Pedicled Gluteal Artery Perforator Flap for Sacral and Ischial Pressure Ulcer Reconstruction: Promising Prospects for Mauritius

Hurbungs A*
Xiangya School of Medicine,
172, Tongzipo Rd, Changsha
Hunan Province, China
Email: drameet@hotmail.com

Ramkalawan H
Xiangya School of Medicine,
172, Tongzipo Rd, Changsha
Hunan Province, China
Email: kushoon82@hotmail.com

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Abstract

Pressure ulcers can result in an intractable wound resistant to conservative treatment ultimately leading to increased morbidity and mortality. With the concept of the perforator flap, pedicled gluteal artery perforator flap can be used for soft tissue coverage of pressure ulcers. Pedicled superior gluteal artery perforator (SGAP) flap holds promise for sacral ulcer reconstruction while pedicled inferior gluteal artery perforator (IGAP) flap holds promise for ischial ulcer reconstruction. Between January 2009 and January 2010, 14 pedicled gluteal artery perforator flaps were performed in 14 patients. The fasciocutaneous flaps were employed to cover ulcer defect in the sacral area (n=8) and ischial area (n=6). The size of the flaps ranged from 8 x 6 cm to 15 x 8 cm. Postoperative partial wound dehiscence was encountered in one IGAP flap and a successful secondary suture was made. In conclusion, the pedicled gluteal artery perforator flap is reliable for reconstruction of soft tissue defects of pressure ulcer.

Keywords: pressure ulcer, pedicled perforator flap, superior gluteal artery perforator flap, inferior gluteal artery perforator flap.

* For Correspondences and Reprints
1. INTRODUCTION

Pressure ulcers are soft tissue injuries resulting from unrelieved pressure over a bony prominence. The causes are multifactorial including primary etiologic factors such as unrelieved tissue pressure more than 32mmHg, shear, friction and moisture. Secondary etiologic factors include malnutrition, age and sensory loss caused by spinal cord injuries. The locations of pressure ulcer vary according to the patient’s position, being more prevalent in paraplegic, quadriplegic patients as well as those with long term hospitalisation. The supine patient is most susceptible to develop sacral pressure ulcer while seated patient is more prone to ischial pressure ulcer. Patients with neurological diseases, cardiovascular diseases, malnutrition and surgical patients are more prone to develop pressure ulcer. Hospitalised patients have a 3-17% incidence rate while hospitalised surgical patients have a 12-66% incidence rate. Immobilised patients in long term care facilities have a 33% incidence rate (Bansal C et al. 2005). Mauritius is no stranger to this problem of pressure ulcer whereby mainly patients with neurological diseases and hospitalised surgical patients are affected. The site most commonly involved is the sacral region followed by ischial region. Treatment is mostly confined to daily dressing exchange and debridement of any necrotic tissue but with relatively low success rate of wound healing. Thus, in view of improving the treatment for patients with pressure ulcer we have conducted a prospective study at our hospital on the application of pedicled gluteal artery perforator flap for the treatment of sacral and ischial pressure ulcer.

2. MATERIALS AND METHODS

2.1. Clinical Details

Between January 2009 and January 2010, 14 patients (9 male, 5 female) with ischial or sacral pressure ulcers were treated with pedicled gluteal artery perforator flap at our hospital. There were 8 patients (57.1%) with sacral pressure ulcer and 6 patients (42.9%) with ischial pressure ulcer. The average age of the patients was 54
years (range 33-68 years). 11 patients (78.6%) were paraplegic and 3 were ambulatory (21.4%). Among the patients, 2 patients had the comorbidity of diabetes mellitus and 1 patient hypertension.

The causes of paralysis were traumatic spinal cord injury in 10 patients and postoperatively after spinal cord tumour resection in one patient.

The pedicled gluteal artery perforator flap is classified into two types: (A) pedicled superior gluteal artery perforator (SGAP) flap, (B) pedicled inferior gluteal artery perforator (IGAP) flap. There were 8 SGAP flap and 6 IGAP flap in this series. (Table 1)

Table 1: Clinical details
M, male; F, female; DM, diabetes mellitus; HBP, hypertension

<table>
<thead>
<tr>
<th>Case no.</th>
<th>Gender</th>
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<th>Etiology</th>
<th>Comorbidities</th>
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<td>Paraplegia</td>
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2.2. Choice of Flap and Anatomical Consideration

The choice of flap depends on the location of the pressure ulcer; the SGAP flap is the flap of choice for sacral ulcer while the IGAP flap is the flap of choice for ischial ulcer. The SGAP flap is based on perforators from the superior gluteal artery and the IGAP flap on the perforators from the inferior gluteal artery. A good anatomical knowledge is essential for flap elevation.

