

## FREE LATISSIMUS DORSI MUSCLE FLAP (FLDMF) TO COVER SCALP DEFECT

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### ABSTRACT

Scalp defect could be covered by several reconstruction techniques that much has been done and reported at plastic surgery journals. Free Latissimus Dorsi Muscle Flap (FLDMF) is one of flaps that is reliable and is often used for chest wall reconstruction and post mastectomy; nevertheless the uses to cover wide soft tissue defect of head and neck as a matter of fact give satisfying result. Electric trauma often makes wide scalp defect deep to the bone. We reported 3 wide scalp defect coverage caused by electric burn using FLDMF. One of them before the FLDMF underwent local flap procedure but failed. M. Latissimus Dorsi gets a dominant blood supply from thoracodorsal artery and secondary blood supplies from perforator branch segmental intercostalis artery and lumbar artery. Anastomosis at scalp is done with superficial temporal artery. Strict monitoring of flap viability at 12-24 hours and optimal drainage is a FLDMF important point for success. At 3 such cases shows satisfying result.

**Keyword:** Free Latissimus Dorsi Muscle Flap, Scalp Defect.

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### INTRODUCTION

Free Latissimus Dorsi flap (FLDP) is reliable technique. It is often used for chest wall reconstruction and post mastectomy; nevertheless the uses to cover wide soft tissue on head and neck as a matter of fact give satisfying result. (Safak T 1998). *Free Latissimus Dorsi Flap (FLDF)* may be transferred as muscle flap, myocutaneous flap or composite osteomyocutaneous flap. The LDMF may be used to provide a sensate reconstruction when it is transferred with an intact neurovascular bundle. Scalp defect may be accompanied with or without intact periosteum. Scalp defect with intact periosteum can be covered with split thickness skin graft. When an injured scalp has inadequate vascular supply with wide damage is not accompanied with periosteum, flap is the must. (Lipa JE 2004)

Local flap or free flap is used to cover scalp defect. However, local flap procedure to cover wide scalp defect with minimal vascular supply has a high risk to fail even though this flap is inexpensive and simple. Meanwhile, FLDF is considered as a very reliable procedure to cover such scalp defect. (Lee 1999 & Lipa 2004). Free flap has been used to cover scalp defect >120 cm<sup>2</sup> with minimal vascularization. Basically, a scalp defect is accompanied with bone exposure and periosteum loss. Electrical burn wound is a high stage of electrical trauma because it causes wide and deep

damage, bone exposure and minimal vascularization. Developed techniques in microvascular surgery, makes FLDMF as one of the chosen method for scalp defect accompanied with bone exposure. Three patients with electrical trauma cases that caused wide scalp defect will be reported in this article and one underwent a local flap procedure before FLDMF.

### Complication

The most common complication following a latissimus dorsi flap is seroma formation at the donor site. The frequency is reported to occur in 38-50% of patients in some series. The frequency of this complication can be reduced by adequately draining the donor site with closed suction drainage and by fixating the skin flaps down with tacking sutures. Donor site appearance is a major concern in some patients, but with the new techniques of endoscopic-assisted harvest, the donor scar can usually be limited to 6 cm incision.

### CASE REPORT

#### Case 1

A 42 year-old man came to emergency room in RSUD dr. Soetomo on 23<sup>rd</sup> November 2005 with electrical cable shot while fixing a roof but did not faint. His GCS was 4-5-6; vital signs were stable with the burn wounds:

R Scalp: grade III 1%  
R digits I-II-III pedis sinistra: grade III 1%  
Total grade III 2%

Patient was diagnosed as Combustio grade III 2% ec. Electrical injury. In early examination, R scalp parietal combustio grade III 1% with necrotic tissues from the skin until periosteum were discovered. Wound bed preparation with autolytic debridement was conducted. After 14 days of treatment, R Scalp was 1% wide or 13 by 8 cm ( $104 \text{ cm}^2 = 11.5\%$ ) raw area with exposed parietal bone accompanied with profuse granulation tissues. We perform a local flap by using pedicles from left superficial temporal artery that was rotated in order to maintain donor's pericranium and was covered with Split Thickness Skin Graft (STG) and tie over. Besides that, necrotomy and left pedis I-II-III digiti amputation were performed and covered with STG.

