Review Article - Practice Guidelines

Microsurgical free flaps: Controversies in maxillofacial reconstruction

Access this article online
Website: www.amsjournal.com
DOI: 10.4103/2231-0746.110059
Quick Response Code:

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ABSTRACT

Reconstructive microsurgery for oral and maxillofacial (OMF) defects is considered as a niche specialty and is performed regularly only in a handful of centers. Till recently the pectoralis major myocutaneous flap (PMMC) was considered to be the benchmark for OMF reconstruction. This philosophy is changing fast with rapid advancement in reconstructive microsurgery. Due to improvement in instrumentation and the development of finer techniques of flap harvesting we can positively state that microsurgery has come of age. Better techniques, microscopes and micro instruments enable us to do things previously unimaginable. Supramicrosurgery and ultrathin flaps are a testimony to this. Years of innovation in reconstructive microsurgery have given us a reasonably good number of very excellent flaps. Tremendous work has been put into producing some exceptionally brilliant research articles, sometimes contradicting each other. This has led to the need for clarity in some areas in this field. This article will review some controversies in reconstructive microsurgery and analyze some of the most common microvascular free flaps (MFF) used in OMF reconstruction. It aims to buttress the fact that three flaps-the radial forearm free flap (RFFF), anterolateral thigh flap (ALT) and fibula are the ones most expedient in the surgeon's arsenal, since they can cater to almost all sizeable defects we come across after ablative surgery in the OMF region. They can thus aptly be titled as the workhorses of OMF reconstruction with regard to free flaps.

Keywords: Microvascular free flaps, oral and maxillofacial surgery, reconstructive microsurgery

INTRODUCTION

Ablative surgery for cancer of the oral and maxillofacial (OMF) region can create sizeable defects, which can be a challenge for the reconstructive surgeon. The introduction of pectoralis major myocutaneous flap (PMMC) raised the bar in head and neck reconstruction in the 1970s making surgeons confident of operating on previously inoperable defects (Inoperable due to paucity of reconstructive options). Fittingly, it was considered as the workhorse for these defects at that time. However, sizeable defects managed by PMMC and other regional pedicled flaps gave a compromised esthetic and functional result and thus the search was on for better options. This search led to the induction of microvascular free flaps (MFF) into OMF reconstruction.

A logarithmic leap in OMF reconstruction thus occurred in the late 80's and early 90's with the introduction of MFF's.[1] During its evolution in the past three decades we have seen around twenty different types of free flaps being used in oromandibular reconstruction.[2] But the last two decades especially has seen a rise in the usage and refining of techniques and instruments which has helped tremendously in bettering the reliability of MFF with centers reporting as much as 95-100% flap success. At present, the day has dawned in which MFF's are considered as the workhorse and the standard of care for reconstructing large ablative defects of this complex anatomic region.[3]

This article will evaluate the most commonly used MFF used in OMF reconstruction and evaluate each one of them based on their strengths and weakness also commenting on some controversies

in MFF reconstruction.

COMMONLY USED MICROVASCULAR FREE FLAPS IN ORAL AND MAXILLOFACIAL RECONSTRUCTION

The fibula free flap

Fibula MFF was first introduced for OMF reconstruction by Hidalgo and is now considered as the gold standard for mandibular reconstruction.[4] The advantages of fibula include the length of bone available (around 25-30 cm), which permits multiple osteotomies and provides adequate pedicle length even for maxillary reconstruction. The peroneal artery and vein are usually of good quality and caliber and ideal for microsurgical anastomosis (MA) to the neck vessels.

With proper harvesting techniques the donor site morbidity can be kept to a minimum. The remaining flexor halluces longus (FHL) should be sutured to the interosseous membrane and the peroneus muscle to the soleus during closure, after attaining hemostasis of the donor site. During harvest, distally atleast 5cm of fibula should be left to prevent angle instability. Preoperative angiography is not necessary before each case and is advised only in cases of history of trauma to the leg, or weak dorsalis pedis pulsations.

The flap harvesting is technically challenging for the beginner but with experience, can be completed within 1 hour. Again due to the distance from the recipient site, two team approach can be used thus greatly reducing operative time.

