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**ORIGINAL ARTICLE**

# Evaluation of scrotal reconstruction with thigh flap

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## Abstract

***Background:*** *Scrotal skin can be lost in many ways. Partial loss of scrotum is easy to manage but major scrotal skin loss represents a significant challenge to the reconstructive surgeon. Although many techniques have been established for the treatment of major scrotal defects, each technique has its own advantages and disadvantages in specific situations.*

***Objective:*** *The aim of this prospective study was to evaluate the outcome of thigh fascio-cutaneous flap for reconstruction of major scrotal loss with exposed testis.*

***Methods:*** *This prospective study was done for 5 years extending from January 2012 to December 2016. In this period we reconstructed major scrotal defects of eight patients with antero medial and pudendal thigh fascio-cutaneous flap in Burn and Plastic Surgery department, Khulna Medical College Hospital. Total eleven thigh fascio-cutaneous flaps were used for reconstruction of major scrotal defects.*

***Results:*** *The mean patient age was 41 years (range 24 to 62 years). The aetiology of scrotal loss was Fournier's gangrene in 4 cases and trauma in 4 cases. Three cases had bilateral and five cases had unilateral flap reconstruction. The flaps allowed sensate coverage and took well. Primary donor site closure obviated the need for skin grafts in most of the cases, Complications were flap tip necrosis (12.50%) and minor wound infection (12.50%) which were treated conservatively. Donor site scar was limited and acceptable. The flap had good aesthetic appearance except in one fatty patient where the flaps were bulky.*

***Conclusion:*** *The study concluded that thigh fascio-cutaneous flap is very reliable for coverage of major scrotal defects.*


***Key words:*** *Thigh fascio-cutaneous flap, Major scrotal loss, Outcome.*

## Introduction

The common causes of scrotal skin loss are trauma, fournier's gangrene, excision of tumour. The techniques for major scrotal defect reconstruction chosen must be individualized and must depend not only on the severity of scrotal skin loss but also upon the extent of tissue defect, associated injuries, and viability of adjacent skin. Scrotal defects secondary to trauma are difficult to treat because they are usually associated with a crushing injury of the perineum, groin, thigh, or lower abdomen.[1]

Fournier's gangrene is a synergistic necrotizing fascitis that spreads along deep fascial planes of the penis, scrotum, perineum, inner thighs and lower abdomen. It can lead to skin loss involving the scrotum, penis, thighs, and lower abdomen and may even be lethal and life threatening. Since the testes have an independent vascular supply, they usually survive and remain exposed.[2] After debridement and control of infection, coverage of the exposed testes becomes the next problem.

Reconstruction of the scrotum is important for functional, cosmetic, and psychological reasons. Scrotal coverage with early single staged sensate flap that provides complete and adequate protection of the exposed testicles is the ideal choice.3 Major scrotal defects with exposed testes have been reconstructed in many ways. The common methods are skin grafting, burying them underneath the medial thigh skin, tissue expansion of adjacent tissues and use of local fasio-cutaneous or musculo-cutaneous flaps.[4-17] Local pedicled fascio-cutaneous flaps from the thigh and the groin area offer the advantages of avoiding skin graft problems, preserving adequate sensation, and covering a large defect.

Although the vast majority of reconstructive options in the world include the use of flaps, either fascio cutaneous or musculo cutaneous, in our

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country common procedure performed for testicular coverage is burying the testes in the thigh that causes repeated trauma to testes, testicular atrophy, unpleasant aesthetic appearance and psychological effect on patient of absence of scrotum.

Reconstruction of scrotum with flaps are being performed recently in some regions of our country but there is no documented study evaluating their outcome. In Khulna region we have started reconstruction of major scrotal loss having exposed testis with thigh fascio cutaneous flap. The aim of the present study was to evaluate outcome of thigh pedicled fascio cutaneous flap for reconstruction of major scrotal defect.

Fig 1(a): Loss of hemiscrotum in Fournier's gangrene

Fig 1(b): Antero-medial thigh flap elevated

Fig 1(c): After inset of flap and primary closure of donor site

## Materials and Methods

This prospective study was conducted at the department of Burn and Plastic Surgery, Khulna Medical College Hospital for a period of 5 years extending from January 2012 to December 2016.