On 12<sup>th</sup> December 2005, graft and flap viability were evaluated. Graft take was 100% but at the end of the flap showed necrotic signs. Besides that, dermatomycosis was discovered and consulted to the skin and genital disease department. It was diagnosed as seborrheic dermatitis and treated with corticosteroid. A necrotic flap was treated with hydrocolloid gel and covered with transparent dressing. At one point, the 4 by 8 cm, necrotic flap was accompanied with seborrheic dermatitis and it did not heal. On 10<sup>th</sup> February 2006, a surgical debridement was performed together with necrotomy at the flap and a full thickness defect the size of 13 by 8 cm ( $104 \text{ cm}^2 = 11.5\%$ ) with an exposed bone in addition to dead bone signs. Subsequently, wound bed preparation using a hydrocolloid gel and was covered with transparent dressing. On 16<sup>th</sup> February 2006, right FLDMF procedure was conducted to cover the scalp defect. Before that, chipping bone and freshening were conducted to achieve viable tissues and adequate cranium bone vascularization. The FLDMF was taken.

#### Case 2

A 53 year-old man came to emergency room on 11<sup>th</sup> January 2006 with electrical cable shot while fixing roof, fell from 4 meter height and fainted. During examination, his GSC 4-5-6, stable vital signs with burn wounds:

R. Scalp: gr III 1%  
R. Facialis colli: gr II AB 4%  
R. Extrem Inf Dext: gr II AB 6%  
R. Extrem Inf Sin: gr II AB 1%  
Total gr II AB 11%, gr III 1%

This patient received a joint treatment from Eye and Neurology Departments respectively. No special

procedure was conducted to his eyes since there were no vision disorders. Meanwhile, from the Neurology Department, meningeal sensation disorder was not discovered and EMG examination was suggested. R scalp wound grade III 1% with necrotic tissues from skin to periosteum. Due to unstable general condition, a non-surgical debridement with an autolytic method was conducted. After two weeks of treatment, scalp defect, the size of 10 by 20 cm ( $200 \text{ cm}^2 = 22\%$ ) at the frontotemporoparietal part with an exposed bone but minimal granulation tissues. On 10<sup>th</sup> March 2006, a left Free Latissimus Dorsi Flap procedure was conducted to cover scalp defect.

The FLDMF was taken.

#### Case 3

A 50 year-old man came to emergency room on 22<sup>nd</sup> March 2005 with electrical cable shot at the head while fixing a roof but did not faint. First he was treated at other hospital. During examination, his GCS was 4-5-6, vital signs were stable, local wounds: frontoparietal defect 8 by 10 cm with bone exposure. On 21<sup>st</sup> April 2006, a FLDMF procedure was conducted from left side and the donor was covered with Split Thickness Skin Graft (=STG). The FLDMF was taken.

#### DISCUSSION

Latissimus Dorsi muscle is a very reliable muscle used in reconstructive surgery because of its adequate vascularization. It has a big size to cover a wide defect. It is able to cover defect problems that are usually difficult to cover such as breast reconstruction, head and neck, upper proximal limb, anterior-posterior waist as a muscle flap, myocutaneous flap or a free flap. (Safak T 1998). Dominant vascular pedicles of latissimus dorsi muscle arises from thoracodorsal artery, creating opportunities for microvascular transplantation procedure because it can be easily rotated at the axial axillary and this allows the muscle to cover defect at the chest, shoulder, breasts, waist and neck. (Bunke 2004, Lee 1999, Lipa 2004, Yuqueros 2000)

Electrical burn wound is the most common scalp defect that causes wide and intense damage. Coverage procedure is adjusted to the need, starting from the simplest methods to difficult techniques. Scalp defect less than 3 cm still has the chance to be covered with primary closure. Scalp defect with intact periosteum usually covered by STG, especially on trauma cases that require rapid coverage. STG is also used together with local flap or free flap to cover wide scalp defect. Local flap can be good choice for scalp defect with a better

knowledge in scalp vascular anatomy, local flap is axial pattern flap type.

