|| ISSN(online): 2589-8698 || ISSN(print): 2589-868X ||
International Journal of Medical and Biomedical Studies
Available Online at www.ijmbs.info
PubMed (National Library of Medicine ID: 101738825)
Index Copernicus Value 2018: 75.71
Original Research Article
Volume 4, Issue 9; September: 2020; Page No. 111-115

INFRAGLUTEAL FASCIOCUTANEOUS FLAP FOR MANAGEMENT OF RECURRENT ISCHIAL PRESSURE SORE

Dr. Santosh Kumar
Senior Resident, Department of in-Charge Burn and Plastic Surgery, Government Medical College and Hospital, Bettiah, Bihar, India

Article Info: Received 02 September 2020; Accepted 29 September 2020
DOI: https://doi.org/10.32553/ijmbs.v4i9.1518
Corresponding author: Dr. Santosh Kumar
Conflict of interest: No conflict of interest.

Abstract

Aim: The aim of the study was to determine the feasibility of infragluteal fasciocutaneous flap in recurrent ischial pressure sore.

Materials and Methods: This prospective cross-sectional study was carried out in Department of Burn and Plastic Surgery at Government Medical College and Hospital, Bettiah, Bihar, India from Dec 2017 to july 2018. 13 patients suffering from recurrent ischial sore with scars of previous surgery were managed with infragluteal fasciocutaneous flap. Wound bed was prepared by surgical debridement and negative pressure wound therapy in each case. In two cases, gracilis muscle flap was used as adjuvant to fill up the residual cavity. Donor area of flap was primarily closed.

Results: Infragluteal fasciocutaneous flap was used in all nine cases. Superficial distal congestion was present in 3 cases. Haematoma (2) and infection (2) at flap donor site occurred. Recurrence of ulcer was observed in 3 cases which were managed by bursectomy and advancement of the bridge segment of the original infragluteal fasciocutaneous flap. All flaps survived without any major complication.

Conclusion: Infragluteal fasciocutaneous flap is reliable option for managing recurrent ischial sore as it transposes well-vascularised thick fasciocutaneous flap from adjacent posterior thigh and its bridge segment can be further used in case of recurrence.

Keywords: Infragluteal fasciocutaneous flap, ischial pressure sore, perforator plus flap, recurrent pressure ulcer

Introduction

Pressure ulcers occur as a result of unrelieved high-pressure exposure to the skin and subcutaneous tissues usually over a bony prominence. High-risk features for developing pressure ulcers include intensive care unit (ICU) admission, spinal cord injuries, lower extremity fractures, cachexia, and being over 65.[1-3] Additional pathologies such as anemia, hypoalbuminemia, diabetes mellitus, and peripheral arterial disease are predisposing factors for pressure ulcers.[4] The prevalence of pressure ulcers has been reported to be 12.5% and 15% in two international multicenter studies.[5,6] Considering numerous patients affected, the burden of the comorbidities and high recurrence rates, pressure injuries continues to be a major reconstructive problem.

Pressure sore is a common surgical condition often referred to plastic surgeons for management. In general, approximately 9% of all hospitalised patients develop pressure sore, its occurrence in acute care setting being around 11%.[7] Pressure sore can be managed conservatively or surgically with a flap depending on stage, size, involvement of bone and general condition of the patient. Long-term follow up studies on patients with pressure sore document-wide range of recurrence rates varying from 3%–6% to 33%–100%. Conservative therapy of recurrent ischial ulcer is not routinely successful. Out of various techniques described for ischial pressure sore, we preferred fasciocutaneous flap over musculocutaneous flap. Homma *et al*. reported using a posteromedial thigh fasciocutaneous flap based on the perforators of either gracilis or the adductor magnus muscle in the treatment of ischial pressure sore.[8] Tissue from the infragluteal region that is posterior thigh was transferred as a free fasciocutaneous flap based on descending branch of inferior gluteal artery. It was first described as an alternative for autologous breast reconstruction in thin patients by Papp *et al*. in 2007. It was successfully used in 28 breast reconstructions with disadvantages of insufficient volume in two and variable sensory problems at donor site.[9] The posterior thigh skin can be transferred based on perforating vessels from descending branch of the inferior gluteal artery that accompanies the posterior femoral cutaneous nerve. The flap can be used repeatedly in the event of recurrence [10]. Even if the vessel is not present due to anatomical variation, the flap survives on superiorly based random fasciocutaneous flap supplied by multiple perforators from the cruciate anastomosis of the fascial plexus.[11] The perforator plus techniques combine

the advantage by providing additional blood supply and preventing distal congestion of peninsular flap by safeguarding venous return.[12]

Material and Methods

This prospective cross-sectional study was carried out in the Department of Burn and Plastic Surgery at Government Medical College and Hospital, Bettiah, Bihar, India from Dec 2017 to july 2018, after taking the approval of the protocol review committee and institutional ethics committee.