The superior gluteal artery and venae arise from the internal iliac system deep in the pelvis. It is a short artery that runs dorsally between the lumbosacral trunk and the first sacral nerve. They exit posteriorly through the greater sciatic foramen, superior to the piriformis muscle and inferior to the gluteus medius where it divides into superficial and deep branches. The superficial branch continues to give off contributions to the upper portion of the gluteus muscle and overlying fat and skin. The point of entrance of the superior gluteal artery from the upper part of the greater sciatic foramen corresponds to the junction of upper and middle thirds of a line extending from the posterior superior iliac spine to the posterior superior angle of the greater trochanter. Perforating vessels are found off the superior branch of the superior gluteal artery. Three perforators usually supply the superior gluteal artery perforator cutaneous territory, with a pedicle length of 3 to 8 cm (Saint et al. 2009).

The inferior gluteal artery arises from the internal iliac system deep in the pelvis. It exits posteriorly through the greater sciatic foramen below the piriformis muscle. It then descends in the interval between the greater trochanter of the femur and tuberosity of the ischium, accompanied by the sciatic and posterior femoral cutaneous nerves, and covered by the gluteus maximus. Once under the inferior portion of the gluteus maximus, perforating vessels are seen branching out through the substance of the muscle to feed the overlying skin and fat. The point of emergence of the inferior gluteal artery and its surrounding vessels from the lower part of the greater sciatic foramen corresponds to the junction of lower with middle thirds of a line extending from the posterior superior iliac spine to the outer part of
the ischial tuberosity. The course of the inferior gluteal artery perforating vessels is more oblique through the substance of the gluteus maximus muscle than the course of the superior gluteal artery perforators, which tend to travel more directly to the superficial tissue up through the muscle. Thus, the length of the inferior gluteal artery perforator and the resultant pedicle length for the overlying IGAP flap at 7-10 cm is greater than that found with SGAP flap (3-8 cm). Because the skin island is placed inferior to the origin of the inferior gluteal vessels, a longer pedicle is also ensured.

The direction of the perforating vessels can be superior, lateral or inferior. Perforating vessels that nourish the medial and inferior portions of the buttock have relatively short intramuscular lengths, between 4 and 5 cm, depending on the thickness of the muscle. Perforators that nourish the lateral portion of the overlying skin paddle are observed travelling through the muscle substance in an oblique manner 4 to 6 cm before turning upwards towards the skin surface. By travelling through the muscle for relatively long distances, these vessels are much longer than their medially based counterparts. The perforating vessels can be separated from the underlying gluteus maximus muscle and fascia and traced down to the parent vessel, forming the basis for the IGAP flap. Between two and four perforating vessels originating from the inferior gluteal artery will be located in the lower half of the gluteus maximus.

2.3 Surgical Techniques

2.3.1 SGAP Flap

With the patient in the prone position, the posterior superior iliac spine (A), ischial tuberosity (B) and greater trochanter (C) were marked respectively, forming a triangle. The emergence of the superior gluteal artery usually corresponds to the junction of upper and middle thirds of the line (AC) extending from the posterior superior iliac spine to the posterior superior angle of the greater trochanter. The perforator vessels located around this marked point was detected by a hand held Doppler probe and marked on the skin. There is a general correlation between the
audible volume of the Doppler signal and the diameter of the perforator which could define the most sizeable one. The pressure ulcer was adequately debrided with thorough excision of the bursa. The defect size was measured and the SGAP flap skin paddle was fashioned accordingly in an elliptical fashion to incorporate the lateral perforators of the superior gluteal artery. The flap was elevated from lateral and superior towards the medial aspect by incising through skin, subcutaneous tissue and deep fascia down to the gluteal muscle. Dissection was done in the subfascial plane, deep to the muscular fascia and above the gluteus maximus muscle, searching for a sizeable perforator. Lateral perforators, running medially towards their origin from the superior gluteal artery are preferred as they provide a longer vascular pedicle and are in the same direction of the desired advancement towards the medial sacral defect. When the larger perforators were identified as the dissection proceeded medially they were traced into the muscles with bipolar dissection and dissected to their exit from between the piriformis and gluteus medius muscle. If the selected perforator was injured during dissection, switch to the next lateral perforator. The medial and inferior incisions were made and the pedicle traced more proximally by placing retraction between the exit if the artery and its venae between the muscular space by separating the muscles from the vascular system. Blood circulation of the flap was assured before securing a good hemostasis. The flap was either rotated or advanced into the sacral defect paying attention to comfortable closure of the defect without tension on suture lines. Great care was taken during flap transport to prevent kinking, twisting, compression or undue tension on the vascular pedicle.

