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The Lower Trapezius Myocutaneous Flap for Reconstruction after Surgery for Head and Neck Cancer: NCI Experience

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ABSTRACT

Purpose: The purpose of this study is to evaluate the lower trapezius myocutaneous flap which is used for reconstruction after surgery for head and neck cancer, as considerable controversy persists regarding the optimal myocutaneous flap for reconstruction of defects resulting from resections in the head and neck. An ideal pedicled myocutaneous flap should provide high success rate, few complications, low morbidity, short hospitalization and the greatest potential for best aesthetic outcome.

Material and Methods: Over a two-year period, (July 1999 to July 2001), the lower trapezius myocutaneous flap was used for reconstruction in 15 head and neck cancer patients at the National Cancer Institute, Cairo University.

Nine patients were males and six were females with a mean age 49.6 years. Squamous cell cancer was diagnosed in 8 patients (53.3%), basal cell carcinoma in 3 patients (20%), adenoid cystic carcinoma in 3 patients, while fibrosarcoma was diagnosed in one patient (6.6%).

Results: Flap survival, complications, ultimate functional and cosmetic outcomes were evaluated. One patient had total flap loss, while in the other 14 patients it was successful. Only one patient had a haematoma at the donor site. All wounds were closed primarily and preservation of the accessory nerve to the superior fibers of the trapezius muscle enabled almost normal abduction of the arm.

Conclusion: The lower trapezius myocutaneous flap is safe, reliable and easy to raise with constant blood supply. Its functional deficits are minimal and the donor site is closed primarily.

Key Words: *Lower trapezius myocutaneous flap (LTMF) head and neck cancer.*

INTRODUCTION

The trapezius composite flap was first described by Demergasso and Piazza **[4]**. Several variations of the trapezius flap have been described. The caudal trapezius island flap was described by Mathes and Nahia **[6]** in head and neck cancer reconstruction. Since then, there have been multiple reports in the literature of failure rates with this flap. There has also been controversy regarding the blood supply of this flap.

Traditionally, the trapezius flap is considered as an axial pattern flap based on the descending branch of the transverse cervical artery (type II) **[9]**. During the past two decades the vascular anatomy has been the subject of several detailed studies of human cadavers and it was found that the trapezoidal branch of the dorsal scapular artery is a constant vessel to lower trapezius muscle **[10]**. So it was shown that there are two main patterns of vascular supply of the trapezius and that the muscle is principally supplied by three vascular sources: the transverse cervical artery, the dorsal scapular artery, in addition to a trivial supply from the posterior intercostal arterial branches **[11]**. Consequently, the lower part of the trapezius muscle has a vascular pattern type IV, thus the lower trapezius musculacutaneous flap merits consideration in head and neck reconstruction (Fig. 1).

PATIENTS AND METHODS

Between July 1999 and July 2001, a total of 15 patients underwent reconstruction of the head and neck region with lower trapezius island myocutaneous flap. The demographic data of the patients and the indications for various the reconstructions performed are shown in table (1).

Technique for elevation of LTMF:

As described by Demergasso and Piazza **[4]**, the skin island is located at the inferior aspect on the trapezius muscle. It is designed between the vertebral column and the scapula with its

vertical axis extending between the mid scapula and the inferior origin of the muscle. The skin territory may be extended inferiorly over the territory of the latissimus dorsi muscle as a random flap extension when necessary to achieve extended arc of rotation for the muscle unit. The skin is incised to the posterior surface of the trapezius muscle (Fig. 2: a-e).

In elevating the skin paddle laterally, it is important to include the fascia overlying the latissmus dorsi muscle and then to dissect from lateral to medial under this fascia. This method automatically leads to the lateral border of trapezius which is included in dissection.

The medial muscle fibers of origin are divided and the flap is elevated towards the base of the neck. At the level of the tip of the scapula, care must be taken to separate the anterior surface of the trapezius muscle from the rhomboid muscle.

At this level the fibers of insertion into the scapula are divided. Further proximal flap dissection will depend on the required destination. If the flap is designed for reconstruction of higher defects of the anterior face, the flap is elevated to the level of the base of the neck. This requires further division of fibers of insertion into the acromioclavicular joint (Fig. 2: e).