13 patients suffering from recurrent ischial sore were managed with inferior gluteal artery based fasciocutaneous flap from posterior thigh. 9 of them had paraplegia, and 4 were ambulatory. 2 of the ambulatory patients was a known case of scoliosis and had undergone below knee amputation. 3 patients of paraplegia were known case of meningomyelocele in their childhood. All patients suffering from paraplegia were incontinent. 5 patients had multiple pressure sores. Patients were thoroughly examined, and clinical assessment of stage of ulcer was done. The general condition of the patients was assessed, and the wound was optimised by surgical debridement. Negative-pressure wound therapy (NPWT) with negative pressure between 70 and 130 mmHg was applied in all patients using polyurethane foam sponge (pore size 400–600 μ). The quantitative culture was sent for detecting invasive infection in each case. Bone biopsy was done to diagnose osteomyelitis wherever the bone was exposed. Average size of pressure ulcer was 5 cm × 5 cm. The average age of our patients was 37 years with the age range of 15–70 years. The size of ischial sore varied from 3 .5 cm × 2 .5 cm to 6 .5cm × 4.5 cm. Size of flap varied from 4 cm × 15 cm to 8 cm × 20 cm and all the flaps survived without any major complication. Primary closure of donor site was achieved in all cases.

Operative technique

Surgical debridement with total excision of well-defined bursa, surrounding scarred tissue, calcification or heterotopic ossification until only healthy pliable tissue is left is the most important step in pressure sore surgery. To achieve this, we placed a methylene blue-moistened sponge in the bursa which helped in thorough excision of all granulation tissue even from the wound base. Removal of infected bone until one reaches hard bleeding bone with proper contour of bony prominence is of paramount importance. Bone should be sent for histopathology and culture and sensitivity. Careful haemostasis should be maintained by cauterisation, packing and suction drain. We should think of potential flap which may obliterate dead space following excision of ulcer, by means of a muscle, myocutaneous or a deepithelialised skin flap. The flap should be planned in such a way that it does not obliterate blood supply for the potential future flaps. Suture lines should not lie on pressure areas and there should be tension-free closure of the donor site.

We planned an infragluteal fasciocutaneous flap depending on the site and size of the ulcer. Axis of the flap was kept midway between the ischial tuberosity and the greater trochanter. Doppler was used in the identification of the inferior gluteal artery. The average width of the flap was between 4 and 8 cm and length was 15–20cm. After proper design and orientation, incision over the posterior thigh was made along the distal margin of flap through the deep fascia. We identified posterior femoral cutaneous nerve to ensure proper level of dissection and just lateral to the nerve descending branch of inferior gluteal vessels was noted. [13] The vessels and nerve were divided and dissected proximally including deep fascia which was divided medially and laterally until inferior border of gluteus maximus was identified along with few femoral perforators, which were sacrificed if they interfered with flap transposition. When the greater length of the flap was required, the gluteus maximus muscle was split and included at the base of the flap. We divided skin bridge separating the flap from the recipient defect to accommodate the flap. In all our cases, the donor defect was closed primarily. Suction drain was used for the donor as well as recipient areas. Drains were removed 4–7 days postoperatively. Gradual weight bearing on the flap was started after 4 weeks. Initially, the patients were called for examination each month for 4 months and thereafter every 4 months for 1st year.

Results

13 Nine patients were followed for an average of 24 months. Superficial distal congestion was observed in 3 flaps and was managed conservatively. Haematoma (2) and infection (2) at the flap donor site occurred due to malfunction of suction drain. Infection was managed with antibiotics as per culture and sensitivity report. Suture dehiscence occurred in two patients at T junction and was managed conservatively in one patient and by resuturing in other.

Further recurrence of ischial ulcer was observed in 3 patients postoperatively, which was managed by complete excision of bursa followed by advancement of the original bridge segment of infragluteal fasciocutaneous flap and suturing. all the 3 cases, sufficient redundant skin was available for advancement and suturing without any tension. Weight-bearing on the flaps was started after one month for 12 min which was gradually increased.