The lack of a large skin paddle is a drawback, which limits its use in situations with full thickness cheek defects along with a segmental mandibular defect with floor of mouth involvement. A method to overcome this problem is to use double flaps, like radial forearm free flap (RFFF) for soft tissue cover and fibula for hard tissue reconstruction of mandible and skin paddle of fibula used for the skin defect.[5] Even though this is time consuming and technically difficult, these double flaps give excellent results. But the amount of cheek skin that can be replaced such is limited, also is the technical challenge of using two free flaps. Yet another option is to use a PMMC for facial skin cover, while the segmental defect of the mandible is reconstructed by fibula.[6]

The color of the skin paddle harvested along the fibula is a mismatch for facial defects and is darker than facial skin. Although this small skin paddle can effectively cover intraoral lining defects of buccal mucosa, floor of the mouth and tongue, the thickness of the skin paddle of the fibula is not pliable enough to mimic the suppleness of oral mucosa. The posterior crural septum, which connects the paddle to the peroneal artery, can be used to cover the reconstruction plate when the skin paddle is folded intraorally. This helps to a certain extent to avoid plate exposure in patients with thin soft tissue cover over the plates.

Harvesting a cuff of FHL along with the fibula is another way of adding soft tissue bulk in the flap to fill up dead space. The FHL can also be used to line palatal defects with the muscle eventually forming a reasonable color match for the palatal mucoperiosteum over time. Although the soleus need not be harvested for protecting the skin perforator, some authors recommend the same.[7]

Experiences in pediatric patients have been encouraging as it is one of the safest flaps to harvest in pediatric population with iliac crest, scapula causing growth disorders later in life.[8]

Also since the sural nerve lies in the same donor area as the harvesting site, it is simultaneously possible to harvest the sural nerve in patients who are planned for reconstruction of inferior alveolar nerve.[9]

Dental rehabilitation

Dental rehabilitation of patients who have undergone fibular free flap reconstruction of mandible is now routinely performed in many centers. Implants are placed primarily and positioned accurately with the help of waxing screws. A cover screw is placed and 6 months later the implants are exposed and healing abutments placed. After 1 month, the implants are exposed following which the abutments and tooth are fixed.[9]

But when compared to deep circumflex iliac artery flap (DCIA) the bone height of fibula may be less. To compensate for this many techniques have been reported with the double barreling of fibula and by using longer and angulated abutments. But this can be done only in defects up to 10 cm in length.

The scapula flap can be considered in these cases where there is a large mucosal and skin component and the flap can be bi-paddled to get two independent skin paddles thus enabling the surgeon to cover both intraoral and extraoral defect. But the scapula flap is disadvantaged by the fact that the bone length available will be inadequate for large segmental mandibular defects[10] and the need for patient repositioning.

Fibula is the flap of choice in reconstructing mandibular defects with less soft tissue involvement. Although the FHL muscle can be used to fill up dead space and for intra oral lining, it causes functional compromise like dysphagia and difficulty in mastication and speech. The thick and insensate skin paddle compounds this disadvantage. Further more extensive harvest of FHL muscle can result in flexon contracture or valgus deformity of great toe as a result of damage to motor nerve of FHL.

Another disadvantage of the fibula flap is the low quality of vessels seen in patients with peripheral vascular disease like arteriosclerosis. In these cases the scapula may be a better option.

Anterolateral thigh flap

An extremely versatile flap, ALT [Figures 1-7] introduced by Song *et al.*, in 1984[11] is supplied by the descending branch of the lateral circumflex femoral artery (LCFA). It enjoys many advantages including low donor site morbidity, simultaneous harvest, large volume of skin and soft tissue available, a long pedicle, acceptability of site for the scar, ability to harvest as subcutaneous, fasciocutaneous, musculocutaneous or adipofacial flap thus giving multiple applications for this flap.

Some authors infer that the variability in vascular anatomy is the

Figure 1: Intraoral photograph of a malignant lesion involving the right maxilla. The silk sutures were placed after biopsy

