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Case Report

Application of Split Gluteus Maximus Muscle–Adipofascial Turnover Flap and Subcutaneous Tension-Reducing Suture Technique in Repair of Decubitus Ulcers

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The purpose of this study was to study the clinical effect of split gluteus maximus muscle–adipofascial turnover flap and tension-reducing suture in the treatment of decubitus ulcers. Thirty-one cases of sacrococcygeal decubitus ulcers were repaired by split gluteus maximus muscle–adipofascial turnover flap. The surface of flaps ranged from 5 × 6 cm to 7 × 8 cm. The skin was then closed, primarily using subcutaneous tension-reducing suture. Eighty-eight percent of the flaps (27 of 31) healed primarily. The split gluteus maximus muscle–adipofascial turnover flap and tension-reducing suture technique was found to be a highly efficient method of repairing decubitus ulcers with a relatively low ratio of recurrence.

Key words: Split gluteus maximus muscle–adipofascial turnover flap – Subcutaneous tension-reducing suture – Decubitus ulcers

Despite a wide variety of flap reconstruction options described, the ischium remains the most difficult pressure-sore site to treat because of large defect. Dead space after resection of decubitus ulcer easily causes serious postoperative complications such as infection, fistula formation, and bowel obstruction.[1–3] Coincidentally, patients with decubitus ulcers are usually more likely to suffer from poor health. A simple and reliable reconstructive technique to fill the defect is therefore preferable. In this

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Fig. 1 Granulation in the decubitus ulcers is healthy and the wound is suitable for operation.

Fig. 2 Adipofascial layer exposed and flap raised.

article, we present the split gluteus maximus–adipofascial turnover flap and subcutaneous tension-reducing sutures as a method for immediate reconstruction of decubitus ulcers with dead space.

Materials and Methods

Between August 25, 2006, and December 31, 2010, we used the split gluteus maximus adipomuscular turnover flap method on 31 patients. Of the 31 patients, 23 were men and 8 were women. Twenty patients had a history of spinal cord injury: 4 were paraplegic and 8 tetraplegic. The patient age ranged from 56 to 72 years, with the mean age of 63 years. The surface of the wound ranged in size from 4×5 cm to 6×7 cm.

The overall condition of patients, including their mental status, cardiovascular function, and so forth, was evaluated and deficiencies corrected before surgery. Nutritional problems should be resolved before surgery. Serum protein levels greater than 6 g/100 mL were required. Correction of anemia was also important, maintaining 12 to 15 g hemoglobin. Most important, granulation tissue of the wound had to be healthy through dressing-change before the operation (Fig. 1).

The patient was placed prone on the operating table. The wound edges were outlined with methylene blue. The planned incision was made through the skin and the subcutaneous tissues. The decubitus ulcer was excised down to healthy tissue until bleeding, and any unhealthy bony prominences were removed.

Following the radical excision (in 3 dimensions) of the ulcer, the skin and subcutaneous tissue were dissected delicately from the underlying adipofascial layer until adequate exposure was obtained of the flap, which can reach the lateral border of the gluteal area, the superior border of the lower edge of the crista iliaca, and the inferior border of the hip line according to the volume of dead space (Fig. 2). Flaps with dimensions of 5×6 cm^2 to 7×8 cm^2 were designed. The first incision was made at the superior border of the flap. Part of the gluteus maximus muscle was raised off the underlying muscle from distal to proximal. The pedicle of the flap is the portion of the gluteus maximus muscle attached to the back of the sacrum. The free part of the flap is elevated gluteus maximus muscle with part of the adipofascial layer.

This way, a pedicled split of gluteus maximus–adipofascial flap was prepared (Fig. 3), the blood supply of which is provided by the collateral circulation between the superior and inferior gluteal artery. The flap was turned over to obliterate dead space without tension (Fig. 4). Gluteus maximus tissue in the flap was carefully sutured to muscle tissue on the opposite side of the defect. The skin and subcutaneous tissue were advanced medially and closed in a separate layer to cover the wound. The skin was closed primarily (Fig. 5).

The subcutaneous tension-reducing suture technique was performed as follows: the needle was

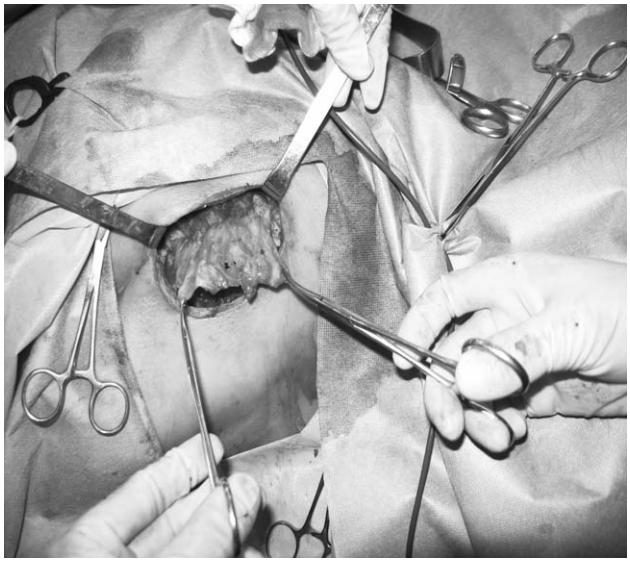

Fig. 3 A pedicled split of gluteus maximus–adipofascial flap is prepared.