2.3.2 IGAP Flap
With the patient in the prone position the following landmarks were marked on the skin: posterior superior iliac spine (A), ischial tuberosity (B), greater trochanter (C); lines were drawn from the posterior superior iliac spine to the ischial tuberosity (AB), from posterior superior iliac spine to greater trochanter (AC) and from ischial tuberosity to greater trochanter (BC). The emergence of the inferior gluteal artery usually corresponds to the junction of lower with middle thirds of the line extending from the posterior superior iliac spine to the outer part of the ischial
tuberosity. A Doppler flowmetry examination of the inferolateral gluteal region, around the point of emergence of the inferior gluteal artery, was conducted to identify the perforators from the artery. After complete pressure ulcer debridement and bursectomy, a skin paddle was fashioned accordingly in an elliptical fashion to incorporate most of the detected perforators. Incision through the skin, subcutaneous tissue and deep fascia was done and the flap was elevated in the subfascial plane. The perforators were approached from lateral to medial. The largest and most lateral perforator was preferred as it yields the longest pedicle. The perforator was dissected carefully through the gluteus maximus muscle splitting the muscle in the direction of the fibres. Any side branches of the perforator were ligated and dissection continued down to the passage of the inferior gluteal artery inferior to the piriformis muscle. The sciatic nerve should not be exposed. The posterior femoral cutaneous nerve and the fat medially overlying the ischium must be preserved. Once the sacral fascia was encountered, it was opened, revealing multiple communicating arterial and venous branches, and branches were ligated carefully. Dissection continued until the pedicle was of sufficient length and diameter, with the artery usually the limiting factor. After achieving the required pedicle length, flap circulation was assured and a good hemostasis was secured. The perforator flap was rotated or advanced into the ischial defect and sutured without any tension on suture lines. Kinking, twisting, compression or undue tension on the vascular pedicle was avoided.

3. RESULTS

3.1. Overall Results

The size of the flaps ranged from 8 x 6 cm to 15 x 8 cm. All flaps survived completely without major complications. Donor site was closed primarily in all 14 cases. 1 case of partial wound dehiscence was noted in a patient of ischial pressure ulcer reconstructed with IGAP flap. A secondary suture was successfully made. Wound dehiscence was due to non compliance of the patient regarding gradual
mobilisation following suture removal. No recurrence of ulcer occurred after an average follow up of 12 months (range 6-21 months). (Table 2)

Table 2: Result of flap transfers
SGAP, superior gluteal artery perforator; IGAP, inferior gluteal artery perforator