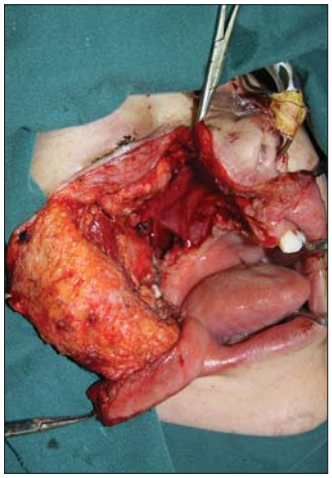

Figure 2: The defect after excision of the lesion

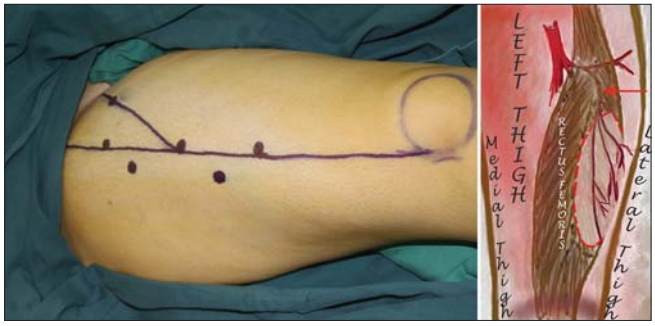

Figure 3: Perforator markings on the skin with the aid of Doppler helps in planning the skin incision, diagram showing the left thigh and the perforator from the descending branch of the lateral circumflex femoral artery supplying the lateral thigh. The region of flap harvest is shown in pink. The red arrow is the descending branch

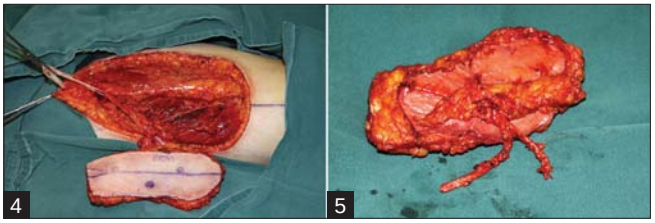

Figure 4 and 5 : (4) The ALT flap still attached to the pedicle . The descending branch is identified and demonstrated, (5) The harvested ALT flap after pedicle division

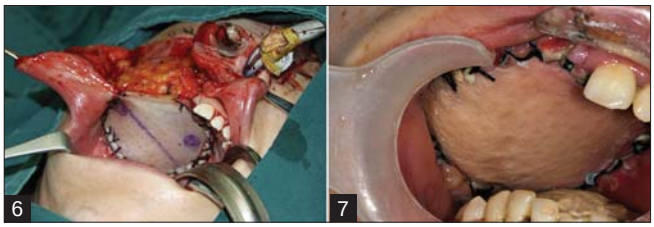

Figure 6 and 7: (6) The Flap partially inset into the defect before closure, (7) Flap after completion of inset and closure of skin

reason why the ALT was less favored during the early 90's.[12] But this is not the case, with ALT now viewed upon as the flap of choice in large soft tissue defects of the OMF region in many centers. Thus it is not the variability in anatomy, but the unfamiliarity of surgeons in harvesting the flap the reason why ALT was not favored initially.

This flap is widely used in Asian population due to advantages like the large skin surface available with the possibility of primary closure of donor site and minimal donor site morbidity,[13] unless flaps of more than 9 cm in width are harvested.

It was not very popular in the West due to the difficulty in harvest in obese patients, but trends in the early period of 20th century shows that it has gained popularity in North America.[14]

Anthropometric studies in European population confirm that the thigh subcutaneous adipose layer is more thicker in them when compared to Sino Asian population, thus supporting the contention that ALT flap will also be thicker in the European population. Thick subcutaneous tissue can result in a technically more demanding flap harvest and can explain sporadic occurrences of failure despite good MA.

Total glossectomy defects have to be reconstructed with flaps that make up bulk. In an organ like tongue although function is important, with the technical limitations we have at present we are only able to replace the missing bulk. We still have not reached a stage in which we can give a dynamic tongue for a patient, which moves with swallowing and mastication, and provides us with sensation of taste. Techniques have been reported,[15] which aim to address this complex issue. This is the goal we should aim for in the future. Sensory nerve neurorrhaphy for reconstruction of tongue,[16] is a direction we should look more into.

At present we try to get around the problem of a static tongue by adding some bulk and volume to the reconstruction so that the upper surface of the neo tongue will contact the palate during swallowing thus helping deglutition. This philosophy of compensating for lack of function of tongue by adding

bulk to the flap is based on the knowledge that wider and thicker flaps significantly improve swallowing and function when reconstructing large tongue defects which is relatively immobile.[17] Thus flaps that can bring in bulk like ALT are ideal for total or near total glossectomy defects. It should be kept in mind that up to 70% of defects of tongue is best reconstructed with a pliable thin flap like RFFF but beyond this it is better to add bulk to the reconstruction as the remaining stump of tongue will no longer help much in movement.

