

The Superior Gluteal Artery Perforator Flap for the Closure of Sacral Sores

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ABSTRACT

The purpose of this paper is to report the use of the superior gluteal artery perforator (SGAP) flap in the closure of sacral pressure sores here in Singapore. This fasciocutaneous flap is a refinement of the musculocutaneous flap which is popularly used for the closure of sacral sores. There were minimal complications. This is a reliable flap and gives the option of further reconstructive possibilities should a recurrence occur.

Keywords: fasciocutaneous, pedicled, sacral pressure sores, superior gluteal artery perforator (SGAP) flap

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INTRODUCTION

Pressure sores are a common recurring complication in patients who are paraplegic or bed-bound, especially in the sacral area. Many surgical methods have been used to correct them including primary closure, skin grafting, local random flaps and muscle flaps. Sacral pressure sores have popularly been closed using the gluteus maximus myocutaneous flap which has reliable vascularity⁽¹⁾.

A refinement of this flap has evolved from a myocutaneous to a fasciocutaneous flap. This flap leaves the gluteus maximus muscle intact while still being reliable for the closure of sacral sores. It is named the superior gluteal artery perforator (SGAP) flap. We have used this flap as described by Verpaele⁽²⁾ in our unit to close four sacral sores with good results.

METHODS

The SGAP flap is marked based on the superior gluteal artery as it emerges at the border of the sacrum at the junction of the medial one third and lateral two thirds of a line drawn between the posterior superior iliac spine (PSIS) and the apex of the greater trochanter of the femur. The artery supplies the supra-piriformis part of the gluteus maximus muscle. The surface marking of the piriformis muscle is by a line from the top of the

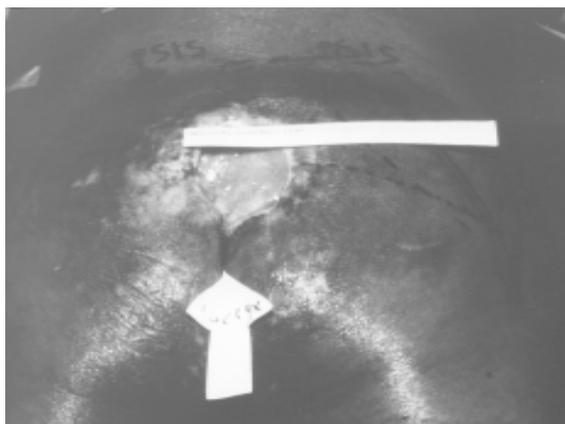


Fig. 1 Photograph shows sacral sore with skin markings.

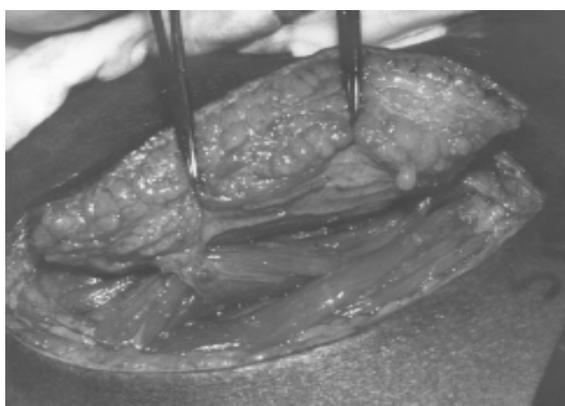


Fig. 2 Operative photograph shows suitable perforator coming through split gluteus maximus muscle fibres.

greater trochanter of the femur to a point midway between the PSIS and the coccyx.

The perforators are located by hand-held Doppler above the second line and marked. (Fig. 1) Verpaele recommends that the flap be designed around the lateral most perforator to create the longest pedicle possible to give a greater arc of movement⁽²⁾. The patient is operated lying prone under general anaesthetic.

