FREE FLAPS IN HEAD AND NECK REGION – LITERATURE REVIEW

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 Abstract

Background: highly defected area or an infected area where required for the reconstruction of the structure .when the local flap or an regional flap are unsupported or insufficient for the reconstruct the area. free flap are used for the reconstruction . the donar and the recipient area are far away from the region of reconstruction . various type of reconstructive free flaps are available in the reconstruction of head and neck region with numerous advantages and disadvantages. The article is an literature review of free flap in head and neck region .

 Key words: flaps,free flaps,fibula flap, temporal flap.

Material and methods: Over 12 articles where selected for review following comprehensive search of the literature from pubmed central.

Conclusion: free flap are used in the reconstruction of the head and neck region the success rate of the free flap are depends on the vitality and the vascularity of the donar and the recepient area will varies from region to region. Successive reconstruction of the recipient site by preventive necrosis therapy .

1. **Introduction** : a flap is a portion of tissue that can be dissected, elevated, and insert into a nonanatomic position as a consequence of its vascular supply and outflow. Flaps come in many different shapes and forms. They range from simple advancements of skin to composites of many different types of tissue Surgical practice routienely involves excision of body parts for treatment of pathologic lesions,producing defects of varying sizes . defects may also be caused by other factor s such as trauma ,burns etc. reconstruction of the lost body parts is important in many respects .they include provision for cover ,restoration of function and esthetic rehabilitation.

2. **Material and method:** Over 12 articles where selected for review following comprehensive search of the literature from pubmed central.

3. Discussion:

Microvascular techniques for anastomosis of small vessels allow the transfer of skin flaps from distant sites. These flaps are particularly useful in cases where adequate tissue for reconstruction is not available in the vicinity of the defect, and where the recipient bed is not vascular enough to facilitate the take of an ordinary flap.An artery and vein of adequate size and in proximity to the defect should be chosen for microvascular anastomosis. It is usually possible to choose vessels with adequate pedicle length for donor vessels to reach. Delicate handling of the vessels is essential to prevent damage to the intima. The recipient vessels may be sutured end-to-end or end-to-side to the donor vessels. Branches of the external carotid artery and internal jugular vein may be used as recipient vessels.

Jejunum

The small intestine has been used for reconstruction of cervical esophagus to provide a reconstructive pharyngeal conduit following pharyngolaryngectomy and for resurfacing the oral cavity defects.

A segment of proximal jejunum is harvested along with mesenteric vasculature, which is capable of providing a single arterial and venous pedicle suitable for anastomosis. After the harvest of jejunum the continuity of the intestine is restored.

The advantages of this flap for intra-oral reconstruction is that the transferred tissue has a mucosal surface which secrete mucous and that the vascular pedicle is of adequate caliber for anastomosis.

The disadvantages of this flap are that it requires abdominal operation and the operating period is prolonged.

Groin flap

This micro-vascular technique was first perfomed for free flap technique. in 1863 wood and reevaluated by mcgregor and morgan in 1973 was the first axial pattern flap. The skin overlying the iliac crest and ilium are perfused by arteries which anastomose in the vicinity of the anterior superior iliac spine, the superficial and deep circumflex arteries and the superior gluteal artery.

The standard groin flap is based on the superficial circumflex iliac artery, usually a branch of femoral artery. Venous drainage is by a superficial and deep system of veins.about 16 to 24 cm successfully transfered. The donor defect is minimal. It can also be used as a de-epithelised flat flap for repair of soft tissue defects.

The disadvantages are a variable pattern of vascularity, short vascular pedicle and the excess bulk of the groin.

Lateral arm

The lateral arm provides a free flap based on the posterior radial collateral artery, which is a direct continuation of the profunda branchii. The flap is thin and pliable and consists of fascia and skin. The posterior cutaneous nerve of the arm accompanies the artery and can be transferred with the flap.

Several branches from the artery provide a periosteal blood supply to the humerus and can allow harvesting of a small segment of vascularised bone.

Latissimus dorsi

Described by maxwell (1978), the flap consists of latissimus dorsi muscle and its overlying skin paddle. The dominant vascular pedicle is the thoracodorsal artery, arising from the subscapular artery (branch of axillary artery). The subscapular artery and its branches offer a variety of flaps suited for free tissue transfer. Venous drainage is by venae comitantes, which accompany the thoracodorsal and axillary arteries.