Fig 2(a): Drawing of pudendal thigh flap

Fig 2(b): After inset of pudendal thigh flap

Fig 2(c): 2 months after reconstruction with pudendal flap

During the study period, eight patients with major scrotal defects were reconstructed with the thigh fascio-cutaneous flap. Patients with loss of more than half of the scrotum were included in this study. Severely debilitated patients, post traumatic cases with crushing injury of the groin and or medial thigh, fournier's gangrene with synergistic gangrene of the groin and/or medial thigh causing loss of flap area were excluded in this study. The infection in cases of foumier's gangrene and scrotal injuries was controlled with wound debridement, dressing and antibiotics. We reconstructed the scrotum with antero-medial thigh flap and pudendal thigh flap under spinal anesthesia.

In case of antero-medial thigh flap, while the patient in the supine position, with thighs abducted and slightly externally rotated, a proximally based longitudinally oriented rectangular thigh flap was designed, to include the skin and fascia over the antero-medial region of the thigh (Fig. la,lb). In case of reconstruction with pudendal flap, patient was in lithotomy position.

Triangular flaps were designed (Fig. 2a). After subfascial elevation of both antero-medial thigh

flap and pudendal flap, the flaps were transposed to cover the scrotal defect by suturing its edges to the edges of the defect. The donor site was then closed after undermining the flaps on both sides in the subcutaneous tissue plane (Fig. 1c, 2b). Edges were closed in two layers with keeping a drain tube. Split skin graft was done in donor site where primary closure was not possible due to previous loss of skin (Fig. 2c).

All the patients were nursed in the supine position with the thigh positioned in such a way not to compress the flap and not to apply tension on it, for at least 5 days. Drains were removed after 48 hours. Interrupted skin sutures were removed after 7 days and rest sutures were removed at 14 days. The patients were followed-up for 36 months. Patients were included after obtaining an informed consent. All the study variables were collected on pre designed proforma such as age, sex, procedure performed and complications noted. Both manual and computer based statistical analysis of the data were done.

## Results

The aetiology of scrotal loss was fournier's gangrene in 4 cases and trauma (machinery injury) in 4 cases. Three cases had bilateral and five cases had unilateral scrotal loss (Table 1).

**Table I**
Distribution of the cause of the defects

| Cause of the defect | Extent of defects unilateral | Bilateral | Number of cases | % |
|---|---|---|---|---|
| Trauma (Machinery injury) | 3 | 1 | 4 | 50 |
| Fournier's gangrene | 2 | 2 | 4 | 50 |

Eleven thigh fascio cutaneous flaps were elevated for coverage of large scrotal defects in 8 patients (Table II). Single flap for unilateral defect and double flaps for bilateral defects were elevated and inset (Fig. Ia, Ib, 2a, 2b). The mean patient age was 41 years (range 24 to 62 years). The mean time between the last debridement performed and the reconstructive procedure was 24.7 days (range 14 to 42 days). The flaps used in our study were antero-medial thigh flap (81.82%) and pudendal thigh flap (18.18%), shown in Table II.

**Table II**
Distribution of the procedures performed for scrotal reconstruction

| Name of the Procedure | Number of flaps Unilateral scrotal skin loss | Bilateral scrotal skin loss | Number of cases | % of flap |
|---|---|---|---|---|
| Anteromedial thigh flap | 5 | 4 | 7 | 81.82 |
| Pudendal thigh flap | 0 | 2 | 1 | 18.18 |
| Total | 5 | 6 | 8 | 100 |

All the flaps survived completely except flap tip necrosis occurred in one case (12.50%) and minor wound infection occurred in one case (12.50%) both of which were improved with conservative treatment (Table III).

**Table III**
Complications of procedure performed

| Name of the Complications | Type of flap | Number of the cases | % of cases |
|---|---|---|---|
| Wound infection | Pudendal thigh flap | 1 | 12.50 |
| Flap tip Necrosis | Pudendal thigh flap | 1 | 12.50 |

Primary donor site closure obviated the need for skin grafts in most of the cases (Fig. Ic). In one case, split skin graft was done as primary closure was not possible due to previous loss of thigh skin from necrotizing fascitis (Fig. 2c). Scarring at the donor site was limited and acceptable to both the patients and the surgeon. All the patients experienced sensation at neoscrotum. The flaps had satisfactory aesthetic results except in one fatty patient where the flaps were bulky.

## Discussion

Many techniques have been used to resurface scrotal defects. Small scrotal loss can be managed easily but major scrotal loss often becomes a problem for reconstructive surgeon. Perforator based cutaneous flaps have been described for scrotal reconstruction, including the island antero medial thigh flap, medial circumflex femoral artery perforator flap, pedicled deep inferior epigastric perforator flap, anterolateral island thigh fascio cutaneous flap.[1-3] Although they are thin flaps which are aesthetically and functionally optimum for scrotum replacement, they are technically

difficult and their blood supply is less predictable.