The incision is made superiorly as part of an imaginary arc of a rotation flap in case no suitable perforators are found. This can then be converted into a musculocutaneous rotation flap. The incision goes down at ninety degrees through skin, fat and fascia to the muscle. The flap is raised off the

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Fig. 3 Operative photograph shows SGAP flap raised on two perforators.

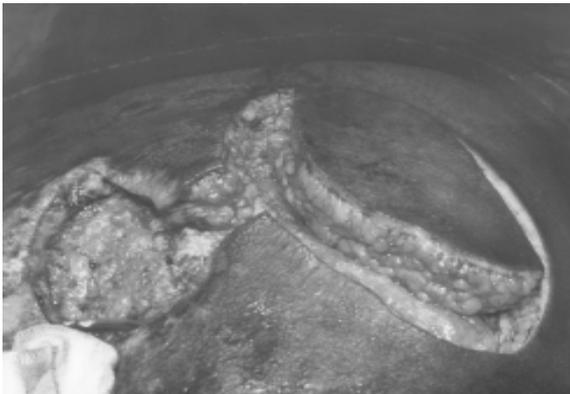


Fig. 4 Operative photograph shows flap fully raised shown beside defect after debridement.

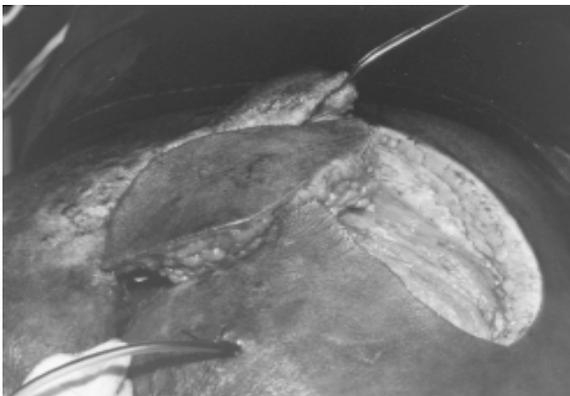


Fig. 5 Operative photograph shows flap inset into defect without tension.

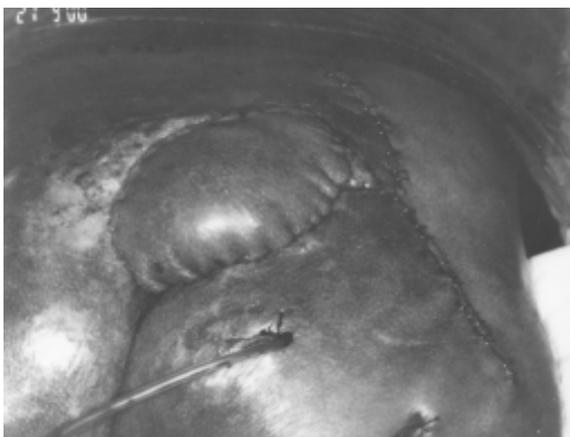


Fig. 6 Operative photograph shows fully closed flap with drains in situ.

muscle until the chosen perforator is found. (Fig. 2) This vessel is slowly dissected out by splitting the muscle fibres rather than cutting, and by ligating small muscular side branches.

The inferior border of the flap is then incised and the flap is raised away from the muscle fully. The dissection of the pedicle continues until near the origin of the superior gluteal artery or until the pedicle length is sufficient to transpose the flap into the defect without tension. (Figs. 3 and 4)

The donor defect is closed primarily after minimal undermining and the flap inset with drains inserted to both areas. (Figs. 5 and 6) The patient is nursed prone or on his sides until the flap is healed.

RESULTS

We have operated on four patients in our unit from September 2000 to July 2002 using this flap. All the flaps healed and the patients were fit for discharge after two to three weeks. There were minimal complications, no seroma collection or early or late wound infection. There was also no flap necrosis noted in any of the flaps.