<table>
<thead>
<tr>
<th>Case no.</th>
<th>Type of flap</th>
<th>Flap size (cm)</th>
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<td>12×8</td>
<td>Primary closure</td>
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<td>Healed</td>
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<td>2</td>
<td>SGAP</td>
<td>10×8</td>
<td>Primary closure</td>
<td>-</td>
<td>Healed</td>
</tr>
<tr>
<td>3</td>
<td>IGAP</td>
<td>11×4</td>
<td>Primary closure</td>
<td>-</td>
<td>Healed</td>
</tr>
<tr>
<td>4</td>
<td>SGAP</td>
<td>11×7</td>
<td>Primary closure</td>
<td>-</td>
<td>Healed</td>
</tr>
<tr>
<td>5</td>
<td>IGAP</td>
<td>9×4</td>
<td>Primary closure</td>
<td>-</td>
<td>Healed</td>
</tr>
<tr>
<td>6</td>
<td>SGAP</td>
<td>11×7</td>
<td>Primary closure</td>
<td>-</td>
<td>Healed</td>
</tr>
<tr>
<td>7</td>
<td>IGAP</td>
<td>9×6</td>
<td>Primary closure</td>
<td>Partial wound dehiscence</td>
<td>Healed</td>
</tr>
<tr>
<td>8</td>
<td>SGAP</td>
<td>15×8</td>
<td>Primary closure</td>
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<td>Healed</td>
</tr>
<tr>
<td>9</td>
<td>SGAP</td>
<td>10×7</td>
<td>Primary closure</td>
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</tr>
<tr>
<td>10</td>
<td>SGAP</td>
<td>12×6</td>
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<td>-</td>
<td>Healed</td>
</tr>
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<td>SGAP</td>
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<td>Primary closure</td>
<td>-</td>
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</tr>
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<td>11×5</td>
<td>Primary closure</td>
<td>-</td>
<td>Healed</td>
</tr>
<tr>
<td>13</td>
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<td>Primary closure</td>
<td>-</td>
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</tr>
<tr>
<td>14</td>
<td>IGAP</td>
<td>8×6</td>
<td>Primary closure</td>
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3.2. Case Reports

3.2.1 Case 1
A 62 years old male patient developed a sacral pressure ulcer due to prolonged hospitalisation following cerebral haemorrhage. On examination, the sacral region showed a 7 x 8 cm size ulcer with bone exposure and purulent secretions. After active antibiotics treatment and daily wound dressing, the sacral ulcer was debrided along with complete excision of the bursa. A right pedicled SGAP flap was planned to close the sacral defect. The SGAP flap was of size 7 x 10 cm and was
elevated on two perforators from the superior gluteal artery. The flap survived completely without any complications and sutures were removed after 14 days yielding a satisfactory cosmetic result. (Fig 1- A, B, C, D)

Fig 1-A: Preoperative sacral ulcer and elliptical design of the flap (7 x 10 cm) over the perforators.
Fig 1-B: Intraoperative view of sacral defect after debridement and bursectomy. The SGAP flap was raised on 2 perforators.
Fig 1-C: Flap inset into the sacral defect and sutured without tension. Donor site was closed primarily.
Fig 1-D: Postoperative view of sacral area 2 weeks postoperatively showing complete flap survival.

3.2.2 Case 2
A 34 years old female patient with post traumatic paraplegia since 2 years developed bilateral ischial pressure ulcer of 1 year duration which failed to heal with conservative treatment. On examination, the ischial areas showed a stage 4 ulcer on the right side and a stage 3 ulcer on the left side. After complete debridement and bursectomy, the left ischial defect was closed primarily while a right pedicled IGAP flap was planned for the right ischial defect. The IGAP flap was of size 9 x 4 cm and was elevated on one perforator from the inferior gluteal artery. The wound healed without complication and sutures were removed after 14 days. (Fig 2- A, B, C, D, E)

Fig 2-A: Bilateral ischial ulcer and preoperative perforator mapping.
Fig2-B: Intraoperative view of the ischial defect after debridement and bursectomy. The IGAP flap was fashioned elliptically, with size 9 x 4 cm, over the identified perforators.
Fig 2-C: IGAP flap elevated on one perforator.
Fig 2-D: Flap inset into right ischial defect and sutured without tension. The left ischial defect was closed primarily. Donor site was closed primarily.
Fig 2-E: 2 weeks’ postoperative view of ischial region showing good wound healing with complete flap survival.