Chimeric flaps are possible with ALT and vastus lateralis thus giving two skin paddles for covering extensive full thickness defects of OMF region. This is really advantageous in a vessel depleted neck since we do not need two free flaps and a single MA will take care of both the skin paddles.[18]

Super thinned ALT has been described which is 4-5 mm thick. Some technical points that should be adhered to are - thinning should be performed under the flap except around the vascular perforator, where only about 1cm of adipose tissue should remain surrounding the perforating vessel. Hence the vascular pedicle is separated after the thinning to an average length of 8 cm. Finally, the thickness of the flap with a layer of small fat lobules should be about 3-4 mm almost uniformly.[19] Some authors have reported partial flap loss in thinned ALT and so caution should be exercised while performing this procedure. The RFFF may be a good option if thin flap is needed for example in partial glossectomy or buccal mucosal defects. But still we are a long way from a nearly perfectly reconstructed tongue atleast in terms of kinesis and sensation.

Disadvantages of ALT include lack of bone stock, since this is a pure soft tissue flap, difficult intramuscular dissection is necessary since it is a perforator flap, risk of morbidity when wider flaps are harvested with skin grafting and when vastus lateralis is harvested along with the flap.

Even if there is difficulty with the perforators during the dissection, it can be easily converted to a tensor fascia lata flap. This flap is based along the ascending branch of the lateral circumflex femoral artery and an advantage is that a part of the iliac bone also can be harvested along with this flap. But the disadvantage is that the donor site is difficult to be closed primarily and also the pedicle length is shorter than that of the ALT.[20]

Radial forearm

The radial forearm free flap was developed in China in 1978 and was first described in Yang's 1981 article. The radial forearm along with the ALT can be considered the workhorses for reconstructing upper aerodigestive tract defects.[21]

It is commonly used for tongue, floor of mouth, lip and hard palate reconstruction. Its greatest advantage is the thin and pliable nature of the flap ideal for intraoral soft tissue lining defects. Its ease of harvest and long pedicle (about 20 cm) with large caliber vessels makes it popular with beginners [Figures 8-15].

The entire skin in the volar aspect of the forearm can be harvested with the long pedicle permitting MA to the contralateral neck also.[22]

Although attempts have been made to harvest a segment of the radius for bony reconstruction, it fell out of favor due to high chances of radius bone fracture. But this is less frequent after pre-plating the radius and cast immobilization of the arm.

Other advantages are the presence of large diameter superficial veins (cephalic or basilic) and deep venous system (the venae comitantes). Studies have shown that the smaller venae comitantes give reliable venous outflow but due to their smaller caliber, MA is difficult compared to the cephalic vein.

There still is a debate regarding which is the dominant venous system. An elegant article by Ichinose *et al.,* used Doppler to demonstrate the venae comitantes to be dominant. They theorized that interruption of small superficial venous channels draining into cephalic vein during flap harvest would force venous drainage more into the deep system. The author uses a more clinical way of judgment. After flap harvest, the artery is anastomosed first and venous return noted from both the superficial and deep systems. Whichever has a faster outflow is used for MA.

It can also be harvested with two skin paddles and if necessary the palmaris longus tendon can be harvested to sling the flap to aid in oral competence during lower lip reconstruction.

The major disadvantage of RFFF is the donor site morbidity especially [Table 1] in cases of paratenon damage during flap harvest causing tenting and painful donor site which can be reduced by suprafascial dissection and minimizing paratenon exposure.[22] Other disadvantages are the need to sacrifice a major artery in the upper limb, decreased sensation in the region supplied by antebrachial cutaneous nerve and large donor site scar.[23]

OTHER FREE FLAP OPTIONS

Iliac crest

The iliac crest free flap was introduced by Taylor in 1979[24] and then later used for mandibular reconstruction. The early popularity it enjoyed was largely due to the thick and strong bone stock and the long and large vascular pedicle.

But later its disadvantages like a thick and largely immobile skin paddle and the lack of bone length when compared to fibula made it unfavorable for mandibular reconstruction. Some authors have pointed out that the bulk of the skin paddle sometimes necessitates a second MA using the superficial cicumflex iliac artery[7] for maintaining its viability.