The flap offers a large amount of tissue with a good quality skin element, thus making it useful to fill large and full thickness head and neck defects. It is very reliable and is easy to use. The disadvantages are the bulk, risk of seroma formation and functional incapacitation in certain occupation groups (athletes and tennis players). The muscle bulk settles slowly over time as the denervated muscle shrinks.

Anatomy: it arises by aponeurosis from lower 6 thoracic , lumbar and sacral spines and the outer lip of the iliac crest . Inserted in the intertubercular sulcus of humerus.

Pattern V vascular supply.

1. Thoracodorsal artery : enters the muscle from deep surface along with vein and nerve 6.0 to 11.5 cm distal to the origin of subscapular artery.
2. Perforating vessels from IC and lumbar vessels : these enter the muscle approximately 8cm from the midline .

Flap design and elevation: a skin paddle is planned over lower third of the muscle usually over the 10th 11th and 12th ribs. The skin paddle can lie transversely ,obliquely or vertically .

An incision is made along the skin paddle marking to the muscle. The remaining skin is elevated off the muscle after marking incision along the lateral border of the muscle extending from the posterior axillary fold to the skin paddle . The muscle is then elevated from the chest wall and the origins are divided and the muscle is mobilized proximally . The donor area is usually primarily closed after placing a suction drain .

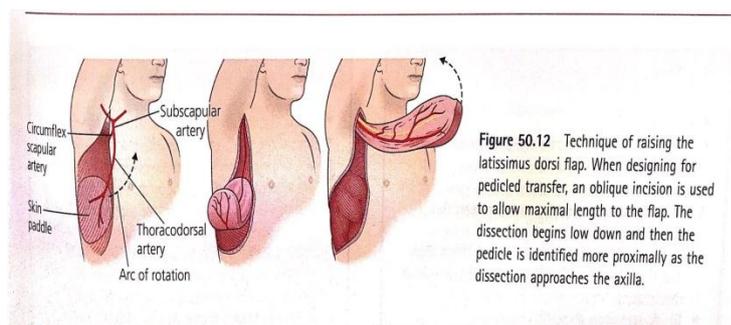**Uses:** reconstruction of the lower half of the face and neck

Figure 50.12   Technique of raising the latissimus dorsi flap. When designing for pedicled transfer, an oblique incision is used to allow maximal length to the flap. The dissection begins low down and then the pedicle is identified more proximally as the dissection approaches the axilla.
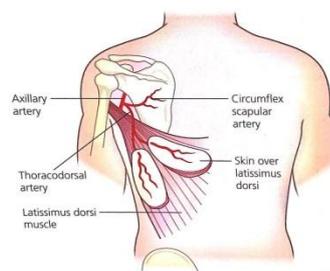
Figure 50.11   Blood supply to the latissimus dorsi flap. The thoracodorsal artery is a continuation of the subscapular artery which comes directly off the axillary artery.

Rectus abdominis

The rectus abdominis muscle can be transferred either as a muscle flap or as a myocutaneous flap. The muscle is supplied by the superior and inferior epigastric vessels. The larger pedicle is the inferior epigastric, which forms the basis of the rectus abdominis free flap.

Alternatively, it is possible to take a small amount of muscle that contains two or three perforators, which supply a large area of skin. it is a long vascular pedicle with vesselsthat can be easily dissected.

The removal of the muscle causes some abdominal weakness, and ventral herniation is frequent. The flap is often too bulky.

Dorsalis pedis

First described by o'brics and shanmughan in 1973, this fasciocutaneous flap transfers skin,superficial fascia from the dorsum of the foot using as its vascular basis the dorsalis pedis artery and the superficial veins, which pass proximally into the long saphenous system. The vascular pedicle of this flap can be dissected from the leg to a length of at least 10 to 15 cm. If additional venous drainage is required, the saphenous vein may be included in the flap.

Second metatarsal bone can be harvested along with the flap for mandibular and temporomandibular reconstruction.

Iliac crest – composite groin flap

The iliac bone along with its overlying skin paddle can be harvested as a free flap based on either the superficial or deep circumflex iliac arteries. daniel (1978)was first to describe the mandibular reconstruction . Taylor et al (1983) showed the superiority of the deep circumflex iliac arteries. The segmental nature of the vessels supplying the

The deep circumflex iliac artery arises from the external iliac artery just above the inguinal ligament. The venous drainage of the flap consists of two venae comitantes which may unite to form a single trunk.

The flap provides an abundance of well-vascularised iliac bone (corticocancellous), which can be used to adequately reconstruct large mandibular defects including hemimandibular or even total mandibular defects if bilateral flaps are used. The donor defect is minimal.

