

**Original Article****Groin Flap for Management of Traumatic Soft Tissue Thumb Injuries**

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Email: syedwaseem32@gmail.com**Abstract**

There are many methods available for soft tissue coverage of traumatic thumb injuries. Some of them allow coverage of volar surface and some dorsal surface only. Although these surgical procedures allow for coverage of the defect, but have the major drawback of donor site morbidity, limited tissue for cover or complexity of procedure. We present an observational study of 10 cases of traumatic thumb injuries including volar, dorsal and circumferential tissue loss and also failed FDMA flaps managed with groin flap- a technically easier procedure with reliable blood supply and limited donor site morbidity and hidden donor site scar. In our study ipsilateral groin flap was used in patients with complete/incomplete volar or complete/incomplete dorsal soft tissue loss as well as in patients with circumferential loss. Groin flap was also used as a salvage procedure for the patients who had loss of FDMA flap. All patients regained adequate function of their hand with acceptable cosmetic results and no donor site morbidity. We conclude that groin flap can be used for partial or total soft tissue loss for volar as well as dorsal soft tissue loss and for circumferential tissue loss too. Groin flap although, does require the immobilization of arm for three weeks and are bulky which may require thinning of flap and many a times more than once but it is not demanding surgically, avoids donor site cosmetic morbidity, provides ample cover of tissue loss of thumb.

Introduction

The special functions of the thumb are responsible for 40% of hand function, thus highlighting the importance of management of thumb injuries to regain most of its functions. Degloving injuries /soft tissue loss of the thumb are quite common, owing to the unique position of the thumb as it stands out from the palm of the hand and is more vulnerable to shearing forces ^[1]. Soft tissue loss of

thumb can be dorsal or volar or both (circumferential) and can be partial or total loss. Surgical treatment includes the use of local, regional, and free flaps.

Moberg flap, Littler neurovascular flap, Kutler's V-Y flaps, FDMA flap, Reverse radial forearm flap and free flaps are usual surgical choices^[2]. Although many of these surgical procedures allow for ample coverage of the defect, but have the

major drawback of donor site morbidity or limited tissue for cover or complexity of procedure. A major advance in the transfer of tissue was the development of the axial flap, which is based on the known pattern of specific blood vessels^[3,4]. McGregor and Jackson in 1972 described a new axial flap, based on superficial circumflex artery, which they called the groin flap^[5]. This flap is based on superficial circumflex artery. Smith and colleagues found the superficial circumflex artery to be consistently present in all dissections undertaken^[6]. This vessel arises from the femoral artery 0.5 cm to 5 cm below the inguinal ligament and runs parallel to the ligament as it travels laterally and superiorly. Numerous venous drain the flap into adjacent saphenous vein. The anatomic studies have revealed the consistency in course and presence of superficial circumflex artery and an excellent venous drainage of this area thus making this section of skin and subcutaneous tissue ideal for use as an axial flap^[5]. We present the results of prospective study of ipsilateral groin flap in management of soft tissue injuries of thumb.

Materials and Methods

A prospective observational study of 10 patients with traumatic soft tissue loss of thumb was made in our Department of Plastic and Reconstructive Surgery. Written informed consent was taken from all patients. The patients in our study were categorized as component loss, incomplete amputation and complete amputation groups. Patients with component loss were further categorized as soft tissue defect, tendon injuries and composite defects. Composite defects were those patients which were having combined loss of soft tissue/tendon with bone. Soft tissue loss was categorized on volar tissue loss or dorsal tissue loss or circumferential tissue loss. Patients with amputation and composite tissue loss and non-traumatic injuries were not included in our study. All age groups (11yrs-65yrs) were included. Ipsilateral groin flap based on superficial circumflex artery was used to cover

dorsal and volar soft tissue loss of the thumb. Thumb function, sensation, cosmetic satisfaction and donor site morbidity was evaluated.

Surgical Technique

The operation was done under general anesthesia with patient in supine and arm on arm table. Groin and arm were prepped and thumb is debrided. The flap was designed using "Two finger width" rule^[7]. Femoral artery represents the medial border of flap. Superficial circumflex iliac (SCIA) originates from the femoral artery, about two finger widths below the inguinal ligament. The course of this artery, also the axis of flap, is then drawn from its origin on femoral artery to the anterosuperior iliac spine.^[8,9,10,11,12] The upper flap border is identified medially two finger widths above the inguinal ligament parallel to the SCIA course. The lower flap border is also parallel to the superficial circumflex iliac artery course and is marked two finger widths below the SCIA origin. The position of the lateral flap border is determined by recipient-site requirements. With proper technique about 12 cms of flap can be raised and donor site closed primarily with undermining. The flap is quite mobile. The grafted limb is totally immobilized to the abdomen so that the flap rests without undue stretch. The flap was detached from the groin at about 3 weeks, as the second stage, and soon afterwards the patients were discharged from hospital. However in some patients where a sizeable portion of the flap remained to be set into the recipient site a delay was done and then flap detached after 3-4 days. The superficial circumflex iliac artery is ligated leaving the major portion of the base intact and wound closed primarily. When 80% or more of the flap is set in at the initial operation, however, no delay was done in patients in whom 80% or more of the flap was set at 3 weeks. In patients in whom flap was bulky thinning of flap was done after 3 weeks.

