

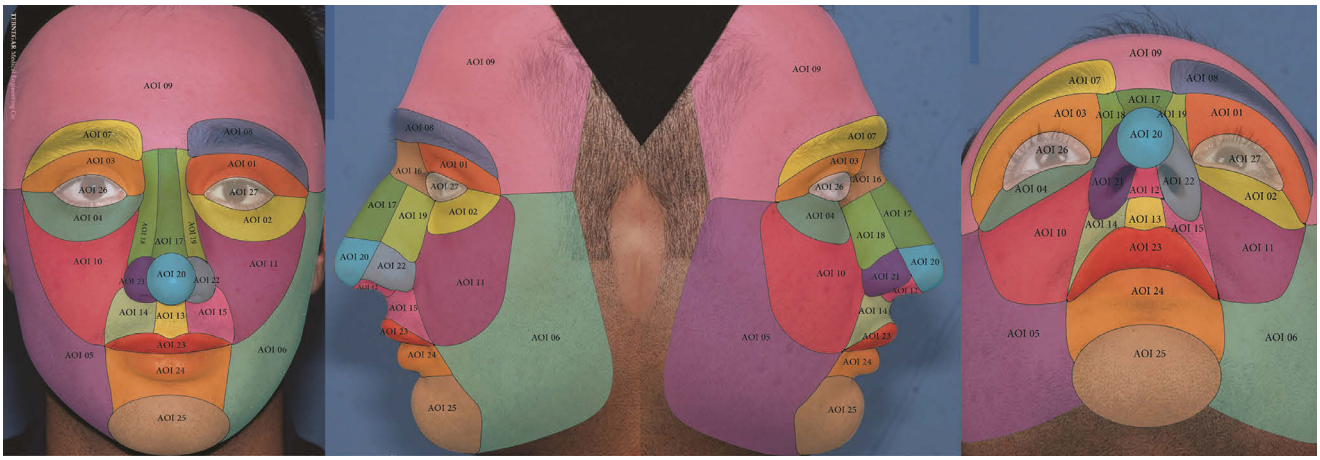


**Figure 1** Areas of interest. Anterior, inferior, right and left lateral views.

increase in attention to the left ala in anterior view and to the columella in the inferior view.

Comparing the attention to the AOIs located in the right side of the viewer (left hemiface) with the correspondent AOI in the left side showed a right-side bias. Previous studies also noted a greater movement on the left side of the face when expressing emotion which could explain why selfies and portraits are depicted mainly from the left side. Reading direction, in addition to hemispheric dominance modulate attentional direction and readers of right to left script showed a rightward bias.[5]

The study had some limitations. First, all viewers were right handed and Farsi readers (right to left script) which may limit generalizability. Second, our analysis method was based on averaged data, which did not capture individual differences.

In conclusion, this study indicated that the preferred fixation area on faces can change after rhinoplasty. Rhinoplasty can play a crucial role to decrease attention from nasal dorsum.

## Funding

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## Declaration of Competing Interest

None to declare.

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# Can plastic surgeons really tell what type of implant a patient is wearing?

*Dear Sir,*

Breast augmentation is the second most commonly performed aesthetic surgery in the United States and the use

This research was presented at the International Society for Aesthetic Plastic Surgery 24th Biennial Congress in Miami, FL, United States.

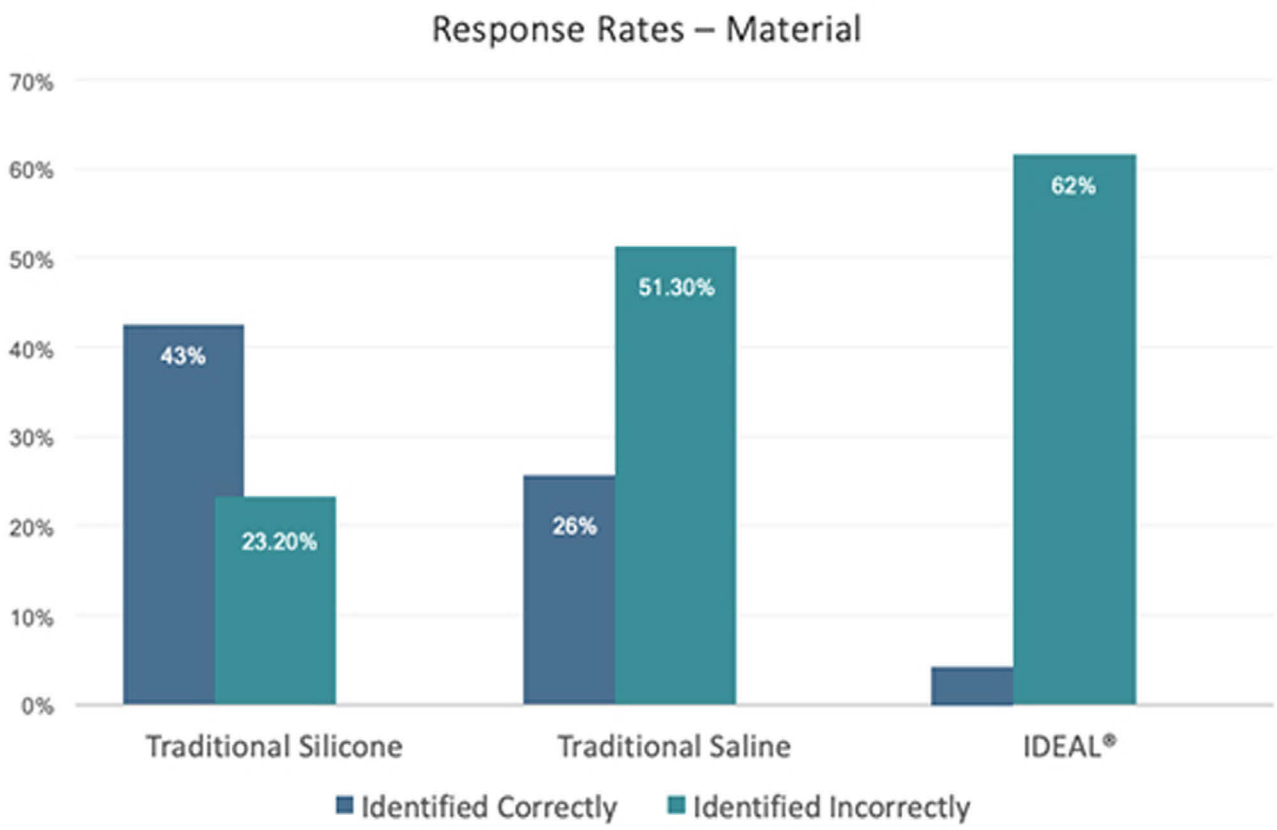


**Figure 1** Graph representing correct and incorrect response rates to implant material used. X-axis represents implant type and Y-axis represents percentage correct; traditional saline was incorrectly identified as traditional silicone 51.3% of the time; traditional silicone was incorrectly identified as traditional saline 23.3% of the time; IDEAL® (saline-based implant) was incorrectly identified as traditional silicone 62.5% of the time.

of different implant materials has changed over the years. Aesthetic goals and results in implant-based breast surgery vary widely based on age, geography, and surgeon preference.[1] Most surgeons have emphatically returned to silicone implants once the moratorium on them was lifted, claiming they yield identifiably better results. This is seen in the United States, where more than two-thirds of breast augmentations use silicone implants.[2]

There are limited studies suggesting a higher patient satisfaction with saline implants, possibly owing to their lower maintenance profile and the belief that they are generally safer.[3] It is well established that saline implants require less monitoring, have no risk of silent rupture and are easier to replace when damaged. However, there are to date no published studies assessing whether or not the suggested cosmetic benefit of silicone translates into real results. We propose the blinded evaluation of silicone vs. saline implants by board-certified plastic surgeons to determine whether or not the trained eye can tell the difference between the two, based on aesthetics alone.

We sent a HIPAA compliant survey to several surgeons throughout the Northeast Region of the United States. This survey contained three images (frontal, lateral and oblique views) of ten unidentifiable patients who underwent breast augmentation and surgeons were asked to identify which implant type and pocket placement were used. Seven patients had silicone-based implants and the remaining three had saline-based implants. Eight patients had implants placed in the sub-glandular plane, while two had sub-pectoral implant placement.

Despite surgeons believing that they can tell the difference between implant types based on looks alone, our survey revealed that plastic surgeons could correctly identify implant type less than one-quarter (22%) of the time. This was statistically significant, demonstrating that plastic surgeons in fact cannot tell the difference among them ($p < 0.001$). Figure 1 represents how frequently the implant types were incorrectly identified.

Interestingly, traditional silicone implants were correctly identified less than half the time (43%), with nearly one-quarter (23%) of respondents believing these were saline implants. Vice versa, saline implants were correctly identified one-quarter of the time, while nearly half of respondents incorrectly identified these as silicone implants.

An inability to accurately identify pocket placement, as reflected in Figure 2, was also appreciated, as it was correctly identified less than half (40%) of the time.