Iliac crest is now only a second line option and has fallen behind the fibula as the donor site of choice for mandibular reconstruction[7] because of its many disadvantages like unpredictable and inflexible skin paddle, lesser length of bone stock and the risk of postoperative donor site pain and hernia. Kimata *et al*.,[25] described an elegant way of harvesting iliac bone with a large skin paddle based on a dominant perforator, thus negating the disadvantage of a bulky skin paddle. They have harvested bone segments up to 4 × 15 cm in size with a thin skin paddle. The disadvantage is the tedious intramuscular dissection of the skin paddle and

Figure 8: Skin markings for outlining margins for a full thickness excision. Note the Estlanders flap design in the upper lip for reconstruction of commisure

Figure 9: The skin markings in the face are traced on to the donor site as a bipaddled design due to the full thckness defect

Figure 10 and 11: (10) The harvested RFFF after pedicle division with the radial artery and cephalic vein dissected out, (11) The flap is placed on the defect for orientation and trimming

Figure 12 and 13: (12) The flap is folded and final adjustments made for deepithelialisation (13) Final inset of the flap. Note that the estlanders flap has been used for commisure reconstrucion

Figure 14 and 15: (14) The flap 2 weeks post op (15) Donor site 2 weeks post op

Table 1: Comparative analysis of factors pertaining to donor site

Donor site	Skin area	Bone stock	Soft tissue bulk	Soft tissue pliability	Pedicle length	Morbidity	Location
Fibula	MF	*VF*	MF	**UF**	*VF*	MF	*VF*
RFFF	MF	**UF**	**UF**	*VF*	*VF*	**UF**	MF
ALT	*VF*	**NR**	*VF*(*)	*VF*(†)	*VF*	*VF*	*VF*
Scapula	*VF*	*VF*	*VF*	**UF**	MF	MF	**UF**
Iliac	MF	MF	*VF*	**UF**	MF	MF	MF

* = When harvested as a musculocutaneous flap; † = When harvested as a subcutaneous flap; Flaps are rated from best to worst as very favourable (VF) Italic text = Moderately favourable (MF), Unfavourable (UF); Bold text = Not relevant (NR); ALT = Anterolateral thigh; RFFF = Radial forearm free flap

uncertainty of dominant perforator supplying skin paddle, which has to be preoperatively accessed by Doppler.

But some authors[26] recommend this flap in select cases like an anterior mandibular defect in a young patient who needs implants later. This is because if the large height of bone flap which can also be similar to the native mandible.

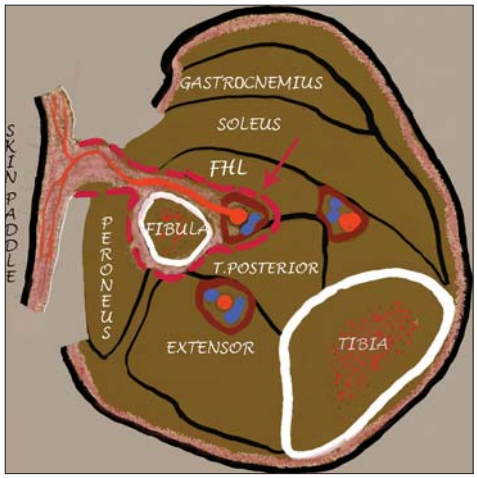

Figure 16: Diagram of the cross section of the lower limb showing fibula flap design and the plane for its harvest with skin paddle

Rectus abdominis flaps

A type III muscle, musculocutaneous flap, the rectus abdominis flap can be harvested based on either inferior or superior epigastric arteries, which makes this flap very flexible with regard to the skin paddle patterns possible. Its site enables a two team approach. Authors have reported good outcomes in defects like total maxillectomies and orbital exenteration.[27] The deep inferior epigastric artery flap and superficial circumflex

iliac artery flaps are very good alternatives for rectus abdominis flap.[28] They are all perforator flaps without involving the rectus muscle and have low incidence of abdominal hernia. Presently ALT is preferred over rectus as it can be harvested as a perforator flap.

Scapula

In many centers, the fibula [Figure 16] has replaced both the scapula and iliac crest as the flap of choice for mandibular reconstruction.[5] In large volume centers it is not favored much because the two team approach cannot be used, repositioning of the patient for flap harvest is time consuming.

