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Sacral Region Defect Caused By Post Burn Sequelae Resurfaced With A Trilobed Superior Gluteal Artery Perforator Flap

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Abstract
Perforator flaps have revolutionized the field of reconstructive surgery by allowing maximum function and minimizing donor site morbidity and cost to the patient. They are now accepted as the gold standard in autogenous reconstruction in situations where muscle flaps are unnecessary. The superior gluteal artery perforator (SGAP) flap is a suitable option for defects in the sacral area, especially grade 4 sacral decubitus ulcers. The procedure of a trilobed SGAP flap provides maximal soft tissue coverage, obliteration of dead space and producing a very inconspicuous donor site scar. This flap is therefore a robust, simple and highly feasible option of reconstruction of defects due to pressure ulcers giving excellent results.

Keywords: *SGAP, perforator flap, superior gluteal artery, pressure sore*

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I. Introduction

Pressure or decubitus ulcers are skin and soft tissue injuries that develop as a result of prolonged pressure on a specific part of the body, especially anatomical pressure points such as sacrum, heels, ankles, greater trochanter, and occiput. (1,2) Stage 4 pressure ulcers are full-thickness skin defects with extensive tissue loss involving muscle, bone, tendon, or joint. (3) Surgical treatment is the only option, with the goal of obliterating the dead space and providing durable skin through flap reconstruction. (4) Perforator flaps have been increasingly used to repair gluteal pressure ulcers since the early 1900s. (5-8) The SGAP flap eventually proved to possess distinct advantages over the older gluteal myocutaneous flaps by providing good quality vascularised soft tissue reconstruction, minimizing donor-site morbidity by avoiding unnecessary resection of an important locomotion muscle and concealing the donor-site scar. (9) Further, pedicle length is maximized, resulting in greater flexibility in flap insetting. Moreover, the SGAP flap has shown to be beneficial in non-paralyzed patients since it keeps functional muscle intact. (10) Therefore, the SGAP flap is an ideal flap for sacral pressure ulcer reconstruction.

II. Case Report

64 year old male presented to our department with a raw area in the right sacral region for 6 months. The patient was apparently normal 1 year ago, when he sustained a road traffic accident for which he was bedridden for a few months during which time he developed a bed sore. The wound was covered with local flap from the right gluteal region but still there was a residual raw area. The patient had no history of comorbidities and he was ambulant. On examination, an irregular raw area of size 10 x 6 cm was present in the sacral region extending into the right gluteal region with healthy granulation with previous surgical scar in the right gluteal region. **(Fig. 1)** We planned for a trilobed superior gluteal artery flap and the perforator was marked with a hand-held Doppler. Under general anaesthesia and in prone position, the flap was marked and incised. **(Fig. 2)** The flap was elevated

as a fasciocutaneous flap along with the perforator, rotated into the defect and inset was given in layers with 2-0 polyglactin and 2-0 nylon sutures over a 16 Fr suction drain. **(Fig. 3)** The post-operative period was uneventful, drain was removed on the 5th post-operative day and the sutures on the 14th post-operative day. Follow-up showed a well-settled flap. **(Fig. 4)**

Fig. 1 – Picture showing the sacral raw area

Fig. 2 – Marking of the SGAP flap

Fig. 3 – Early post-operative picture

Fig. 4 – Late picture showing a well settled flap

III. Discussion

Decubitus ulcer formation is multifactorial and the main reason is long-standing persistent pressure. External pressure exceeding arterial capillary pressure of 32 mm Hg and venous capillary pressure of 8–12 mm Hg impedes blood flow and return leading to tissue necrosis. (11) Ischemia-reperfusion injury is an important factor in tissue damage leading to pressure ulcers. (12) Reperfusion of ischemic tissue leads to the formation of reactive oxygen species triggering an inflammatory response. The most vulnerable tissue is at the junction of bone and muscle, where the effects of hypoxia and the risk of tissue damage are maximum, followed by subcutaneous tissue and skin. (11) Defects of the sacral area need soft tissue coverage with robust flaps as these areas are prone to developing pressure sores and recurrence of the sores is common. The gluteal region has extensive vascular supply from the superior and inferior gluteal arteries. Based on these vessels, three different flaps that can be elevated based on the gluteal arteries, namely the gluteus maximus musculocutaneous flap, the gluteus maximus fasciocutaneous flap and the gluteal artery perforator flap.

Reconstructive surgery for pressure ulcer defects is challenging because of high rates of wound complications and recurrence. (13) The superior gluteal artery perforator (SGAP) flap is a versatile perforator flap from the gluteal region. The superior gluteal artery bifurcates into superficial and deep branches, with perforators emerging to supply the overlying skin and subcutaneous tissue. The SGAP flap utilizes these perforators, ensuring a robust blood supply while preserving the underlying muscle. Koshima et al. in 1993 first popularized the SGAP flap and since then the technique has had a variety of uses ranging from repair of sacral pressure sores to breast reconstruction. (10,14,15) Allen and Tucker introduced the superior gluteal artery perforator flap (SGAP) in 1993

that not only had a longer vascular pedicle of 8-10cm in length but also kept the underlying gluteus maximus muscle intact by dissecting the perforating vessels from the surrounding tissue down to the SGA. (10,16,17) A long vascular pedicle also means there is greater mobility of the flap and tension free closure. Blondeel further refined the operation in 1999 by demonstrating the use of the SGAP as a sensate flap. (15) Verpaele and colleagues published their experience with the pedicled SGAP based on a single perforator of the superior gluteal artery (SGA), allowing for a much greater mobility in the treatment of sacral pressure sores. (10) Chen et al. stated that the perforator flap can be rotated, advanced and transposed onto the defect or used as a propeller flap. (18) He also reported a lower rate of dehiscence (6.45%) in gluteal perforator flaps compared to fasciocutaneous flaps for which the rate was 18.75%. (18)

The vascular anatomy of the perforating branches of the superior gluteal artery is well documented. The surface marking of the superior gluteal artery is the junction of the medial one third and lateral two thirds of a line drawn between the posterior-superior iliac spine and the apex of the greater trochanter of the femur. The perforating vessels are widely distributed and the blood supply is reliable. (9,19) The superior gluteal artery shows fixed anatomical marks, low variation, convenient location, and rich blood supply, which provides an anatomical basis for the wide clinical application of the perforator flap. (6) Therefore, the superior gluteal artery perforator flap has been used in various forms to repair ischial and sacral pressure ulcers. (20-22) By leveraging the reliable vascular supply from the superior gluteal artery perforators, surgeons can achieve robust and sustained tissue viability, which is critical for successful reconstruction and optimal healing outcomes. As a result, the SGAP flap has become an important tool in the armamentarium of reconstructive surgeons, offering a reliable and effective solution for complex pressure ulcer reconstructions. (23)

IV. Conclusion

In the current reconstructive armamentarium, perforator flaps is the preferred weapon for providing good soft tissue cover with least donor site morbidity due to sacrifice of muscle. It gives a new option to cover perineal defects requiring obliteration of dead space with well vascularised tissue. The presence of constant perforators simplifies the surgical approach, resulting in a reduced hospital stay and improving patient recovery. The SGAP flap is a useful and versatile adjunct to the reconstructive surgeon both as a free and pedicled flap. Hence, we conclude that the SGAP flap is an accpetable choice reconstruction of sacral defects.

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