Results

Two cases of circumferential tissue loss and six cases of dorsal or volar tissue loss (both partial and total) were managed with groin flap and groin flap was also used to salvage two cases of FDMA loss. All patients had complete flap intake and no flap necrosis was observed. Functional and aesthetic outcome was good in all patients. The

skin on the reconstructed hand was pliable and had a good color, but the sensation was vague in all cases. All patients with groin flap were satisfied with results except one who was initially dis-satisfied with cosmetic result, which improved after flap thinning

Table 1 Individual results of the 10 patients with thumb reconstruction using Groin flap

Patient	1	2	3	4	5	6	7	8	9	10
Sex	40	38	24	27	19	11	17	65	20	13
Age	Male	Female	Male	Male	Male	Female	Male	Male	Male	Male
Flap survival	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Satisfaction	10	09	10	10	09	07	09	10	10	10
Flap sensibility	Vague	Vague	Vague	Vague	Vague	Vague	Vague	Vague	Vague	Vague
Donor sensibility	Normal	Normal	Normal	Medium	Normal	Normal	Normal	Normal	Normal	Medium



Fig 1a.circumferential tissue loss of thumb



Fig 1c.groin flap in situ, volar aspect



Fig 1b.Groin flap in situ,dorsal aspect



Fig 1d. Final result of groin flap cover of circumferential tissue loss



Fig 2a. tissue loss of thumb with with raised groin flap



Fig 2b.Groin flap in situ



Fig 2c.After 4 weeks of flap detachment

Discussion

The groin flap is an axial-patterned cutaneous flap based on the superficial circumflex artery. Groin

flaps have been the most widely used pedicled flaps in hand reconstruction^[12,13,14]. They can cover extensive defects of over 10x15cm without sacrificing a major artery or the need for end-to-end micro-vascular anastomosis. Groin flap is a simple procedure with short operating time and can be used in emergency settings because of technical ease, short operation time and large size flap. The flap has a reliable vascular supply^[7,15,16] secondary division and inseting procedures can be performed in a short outpatient procedure. The flap is hairless with good skin color and cosmetic appearance. The donor site has acceptable scar which is easily hidden by underwear – and thus preferable in females^[17]. Groin flap is contraindicated in cases with previous groin surgery, or radiotherapy. We had no such patient in our study. The groin flap has a disadvantage of being bulky (which can be improved after flap thinning), needs long hospital stay, limb immobilization and vague flap sensation.

Conclusion

The groin flap can be used for partial or total soft tissue loss for volar as well as dorsal soft tissue loss of thumb and for circumferential tissue loss too. Groin flap although is not demanding surgically, provides large flap size, good flap intake, also avoids donor site morbidity, but does require the immobilization of arm for three weeks and are bulky which requires thinning of flap and many a times more than once and has vague flap sensation.

References

1. David C. C. Chuang, L. H. Colony, C. Chert, F. C. Wei. Groin Flap Design and Versatility. *Plast Reconstr Surg.* 1989, 84(1):100-7.
2. Nardi Kola. Thumb Reconstruction Using Foucher's Flap. *Maced j Med Sci.* 2016; 4(1): 70–73.
3. McGregor IA, Morgan G. Axial and random Pattern flaps. *Br J Plast Surg.* 1973; 26: 202.

4. Smith PJ: The vascular basis of axial pattern flaps. *Ibid*, p 150
5. Gordon H. Knutson, The groin flap: A new technique to repair traumatic tissue defects. *CMA Journal*. 1977; 116:622-5.
6. Smith PJ, Foley B, McGregor IA, et al. The anatomical basis of the groin flap. *Plast Reconstr. Surg.* 1972; 49: 41.
7. Chuang DC, Colony LH, Chen HC, Wei FC. Groin flap design and versatility. *Plast Reconstr Surg.* 1989; 84:100-7. [PubMed]
8. Harii, K., Obmori, K., Torii, S., et al. Free groin skin flaps. *Br. J. Plast. Surg.* 1975; 28: 225.
9. O'Brien, B. M, Morrison, W. A, Ishida, H, et al. Free-flap transfers with microvascular anastomoses. *Br. J. Plast. Surg.* 1974 27: 220.
10. Serafin, D, and Buncke, K.J. (Eds.) Groin Flap. In T. Jackson (Ed.), *Microsurgical Composite Tissue Transplantation*. St. Louis: Mosby, 1979: 231-43.
11. Taylor G. I, and Daniel R. K. The anatomy of several free-flap donor sites. *Plast. Reconstr. Surg.* 1975 56:243.
12. Ohmori K., and Harii K. Free groin flaps: Their vascular basis. *Br. J. Plast. Surg.* 1975; 28: 238.
13. Goertz O, Kapalschinski N, Daigeler A, Hirsch T. The effectiveness of pedicled groin flaps in the treatment of hand defects: Results of 49 patients. *J Hand Surg Am.* 2012; 37:2088-94. [PubMed]
14. Voulliaume D, Mojallal A, Comparin JP, Foyatier JP. Brûlures graves de la main et lambeaux: choix thérapeutiques et revue de la littérature. *Ann Chir Plast Esthet.* 2005; 50:14-319. [PubMed]
15. Li YY, Wang JL, Lu Y, Huang J. Resurfacing deep wound of upper extremities with pedicled groin flaps. *Burns.* 2000; 26:283-88. [PubMed]
16. Guiga M, Fourati MK, Meherzi A, Belhassine H. Notre expérience des lambeauxinguinauxpédiculés à propos de quatre-vingt-cas. *Ann Chir Main.* 1988; 7:79-84. [PubMed]
17. Kashiwa K, Kobayashi S, Ogino K, Kashiwaya G, Higuchi H. Inferolateral extension of the groin flap based on the artery accompanying the lateral femoral cutaneous nerve. *J Reconstr Microsurg.* 2009; 25(3):181-189. [PubMed]