Many surgeons who frequently perform breast augmentation procedures will insist that their preferred implant type and pocket placement consistently yields optimal results. They are sure they could easily tell the difference based on looks alone, and often use this argument to steer patients toward his or her own preferred device. The fact that they cannot make that determination in any reliable

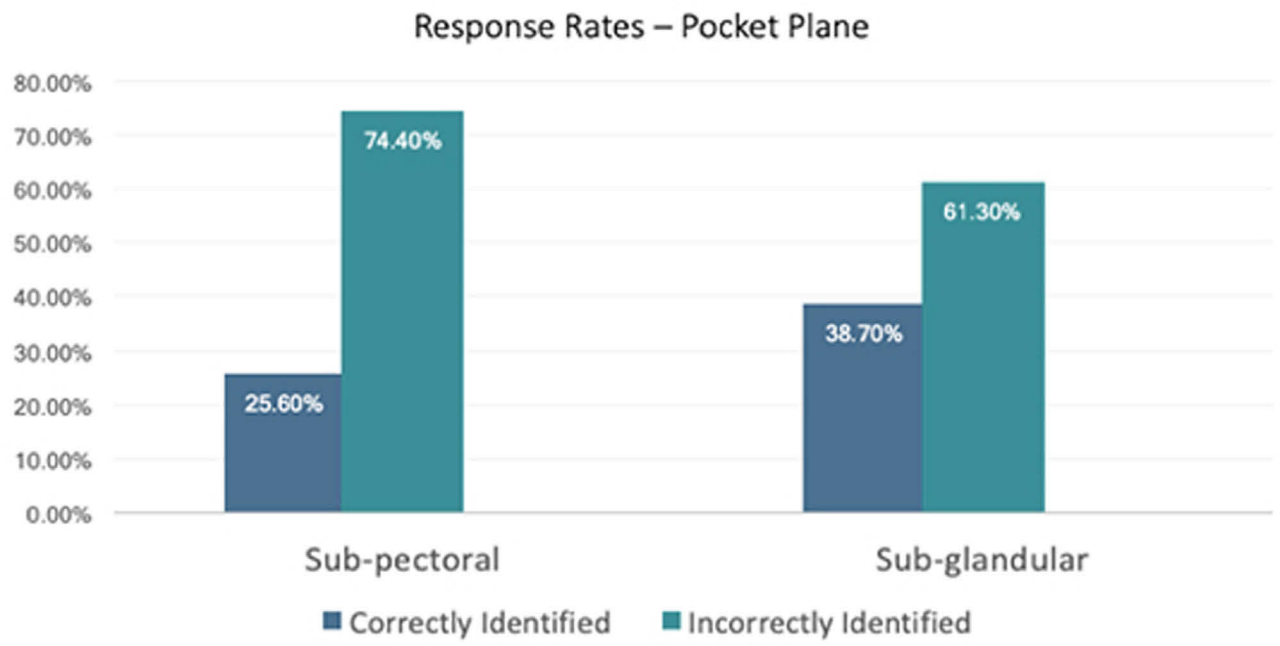


**Figure 2** Graph representing correct and incorrect response rates to pocket placement. X-axis represents pocket placement and Y-axis represents percentage correct; sub-pectoral placement was correctly identified 25.6% of the time; sub-glandular placement was correctly identified 38.7% of the time.

fashion suggests the conversation about implant types should be revisited, at least where aesthetics is concerned.

We hypothesized that a well-placed, appropriately sized implant could consistently yield excellent aesthetic results, regardless of implant type. While there is a discernible difference in contour and structure of implants, none is so significant that you could individually single out a result on those grounds alone. In our experience, making that determination would require a side by side comparison of the same patient with the same size implant in the same pocket with only the implant type being different. With this exception, there is no significant aesthetic benefit to silicone vs. saline implant use, nor sub-glandular vs. sub-pectoral placement.

Aesthetics aside, the decision of implant types should also take into consideration other issues such as cost and potential complications. It is well accepted that silicone implants carry higher potential complications; but there is also strong evidence that they are overall a higher cost product, besides their price on the market.[4] These secondary complications often involve reoperation and/or expensive imaging modalities such as MRI,[4,5] that tax both cosmetic patients and the self-pay healthcare system alike.

While the moratorium on silicone implants has long been lifted, we are currently revisiting potential hazards with regard to these devices. Newer materials and high-tech alternatives provide improvements on the past, but the long-standing concerns of silent rupture and immune response remain. With mounting evidence that silicone implants may be a more high-risk option, one must consider the apparent trade-off of their use. Similarly, given the potential for complications like double-bubble deformity, animation, or significant postoperative pain, the need for sub-pectoral placement seems equally questionable as a risk-benefit equation. Appropriate informed consent and patient counseling should offer a thorough and accurate review of each implant's concerns and likely outcomes, as well as short and long-term maintenance issues. With all of them yielding equally good cosmetic outcomes, perhaps the choice of which to use should be redirected away from aesthetics alone.

## Funding

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## Declaration of Competing Interest

Dr. Bartsich reports honoraria for speaking at a symposium for IDEAL® Implant. All other authors have no conflicts of interest to disclose.

## Ethical approval

Exempt by Flushing Hospital Institutional Review Board Committee.

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# The long-term results of polyacrylamide hydrogel for augmentation mammoplasty

*Dear Sir,*

Polyacrylamide hydrogel (PAAG) is a synthetic macromolecule material that had been widely used for breast augmentation in Asia. However, complications such as filler migration, infection, haematoma, and lumps were increasingly noticed.[1,2]

A study retrospectively study was conducted to evaluate the long-term outcomes of augmentation mammoplasty with PAAG from 2012 to 2017. Out-patient and in-patient charts were reviewed. The following data were collected: gender, address, age, medical history, image findings (mammography, Doppler ultrasound, or MRI), and pathology results. The pathology sections were re-evaluated by two senior pathologists.

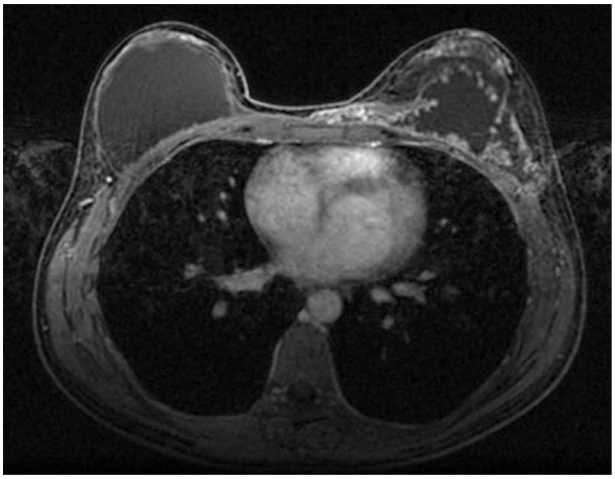

**Figure 1** Typical MRI images after PAAG breast augmentation.

A total of 346 women met inclusion criteria for this study. The age ranged from 22 to 71, with an average of 45.5 years old. A total of 189 patients (54.6%) chose to be put on follow-up and observe and the other 157 patients (45.4%) underwent surgery to remove the PAAG injections.

Mammography, ultrasound, and MRI could be applied after PAAG injection, among which MRI best locates and profiles the filler, providing the most information. PAAG gel is rich in its water component, as shown with a low signal on T1-weighted images and a high signal on T2-weighted images of MRI. We applied dynamic contrast-enhanced MRI (DCE-MRI) for further evaluation of PAAG-associated nodules for the first time. DCE-MRI was proved to have the highest overall negative predictive value (NPV) of all imaging techniques. It could safely exclude malignancy.[3] Sixteen patients received DCE-MRI to differentiate malignancy from benign nodules. Twenty eight nodules were tested with time/signal intensity curve. All lesions showed progressively rising time/signal intensity curve (type I), suggesting a benign origin. The typical radiological images were shown in Figure 1. However, the sample size in this study was not adequate to verify the relationship between PAAG injection and breast cancer.

The gross view of removed PAAG was either millet congee-like or jelly-like. Millet congee-like filler was the most common type of the extracted fillers in our patients. It has a yellow granular appearance, with good fluidity. The jelly-like filler has a transparent appearance, and much thicker compared to the millet congee-like filler. Under microscope, PAAG pools were stained blue in the H&E sections. The pools were surrounded by hypocellular fibrous tissue. Significant chronic inflammation was seen in cases without fibrous capsules, characterised by an infiltration of lymphocytes, plasma cells, and eosinophils (Figure 2). No breast cancer was observed.

Although PAAG has been banned for years, complications of this filler continued to emerge. Our study revealed that the PAAG filler had two different forms after years dwelling in the breast. Most of the publications reported only the millet congee-like filler.[4] We found that the jelly-like filler, with a transparent and sticky texture, was also common.

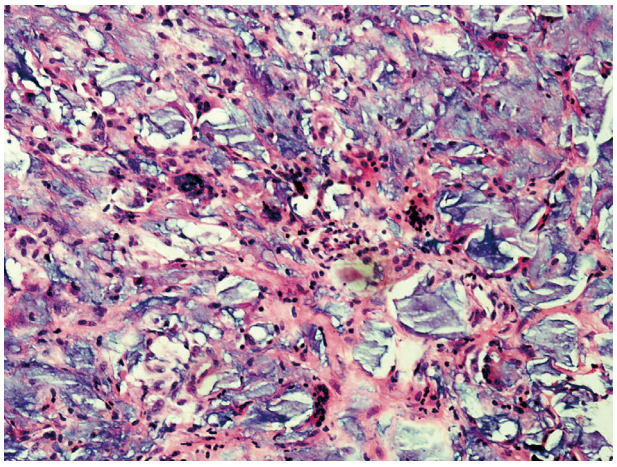

**Figure 2** Pathological changes of the breast after PAAG injection. PAAG mixed with the fibrous tissue, and a significant inflammatory reaction was noted (H&E stain, 100× magnification).

Each type has distinct physical characteristics. One possible explanation of this morphology difference is the extent of necrotic tissue mixed.

To our knowledge, this is the largest single centre study that focused on the clinical features and long-term outcomes of PAAG injection. We hope the findings of our study would serve to improve the understanding of PAAG and help surgeons and patients make proper treatment decisions.