ISSUES AND CONTROVERSIES IN MFF RECONSTRUCTION

Free bone grafts and bone flaps

The use of bone grafts (e.g. rib, iliac) in mandibular reconstruction is disadvantaged by the fact that bony union here occurs by creeping substitution rather than appositional growth that occurs in bone flaps. Thus bone grafts resorb much faster and they tend to get infected if large segments of bone (5 cm)[29] are replaced. Thus MFF are definitely favored here for their minimal resorption, inherent resistance to infection, ability to be placed in defects that are to be radiated, and they take up even in scarred previously operated beds. At present it is safe to limit the use of free bone grafts to defects less than 5 cm in wounds not contaminated by oral cavity and avoiding it totally in patients planned for radiotherapy.

Radiotherapy and free flaps

The effects of radiotherapy on MFF reconstruction in head and neck patients are a matter of debate with contradictory results obtained by different authors. Munenaga *et al.,* reported that a radiation dose not higher than 50 G preoperatively and chemotherapy, does not affect flap outcome.[30] He also noted that using vessels of larger diameter, with good flow and less fibrosis even if they are in the irradiated field gave them few vascular complications after free flap transfer.

Preoperative radiotherapy does not affect the success of MA.[31] It is stressed that the quality of the recipient vessels were more important. The efficacy of MFF in irradiated patients is comparable to non-irradiated patients and probably superior to pedicled flaps.[32] Some authors have lower patency in irradiated patients,[33] while other studies show higher patency rates in irradiated fields.[34]

With these conflicting results it should be remembered that microsurgery is basically technique sensitive with the experience of the surgeon in dissecting out the friable vessel from the irradiated neck and the technical perfection with which the MA is being performed being equally important.

Age and free flap reconstruction

Reconstruction with free flaps in the elderly is a matter of discussion with review of literature giving contradictory results.[35,36] The misconception concerning the safety of performing MFF in elderly patients have been proved false with excellent publications in this regard.[37] The age at which an individual becomes old is a subjective thing and is debatable.

One of the largest and exhaustive studies on the effect of age on flap reliability was by Nao, *et al*.[38] They studied age both as a qualitative variable (patients aged more vs. less than 70 years) and as a quantitative variable, using the appropriate statistical tests. With 418 patients, almost a quarter of them aged over 70 years. Their results showed that age did not affect the success rate of MFF in the elderly. The success rates were actually higher in the elderly but not to a statistically significant level. Other studies also found similar success rates between younger and elderly flap patients.[39]

But it is important to find that many studies have found a correlation between co-morbidity and local complications like hemorrhage or infection.[40] But other studies found correlation between advanced age and general complications.[38]

So in view of the present evidence we can infer that free flap failure rates are comparable in young and elderly patients, but the latter shows more local and systemic complications. Thus patient selection in the elderly population for free flaps should be prudent with special attention to their comorbidity levels.

Innervated or non innervated flaps

Whether to use an innervated or a non innervated flap for OMF defects is controversial as most of the flaps will develop a certain amount of sensation without a formal neurorrhapy.[41]

The RFFF is one flap frequently harvested as a sensate flap. The medial antebrachial cutaneous nerve can be anastomosed with a branch of the trigeminal nerve, with the lingual nerve or a branch of the superficial cervical plexus. Owing to the high head and neck cortical representation, flap sensation is better restored in head and neck reconstructive surgery. Sensory rehabilitation of intraoral flaps gives better oral functions and will certainly improve the quality of life of the patient.

Role of regional flaps

In many centers around the world, pedicled flaps have become a secondary option taking into consideration their many disadvantages like restricted freedom of movement and their bulk.[42]

The workhorse pedicled flap for OMF defects is the PMMC, which can be really bulky especially in obese ladies.[43] But Russel *et al*., has elegantly pointed out that this increased bulk of PMMC in some patients can be an advantage in cases where in oral cavity defects, we are not reconstructing the lateral hemi-mandible defect. The bulk of the PMMC can easily add bulk to the contour deformity due to the resected mandible. They noted that it is better to consider PMMC in patients with co-morbidities who can not withstand longer anesthesia and also in patients with vessel depleted neck and as a salvage flap for failed primary reconstruction.