Table 1: Summary of the patients								
Case number	Age/sex	Associated morbidity	Defect location	Flap	Flap dimension	Past history	recurrence	Follow up
1	25/male	Paraesthesia bilateral lower limb	Right ischial	Local	4×17cm^2	-trauma to spinal cord	Absent	37
2	49/male	Scoliosis and below knee amputation	Right ischial	Local	5×15cm^2	Congenital and trauma	Present	21
3	49/male	Post surgery paraplegia	Left ischial and Sacral	Musculocutaneous	8×20cm^2	trauma to spinal cord	Absent	19
4	33/female	ambulatory.	Right ischial	Musculocutaneous	5×19cm^2	Congenital	Present	14
5	16/male	post traumatic parapleagia	Right ischial	Musculocutaneous	6×18cm^2	Congenital	Absent	16
6*	20/female	post traumatic parapleagia	Bilateral ischial	Local	6×15cm^2	Congenital	Absent	25
7	24/female	Scoliosis and below knee amputation	Left ischial and Sacral	Local	5×12cm^2	trauma	Present	9
8	22/female	post traumatic parapleagia	Right ischial	Musculocutaneous	6×17cm^2	trauma	Absent	14
9	22/male	post traumatic parapleagia	Left ischial	Local	7×16cm^2	trauma	Absent	20
10	29/female	ambulatory.	Left ischial	Musculocutaneous	4×16cm^2	trauma	Present	16
11	19/male	post traumatic parapleagia	Right ischial and Sacral	Musculocutaneous	20×11cm^2	trauma	Absent	18
12	22/female	post traumatic parapleagia	Left ischial	Musculocutaneous	10×9cm^2	trauma	Absent	18
13	27/female	post traumatic parapleagia	Left ischial and Sacral	Local	9×8 cm^2	trauma	Absent	26

Discussion

Pressure sore reconstruction is associated with high rates of complications and recurrence. The reasons for high recurrence are multifactorial. The underlying medical and surgical conditions which had contributed to ulcer formation sometimes persist even after conservative or flap surgery. The labour intensive nursing care, irregular follow-up, lack of financial backup, inadequate family and community support are important associated factors behind recurrence.

Majority of pressure sores develop in the lower part of the body. In early acute phase, sacral area is the most common site of pressure sore. In sub-acute and chronic phase, the ischial area becomes the predominant site of pressure sore. Ischial pressure sore is one of the most difficult regions to manage as it is mobile and vulnerable to pressure in sitting position. In the ischium, ulcer size alters on flexion and extension of the lower extremity.

In a most extensively published experience with pressure sore treatment by Conway and Griffith (1000 cases) conservative therapy was successful in 18% of cases, skin grafting in 14% and partial ischiectomy with primary suture in 46% (with 54% recurrence).[14]Total ischiectomy lessened number of recurrences to 22% and when combined with muscle flaps and regional rotation flap it further decreased. Regardless of the type of treatment received (non-operative or operative), the recurrence rate was 75%–77%.

Commonly used flaps for reconstruction of ischial sore are inferior gluteal myocutaneous flaps, V-Y hamstring advancement flap, medially based thigh flap, gluteus maximus muscle flap, gluteal island thigh flap, inferior gluteal artery fasciocutaneous flap from posterior thigh, tensor fascia lata flap, gracilis flap and inferior gluteal artery perforator (GAP) flap.[15] Since the introduction of perforator flap by Kroll and Rosanfield, Gluteal perforator flaps have been used as pedicle flap for sacral and ischial pressure sore.[16] GAPs flaps have been used in breast surgery since 1993 with decreased donor site morbidity of the buttock. The superior gluteal artery emerges at the junction of the medial and middle thirds of a line drawn between the posterior superior iliac spine and the apex of greater trochanter of femur. The superior gluteal supplies the suprapiriformis portion of gluteus maximus muscle, only perforators located above the piriformis muscle are used. The superior gluteal artery flap can be raised as an oblique ellipse extending superiorly from medial to lateral with the advantage of concealing the scar in swimwear and undergarments. However, the flap may cause a significant contour deformity at donor site. Superior GAP flap has now become an important option in the treatment of sacral pressure sore.

Higgins introduced the Inferior GAP flap for ischial sore with the advantage of preserving vascular pedicles and muscles keeping in mind its use in future recurrence.[17] In prone position, the inferior gluteal artery is identified with Doppler, the anatomical landmarks includes posterior

superior iliac spine, greater trochanter and ischial tuberosity. The inferior gluteal artery runs along a linear line halfway between the posterior superior iliac spine and ischial tuberosity, maximum numbers of perforators are distributed along the line.[18] When inferior GAP flap is used for breast reconstruction the donor area is the lowest part of buttock and the donor site scar would be in the natural inferior gluteal crease. The course of inferior GAP is more oblique and its length is 7–10 cm. Sitting directly on the healing incision causes pain and chances of wound dehiscence increases.[19]The limitation of perforator flaps is scar of previous surgery, inadequate subcutaneous tissue, inexperience of surgeon and congestion in flap due to kinking of the vessel.