## Declaration of Competing Interest

The authors have no disclosures to report.

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# Masseteric or facial nerve? Intricacies in dynamic facial reanimation

*Dear Sir,*

We read Roy and colleagues'[1] commendable systematic synthesis of the literature on the use of free Gracilis muscle transfer (FGMT) for dynamic reanimation with considerable interest. This letter addresses noteworthy findings from Greene et al.'s[2] work that captured long-term outcomes following FGMT in paediatric facial palsy.

The subtlety, versatility, and spontaneity of facial expression afford us an effortless, yet adulating interaction with the world. Thence, facial paralysis not only deprives those of this wonder, but also induces considerable psychosocial and functional morbidity.[3] The authors have eloquently surmised the rationale for smile restoration in facial paralysis, as it curtails negative perceptions and improves visual appeal.[1] The neurovascular gracilis free flap is the preferred donor for dynamic reanimation and the masseteric nerve is the most favoured non-facial donor nerve for coaptation.[3]

Consistent with Roy's meta-analysis, Greene reported a considerable improvement in smile excursion from baseline (−0.8 to 5.9 mm, $p = 8.2 \times 10^{-12}$) in 40 FGMTs (mean follow-up 42 months), and 15 patients reported a significant improvement in their quality of life ($p = 0.015$).[2] Notably, there were 4 (10%) FGMT re-innervation failures (<3 mm smile excursion), predominantly in those coapted with CFNG ($n = 3$), and 1 masseteric failure.[2]

In the cohort with long-term data ($n = 14$), comparison of outcomes between the CFNG and masseteric groups is more thought provoking. Early smile excursion in the masseteric group ($n = 6$, 1 failure) improved from mean 0.06 to 6.9 mm, however plateaued in the long-term at mean 5.6 mm.[2] Conversely, those in the CFNG group ($n = 8$) exhibited lesser smile excursion in the short-term (mean −0.2 to 4.4 mm) but continued to improve in the long-term (mean 6.9 mm).[2] Roy's systematic review underscores the differential smile excursion attained in masseteric (10 mm) and CFNG (6.8 mm) innervated FGMTs.[1] The co-authors' group (GB, RZ) have previously demonstrated this difference is attributed to considerably greater (3 fold) axonal density in the masseteric nerve than the downstream CFNG.

Smile spontaneity is a highly desirable component of smile reanimation and CFNG consistently affords this attribute unlike masseteric innervation, that the authors emphasized.[1] Thence, CFNG (when available) is preferable for re-innervation in smile restoration, especially in the paediatric population. Hadlock's group recently reported that masseteric innervation yields acceptable smile spontaneity[4] and is a credible alternative in setting of facial nerve unavailability, CFNG re-innervation failure, adults aged >30 years due to decreased potential for neural regeneration, or dual-innervation. Dual innervation circumvents the limitations of the individual CFNG and masseteric use, curtailing re-innervation failures, affording early improvement in resting facial tone, powerful, coordinated smile excursion, and spontaneity in <12 months.[5] Notwithstanding, further robust evidence is required to ascertain further intricacies including 1-stage or 2-stage procedure, and ideal coaptation pattern.

Greene's valuable study suggests that although smile excursion is more powerful and earlier with masseteric innervation, such excursion can be achieved with CFNG over a longer period; it is plausible that repeated stimulation (smiling) may induce motor recruitment or increase axonal regeneration through the graft over time – at least in the paediatric cohort. As the masseteric is not a native mimetic muscle donor, such continuous improvement may not be reproduced in masseteric innervated FGMTs.

Although Greene's[2] work was published beyond the systematic search period, we felt the findings are worth the attention of this *Journal's* readership.

## Declaration of Competing Interest

None.

## Funding

None.

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# Use of computed tomography in an upright position for preoperative planning in orbital wall fracture treatment: A pilot study

*Dear Sir,*

Enophthalmos is defined as a backward and downward displacement of the globe into the bony orbit. Clinically, more than 2 mm of enophthalmos is noticeable and a 5% increase in the total volume of the orbital cavity is sufficient to result in significant enophthalmos.[1]

To measure the degree of enophthalmos, Hertel exophthalmometry is a simple and easy method. Although it is widely used in clinical practice, this method is often associated with low accuracy and poor reproducibility.[2]

For this reason, there have been some attempts to use computed tomography (CT) to measure the orbital volume or proptosis quantitatively. However, conventional CT imaging is performed with the individual in the supine position. In the upright position, the globe is displaced downward due to the influence of gravity, whereas in the supine position, the amount of downward displacement is less and backward displacement is overcalculated by the influence of gravity. Therefore, in some cases, a good globe position cannot be obtained and an improvement in diplopia may not be achieved on performing surgery based on CT findings that has been performed in the supine position.

Recently, we developed a novel upright CT, which enables to obtain cross-sectional images of subjects in a standing and sitting position.[3]

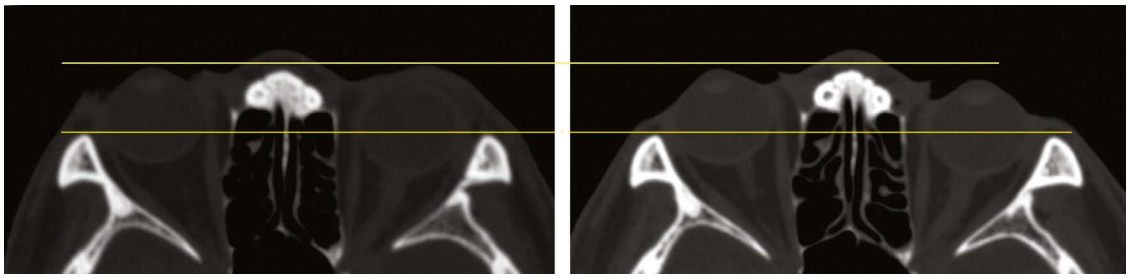

**Figure 1** Comparison of axial slice in the upright (left) and supine position. Each slice showed the center of the lens in the unaffected right eye. Note that the center of the lens in the affected left eye could not be detected in the upright position. On the other hand, the center of the lens in the affected left eye could be detected to the same degree as that of the right eye in the supine position. Furthermore, the affected left eye in the supine position was more depressed than that in the upright position.

We selected a 41-year-old male with a left-sided orbital floor fracture. Six month ago, he was punched by a stranger and visited out hospital. Initially, despite the fracture of the orbital floor, the herniation of orbital soft tissues into the underlying maxillary sinus was mild. Moreover, there were no subjective symptoms. Therefore, surgical treatment was deemed unnecessary. However, enophthalmos and diplopia gradually developed and progressed and he visited again for the purpose of treatment.

For preoperative evaluation of the orbital globe, the location of the orbit was assessed using conventional 320-detector row CT (Aquilion ONE, Canon Medical Systems, Otawara-shi, Japan), which was taken in the supine position for comparison. Immediately after the supine CT scan, we assessed the orbit using the upright CT (TSX-401R, Canon Medical Systems, Otawara-shi, Japan), in the sitting position. The scans were performed with the eyelids open and the eyes focused at a single point.

Slices were used to assess the globe position of the unaffected and affected sides. Using axial slice at the position where the center of the lens is reflected, the distance of the corneal apex from the level of the lateral orbital rim was measured as the horizontal degree of the eye. Similarly, using sagittal slice where the center of the lens is reflected, the distance of the lower edge of the globe from the level of the superior orbital rim was measured as the vertical degree of the eye. This study received approval from the relevant institutional ethics review board, and informed consent was obtained from the patient.

The physical variables for supine CT and upright CT were set at the same conditions, and the dose-length product for supine CT and upright CT were 1390.8 and 1110.3 mGy cm, respectively. The effective dose estimates for supine CT and upright CT were 3.2 and 2.6 mSv, respectively, which were determined by the dose length product measurements and appropriate normalized coefficients reported in the literature.[4] The quality of upright CT images was comparable to that of supine CT.

In the supine CT, the globe position of the unaffected side had a vertical degree of 5.26 mm and horizontal degree of 17.8 mm, whereas the affected side had a vertical degree of 3.37 mm and horizontal degree of 14.5 mm. In the upright CT, the globe position of unaffected side had a vertical degree of 4.91 mm and horizontal degree of 17.2 mm, whereas the affected side had a vertical degree of 2.11 mm and horizontal degree of 14.6 mm (Figure 1, extra).

Cone beam CT (CBCT) may be considered for imaging in the sitting or standing positions. Several reports have described the usefulness of CBCT for the diagnosis of facial fracture, including orbital fractures.[5,6] CBCT causes less radiation exposure than supine CT.[5] However, the expected soft tissue contrast is poorer on CBCT than on supine CT, although the conspicuity of facial bones is close to that in supine CT.[6] CBCT can be taken in the standing position and can reflect daily living conditions; however, incomplete evaluation of soft tissue can occur, even with a perfect repair of the orbital floor. Moreover, diplopia and enophthalmos cannot always be completely resolved because of soft tissue atrophy. In contrast, although a multi-detector row CT has high resolution, evaluation in the standing position is not possible, and the radiation exposure must be considered.

Recent advances in the technical aspects of these approaches have produced low tube voltage scans and iterative reconstruction can be obtained with low doses of radiation exposure. With little difference in radiation exposure, CT in a standing position has the advantages of both modalities; soft tissue can be evaluated which is an advantage of multi-detector row CT, and a upright position is possible reflecting the daily living conditions, an advantage of CBCT.