The superior and anterior fibers of the trapezius muscle are left intact to preserve the posterior fold of the neck to minimize aesthetic deformity. The branch of the dorsal scapular artery appearing at the scapula can be clearly identified between the rhomboid muscles at this stage of dissection. The deep branch of transverse cervical artery can also be seen as it appears medially and superiorly to the dorsal scapular artery (Fig. 2: d).

No incision is required in the skin of the posterior triangle of the neck. Only subcutaneous undermining is done so that the lower trapezius myocutaneous flap can be tunneled onto the head and neck region. The donor site is closed primarily.

RESULTS

Of the 15 patients included in this study, nine patients were males and six were females and their ages ranged from 16 to 68 years (mean age: 49.6 years).

Squamous cell carcinoma was diagnosed in 8 patients, only one was recurrent, recurrent basal cell carcinoma in 3 patients, adenoid-cystic carcinoma in 3 patients while fibrosarcoma was seen in one patient. The occiput was the most common site for reconstruction, 7 patients; parotid region 3 patients; parietal region 2 patients while the ear pinna, external auditory meatus, preauricular region; 1 patient for each region.

Only one female patient had total flap loss which was salvaged using pectoralis major myocutaneous flap. One patient, who was previously irradiated, had a minor dehiscence. Haematoma occurred at the donor site in one patient. All wounds were closed primarily and preservation of superior fibers of the trapezius enabled almost normal abduction of the arm.

Different operative views are shown in figs. (3-7).

Table (1).

Case	Sex/ Age	Primary diagnosis & Site
1	M/48	S.C.C of the ear pinna
2	M/52	Rec. B.C.C of the occiput
3	F/55	S.C.C of the occiput
4	F/54	Rec. B.C.C of preauricular area.
5	M/62	S.C.C of E.A.M
6	F/16	Fibro sarcoma of the occiput
7	M/64	Rec. B.C.C of the occiput
8	F/60	S.C.C of the parotid.
9	M/47	Rec. Sq. C.Ca. of the occiput
10	M/53	Adenoid cystic Ca of the parietal region
11	M/68	Rec. Sq. C.Ca of the parietal region
12	M/50	Sq.C.Ca of the occiput
13	F/49	Sq.C. Ca of the occiput
14	M/38	Adenoid cystic Ca. of the parotid
15	F/28	Adenoid cystic Ca. of the parotid

Sq. C. Ca.: Squamous cell carcinoma, B.C.C.: Basal cell carcinoma.
E.A.M. : External auditory meatus, Rec.: Recurrent.

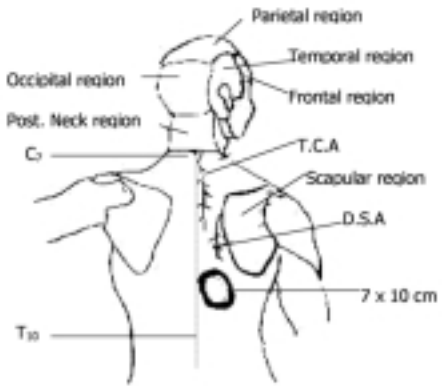

Fig. (1): Blood supply of the lower trapezius myocutaneous flap, its possible site distinations.
T.C.A: Transverse cervical artery, D.S.A: Dorsal scapular artery

Fig. (2): Planning of the flap.

Fig. (2-A): Preoperative planning of the flap showing the course of deep branch of transverse cervical artery (TCA) and dorsal scapular artery (DSA).

Fig. (2-B): Operative view.

Fig. (2-C): Design of the flap.