4. DISCUSSION

Reconstruction of pressure ulcer defects has always been a challenge to surgeons due to high rate of complications and recurrence. While conservative treatment still remains the first line treatment, reconstructive options have to be considered in cases of conservative treatment failure. Treatment options vary according to the stage of the pressure ulcer. The most accepted classification system for pressure ulcer is the NPUAP (National pressure ulcer advisory panel system). Stage 1 is defined as intact skin with non blanchable redness. Stage 2 pressure ulcers have partial thickness loss of dermis, presenting as a shallow ulcer. A stage 3 pressure ulcer has full-thickness loss of skin with exposed fat. Stage 4 pressure ulcers have full thickness loss with exposed muscle, tendon, or bone. The treatment strategy include: (1) pressure relief, (2) wound care, (3) optimising nutritional status, and (4) surgical management. Pressure relief is primordial in treating pressure ulcer. Changing the patient’s position every 2 hours is usually recommended so as to relieve pressure on vulnerable areas. Patients with stage 1 and stage 2 ulcer can benefit from static surfaces such as air, foam and water mattress while those with stage 3 and 4 benefit from dynamic surfaces such as alternating air overlay, low air loss bed and air fluidized beds. Wound care aims at removing dead tissue which hampers the healing process. Appropriate dressing is also the cornerstone to enhance healing. Heavy draining wound require dressing such as alginate or foam. Medium or light draining wound require hydrocolloid dressing while wounds with no drainage require hydrogel-amorphous or simple gauge dressing. Control of wound infection is also mandatory. The nutritional status also guides the healing process of the ulcer. Malnourished patients will be more prone to ulcer formation, poor healing and risk of infection. Enteral or parenteral feeding aiming at improving the nitrogen balance will be beneficial in speeding healing of the ulcer. Surgical management involves debriding the wounds and flaps surgery which is usually confined to stage 3 and stage 4 pressure ulcer.
Surgical reconstruction of pressure ulcer in ambulatory or non-ambulatory patients often presents a challenging problem in plastic surgery. Many techniques have been described, with the ideal operation still being sought. Surgical methods which can be used include primary closure, skin grafting, local random flap, muscle flap, fasciocutaneous flap or free tissue transfer. The development of musculocutaneous flap proved to be very useful in greatly decreasing the incidence of wound complication following reconstructive surgery in pressure ulcer patients. The gluteus maximus musculocutaneous flap for sacral pressure ulcer reconstruction and the inferior gluteal musculocutaneous flap for ischial pressure ulcer reconstruction were the most reliable method used due to their good vascularity. However, these flaps had the disadvantages of causing much intraoperative blood loss, restricting future reconstructive options in case of recurrent ulcer in paraplegic patients, causing gait disturbances in ambulatory patients. Many surgeons tried to improve flap techniques in view of minimising these shortcomings. Ramirez et al. (1984) described the sliding gluteus maximus flap whereby pressure ulcer reconstruction was achieved while preserving structural and functional integrity of the muscle unit. However, large defects reconstruction was difficult due to restricted mobility of the flap even with the use of bilateral gluteal flaps. Further studies showed that a passive muscle carrier is not necessary for flap survival if careful dissection of the musculocutaneous perforator vessels is accomplished. By selective harvesting the skin above the underlying muscle, a reduction of donor site morbidity has been demonstrated (Kroll et al. 1988). Further studies by Rosenfield (1988) and Koshima et al. (1993) led to the concept of the perforator flap which is composed exclusively of skin and subcutaneous fat. The perforator flap combines the reliable blood supply of musculocutaneous flap with reduced donor site morbidity of skin flaps. Yamamoto et al. (1997) found that these fasciocutaneous perforator flaps provide better long term results in surgical reconstruction of pressure ulcers than the musculocutaneous or muscle flap.

Pressure ulcer reconstruction with pedicled gluteal artery perforator flap yields the following advantages over the musculocutaneous flap: (1) preservation of the muscle, (2) conservation of future reconstructive options in case of recurrence, (3)
minimal intraoperative blood loss, (4) placement of suture lines away from pressure laden prominences, and (5) longer vascular pedicle than is achievable with the musculocutaneous flap. Preservation of muscle for functional purposes is a consideration in the ambulatory population. Functional deficit from muscle harvest has not been well documented and thus muscle sparing should always be a goal in the ambulatory and sensate patient, as it may prevent some functional loss and potentially reduce postoperative pain. Muscle sparing should also be considered in paraplegic patients as well. Sacrifice of the underlying muscle is required in musculocutaneous flap and thus this donor site dissection requires closure over the dead space created by the disinserted muscle. This site is a common site of postoperative wound breakdown after this reconstruction (Higgins et al. 2002). The perforator counterpart permits tension free donor site closure over an intact muscle bed. Elevation of the flap is performed in the avascular subfascial plane with minimal blood loss and no need of any blood transfusion.

The V-Y advancement fasciocutaneous flap is another muscle sparing surgical option in treating pressure ulcer. Although being a reliable simple method, the V-Y plasty is preferred in rectangular shape defects with post excision defect less than 10cm. Post excision defect greater than 10cm requires bilateral V-Y plasties. On the other hand, the pedicled gluteal artery perforator flap can be adjusted to the size and shape of the receptor zone and avoids need for bilateral flap.