In conclusion, despite the inclusion of only one case in this report as upright CT is in the research phase, this modality could be useful for preoperative planning, postoperative evaluation, and assessing the normal ranges of the globe position in upright, “daily-life”, position.

## Funding

This study was supported by Canon Medical Systems (Otawara, Japan).

## Ethical approval

The present study was approved by the Institutional Review Board of Keio University School of Medicine (#20170134)

## Declaration of Competing Interest

Masahiro Jinzaki has received a grant from Canon Medical Systems. Canon Medical Systems has loaned the upright computed tomography machine to Keio University. However, Canon Medical Systems is not involved in the design and conduct of the study; in the collection, analysis, and interpretation of the data; and in the preparation, review, or approval of the manuscript. All other authors have no relationships with industry or other entities.

## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.bjps.2019.09.046.

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# Clinicopathological features of malignant melanoma of the skin among patients seen at Kenyatta National Hospital

*Dear Sir,*

Malignant melanoma results from malignant transformation of melanocytes. It is more frequently fatal, than the more common basal and squamous cell tumours of the skin, due to its intrinsic tendency to lymphatic and haematogenous metastasis.[1]

Although once considered uncommon worldwide, the annual incidence has increased over the last few decades. It is curable when diagnosed in its early stages, but poses a major challenge to physicians in advanced stages and can be fatal. While it is not the commonest of the skin cancers, it causes the most deaths.

There is paucity of data regarding the clinical and pathological characteristics of malignant melanoma in black Kenyans.

The objective of this cross-sectional descriptive study was to describe the clinical and pathological characteristics of malignant melanoma (melanoma) of the skin among black patients presenting to the Kenyatta National Hospital (KNH) over six months.

They were patients confirmed to have a histopathological diagnosis of melanoma, based on an incisional biopsy they had undergone in KNH, prior to enrolment into the study.

Of the 29 patients recruited, five patients did not undergo an excisional biopsy of their lesion for various reasons including falling out of clinic follow up and not presenting themselves for admission to undergo excision.

23 of the 24 patients analysed, had Fitzpatrick skin types 5 and 6, with one albino patient of Fitzpatrick skin type 1, a known predisposing factor.

70.8% were female, with a male female ratio of 1:2.4 which correlates with other studies.[2–4] They ranged in age

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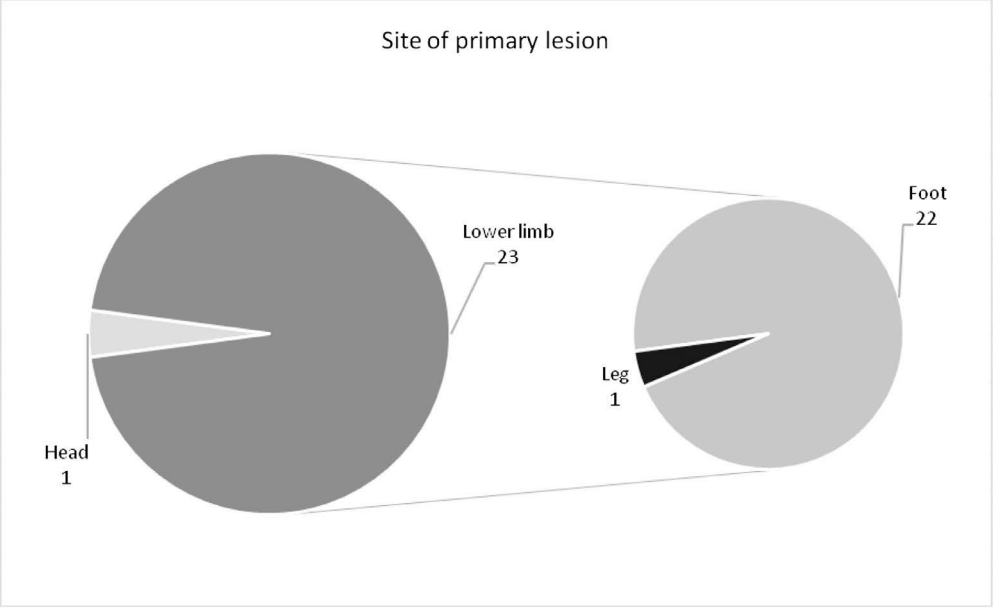


**Figure 1** Site of primary lesion.

| Stage | Male (n, %) | Female (n, %) | Total |
|---|---|---|---|
| I | 0 (0.0) | 3 (17.6) | 3 (12.5) |
| II | 3 (42.9) | 8 (47.1) | 11 (45.8) |
| III | 2 (28.6) | 4 (23.5) | 6 (25.0) |
| IV | 2 (28.6) | 2 (11.8) | 4 (16.7) |
| **Total** | **7 (100.0)** | **17 (100.0)** | **24 (100.0)** |

**Figure 2** Stage of disease.

from 38 to 90 years with a mean age of 62 years. Peak incidence was in the 6th and 7th decade of life. This correlates with findings by Hudson and Krige in a black South African population with a mean age of 60.5 years, range in age; 30 to 85 years, and peak incidence in the sixth decade.[5] Therefore, sun avoidance education and screening should target all age groups, young and old.

The commonest histopathologic subtype was acral lentiginous melanoma followed by nodular melanoma. The Hudson and Krige study also found superficial spreading melanoma.[5]

The commonest symptoms were swelling and ulceration, 95.8% of the lesions, were located in the lower limb especially on the foot, left more frequently affected than the right (Figure 1). An albino, had eyelid, ear and lip lesions.

Majority of the patients presented with stage two disease; mostly female, Followed by stage three disease, eleven and six respectively (Figure 2). 58.3% of the patients presented with T4b (Tumour) disease; in whom melanoma was thicker than 4 mm, with ulceration being prevalent across all T size stages.

70.8% had disease with a Breslow thickness greater than 4 mm. 54.2% of the patients presented with symptoms for 1–3 years.

Delayed presentation or advanced disease at first hospital contact in our patients is patient-related. Varying from financial difficulties experienced when accessing healthcare, to lack of community awareness on the importance of early reporting to hospital for timely diagnosis and treatment.

Our study demonstrated that the commonest melanoma molecular subtype across all age groups is ALM, followed by nodular melanoma.

Majority of the patients presented with late stage disease.

The poor prognosis in black Kenyans is the result of delayed presentation with thick primary lesions and advanced disease.

Clinicians need to embrace Sentinel Lymph Node Biopsy (SLNB) for tumours greater than 1 mm in depth, so that we can improve prognosis in our patients and reduce dissemination and recurrence of disease.

An active education program through both audio and visual media; in television, radio, social media platforms,

visiting primary, secondary and tertiary schools to disseminate information; about sun avoidance, importance of skin awareness and skin examination, and the screening of populations at high risk for melanoma, may reduce mortality through early management.

A larger long-term multicentre study would help to elucidate whether the clinicopathological features are different in a cohort of patients from other population groups in Kenya.

## Declaration of Competing Interest

None.

## Funding

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## Ethical approval

KNH and UoN Ethics Committee; P662/10/2015.

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# Relation between palatal index and the incidence of postoperative fistula in patients with complete unilateral cleft palate (a prospective cohort study)

*Dear Sir,*

Oronasal fistula has an incidence of 3–45% and it varied in shape from pinpoint, slit, and oval to a total dehiscence of the flap.[1] Fistula can be classified into seven classes which are (I) uvula, (II) soft palate, (III) at the junction of soft and hard palate, (IV) hard palate, (V) at junction between primary and secondary palate, (VI) palatal–alveolar, (VII) labial–alveolar.[2] Palatal index is the proportion between the width of the cleft (cleft severity) and the sum of the width of the two palatal segments (tissue deficiency). The index classifies in to mild (0–0.2), moderate (0.2–0.4) and severe (>0.4).[3]

In Materials & Methods, 30 patients between 6Ms and 24Ms with complete unilateral cleft palate where included. Measuring palatal index including: posterior, middle and anterior palatal index. Each patient with complete unilateral cleft palate underwent single staged 2 flap palatoplasty procedure. Patients were followed up during 1$^{st}$, 3$^{rd}$ week, 3$^{rd}$, 6$^{th}$, 9$^{th}$ month postoperative to evaluate fistula. Results showed association between palatal index and presence of fistula ($P < 0.0001^{*}$). The cases recorded mild index didn't developed fistula. In cases with mild palatal index no fistula appeared for both less and more experience surgeon. In cases with moderate palatal index fistula appeared 100% with less experience surgeon and in 50% with more experienced surgeon. In cases with severe palatal index fistula appeared 100% with more experience surgeon.

In the present study, we found that severity of clefting had an effect on the incidence of fistula in which 12 cases recorded mild index didn't developed fistula while 14 cases recorded moderate and sever index developed fistula. Our finding also was in agreement with other studies showed that palatal index was a system designed to estimate the secondary palate deformity by considering the cleft's severity and the tissue deficiency.[4] There was association between palatal index, surgeon experience and presence of fistula ($P = 0.021$). This study was in agreement with previous studies showed that there was an association between surgeon experience and fistula formation in which the skills of the operating surgeon due to more and more surgeries he had done so he had a significant lower effect on the incidence of fistulas, than did the resident surgeon.[5] We concluded that palatal index was a good predicator of fistula formation, this gave the surgeon information about the amount of soft tissue available for palatal flaps and its relation to the width of the cleft to be repaired (Figures 1 and 2).