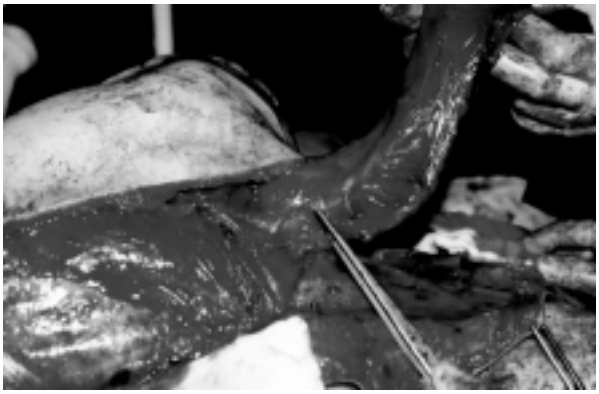

Fig. (2-D): Operative view showing the deep branch of transverse cervical artery.

Fig. (2-E): Elevation of the flap.

Fig. (2-F): The flap at the site of installation, and primary closure of the donor site.

Fig. (3-A): Recurrent B.C.C of the occiput.

Fig. (3-B): Early postoperative view for recurrent B.C.C of the occiput.

Fig. (4-A): Fibrosarcoma of the occiput.

Fig. (4-B): Immediate postoperative view for fibrosarcoma of the occiput.

Fig. (4-C): Late postoperative view for fibrosarcoma of the occiput.

Fig. (5-A): Sq. C. Ca. of the ear pinna.

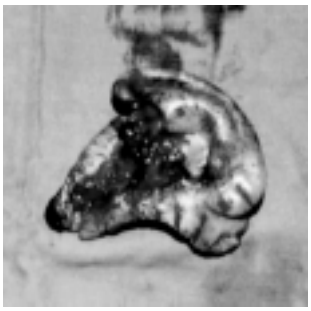

Fig. (5-B): Postoperative specimen.

Fig. (5-C): Late postoperative view.

Fig. (6-A): Adenoid cystic Ca. of Lt parietal region.

Fig. (7-A): Adenoid cystic Ca. of the parotid.

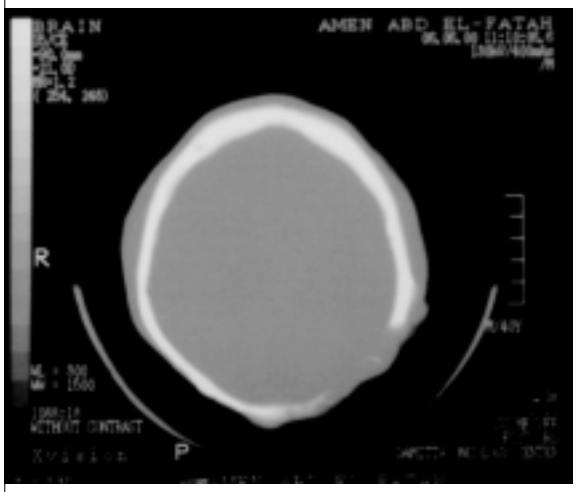

Fig. (6-B): CT for adenoid cystic Ca of the parietal region showing parietal bone invasion.

Fig. (7-B): Operative view after excision of adenoid cystic Ca of the parotid and reconstruction.

Fig. (6-C): Postoperative view for adenoid cystic Ca of the parietal region. Craniectomy was done.

Fig. (7-C): Another operative view of the adenoid cystic Ca of the parotid.

DISCUSSION

Reconstructive procedures in head and neck region have to take into account the anatomic, aesthetic and functional aspects [5]. First, normal contours have to be achieved in the neck and the cervicomandibular angle has to be reformed. Second, the aesthetic units have to be taken into account to cover defects of the head and neck, i.e. thin flaps with good colour and texture should be used [1]. The best colour and texture match is achieved with local and regional flaps. Usability of the local flaps may be restricted because of radiation or destruction of vascularization. Third, functional outcome has to ensure full range of movement both of the lower face, neck and shoulder. Finally, additional scarring of the upper chest should be avoided.

Microsurgical transplantation of free flaps enables coverage by vascularized tissue to fill larger defects. The incidence of complications with free-tissue transfer ranges from 5 to 10 percent. In addition to technical problems, the aesthetic outcome depends on the donor site. In contrast, the use of regional flaps as the trapezius myocutaneous flap reconstructive surgery gives high reliability when covering large defects and reduces the risk of complications to a level lower than that found for free flaps.