Three wide scalp defect cases due to electrical burnt wound are reported. FLDMF procedure was chosen due to developed microvascular surgery and adequate vascularization anastomosis thus, the risk to fail is relatively slim. Besides that, size and depth of the scalp defect were the factors to use this procedure. Electrical burn in 2004 – 2005 was about 32% from the total burn wound. Meanwhile, electrical burn on scalp was about 27.8% from all electrical burn. The largest size defect was 348 cm<sup>2</sup> and the smallest was 57 cm<sup>2</sup>. Most of the burn wounds of the scalp were covered with local flap or STG. In this report, one of the patients received local flap (rotation flap) but failed before the FLDMF. The most important blood vessel for scalp recipient to anastomosis is superficial temporal artery because it is able to supply vascularization to the whole scalp due to its size. Superficial temporal artery runs along temporoparietalis fascias which are connective tissues from galea that arises from Superficial Musculo Aponeurotic System (SMAS) in the face.

In this report, thoracodorsal artery of latissimus dorsi muscles were taken from donor's back anastomosed with Superficial Temporal artery together with one of the veins. Pattern test showed good results. Subsequently, some parts of the FLDMF are covered with STG without tie over. This procedure was conducted in order to avoid pressing the flap and vascularization anastomosis. Besides that, drainage was installed in order to avoid haematoma and seroma. (AcartOrk 1996, Schwabegger et al. 1997). 12 – 24 hours of tight monitoring on the flap viability because of thrombus, venous problem or artery inflow. Two of these cases were reported to have viable flap with satisfactory results. If FLDMF contains muscles only or flap size less than seven centimetres, donor site could be closed primarily. However, there are times STG is required to cover the donor especially at the back.

Aspects that should be observed during flap dissection are: -

1. Identification and preservation of neurovascular pedicle.
  2. Identification and preservation of the longest thoracic nerve.
  3. Hands' position is not supposed to be in excessive abduction position and external rotation because it can cause neuropraxia of brachial plexus or ulna nerve.
- The Latissimus dorsi muscle transfer is hardly discovered functional deficit of daily activity. Lipa JE, Butler CE (2004) had studied FLDMF complications in six patients with scalp defect due to tumor with 367 cm<sup>2</sup> average defect and conducted with 13 months post

operatively. Results showed that three patients died because of their own illnesses, whereas the other three patients were healed. No dehiscence flap was discovered. Complications that occurred were seroma at donor site in two patients, lysis partial skin graft in a patient and burn wound due to radiation at the flap, face and ears of a patient. Scalp contour was excellent aesthetically except patient with radiation burn. It was concluded that good result in FLDMF procedure and skin graft for scalp reconstruction with tumour that received radiotherapy post operation.

Dalay C, Yavuz D (1996) reported that case studies of three patients with Malignant Neoplasia at scalp region where the tumors were damaging soft tissues until cranial bone to all cranial layers should be excised. This condition was due to local flap that was not performed. Therefore, free flap was chosen. Mc Lean and Bunckell reported that cranial defect coverage with free tissue transfer using omentum transplantation and STG. However, laparotomy procedure was required in this technique; thus, FLDMF was chosen to cover parieto-occipital defect. FLDMF procedure gave satisfactory result in our cases, they are trauma, no tumor was applied. The most common complication is seroma formation at the donor site. In this case, two cases of seroma formation were discovered. Haematoma evacuation and plastering were conducted.

## CONCLUSION

FLDMF is one of the reliable flaps to cover wide and minimal vascularized scalp defect although remarkable skills and particular facilities are required. The dominant blood supply arises from the thoracodorsal artery of the donor site and the scalp recipient's should be from superficial temporal artery because these two separate vascular systems are able to provide vascularization to the whole scalp due to its large size. Flap viability and drainage should be monitored to enhance the success of FLDMF. The most common complication is seroma formation at the donor's site and asymmetry bottom's contour even though functional deficit is usually not significant.

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