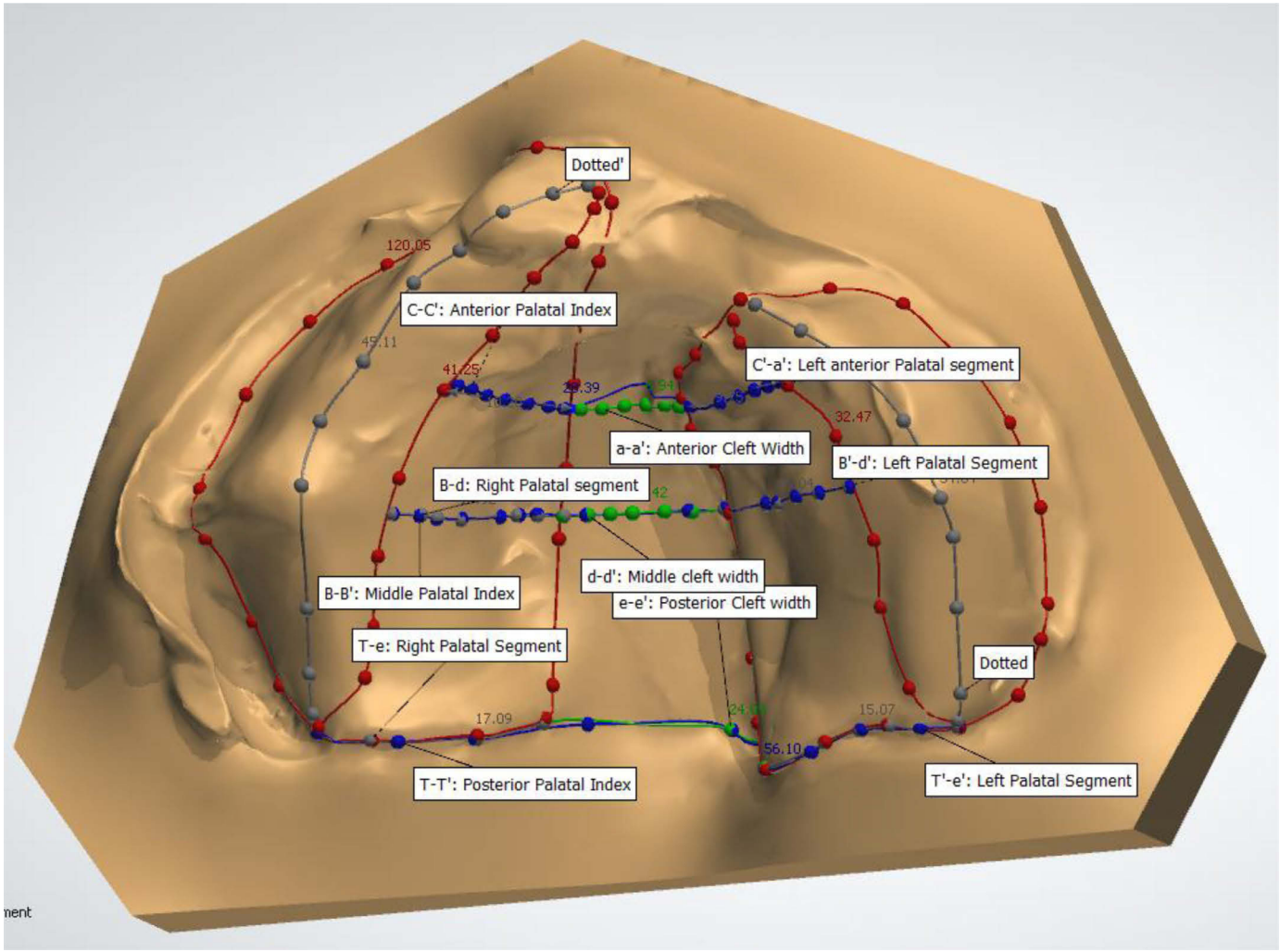


**Figure 1** Palatal index.

**Figure 2** Photograph showing surgical site 9 months postoperative.

## Declaration of Competing Interest

No competing interests were disclosed.

## Acknowledgments

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## Consent

Written informed consent for publication of clinical details and images was obtained from the patient's parent

## Grant information

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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.2019.09.042.

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# Reel it in: A readily available and high-fidelity model for microvascular training

*Dear Sir,*

Training in microvascular techniques is essential for plastic surgeons and many of our surgical colleagues, who may be expected to undertake procedures such as revascularisation, replantation and free tissue transfer routinely, in addition to composite tissue allotransplantation and supermicrosurgery within specialised centres.

Most trainees attend a formal course to learn the basic principles and undertake their first anastomoses, traditionally on the femoral vessels of a live murine model, although the femoral vessels of a fresh or defrosted chicken thigh represent a biological alternative.

Interval training has been reported to be more effective than massed training for skill acquisition.[1] Most of the additional training and practice that follows an initial course is undertaken locally within teaching hospitals. Here, a table-mounted microscope may be available in a dedicated area or laboratory that often adjoins one or more clinical areas. However, there are health and safety barriers to using biological tissue in an institutional environment, and logistical issues with its storage and disposal. Although microsurgical training in the home environment has been described as effective for basic skills acquisition, it is unusual for trainees to have ready access to high quality microscopes outside of their training institutions.[2]

Non-biological synthetic models are therefore essential for robust microsurgical training. For example, the popular 'round-the-clock' model uses a combination of embroidery needles and cut latex glove to enhance visuo-spatial awareness and hand-eye coordination at different depths and positions.[3] Others have used a latex sheet cut in 'I' and 'double-triangle' configurations to simulate the instability of vessel ends.[4] Alternative non-tubular models have included surgical gauze, Mepitel® dressings, beads, and Japanese noodles. Most synthetic models are non-tubular, and although synthetic tubular models have been developed, they come at significant expense.[5] To address this limitation, we explored the use of alternatives extensively before identifying our preferred solution.

A rig is a set of items attached to the end of a fishing line and may be custom made by anglers to help them catch individual species of fish. A 'hair rig' is used to suspend bait from the fishing hook so that the hook catches the inside of the fish's mouth even if the bait is ejected. Hollow silicone tubing is used by anglers to hold the 'hair' in place on the hook and prevent tangles in the line, which helps the hook to catch hold more effectively. Furthermore, silicone tubing is used to protect the fish if it contacts the line during the fight. The tubing's diameter, colour, and weight all impact upon its ability to conceal the line and reduce the risk of scaring off the fish.

Silicone rig tubing has not previously been described for use as a microvascular simulation training model and has numerous advantages. It represents a high quality simulacrum of a human vessel with a relatively thin wall and large lumen (in a similar ratio to human vessels); it offers resistance to the passage of a suture needle but is friable and can tear with inappropriate handling, mimicking the delicate nature of human vessels; it is available in a multitude of gauges (1–3 mm external diameter) to allow simulation of different sized vessels; it is available in many colours, allowing sutures to be easily visualized and assessed after placement; it is impermeable allowing anastomotic patency to be tested; it can be used with anastomotic coupler devices; it can be used in any environment; it does not require any preparation or special storage and there are no hygiene issues associated with the use and disposal of raw meat; it is easily portable on a reel; and it can be readily purchased online for less than £2 per metre length. Its use for both hand-sewn and coupler anastomoses and the range of gauges available are demonstrated in Figures 1 and 2 and Appendix 1.

In summary, we propose silicone rig tubing as a realistic, readily available, inexpensive, portable, and versatile simulation model. As microsurgeons, we need to encourage, support and above all facilitate training in our subspecialty area. We commend it for use by trainers and trainees and hope that this innovation helps them to address a longstanding barrier to the acquisition and refinement of microsurgical skills.

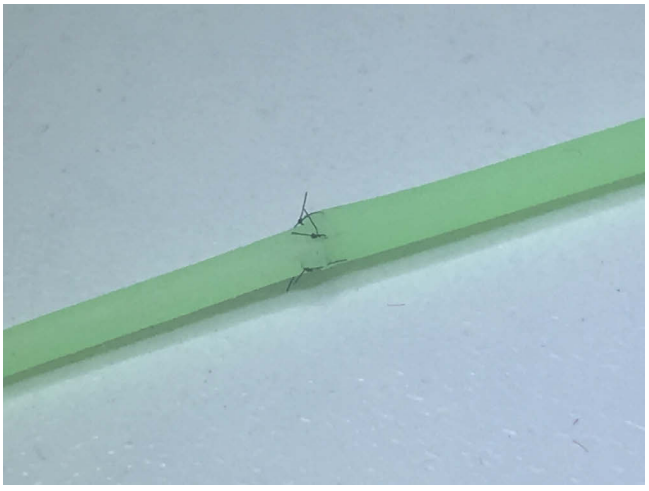

**Figure 1** Simulated arterial anastomosis using 1.5 mm rig tubing.

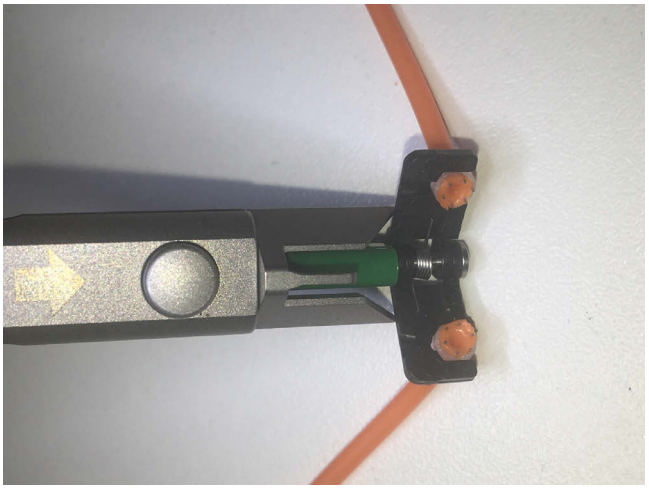

**Figure 2** Simulated venous anastomosis using coupler device and 2.0 mm rig tubing.

## Financial disclosures

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

## Ethical approval

Ethical approval was not required.