Three separate trapezius myocutaneous flaps have been discussed [2,4,9]. The superior flap is based on the occipital artery and the cervical paraspinous perforators. The lateral island trapezius myocutaneous flap is based on branches of the transverse cervical artery whereas the lower trapezius island myocutaneous flap is based on the ascending branches of the transverse cervical artery. The vascular supply of the skin paddle is based on the theory of Taylor et al. [8] who described the design of skin flaps incorporating vascular territories outside the traditional vascular supply to the flap in question. This design is based on the angiosome theory of blood supply. One can raise a flap that will include the angiosome of the flap's vascular supply in addition to adjacent angiosomes. Injection studies done by Tan et al. [7] have shown that the angiosome of the dorsal scapular artery was lower and more lateral than the transvere cervical artery, adding to the distal limit of this flap. Extension of this flap to the midaxillary line over the latissmus dorsi muscle could be achieved. In the current series of clinical cases, this flap has proved to be reliable in head and neck reconstruction. This design could be the "workhorse" myocutaneous flap in regions not covered by the pectoralis major or in women in whom prevention of distortion of the breasts is desirable. The resulting donor scar on the back has been favored over anterior chest scars by some female patients. The main disadvantage of this flap is the position of the patient in the lateral decubitus position during surgery.

Conclusion:

The lower trapezius myocutaneous flap has proved to be another adjunct in the reconstructive armamentarium of the head and neck surgeon. This flap may well become the first consideration in the flaps used for reconstruction of extensive defects of the head and neck. The LTMF is safe, reliable and easy to raise with constant vascular supply.

The donor site functional deficits are minimal and the donor site is closed primarily without necessity of skin graft. Its cutaneous reach and arc of rotation make it a suitable source for skin and muscle replacement for the entire neck, face and occipital region of the scalp.

REFERENCES

1- Baek S.M., Biller H.F., Krespi Y.P. and Lawson W.: The lower trapezius island myocutaneous flap. Ann. Plast. Surg., 5: 108-112, 1980.

2- Bhathena H.M.: Caudal Trapezius composite island flap for extensive shoulder defects. Acta Chir Plast., 32 (3): 90-93, 1996.

3- Conley J.: The use of regional flaps in major head and neck surgery. J. Otolaryngol Soc. Augst., 3: (303-305), 1972.

4- Demergasso O. and Piazza M.V.: Trapezius myocutaneous flap in reconstructive surgery in head and neck cancer. An original Technique. Am. J. Surg., 138: (533-536). 1979.

5- Lynch J.R., Honsen J.E., Chaffoo R. and Seyfer A.E.: The lower trapezius musculocutanous flap revisited. Versatile coverage for complicated wounds to the posterior cervical and occipital region, based on the deep branch of the transverse cervical artery, Plast Recontr. Surg., 109 (2): 444-50, 2002

6- Mathes S.J. and Nahai F.: Clinical Atlas of Muscle and Musculocutaneous flaps. St. Louis: Mosby, 1979, pp. 303-305.

7- Tan K.C. and Tan B.K.: External lower trapezius island myocutaneous flap: A Fasciocutaneous flap based on dorsal scapular artery. Hand and Reconstr. Surg., 15 (5): 1758-1763, 2002.

8- Taylor G.J., Palmer J. and McMamamy F.: The vascular territories of the body (Angiosome), and their clinical application. Reconstructive Plastic Surgery, Philadelphia: Saunders, pp. 329-378, 1990.

9- Urnken M.L., Naidu R.K., Lawson W. and Biller H.F.: The lower Trapezius Island Musculocutaneous flap revisited. Arch. Otolaryngol. Head and Neck Surg., 14 502-505, 1991.

10- Weiglein A.H., Haas F. and Pierer G.: Anatomic basis of the lower Trapezius Musculocutanous flap. Surg. Radiol Anat, 18 (3): 25 7-61, 1996.

11- Yang D. and Morris S.F.: Trapezius Muscle, anatomic basis for flap design. Ann Plast Surg., 41 (1): 52-7, 1998.