Implantation of the testes in the thigh is a common procedure performed in the past. But the drawbacks to this technique are constant pain caused by mechanical trauma, the testicular atrophy, problem of temperature regulation and adverse psychological effects from absence of scrotum.[4] The scrotal musculo-cutaneous advancement flap can be used for small to medium size defects and provides durable and good quality skin but not applicable for major scrotal loss.[5]

Numerous myo-cutaneous flaps have also been used, including the rectus abdominis myocutaneous flap, the gracilis myo-cutaneous flap.[4,5,17] AIthough the flaps take readily even in the contaminated environment they can be technically challenging and aesthetically unpleasant due to their bulkiness.

Split skin grafts have been used in the past but graft take is not satisfactory, and it commonly undergoes contraction, offers less protection to testes. A free skin graft will also not take if the testes have been stripped of the tunica Vaginalis.[6,7]

Because of the viscoelastic nature of scrotum, as little as a third of residual scrotum can be expanded to resurface the entire scrotum.8 But it's not a common practice due to unavailability of expander, costly and it is multistage procedure.

Numerous thigh fascio cutaneous flaps have been used and represent excellent tool for scrotal reconstruction. They offer good cosmetic results while being technically simple to perform with minimal disruption of the donor site. These include antero medial thigh flap, the medial thigh flap, supero medial thigh flap, pudendal flap, V-Y fascio cutaneous flap. The thigh fascio cutaneous flap was adopted as a single staged sensate flap option for creation of a neoscrotum. No specific vascular pedicle had to be identified at the base of these flaps as they are nourished by the suprafascial plexus of the thigh except in pudendal thigh flap. In pudendal thigh flap, it is nourished by terminal branches of the superficial perineal artery, which is a continuation of internal pudendal artery.[9,16]

Thigh fascio cutaneous flap has many advantages over other reconstructive methods of major scrotal loss. The flaps are easy to raise without compromising their vascularity. Reconstruction with thigh flaps is a simple, safe, and single stage procedure. The flaps provide sensate coverage, achieve reasonable aesthetic result, preserving male identity, closure of the donor site. Mageed mentioned minor wound infection in case of scrotal reconstruction with antero medial thigh flap." But in our study all complications occurred in case of reconstruction with pudendal thigh flap.[11] Primary donor site closure obviated the need for skin grafts in most of the cases (Fig. Ic). In one case where there was previous thigh skin loss due to necrotizing fascitis, primary closure was not possible and split skin graft was done (Fig 2c). Scarring at the donor site was limited and acceptable to both the patients and the surgeon.

Antero medial thigh flap has the following advantages over pudendal thigh flap-1) Flap dissection is easier, being more accessible, 2) Scar of donor site closure is away from friction area in the medial thigh and 3) Arc of rotation is less acute with less kink at the pedicle. One disadvantage of the described antero medial thigh flap is, in fatty patient the neoscroturn becomes very bulky and aesthetically unpleasant. In our study group, neoscrotum was bulky in one fatty patient But pudendal thigh flap is thin, more resilient and it may be a very good option for scrotal reconstruction in obese patients.

Scrotal sensation is an important issue. All the patients experienced sensation at neo scrotum. The flaps took well even in contaminated areas. Hallock mentioned that one medial thigh fascio-culaneous flap from one thigh can serve to make the whole neoscrotum for bilateral cases. Although the technique of antero-medial thigh flap mentioned here is very similar to the technique of medial thigh flap of Hallock, we used one flap for each scrotal half to preserve the shape of two scrotal compartments rather than one single bag.

The number of cases in this study were less because major scrotal loss are not very common and lack of referral system due to lack of knowledge of many practitioners about options of scrotal reconstruction techniques. The number of cases were also less in many studies.[13,17]

Regulation of scrotal temperature is important for spermatogenesis. Bulky thigh fasciocutanous flap may affect spermatogenesis. There are few studies providing assessment of testicular function after scrotal reconstruction, majority of which were subjective. They claimed that spermatogenesis was not impaired. One study showed normal testicular function by 6 months after implantation of testis in thigh by testicular biopsy.7 Wang showed that spermatogenesis was not altered in the early stage but was abnormal after two years.[18] But he showed in another study that spermatogenesis can be improved by thin

trimming of scrotal flap.[19] In our study we did not assess spermatogenesis.