## Declaration of Competing Interest

There are no conflicts of interest to disclose.

## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.bjps.2019.09.047.

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# Plastic surgery research: Current activities and future scope

*Dear Sir,*

We read with great interest the study by Sepehripour et al.[1] The study makes many valid points with regards to the state of research within plastic surgery, with widely applicable conclusions to research within surgery as a whole.

Of note are the discussions around the merits of unsuccessful publications and the motivators for engaging in research.

The authors describe the difficulties plastic surgery trainees face with "failed publications" and also note the lack of formal training and supervision with regards to scientific writing. Hanratty et al.[2] highlighted the importance of ensuring scientific writing, describing the career enhancing potential of engaging in research. However, despite the Hanratty's BMJ article being published in 1999, the GMC Medical School Curricula does not reflect the numerous calls within the scientific literature to promote formal education in scientific research. Further, whilst some medical schools do provide formal critical appraisal and scientific writing teaching, the practice is variable across the United Kingdom. In view of the new updates to the curriculum, including the introduction of the new national Medical Licensing Assessment being introduced for all medical students in the United Kingdom from 2023, further consideration to formalised teaching and assessment in scientific writing should be given to help resolve an issue which has persisted over the past 20 years.

Motivators of research have been the subject of multiple characterisations with a frequent dichotomy of intrinsic and extrinsic motivators. Whilst it is well established that motivation theory is not synonymous with behavioural theory, the discussion as brought up by Sepehripour et al., prompts some observations. The hypothesis that material incentives increase effort which in turn increase improvements in performance has been found to be true in a variety of settings.[3] The surrogate in this scenario is prospect of promotion and potential improvement of trainees CVs. However, McKeachie et al. described the role of intrinsic motivators in scientific pursuit and studies have demonstrated the role of intrinsic motivators in improving task completion.[4]

The conclusion therefore is that the current system presents a motivation paradox, whereby the motivators to pursue research are separated from the motivators to complete research. Whilst there may be arguments suggesting that the experience of failure in itself is both constructive and educational, we recognise the opportunity costs associated with such pursuits may not represent the best use of time for trainees. As such we believe a two armed approach could help resolve the current difficulties faced by trainees with both a grass-roots improvement, described above, targeting medical schools, in conjunction with an adaptation to recruitment methods.

One proposal is the use of 'small wins' drawing on the principles of behaviour theory, specifically expectancy theory – where the trainee's intrinsic motivators are strengthened through greater self-efficacy in achieving smaller, more manageable tasks. In practice, this would result in candidate selection criteria being adapted to reward evidence of; literature research, critical appraisal of data, preparation of manuscripts, submission to journals, and thereby shifting the focus to the process rather than the conclusion. Such an approach would need to be considered at length and regulated for quality-assurance and robustness. The solution would help to negate the publication bias, recalibrate candidate selection and further encourage and empower those

who are interested in research to pursue their ambitions in a more formalised context such as a PhD through the enhanced intrinsic motivators such a process would provide.

The topic of research itself has been controversial and it is hoped that this letter will further promote discourse and look to provide solutions for a currently imperfect system.

## Declaration of Competing Interest

None.

## Funding

None.

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# A review of timelines for metastasis in cutaneous squamous cell carcinoma, and evidence for clinical follow-up

*Dear Sir,*

We write in response to the findings of Khan et al.,[1] Oxford, regarding the timing of presentation of metastatic disease in cutaneous SCC. They suggested that it was "safe to reduce follow-up time of high-risk SCCs to 2 years" as 96% of their limited cohort presented within that time.

We and colleagues of the Newcastle Upon Tyne Hospital NHS Foundation Trust Special Skin Cancer MDT (SSMDT), have also been concerned that the still-standing recommendations from the British Association of Dermatology[2] (BAD) are based on literature written more than a three decades ago, many of which were not specific to SCC.

The SSMDT manages over 500 patients per year with primary cutaneous SCC, treated mainly by the Plastic Surgery and Dermatology departments. It also reviews all metastatic cutaneous SCCs treated at the Trust, including cases referred in from neighbouring Trusts. We are thus confident that it manages almost all metastatic cases arising from within our own primary population.

We reviewed all patients who presented to our supra-regional SSMDT for management of metastatic cutaneous SCC between 2012 and 2018, and retrospectively analysed their primary disease, and when and how they presented with metastases.

Forty-nine patients were identified as presenting with metastatic disease following a primary excision, which had been previously reviewed by the SSMDT between 2000 and 2018.

There were 37 males and 12 females. Average age at primary presentation was 79 years (range: 50-97 years). Primary tumours originated 71% of the time from the head and neck, with distribution as follows: forehead/cheek/temple ($n = 13$, 27%), ear ($n = 11$, 23%), scalp ($n = 3$, 6%), lip ($n = 3$, 6%), neck ($n = 3$, 6%) and nose ($n = 2$, 4%). The rest, 29% originated from other areas: upper limb ($n = 6$, 12%), trunk ($n = 4$, 8%), lower limb ($n = 4$, 8%).

Six patients were known to be immunosuppressed.

Full primary histology reports were available in 41, with partial but key histological details for the remaining 8.

The mean recorded histological diameter of the primary tumours was 27.4 mm (range: 9-85 mm, $n = 37$), mean tumour thickness was 6.3 mm (range: 2-24 mm, $n = 41$).

One tumour was excised down to bone, thus had a histologically incomplete margin. Otherwise, mean peripheral margin was 4.6 mm ($n = 33$, range = 1-11 mm) and mean deep margin was 2.9 mm ($n = 34$, range = 0.1-7 mm).

Histological differentiation was as follows: well ($n = 2$), moderately ($n = 24$), and poorly differentiated ($n = 19$). Perineural invasion was reported in 6 patients, and vascular invasion in 3.

Eight (16%) patients presented first with local recurrence, with 3 developing nodal metastases within one month of their local recurrences, and the rest doing so later. Forty-one patients presented first with metastasis in the adjacent lymph node basins. None of the patients presented with simultaneous local recurrence and nodal metastasis, nor did any of the patients have distant metastasis as first mode of presentation. The median interval to development of local recurrence was 6.5 months (range 2-132 months, $n = 8$), while the median interval until nodal metastasis was 13 months (range 1-143 months, $n = 41$).

In terms of time to first metastasis, 76% of our cohort presented with metastatic disease within 2 years of primary diagnosis. By 5 years, this increases to 90%, with 96% of pa-

tients presenting by the end of 6 years. Therefore, in contrast to the finding by Khan et al.,[1] our finding, from a larger metastatic cohort, is similar to the figures suggested in the BAD guideline of 75% and 95% recurrence at 2 and 5 years.[2]

A significant source of variation between our reported results is, as Khan et al.[1] accept, that the Oxford cohort consists solely of cases referred to plastic surgery, which tend to be larger and thus of higher metastatic risk. This may also explain why their proportion of local recurrences (80%, $n = 32$) was much higher than in ours (16%, $n = 8$) which are from a much larger primary cohort of mainly simple, dermatologically excised SCCs.

Therefore, in light of our findings we cannot at present support the Oxford team's suggestion that length of follow-up for high-risk SCCs could safely be reduced.

However we are conscious of the increasing burden, that this places on skin oncology services, and thus recommend a more up to date and rigorous analysis of metastatic risk and presentation from cutaneous SCC's as a whole, and of the specificity and sensitivity of the commonly used staging systems to enable a more rational and evidence based follow-up protocol. We are in the process of investigating this.

## Declaration of Competing Interest

None.

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## Funding

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# Letter comments on: Additional advancement after elevation of a neurovascular advancement flap with interposition of an artificial nerve conduit

*Dear Sir,*

We congratulate the authors on this impressive technique for significantly lengthening the reach of the V to Y pattern (Venkataswami) flap by dividing and lengthening the digital nerve with a collagen conduit[1].

One key aim of fingertip reconstruction is to restore sensation, so we are concerned that our patients might be unforgiving of a long-term reduction in sensation or a long delay in recovery, leading to exclusion of the digit. The cost of the conduit might also be undesirable to our NHS organisation. We are also concerned that the additional stretching of the digital artery, or potential disruption of the venous drainage of the flap (which relies on the tissues surrounding the nerve) could compromise flap survival.

We offer an alternative approach to optimising advancement of this type of flap: an oblique (Bruner pattern) incision is made into the palm (Figure 1A) allowing further proximal dissection of the digital nerve and artery, and division of the natatory (superficial transverse metacarpal) ligament (Figure 1B). This allows about 5 mm additional flap advancement giving typically about 10 mm flap reach. If we feel that this technique will not allow sufficient flap advancement, then an innervated reverse-flow homodigital island flap or a free toe pulp flap is performed in preference.

## Declaration of Competing Interest

None.

## Funding

None.