Fig. 5 The subcutaneous tension-reducing suture method is performed.

inserted from the fascia superficialis approximately 2 cm near the incision carrying part of the dermis and then pulled out approximately 1 cm from the incision. Next, the needle was inserted from offside the fascia superficialis approximately 1 cm near the incision, carrying part of the dermis also, and then pulled out approximately 2 cm from the incision. Such subcutaneous interval suture is performed at the incision for reduction of tension. Finally, the suture was knotted at the deep layer of subcutaneous tissue (Fig. 6). Drains were left in for 3 days. Sutures were removed after 14 to 18 days.

Fig. 4 The flap is turned over to obliterate dead space without tension and is carefully sutured to the muscle layers on the opposite side of the defect.

Results

The mean follow-up period was 6 months (range, 6–16 months). All flaps survived without major problems except in 4 patients. One patient had a hematoma; while in 2 patients, seromas developed in the surgical area postoperatively. They were

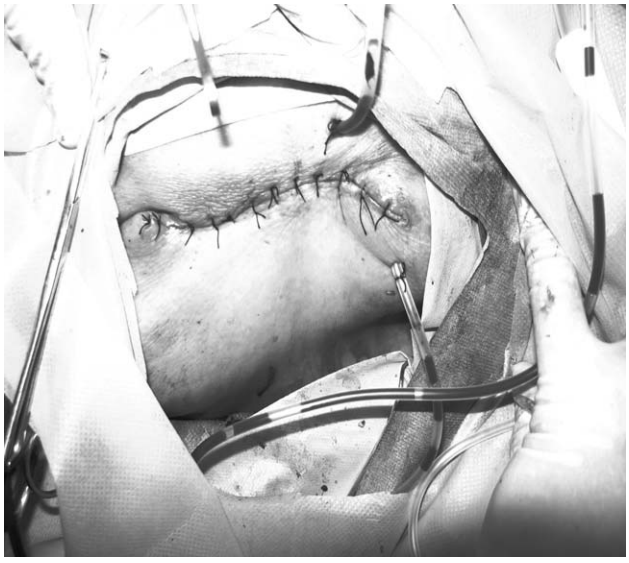

Fig. 6 The skin is closed primarily.

treated, and the wounds healed. In the last patient, sacral decubitus ulcer relapsed, and it healed throughout dressing-change without secondary operation.

Discussion

The treatment of sacrococcygeal decubitus ulcers requires soft tissue reconstruction with thick tissue to obliterate dead space. Local flaps are the first choice for the coverage of decubitus ulcers. Fasciocutaneous flaps may not provide adequate bulk.[4] Several other surgical procedures, such as musculocutaneous and perforator flaps have also been introduced for the treatment of decubitus ulcers.[5–7] The flaps can be applied as rotation, advancement, or island flaps.[8–10] But the mobility of the flaps is limited, and a skin graft is usually required for the donor site.

In this report, we demonstrated 31 cases in which the split gluteus adipofascial flap was used successfully. The flap as a modification of the conventional gluteus maximus muscle flap was designed to obliterate an extensive residual dead space. However, this type of flap can reach further than rotation or advancement flaps because cutaneous branches of the inferior gluteal artery allow dissection of inferior gluteal perforators with improved flap mobility. The donor site can usually be closed primarily. In addition, it provides a thick flap well-furnished with muscles. The muscle in the flap allows reliable closure of deep dead space. The muscular portion of the gluteal flap also provides well-vascularized bulky tissue to prevent serious postoperative complications. The gluteus maximus muscle is the most important extensor of the hip joint. Its total removal may leave a significant functional disturbance in ambulation, particularly in walking up stairs and in straightening up from a bending position. This split-muscle style does not completely divide the whole gluteus maximus muscle and therefore prevents functional deficit of the gluteus maximus muscle. Furthermore, no significant contour deficit was seen in any of the cases. The adipofascial portion in the flap can make it tougher than a simple muscle flap.

Surgeons should be mindful of the thickness of mobile gluteus maximus muscle. The volume of muscle in the flap should be enough to obliterate dead space after removing decubitus ulcer. Because the blood supply of the flap is provided by the collateral circulation between the superior and inferior gluteal artery, we should avoid injuring the artery during splitting muscle. The gluteal skin flap should include the superficial fascia to ensure skin survival. In addition, suction drains should be used to prevented hematoma formation beneath the flap, which can lead to infection.

Tension, manifesting at the time of wound closure, limits the extent of tissue excision and predisposes to complications.[11] Routine tension-reducing sutures will have no effect on diminishing the tension of the incision after removing sutures; then, disruption of the incision will occur if too high tension exists at the incision site. However, the subcutaneous tension-reducing suture technique deals with the problematic incision tension and difficulty in closure. The method may minimize the possibility of incision disruption and may reduce tension for a long time after removing sutures. This method has lower incision complications compared with the traditional full-thickness intermittent tension suture method. It is also beneficial for incision healing. However, effort should be made to maintain appropriate suture tension to avoid local tissue necrosis.

Conclusion

We recommend the split gluteus maximus muscle–adipofascial turnover flap as an alternative procedure for large defect coverage for patients with sacrococcygeal decubitus ulcers. Unlike the published method, we did not completely divide the whole gluteus maximus muscle and only used a portion of the muscle. In addition, the quality of wound healing is promoted by the subcutaneous tension-reducing suture method. Emphasis should also be paid on the suturing skill while using this technique.

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ERRATUM

The case report "Application of Split Gluteus Maximus Muscle–Adipofascial Turnover Flap and Subcutaneous Tension-Reducing Suture Technique in Repair of Decubitus Ulcers," which appeared in the July/August 2014 issue (Volume 99, Issue 4) on pages 447–451, incorrectly listed Zhoug Zheng as the sole author. This was a publisher mistake in spelling and the absence of two other authors. Subsequently the case report has been corrected to list the authors as Liang Weizhong, Zhou Zheng, and Zhao Zuojun.

The publisher regrets the errors.