## Conclusion

Among the multiple techniques for scrotal reconstruction, the present technique is simple, safe, and single stage procedure. It provides sensate coverage, achieve reasonable aesthetic result, preserve male identity and makes primary closure of the donor site. Therefore, thigh fascio cutaneous flap is very reliable for coverage of major scrotal defects.

## References


1. Kim KS, Noh BK, Kim DY, Lee SY, Cho BH. Thin Paraumbilical Perforator Based Cutaneous Island Flap for Scrotal Resurfacing. Plast; L Reconstr. Surg. 2001; 108: 447-451.
2. Hallock GG. Scrotal Reconstruction Following Fournier Gangrene Using the Medial Circumflex Femoral Artery Perforator Flap. Ann. Plast. Surg. 2006; 57: 333-335.
3. Zeng A, Xu J, Yan X, You L, Yang H. Pedicled Deep Inferior Epigastric Perforator Flap: An Alternative Method to Repair Groin and Scrotal Defects. Ann. Plast Surg. 2006; 57: 285-288.
4. Ferreira PC, Reis JC, Amarante JM, Silva AC, Pinho CJ, otiveira. JC, et ai. Fourniers Gangrene: A Review of 43 Reconstructive Cases. Plast. Reconstr. Surg. 2007; 119: 175-184.
5. Laurel S, Karian MD, Stella Y, Chung MS, Edward S. Reconstrucfion of Defects After Fournier Gangrene: A Systematic Review. E Plasty 2015; 15: 155-169.
6. Maharaj D, Naraynsingh V, Perry A, Ramdass M. The scrotal reconstniction using the Singapore sling. Plast. Reconstr. Surg. 2002; 110: 203-205.
7. Agarwal P. Scrotal Reconstruction: Our Experience. Journal of Surgery Pakistan (International) 2012; 17: 32-35.
8. Por Y, Tan B, Hong S, Chia S, Cheng C, Foo, C, et al Use of the Scrotal Remnant as a Tissue Expanding Musculocutaneous Flap for Scrotal Reconstruction in Pagets Disease. Ann. Plast Surg. 2003; 51: 155-160.
9. Hallock GG. Scrotal reconstruction. following Fournier's, gangrene using the medial thigh fasciocutaneous flap. Ann. PlasL Surg. 1990; 24: 86-90.
10. EI Khatib HA. V Y Fasciocutaneous Pudendal Thigh Flap for Repair of Perineum and Genital Region After Necrotizing Fascitis: Modification and New Indication. Annals of Plastic Surgery 2002; 48: 370-375.
11. Yu P, Sanger JR, Matloub HS, Gosain A, Larson D Anterolateral Thigh Fasciocutaneous Island Flaps in Perineoscrotal. Reconstruction. PlasL Recosntr. Surg 2002; 109: 610-616.
12. Mageed MA. Evaluation of anteromedial thigh flap for scrota! reconstruction. Egypt J. Plast Reconstr. Surg 2007; 31: 149-155.
13. Mopuri N, O'Connor EF, Fortune C. Scrotal reconstruction with modified pudendal thigh flaps. Journal of Plastic, Reconstructive and Aesthetic Surgery 2016; 69: 278-283.
14. Yang J, Hoonko S, Joon S, Dung SW. Reconstruction of penoscrotal defects using bilateral medial thigh fascio cutaneous flaps. Arch Plast Surg 2013; 40: 72-74.
15. Chen SY, Fu JP, Chen TM, Chen SG. Reconstruction of scrotal and perineal defect in Fournier's gangrene J Plast Reconstr Aesthet Surg 2011; 64: 528-534.
16. Outkir AA, Tazi MF, Alami MN. The superiomedial thigh flap in scrotal reconstruction: Technical steps to improve cosmetic results. Indian J Urol 2013; 29: 360-362.
17. Lee SH, Rah HK, Lee WJ. Penoscrotal reconstruction with gracilis muscle flap and internal pudendal artery perforator flap transposition. Urology 2012; 79: 1390-4
18. Wang D, Zheng H, Deng F. Spermatogenesis after scrotal reconstruction. Br J Plast Surg. 2003; 56: 484-8.
19. Wang D, Wei Z, Sim G, Luo Z. Thin timming of the scrotal. reconstruction flap: long term follow-up, shows reversal of spermatogenesis arrest. J Plast Reconstr Aesdx:t Surg 2009; 62:455-6.