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# Treatment of large ischial ulcers communicating with the hip joint with proximal femoral resection and reconstruction with a combined vastus lateralis, vastus intermedius and rectus femoris musculocutaneous flap

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## KEYWORDS

Vastus lateralis;  
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Flap;  
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Lateral circumflex femoral artery;  
Girdlestone arthroplasty

**Summary** Pressure ulcers which communicate with the hip joint are very difficult to treat. Often, the hip joint is infected with osteomyelitis of the proximal femur resulting in bouts of sepsis and flap failure. These patients require proximal femoral resection and wide debridement in order to eradicate the infection, which in turn results in large and deep cavities. Reconstruction requires either a muscle flap or even a total thigh flap if the defect is very large and the pelvis is involved.

In a series of six ischial or ischio-trochanteric pressure sores communicating with the hip joint, following multiple serial debridements, the vastus lateralis, vastus intermedius and rectus femoris muscles were raised as a single musculocutaneous flap ('three muscle flap'), based on the descending branch of the lateral femoral circumflex artery, and transposed into the defect. All patients were paraplegics and had signs of sepsis during admission. Two patients had prior failed reconstructions within 3 months of admission and the others had not been operated on before. The external skin defect of the ulcers ranged from 7 × 5 cm to 30 × 12 cm. After 12 months follow up there was no recurrence of pressure sores or sepsis.

The 'three muscle flap' offers the advantage of providing large bulk to fill deep cavities, while preserving the rest of the thigh. The flap elevation is fast and safe and the vascular pedicle is reliable. This technique is not for simple pressure sores, but should be reserved for large pressure sores complicated with large cavities created after resection of the proximal femur.

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Multiple large pressure ulcers are often seen in long term paraplegic patients, especially in neglected cases. In long standing cases, these ulcers may extend and involve deeper structures. When ischial or trochanteric pressure sores communicate with the hip joint a refractory form of the disease is encountered. Even though a small pressure sore may be present on the surface, the patient may still have deep, extensive, non-healing large cavities in the hip joint. Sometimes the presence of the communication is missed, resulting in persistent infection and fevers, recurrent osteomyelitis, pyoarthrosis, reconstructive failure, flap breakdown, recurrent ulceration and draining sinuses. In order to achieve complete control of the disease, the femoral head resection (Girdlestone arthroplasty) should be performed with wide debridement resulting in deep and wide cavities.<sup>1–5</sup> The use of the vastus lateralis muscle flap is useful in such cases.<sup>2–5</sup> However, in some neglected long standing cases the degree and duration of infection and inflammatory process is so extensive that wider areas of the femur and acetabulum are involved and exposed. In addition, the hip communicates with the ischial pressure sore through a wide draining sinus wound and involvement of the ischial bone. Thus, in order to control the infection and the inflammatory process, large tissues need to be resected, which in turn result in huge cavities. Ordinarily for such very large pressure sores and cavities, where the hip joint is exposed and there is intractable infection in the pelvis, a total thigh and leg amputation has been used to reconstruct such large cavity defects.<sup>6</sup>

In this paper, we describe a series of cases where deep and wide ischial and trochanteric ulcers with exposed hip joints with intractable infection are covered by a combined vastus lateralis, vastus intermedius and rectus femoris flap ('three muscle flap') based on the lateral circumflex femoral artery following proximal femoral resection. This method provides larger bulk than a single muscle flap as well as obviating the need to use a whole thigh as a flap when large cavities need to be filled.

## Material and methods

Five consecutive paraplegic patients (six ulcers) with ischial pressure ulcers (single or combined) that were communicating with the hip joint were included in the study and the data were collected prospectively.

The ulcers were examined manually to determine the existence of communication with the hip joint, the depth of the cavity and involvement of the femoral head (Figure 1A). Cultures were obtained from the cavities. An initial radical debridement of the pressure sore, the cavity, surrounding fibrotic tissue and heterotrophic bone formations was performed in addition to the resection of the exposed femur (femoral head, neck and proximal femur) and debridement and curettage of the cartilage of the surface of the acetabulum (Figure 2A). In patients where the hip joint was not well visualised, an incision from the ischial pressure sore to the area overlying the joint was made extending laterally in the direction of the greater trochanter. The bone was sent for biopsy and cultures. This was followed by several minor debridements. After each debridement dressing changes were applied to the cavity with 0.5%

Dakins solution for 2 days followed by vacuum-assisted closure (VAC) for 6 days (Figure 3A).

Once the wound was ready for final closure, the patient was placed in a semilateral decubitus position (Figures 1–3). After the hip joint cavity, pressure sore and edges of the skin were debrided, the width and the length of the skin defect was measured with the hip in semiflexed position. The distal edge skin island of the flap was placed 5 cm proximal to the upper edge of the patella. The midsection of the skin island was positioned over the intermuscular septum between the vastus lateralis and rectus femoris muscles determined by a line drawn between the anterior superior iliac spine and the supero-lateral edge of the patella. The width of the flap was equal to the width of the skin defect. The length of flap was determined to be approximately 50% longer than the length of the defect (this prevented the pedicle of the flap being squeezed once the flap is transposed into the defect, as no tunnelling was used). Once the skin island was cut, the incision continued to the defect from the upper edge of the skin flap in order to open the tunnel where the flap would lie. Later vastus lateralis, vastus intermedius and rectus femoris muscles were raised from distal to proximal in an en-block fashion without exposing the descending branch of the lateral femoral circumflex artery. The periosteum of the femur was left behind so as not to skeletonise the bone. The most proximal part of the vastus lateralis on the femur, which corresponded to the area where the femur was resected, was detached from the bone to allow easy transposition of the flap. During this dissection, the vascular pedicle (lateral circumflex femoral artery and its descending branch) lay within these three muscles and was protected from any injury. The flap was transposed into the defect. Several sutures were taken, over suction drains, between the muscle layer of the flap and deepest part of the wound cavity. Then, the flap was inserted to cover the bony structures and the defect of the ischial pressure sore. Finally, the skin was closed in two layers. The donor areas were closed primarily. The patient was not allowed to lie on the flap for 2 weeks and hyperflexion of the hip was prevented by adequate positioning.

## Results

There were four male and one female patients with an age range of 16 to 57 years. There were two ischial ulcers, two ischio-gluteal ulcers, one ischio-sacro-gluteal ulcer and one ischio-trochanteric ulcer. One patient had bilateral ulceration. The external skin defect of the ulcers ranged in size from 7 × 5 cm to 30 × 12 cm. All ulcers communicated with the hip joint. The duration of the ulcers ranged between 6 and 30 years. Two patients had prior failed local flap coverage of their pressure sores. The remaining three patients had never been operated on before.

During the initial examination gross purulence was coming from the hip joint and all patients had signs of sepsis with recurrent high fever and chills which required hospital admission. The fever was relapsing over a 3 month period before the patients were referred to our clinic and had used multiple antibiotics. All patients had leukocytosis and high C-reactive protein levels. Bone biopsy and cultures

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