The chief disadvantages are the risks of necrosis of the skin segment and abdominal wall herniation. The dissection is tedious.

Radial fore-arm flap

The radial forearm free flap, described by soutar (1983), is a fasciocutaneous flap based on the radial artery. The venous drainage is dual; the paired venae comitantes accompanying the radial artery and the subcutaneous veins. The entire fascia and skin of the volar aspect of the forearm can be used for microvascular transfer. The periosteum of the radius is supplied by a rich network of vessels from the radial artery, and a vascularised segment of radius lying between the insertion of the pronator teres and the radial styloid may be transferred with the flap. The flap is extremely reliable, has a constant anatomy, and has large diameter vessels. A large amount of thin, pliable skin may be harvested. The blood supply to the bone and skin arises from a different

Furthermore, the segmental blood supply preserves vascularity of all segments. This flap is most useful in mucosal defects of the floor of the mouth and anterior mandibular defects in combination with floor of the mouth defects. The main disadvantage is the need to interrupt the radial artery and the resultant compromise to vascularity of the hand. The amount of bone available for use is limited to 10 or 11 cm in length. This limits its use to small defects.

Scapular / parascapular flap

The scapular and parascapular free flaps are based on transverse and descending branches, respectively, of the circumflex scapular artery, which is the largest branch of axillary artery. The flaps are of fasciocutaneous type, though variable amounts of bone or muscle (serratus anterior) can be included in selected cases. Large cutaneous paddles based on either of the arteries may be raised. The descending branch provides multiple segmental vessels to the periosteum of the lateral border of scapula, allowing a vascularised segment of bone to be harvested. The flap is relatively thin, the anatomy reliable, and a large area is available for transfer.

The chief disadvantage is the need to reposition the patient. The dermis of the back is thick, and the scar tends to widen in course of time.

Fibula free flap

Introduced in 1975 by taylor et al, the free fibula flap was one of the earliest osseous free flaps with extensive application in long bone reconstruction. In 1983, chen and yan described the vascular supply of free fibular osteocutaneous flap. Hidalgo (1992) reported the first application in mandibular reconstruction. Hayden (1992) described the nerve supply to the cutaneous paddle and advocated a neurosensory potential. He also demonstrated successful primary osseointegration with titanium implants in the fibula.

A long segment of fibula can be harvested as a free flap based on the peroneal artery. The blood supply is rich, consisting of both medullary and periosteal vessels, which allows osteotomies without jeopardising viability. The branches of the common peroneal nerve, the lateral cutaneous nerve of the calf or the sural communicating nerve may be harvested with the flap to provide a neurosensitised skin paddle.

The dissection is straightforward and provides vessels of moderate size. The bone is strong and can even be folded on itself to provide a double strut. Donor site morbidity is unusual as long as the distal 5 to 6 cm of fibula is left for ankle support.

MASSTERIC FLAP:

▶ The masseter muscle has been utilized for many years in the reanimation of the paralyzed face
▶ Its use in intraoral recontruction was popularized by tiwari – for the reconstruction of oral defects following the ablation of tonsil and retromolarfossa cancers.
▶ Langdon- transfer of the masseter muscle to defects of the palate.

Technique:

▶ At the completion of neck dissection the inferior border of the mandible is exposed in a subperiosteal plane . The masseter muscle is elevated from the lateral surface of the mandible. It is dissected to the level of coronoid notch .
▶ The masseter muscle is a well vascularized tissue that is readily available following the ablation of tumors of the RM fossa and the tonsillar region
▶ The masseter muscle flap remains a useful , readily available local tissue for site specific defects of the oral cavity .
▶ The major disadvantage of the flap are the limited volume of tissue and the potential for the development of trismus .
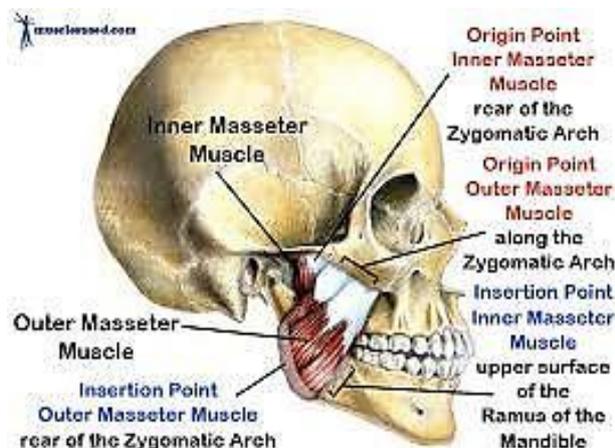
TEMPEROPARITAL FLAP:

Fasciocutaneous flaps:

TPFF:

- The TPF is continuous with SMAS and auricularis muscle inferiorly and attached to the zygomatic arch .
- It is continuous with the galea superiorly , the frontalis muscle anteriorly and the occipitalis muscle behind .
- Medial to the TPF , loose areolar tissue lies between TPF and TMF.
- The TPF is 2-3mm thick . It is supplied by the superficial temporal artery and vein which lies on or within this layer

Flap elevation:

- An incision is made in the preauricular region , starting from the tragus extended superiorly into the temporoparietal region.
- Dissection is started just above the ear where the identification of hair follicles is easier . Near temporal line , this fascia is firmly attached to the dermis by the fibrous septa .lateral plane of dissection lies just below the hair follicle .
- Medial plane of dissection lies in the loose areolar tissue superficial to the TMF.
- Anterior dissection stops at a line joining the points 0.5 cm below the tragus and 1.5 cm above the lateral brow .
- Donor area is closed over a suction drain . After covering the defect , the outer surface of the fascia is resurfaced by split thickness skin graft
- The disadvantage is a transient / permanent alopecia .

- Mokal et al., concluded that well vascularized TPFF brings good blood supply to the fibrosed muscles and mucosa. This provides a healthy and vascularized bed for the skin graft.
- It is useful even in irradiated or chronically infected tissue beds.
- The disadvantages of this procedure include multiple surgeries, temporary disfigurement due to the tissue expanders, and limited applicability in female patients
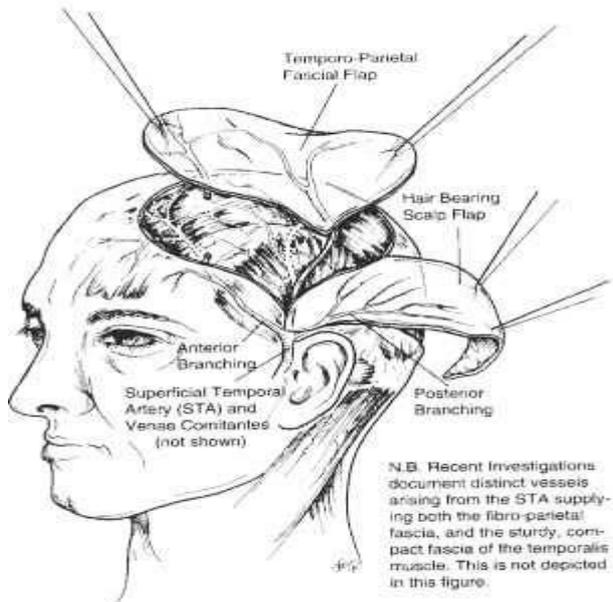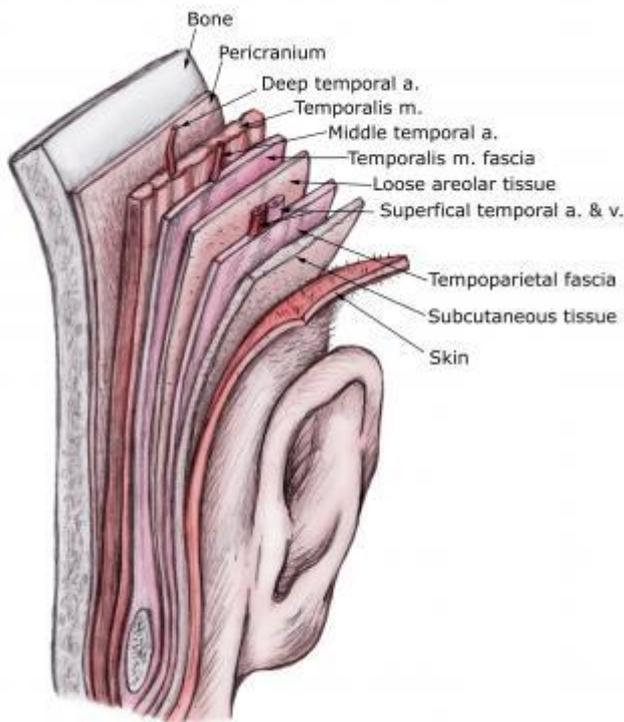
1. **Conclusion:**the success rate of the free flap are depends on the vitality and the vascularity of the donar and the recepient area will varies from region to region. Successive reconstruction of the recipient site by preventive necrosis therapy .

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