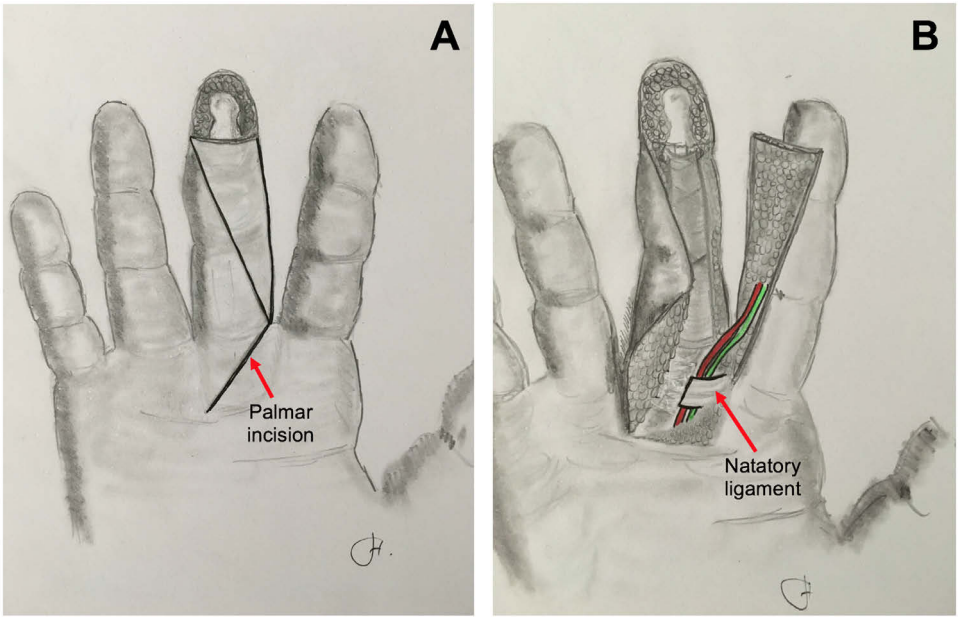


**Figure 1** (A) Illustration demonstrating the oblique Bruner pattern incision into the palm to allow further proximal dissection. (B) Illustration demonstrating the raised Venkataswami flap, proximal dissection of the digital artery and nerve, and division of the natatory ligament.

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# "Naïve" cost-utility analysis of reduction mammoplasty in Brazilian public service using BREAST-Q®: Response to the authors

*Dear Sir,*

I read with interest the article by Corrêa and colleagues on cost-utility of reduction mammoplasty in Brazilian public service using BREAST-Q® published in the July issue of the JPRAS.[1] The authors attempted to combine cost of surgery and health benefits, expressed in quality adjusted life years (QALYs), in one metric with a noble intention of assisting public health care spending. This is the subject of a discipline of health economics that for the last 30 years has been gradually recognised by medical practitioners everywhere around the world and, evidently, attracted interest from the clinicians in the University Hospital of Juiz de Fora. Although such interest should be encouraged, it should also be stressed that branching out into the discipline of health economics requires more than sheer enthusiasm. I felt obliged to bring attention of the JPRAS readers to the misleading results reported in the paper.

In short, contrary to the authors' intention, BREAST-Q® data are not suitable for estimating the combined effect of quantity and quality of life gained through a given intervention. Not for the intended purposes of rational healthcare resource allocation. Outcomes expressed in QALYs do quantify improvements in health and the corresponding time interval in a single index. However, the measure for health benefit ought to incorporate people's preferences for various health outcomes (also known as "utility"). The concepts of QALYs and utility weights relates to the theoretical foundation of welfare economics and utility theory. Budget allocation decisions consistent with the population's health-related preferences would be maximising the health of the entire population rather than any particular group of patients.

Utility refers to subjective valuations of the relative worth of any particular health state composed of different dimensions for which there is a general consensus on their centrality to health (e.g. physical, psychological, social functioning, and symptoms related to impairment in seeing, hearing, and communication). The dimensions are typi-

cally broader than any disease-specific measure of patient outcomes. Importantly, preference-based quality of life instruments are required to have interval scale properties, therefore changes of an equal amount anywhere on a scale of 0 to 1 (where 0 represents death and 1 represents perfect health) can be interpreted as equivalent to one another. Subsequently, when comparing different interventions for the same conditions or across different diseases, a single metric combining years of life and utilities is influenced equivalently by changes in life expectancy and health status.[2] Utility scores can be directly obtained from patients or the general public using scaling techniques such as the time trade-off or standard gambling, but this task requires a specialist expertise. A more practical option is off-the-shelf multi-attribute utility- scoring instruments, such as the European Quality of Life-5 Dimensions EQ-5D[3] or SF-6D (not to be confused with the Short Form 36 Health Survey - SF-36)[4] that combine questionnaires with their computational algorithms for calculating utility scores.

Preference-based multi-attribute generic instruments fundamentally differ from (a) disease-specific instruments used by clinicians for measuring treatment outcomes or (b) other generic health quality assessment instruments (e.g. SF-36) that are used to differentiate healthy subjects and those suffering from some medical or psychiatric condition. Although the BREAST-Q® scale is a validated patient-reported outcome measure for breast surgery, it is a typical disease-specific scale and not a preference-based instrument. Utility-based instruments are often not sensitive enough to detect particular benefits of surgery, such as better appearance of breasts after autologous fat grafting, for which BREAST-Q® would provide more "meaningful" outcomes from surgeons' specialist perspective. However, assigning a monetary value even to the clinically significant BREAST-Q® scores would be a challenge better addressed with utility-scoring instruments specifically designed for that purpose. Some countries define a universal threshold value for the incremental cost per QALY gained (ICER) as long as the QALYs are estimated according to the methodological rigour of health economics. For example, in UK NHS an intervention with ICER less than £30,000 (US$36,600) is entitled for public funding. For their declared purposes of estimating QALYs the authors should have used a utility-based 15 dimension (15D) instrument as in the study by Tykkä et al.[5] quoted in the paper. In the breast cancer population this instrument has shown better discriminatory power and content validity in comparison to the more popular EQ-5D-3L.

Finally, presentation of the results does not comply with the health economics convention that, among other things, requires that the difference in costs between the intervention (i.e. reduction mammoplasty) and the comparator (no surgery) be divided by the difference in health benefits (i.e. QALY gain, conventionally assessed on the 0 – 1 scale). Just as an example and notwithstanding the inappropriateness of the scale used, the ICER estimate from Figure 1 is (US$287-US$0)/(0.298- 0.1121) = US$1543. Contrary to the authors' claim, these results do not and could not corroborate with the ICER estimate of €3638 (US$4038) reported in Tykkä et al.[5]

## Declaration of Competing Interest

None.

## Funding

None.

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# Letter comments on: Time course of improvement after re-repair procedure for VPI management

*Dear Editor,*

We read with much interest this paper regarding speech improvement after palate re-repair.[1] This technique has been developed and pioneered by Sommerlad and has been used for primary palate repairs and secondary speech improving surgeries in our centre since the mid-1990s.[2–5] The technique has been widely adopted in the UK[6–8] and internationally.[9–17] Sommerlad's practice has been to recommend follow-up six months postoperatively, which Ahmed et al. describe as arbitrary.

We welcome the authors' efforts to provide more evidence regarding the time to speech resolution following palate re-repair, and especially to inform the timing of the next surgical procedure should this be needed, and to improve the informed consent process.

The authors report the numbers of patients in whom speech abnormalities had resolved within six months of surgery, after 1 year, after 2 years and after 3 years in children with a mean age of 6.6 years, age range 3–14 years. They reported that speech abnormalities had resolved in 44.5% of patients within the first 6 months after surgery, 62.2% after up to one year, 75.6% after up to two years and 88.9% after up to three years post re-repair. The remaining 11.1% continued to improve after 3 years up to 6 years. The Pittsburgh Weighted Speech Score (PWSS) was routinely used in their clinical practice but for the purposes of this study the conclusions are based on two parameters only – that of nasal emission and nasality. The authors concluded that a six-month waiting period following palate re-repair surgery for VPI is not sufficient and that "close monitoring of improvement with continued speech therapy" is needed.

The authors acknowledged the limitation of a retrospective design, small sample size and lack of double blind speech analysis, and we would add to this, inevitable bias. Most importantly however, there is no detailed speech analysis of consonant production, and importantly no phonetic transcription as this is not required in the PWSS. Such data are essential to understand the context of the continuing nasality and nasal emission. Hypernasality is often associated with non-oral articulation errors (such as glottal stops, pharyngeal fricatives and active nasal fricatives), even when surgery has achieved the potential for velopharyngeal closure.[18] Speech therapy intervention is required to eliminate the learnt errors. As the patient learns and establishes the correct consonant production, hypernasality resolves, through the accurate use of an oral airstream for consonant production. There is also evidence that making the distinction between active nasal fricatives and sounds with accompanying nasal airflow i.e. those with nasal emission, is not always reliable.[19,20] Without a report of the articulation characteristics based on the gold standard of phonetic transcription[21,22] how can the reader be confident that the time line of improvements does not relate to the resolution of articulation difficulties and not the improved velopharyngeal mechanism? These data would seem to support this given the finding that the younger children were slower to resolve their speech difficulties according to the author's criteria than the older children – almost certainly because they had more articulation errors.

The author's statement regarding the "close monitoring of improvement with continued speech therapy" suggests all patients should have therapy. Therapy is indicated for consonant production errors but should be individually determined and not a general recommendation. Those with persistent VPI of a structural nature do not usually require therapy.

A specialist SLT/speech pathologist should undertake a screening speech assessment with phonetic transcription, such as the GOS.SP.ASS.[23] at six months after surgery. On this basis a differential diagnosis can be made with differential recommendations, i.e. speech therapy intervention, a wait and see approach or the need for investigations and probably surgery.

We caution against one rule for all and the routine recommendation that it is necessary to wait 12 months before decisions on further surgery can be made following the Sommerlad palate re-repair.

## Declaration of Competing Interest

None.