In recurrent ischial pressure sore before reconstruction we tried to optimise associated factors and assessed wound in terms of stage, size and involvement of bone. Quantitative culture as well as bone biopsy was sent for bacteriological evaluation, and preoperative antibiotics were given accordingly.[20] We used NPWT in all patients. It helped in increasing area and quality of granulation tissue as well as decreased depth and exudation from wound.[21]

In our study, all the patients were suffering from ischial pressure sore for more than 4–8 years and had undergone surgery in the form of primary suturing or flaps from adjoining gluteal region. 5 of our patients were also suffering from multiple pressure sores. Scar and fibrosis in and around the pressure sore were managed by borrowing tissue from adjoining normal skin. Keeping these factors in mind, we looked for flap which was robust, thick and could be made sensate if required. It was important to have sufficient thickness to provide padding and obliterate dead space. Infragluteal fasciocutaneous flap is an axial pattern flap. The descending branch of inferior gluteal artery is quite inconsistent, but the flap survives on subfascial and fascial plexus which are supplied from perforators of inferior gluteal artery and musculocutaneous and fascial perforating vessels. The thickness of Infragluteal fasciocutaneous flap varies from 2 to 5 cm. Thicker flap was more common in females and obese males although thick flaps were more cumbersome and difficult to transpose with an advantage of providing padding over pressure points. The flap is innervated by posterior femoral cutaneous nerve and is located midway between the ischium and the greater trochanter. The nerve is intimately associated and medial to the descending branch of inferior gluteal artery. In ambulatory patients, sacrifice of nerve did not cause any major sensory deficit except numbness.[22] The point of rotation of flap varies in peninsular flaps, the cone of rotation absorbs one-third of flap length. When we incorporated gluteus maximus, the arc of rotation was extended to the sciatic foramen. Then, the raised flap can be called as inferior gluteal artery myocutaneous flap (Hurwitz).[23]

We kept flap width between 4 and 8 cm and could achieve primary closure of the donor site. In two cases of paraplegia, we used gracilis muscle to fill the cavity following bursectomy and partial ischiectomy. One of the advantages of infragluteal fasciocutaneous flap is that the flap can be used repeatedly in the event of recurrence. Foster *et al*. reviewed ischial coverage from 1979 to 1995 in which 139 ischial pressure sores were treated. In his study, the inferior gluteus maximus island flaps and inferior gluteal thigh flap had the highest success rates 94% and 93%, respectively.[24] While the V-Y hamstring flap and tensor fascia lata flap had the poorest healing rates 58% and 50%, respectively. Ahluwalia *et al*. reviewed 72 ischial wounds and found a complication rate of 16% and recurrence rate of 7%.[25]

There are a few limitations of this flap; thicker flaps are cumbersome and difficult to transpose. In peninsular flap, the cone of rotation absorbs up to one-third of the flap length. To resurface small defects, large flap has to be dissected. If flap width exceeds 6–7 cm the donor area requires split thickness graft. While using this flap in 13 patients, we encountered only 4 recurrences. all patients were ambulatory. On counselling, patients revealed lack of care of the ischial region as the primary cause. Recurrence was managed by bursectomy and advancement of the flap. None of our flaps failed.

Conclusion

The infragluteal fasciocutaneous flap is a reliable option for managing recurrent ischial sore as it transposes well-vascularised thick fasciocutaneous flap from the adjacent posterior thigh region to obliterate the dead space following bursectomy and ischiectomy. It can also be used in cases of recurrence by advancing the same flap taking advantage of loose tissue in bridge segment.

Reference

1. Lindholm C, Sterner E, Romanelli M, Pina E, Torra y Bou J, Hietanen H, et al. Hip fracture and pressure ulcers – The Pan-European Pressure Ulcer Study – Intrinsic and extrinsic risk factors. Int Wound J 2008;5:315-28.
2. Gélis A, Dupeyron A, Legros P, Benaïm C, Pelissier J, Fattal C, et al. Pressure ulcer risk factors in persons with spinal cord injury part 2: The chronic stage. Spinal Cord 2009;47:651-61.
3. Ricci JA, Bayer LR, Orgill DP. Evidence-based medicine: The evaluation and treatment of pressure injuries. Plast Reconstr Surg 2017;139:275e-86e.
4. Cakmak SK, Gül U, Ozer S, Yiğit Z, Gönü M. Risk factors for pressure ulcers. Adv Skin Wound Care 2009;22:412-5.
5. VanGilder C, Amlung S, Harrison P, Meyer S. Results of the 2008-2009 international pressure ulcer prevalence survey and a 3-year, acute care, unit-specific analysis. Ostomy Wound Manage 2009;55:39-45.