However one patient developed a deep vein thrombosis which was treated with anti-coagulation. All the flaps are still well after an average of 21 months follow-up (9-30 months). (Fig. 7)

Case 1

A 28-year-old Bangladeshi worker involved in a road traffic accident became paraplegic and developed a deep sacral pressure sore which failed to heal with conservative methods. In September 2000, he was operated on and the defect closed with an SGAP flap based on two perforators. He was allowed to sit on the flap after three weeks and discharged to rehabilitation.

Case 2

A 42-year-old Indian man became paraplegic after a motorcycle accident and suffered multiple pressure sores including trochanteric and sacral pressure sores. He had an SGAP flap based on one perforator to close the sacral defect in January 2001. He healed without any complications and sat up after the 7th post-operative day and was discharged two days later.

Case 3

A 22-year-old Indian man became bed-bound after severe head injury sustained in a road traffic accident. He developed a deep sacral pressure sore and had an SGAP flap on August 2001. This flap suffered a small wound dehiscence laterally due to handling of the patient but healed conservatively.



Fig. 7 Photograph taken four weeks post-operatively shows good healing.

He also developed a deep venous thrombosis. He was treated with heparin and later with warfarin.

Case 4

A 45-year-old Indonesian man developed a sacral sore after a spinal operation. The orthopaedic team wanted his wound closed before performing further spinal surgery with new prosthesis insertion. He underwent closure of his wound with an SGAP flap in July 2002. He had an uneventful recovery without complications.

DISCUSSION

Patients who are bed-bound due to stroke, coma or severe illnesses or who are paraplegic are prone to recurrent pressure sores. These pressure sores can be managed conservatively with daily dressings, reducing pressures off the area or vacuum assisted closure. Alternatively, they can be closed by surgical methods. These include primary closure, skin grafting, local random flaps, muscle flaps or free tissue transfer.

Of these, the most popular method for closing sacral sores is the gluteus maximus myocutaneous flap. There are many variations of this flap including turnover flaps, rotation flaps, island flaps and the sliding flap described by Ramirez which is useful in the non-paraplegic patient⁽³⁾.

The gluteal myocutaneous flap is a reliable method because of its good vascularity. However, since then, work has been done showing that perforator flaps are also as reliable⁽⁴⁾. The SGAP flap is a pedicled fasciocutaneous flap developed from an evolution of work by Kroll and Rosenfield⁽⁴⁾, Koshima et al⁽⁵⁾, and Verpaele et al⁽²⁾. The beauty of this flap is that a large, safe flap can be raised unilaterally with little bleeding and still leave muscle intact and little donor site morbidity. Yamamoto found that fasciocutaneous flaps were expected to provide better long term results in surgical reconstruction of pressure sores than the

myocutaneous or muscle flap⁽⁶⁾.

The SGAP flap is an important tool in the closure of sacral sores as the gluteal muscles are not sacrificed and neither is their function which is advantageous in the non-paralysed patients. This also leaves other reconstructive options open in case of recurrence which would be helpful in both paralysed and non-paralysed patients. This fact is incorporated in the superior approach taken in the design of this flap and as a safety feature in case no suitable perforators are found.

Little bleeding is encountered in this flap as the dissection does not cut muscle but splits them along their fibres. This is also useful in non-paraplegic patients as it reduces post-operative pain and mobilisation can be started early. A long pedicle can be raised if a lateral perforator is chosen providing the flap a large arc of movement. This allows undamaged tissue to be used from distant untraumatised zone in certain cases⁽²⁾.

The donor site can be closed primarily with little undermining giving little morbidity. The SGAP flap is a relatively easy perforator flap to raise and is recommended for someone starting to use perforator flaps⁽⁷⁾. There are minimal complications. Although seroma formation was expected⁽⁸⁾, we had none in our cases and all of them healed well.

We would recommend the SGAP flap as a good alternative in the closure of sacral sores as it is relatively easy to flap to raise with good reliability and minimal complications.

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