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# Reply to: Letter comments on: Time course of improvement after re-repair procedure for VPI management

*Dear Sir,*

We would like to thank the authors, Sell et al. for their well reasoned and referenced comments on our paper and their analysis of our work. To add a bit of background: the inspiration for the paper came after we noticed a subset of previously lost-to-follow-up patients after re-repair procedure who returned to clinic after an interval of greater than six months and upon evaluation, demonstrated significant improvement in VPI without having had additional surgical intervention. In a number of these cases, the children had undergone awake nasoendoscopy prior to their lapse in follow-up. Endoscopy confirmed anatomic closure deficiency as the etiology of their VPI, and clinic records indicate that additional surgical intervention was discussed with the patients and their families. This observation led us to wonder if there might be a difference in the time required to reach maximal medical improvement in patients who have undergone dynamic VPI procedures such as re-repair or secondary Furlow, as compared to patients who had undergone more static procedures such as pharyngeal flap. Until that thought occurred, we too had used the traditional six month interval between VPI procedures, with additional surgery offered in the absence of demonstrable improvement. We therefore conducted an audit of our database to identify all patients who underwent re-repair and then mapped the time interval to their achieving resolution of their VPI, which was defined by the complete resolution of the nasality and nasal emission scores of the PWSS. We chose to consider only these measures (with exclusion of the documented scores of articulation errors) in an effort to best isolate anatomic VPI, defined as lack of the ability to close the nasopharyngeal port. Indeed there are some cases in this series who eliminated nasality and nasal emission but still have errors of articulation.

The PWSS is a well-known tool for evaluation and classification of velopharyngeal dysfunction using multiple components of speech.[1] We aknowledge its weaknesses, but as it was the scoring system used in clinic at the time these patients were followed, the retrospective nature of the study limited us to use it as our recorded system of analysis. For the purposes of this study, nasality and nasal emission ratings from the PWSS were selected to attempt to evaluate VPI outcomes. These speech components were chosen based on their relationship to velopharyngeal dysfunction and the ability of these components to provide insight regarding velopharyngeal closure.[2] Articulation errors were excluded from the scope of this study as maladaptive articulation errors (i.e., glottal stops, pharyngeal stops or fricatives, nasal fricatives, and nasalization of non-nasal sounds) can contribute to the perception of increased nasality as pointed out in the comments. As such, the presence of such errors may not accurately reflect velopharyngeal function since a child can exhibit these errors even if they have a competent VP mechanism. Sell et al. raise an excellent point regarding the need for a "detailed speech analysis of consonant production and phonetic transcription". Speech evaluation at our center is conducted by speech-language pathologists (SLPs) who are specifically trained in articulation and resonance evaluation for cleft patients. The SLPs used a standard perceptual speech evaluation format including informal speech sample, conversational speech sample, as well as a standardized articulation assessment using the Goldman Fristoe Test of Articulation-2nd Edition. Stimulability testing was conducted once the child's consonant repertoire was determined using additional words, phrases, and simple sentences. The child's consonant inventory was transcribed and maladaptive or compensatory articulation

productions were noted. Compensatory or maladaptive articulation error patterns were excluded from target words and phrases used during assessment of velopharyngeal function as these non-oral articulation errors (such as glottal stops, pharyngeal stops or pharyngeal fricatives, or nasal fricatives) do not require closure of the VP mechanism for production.[3] We agree with the reviewers that this data is essential to understanding the context of persistent nasality and/or nasal emission and should have better detailed our evaluation metrics in the manuscript to make this clear.

As stated in the comments by Sell et al., assessment of the velopharyngeal mechanism can only take place when the child demonstrates at least a basic understanding of the concept of oral airflow and oral sound production. Therefore, if a child exhibits atypical articulation errors, speech intervention is required to remediate learned error patterns. So, we agree that speech therapy should not be a generalized post-operative recommendation for all children. We should have spelled this out more clearly in the text of the manuscript. Patients presenting with pervasive compensatory or maladaptive articulation errors were referred for articulation therapy before further evaluation and/or determination for additional surgery could take place. Evaluations with the cleft team speech pathologist were recommended every 6 months, until the child demonstrated correct placement for at least two oral plosive or fricative sounds as well as demonstrating the concept of oral sound production. Nasal occlusion was used as a technique to determine if the child did or did not understand the concept of oral sound production or if they did understand the concept, but just had an incompetent VP mechanism. Assuming the child has a competent VP mechanism, they should then be able to learn correct placement and production of sounds through the use of appropriate oral airflow. In such cases surgical intervention would not be recommended. If they exhibit true anatomic VP dysfunction, further assessment using nasoendoscopy would be performed to confirm the specific size and location of the remaining anatomic closure gap, with subsequent treatment directed by these findings. We agree with the comments that during regular follow up visits after re-repair, a differential diagnosis should be made with differential recommendations, i.e. speech therapy intervention, a wait and see approach or the need for investigations and probably additional surgery. This study recommended a more cautious approach with the last mentioned group.

Another approach to evaluate if the progressive improvement in VPI is due to structural anatomy would be to have serial nasoendoscopies and/or videoflouroscopies, however this is not a routine component of our management protocol. Since the publication of our manuscript, we have become aware of a recent study by Denadaie et al. assessing the use of buccinator flaps in VPI. They performed serial nasoendoscopy every three months up to 15 months post operatively. They found a gradual change in the closure pattern and also the VP gap size during contraction. For instance, the number of cases with complete closure increased from zero preoperatively to 7 at 3 months, 19 at 6 months, 36 at 12 months and 41 at 15 months post operatively. The endoscopic findings were noted to correspond with gradual improvement of the nasality scores.[4] Buccinator flap palatal lengthening procedures are dynamic VPI management procedures such as re-repair and secondary Furlow. We have speculated that the improvement pattern seen in our patients over time may relate to such factors as edema resolution, scar maturation and softening and the true lengthening of the palate.[5]

In summary we feel that despite its stated limitations, our paper provides some evidence that the anatomical deficiencies addressed by the re-repair technique may take a longer time than previously thought (6 months to 1 year) in some patients. In an effort to isolate our analysis to the improvement of the structural deficiency only, we elected to exclude our analysis of errors in articulation scores. This study does not intend to recommend a specific time point for obtaining the final re-repair outcome and deciding upon the need the next surgical procedure in the protocol. Rather we had hoped to raise just the type of thoughtful questions raised in the comments by Sell et al. We do feel that it might be prudent in the face of demonstrated improvement in VPI as measured by perceptual speech analysis, nasometry and occasionally repeat endoscopy or videoflouroscopy, that teams may consider watching the curve of VPI resolution changes until it plateaus. We hope that the engaged discussion presented herein may serve as the impetus for additional studies to better understand the healing and recovery process as many teams are now moving toward dynamic surgical procedures to address VPI.

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## How important is cephalic vein for venous drainage of the forearm

*Dear Sir,*

I read with great interest an article by Golash et al.[1] about value of communicating vein in the cubital fossa, between deep and superficial system of the radial forearm free flap. The reason is because we incorporate this vein in all of our radial foreram free flaps as well, thereby having both venous system drain into one larger caliber vein more appropriate for the anastomosis.[2]

The main difference of this article to other reports about communicating vein and incorporating it into radial forearm free flap is that Golash et al. leave distal cephalic vein in the forearm, they ligate it just one centimeter distal to the communicating vein in the cubital fossa.[1] This way they have deep system only draining into the communicating vein with the proximal part of the cephalic vein which is more suitable for the anastomosis.

The main proposed advantage of leaving distal cephalic vein is better venous drainage of the forearm. Nevertheless the authors did not prove any true evidence or reference that this is actually the case. Donor site morbidity of the forearm after raising radial forearm free flap is certainly not caused by sacrifying cephalic vein and prolonged edema which is mentioned in the article. Main disadvantage of the radial forearm free flap is still linked to exposure of the tendons and poor skin graft uptake. Some edema of the forearm can be seen postoperatively but it is very speculative to say it is because of distal cephalic vein ligation.

A prospective study of venous outflow measurements of the forearm after preservation or ligation of the whole distal cephalic vein would be needed to objectively justify the advantage of not including the distal cephalic vein in the flap. Otherwise, this is yet another valuable paper like others stressing the importance of communicating vein between deep and superficial system of the radial forearm free flap.

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## Response to letter-comment on "Clinical utility of the communicating vein in free radial artery forearm flaps: Best of both worlds"

*Dear Sir,*

We agree with Dr. Dediol that evidence with regards to decreased donor site edema and morbidity by sparing the distal cephalic vein is lacking and has been mentioned so by us in our letter addressed to the editor.[1] However, there are some unequivocal advantages offered by not including the distal cephalic vein in the flap harvest. To reiterate once again – in order to include the cephalic vein in the flap, the flap has to be designed more radially with an increase in dissection time and a higher incidence of radial never injury.[2] Notably, avoiding radial placement of the flap design allows for the possibility of covering the exposed BR tendon with the advancement of the radial side defect margin. This is consequently important in preventing tendon exposure and poor graft take, a major complication of Radial forearm flaps, as rightly pointed out by Dr. Dediol. Furthermore, owing to its superficial location and large size, the cephalic vein in the distal forearm is frequently used for intravenous cannulation which may result in intimal injury and occlusion with the vein appearing deceivingly normal.[3] Also, the superficial vein may not always drain the flap territory.

On the other hand, the deep venous system has been shown to be a reliable venous drainage system for the RAFF. A hemodynamic study demonstrated that the deep vein has twice the volume of drainage per unit time compared to the superficial vein.[4,5]

Thus, for all these reasons, the authors feel that the distal cephalic vein does not contribute in any way to flap survival and strongly advocate its exclusion from the flap design.

## Declaration of Competing Interest

None.

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