6. Whittington K, Patrick M, Roberts JL. A national study of pressure ulcer prevalence and incidence in acute care hospitals. J Wound Ostomy Continence Nurs 2000;27:209-15

7. John BD, John MS, Linda PG. Pressure sore. In: Chales TH, editor. Grabb's and Smith's Plastic Surgery. 6th ed. Philadelphia: Lippincott Williams & Wilkins and Wolters Kluwer Business; 2007. p. 722.

8. Homma K, Murakami G, Fujioka H, Fujita T, Imai A, Ezoe K, et al. Treatment of ischial pressure ulcers with a posteromedial thigh fasciocutaneous flap. Plast Reconstr Surg. 2001;108:1990–6.

9. Papp C, Windhofer C, Gruber S. Breast reconstruction with the fasciocutaneous infragluteal free flap (FCI) Ann Plast Surg. 2007;58:131–6.

10. Robert K, Jeffrey JE. Pressure sores. In: Peter NC, David SH, editors. Plastic Surgery. Vol. 4. London: Elsevier Saunders; 2013. p. 352.

11. Song WC, Bae SM, Han SH, Koh KS. Anatomical and radiological study of the superior and inferior gluteal arteries in the gluteus maximus muscle for musculocutaneous flap in Koreans. J Plast reconstr Aesthet Surg. 2006;59(9):935–41.

12. Sharma RK. Perforator flap: Evoluation of the concept and its place in plastic surgery repertoire. Indian J Plast Surg. 2010;43:148–50.

13. Walton RL, Hurwitz DJ, Bunkis J. Gluteal thigh flap for reconstruction of perineal defects. In: Strauch B, Vasconez LO, Hall-Findlay EJ, editors. Grabb's Encyclopedia of Flaps. 2nd ed. Philadelphia: Lippincott Raven Publishers; 1998. p. 1499.

14. Conway H, Griffith BH. Plastic surgery for closure of decubitus ulcers in patients with paraplegia; based on experience with 1,000 cases. Am J Surg. 1956;91:946–75.

15. Foster RD, Anthony JP, Mathes SJ, Hoffman WY. Ischial pressure sore coverage: A rationale for flap selection. Br J Plast Surg. 1997;50(5):374–9.

16. Kim YS, Lew DH, Roh TS, Yoo WM, Lee WJ, Tark KC, et al. Inferior gluteal artery perforator flap: A viable alternative for ischial pressure sores. J Plast Reconstr Aesthet Surg. 2009;62:1347–54.

17. Higgins JP, Orlando GS, Blondeel PN. Ischial pressure sore reconstruction using an inferior gluteal artery perforator (IGAP) flap. Br J Plast Surg. 2002;55:83–5.

18. Beshlian KM, Paige KT. Inferior gluteal artery perforator flap breast reconstruction. Am J Surg. 2008;195:651–3.

19. Allen RJ, Levine JL, Granzow JW. The in-the-crease inferior gluteal artery perforator flap for breast reconstruction. Plast Reconstr Surg. 2006;118:333–9.

20. Stal S, Serure A, Donovan W, Spira M. The perioperative management of the patient with pressure sores. Ann Plast Surg. 1983;11:347–56.

21. Greer SE, Duthie E, Cartolano B, Koehler KM, Maydick-Youngberg D, Longaker MT, et al. Techniques for applying subatmospheric pressure dressing to wounds in difficult regions of anatomy. J Wound Ostomy Continence Nurs. 1999;26:250–3.

22. Hurwitz DJ, Swartz WM, Mathes SJ. The gluteal thigh flap: A reliable, sensate flap for the closure of buttock and perineal wounds. Plast Reconstr Surg. 1981;68:521–32.

23. Hurwitz DJ. Closure of a large defect of the pelvic cavity by an extended compound myocutaneous flap based on the inferior gluteal artery. Br J Plast Surg. 1980;33:256–61.

24. Foster RD. Pressure sore. In: Mathes SJ, Hentz VR, editors. Plastic Surgery. 2nd ed. Vol. 6. Philadelphia: Saunders/Elsevier; 2006. p. 1321.

25. Ahluwalia R, Martin D, Mahoney JL. The operative treatment of pressure wounds: A 10-year experience in flap selection. Int Wound J. 2010;7:103–6.