PMMC has many advantages like shorter time and ease of harvest compared to MFF. But pedicled flaps appear to present with a greater prevalence of partial flap loss, fistula and wound dehiscence. A greater number of patients remain dependent on enteral tube feeding following pedicled flap reconstruction than patients who undergo MFF reconstruction.[44] This results in a longer hospital stay, additional nursing care, extra consumables and hospital expenses. Thus the overall costs may be same or

even exceed that of free flap.[45]

The author's contention is that pedicled flaps should be considered in patients for whom a MFF has failed, in compromised anesthetic fitness including settings in which anesthesia time should be reduced as much as possible and in salvage settings where long term survival is not expected.

Oncological outcomes

In a way, MFF can improve treatment outcome since its availability results in more aggressive ablation. Hanasono *et al*.,[46] proved that cancers treated after the introduction of free flaps included a significantly higher proportion of T4 lesions compared to T3 lesions and significantly more advanced N stage. Although the cancers were more advanced, survival and recurrence rates were maintained and the rate of positive pathologic margins decreased significantly.

Operating time

Microsurgery being a technical task needs time and effort from the surgeon to build up the necessary skills for safe MA. But once a surgeon gets to have the hand eye coordination and manual dexterity required for microsurgery, the length of operation drastically reduces. Eckardt *et al*., in an article elegantly described that it is better to concentrate on a small number of proven flaps, as this will lead to better flap harvesting techniques and better insetting. The increased experience also decreases the operating time and lessens complications and also associated expenses.[47] In reconstruction of OMF defects, the paradigm 'less may be more',[48] is true in the sense that expertise in a few flaps is more than adequate in OMF reconstruction. This will improve success rates.

Comparing overall expense of free flaps and pedicled flaps

Longer operative time, increased length of hospital stay, increased use of monitoring in ICU, and increased use of drugs in free flap patients are concerns that are raised causing increase in cost of free flap surgeries.[49] Authors have reported higher cost of free flaps when compared to pedicled flaps.[50] Actually the increased cost was mostly related to the patient comorbidities and the extent of the surgery than the free flap itself. Thus we can infer that the increased expense was probably due to operations performed on more complex cases with resultant more morbidity and expenses incurred in managing them.

With the available data we can infer that, free flaps are not more expensive than regional flaps and may actually provide cost savings for selected patients.

CONCLUSION

The commonly misplaced notion till recently that free flaps are lengthy procedures does not hold ground anymore as many centers which regularly do free flaps take only as much time or a little more than that needed for loco regional pedicled flap. More interesting is the fact that the length of hospital stay of a patient who underwent free flap reconstruction is much less when compared to regional pedicled flap.

Free flaps take a longer time in beginners due to many reasons. The learning curve needed for performing faster and safer MA, attaining technical perfection in flap harvest and inset, experience in donor and recipient site vessel preparation and orienting the anastomosed vessels in the right plane keeping in mind the vessel geometry after skin closure are technical skills mastered only by experience. But once this is perfected the operating time drastically reduces. Combined with an efficient infrastructure and effective theatre protocols, microsurgery can be introduced seamlessly into any surgical practice.

Even with the numerous flaps available at present for OMF reconstruction, no single free flap can cater to the multitude of defects we come across after ablative surgery. In this scenario, it would be prudent for the beginner who is just venturing into OMF reconstruction to initially be familiar with a few basic flaps, which he can confidently harvest, safely anastomose and successfully carry out.

Microsurgery being a field requiring intense practical training, the surgeon should not initially venture into harvesting newer flaps which he is not familiar with, but should have the resolve to do so later on when he has mastered the basic skills reasonably well. We consider three flaps-The RFFF, ALT and fibula to have all the components necessary for OMF reconstruction. RFFF can be considered for medium size intraoral defects where pliability of the tissue is paramount, fibula can be considered in maxillomandibular defects when we need to reconstruct a long span defect of bone, and ALT can be considered for replacing a large soft tissue defect in the OMF region, especially when there is a skin defect. Mastery in these three flaps can arm the reconstructive surgeon with sufficient options in his arsenal to reconstruct almost all types of OMF defects.

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Cite this article as: George RK, Krishnamurthy A. Microsurgical free flaps: Controversies in maxillofacial reconstruction. Ann Maxillofac Surg 2013;3:72-9.

Source of Support: Nil, **Conflict of Interest**: No.