The SGAP flap is a pedicled fasciocutaneous flap which developed from an evolution of work by Koshima et al. (1993). The flap provides excellent coverage of soft tissue defects in sacral pressure ulcer reconstruction with minimal incidence of postoperative complications and recurrence. The flap is based on the perforator vessels from the superior gluteal artery. Three perforators usually supply the superior gluteal artery perforator cutaneous territory, with a pedicle length of 3 to 8 cm. The average diameter of the perforators arising from the superior gluteal artery is 0.6±0.1mm. A flap width of up to 12 cm may be closed directly and the maximum flap length is usually between 24 and 26 cm (Saint et al. 2009).
The IGAP flap is a pedicled fasciocutaneous flap used for ischial pressure ulcer reconstruction. The ischial area being very mobile and vulnerable to pressure in sitting position makes it a difficult area to treat. Flexion and extension of the lower extremities also influence the tension and size of the pressure ulcer. Thus, to minimize tension after a pressure ulcer operation, it is mandatory to select a non-mobile flap from the pelvis rather than from the lower extremities (Foster et al. 1997). The SGAP flap used for reconstruction in sacral area cannot be used for ischial area reconstruction due to insufficient length of the pedicle. Higgins et al. (2002) reported the use of IGAP flap based on perforator vessels from the inferior gluteal artery for ischial pressure ulcer reconstruction. The IGAP flap proves to be the most reliable flap for soft tissue coverage in ischial pressure ulcer reconstruction providing tension free closure of wound as well as minimal incidence of complications and recurrence. Usually, two to four perforators originating from the inferior gluteal artery supply the cutaneous territory of the inferior gluteal artery perforator flap, with a typically longer pedicle of 7 to 10 cm. The average diameter of the perforators arising from the inferior gluteal artery is 0.6±0.1 mm. Flap width should not exceed 12 cm in view of achieving primary closure while maximum flap length is between 24 and 26 cm (Saint et al. 2009).

Gluteal artery perforator flaps, being of great use in the surgical management of sacral and ischial pressure ulcer, require a good preoperative designing. Identification and location of consistent perforators of adequate size is very important. A hand held unidirectional Doppler probe is an indispensable tool used for perforator mapping. The 5 and 8 MHz are usually applied in perforator flap surgery planning. The principle of the Doppler is detecting the blood flow in the vessels and thus generating pulsatile signals. The higher signal strength correlates with the larger perforator. Doppler does not differentiate perforator vessels from main axial vessels and this can lead to false positive results if the axial vessels run superficially. However, gluteal arteries are situated below the gluteus muscle with perforators travelling through the muscle almost perpendicularly thus making it easy to locate the exit point of the perforators with unidirectional Doppler probe. Based on anatomical knowledge of the gluteal arteries, perforator vessels from
superior gluteal artery territory or inferior gluteal artery territory are mapped preoperatively. The largest and most lateral perforator is usually selected as it yields the longest pedicle. Intraoperative identification of perforators with a sterile Doppler probe may sometimes be required. The skin paddle is designed elliptically to include most of the perforators. For SGAP flap, horizontal flap designs produce a more favourable scar than obliquely oriented incisions which is associated with contour deformity. The inferior limit of the IGAP flap is best marked 1 cm inferior and parallel to the gluteal fold.

In this series, all the perforator vessels were identified intraoperatively at the predetected site. The perforators were carefully dissected without the help of magnification and we did not encounter any case where the chosen perforator was injured during dissection. However, if this situation is encountered, the next predetected perforator vessel should be carefully dissected. Usually no re-orientation of flap design is required. All the perforator flaps were performed without any sensory reinnervation. However there is the potential for sensory reinnervation by anastomosis of the nervi clunium superiores which can be considered in non paraplegic patients.

Preoperative preparation is the most important factor for maintaining a healed wound after flap closure. Mandatory preoperative management include: (1) diabetes control, (2) treatment of spasticity, (3) pressure relief training, (4) achieving an optimum nutritional state, (5) debridement of the necrotic tissue and control of infection, (6) osteomyelitis, if present, should be treated before planning of surgery, and (7) the wound should show some evidence of spontaneous healing, otherwise flap surgery will be unsuccessful. Intraoperative guidelines to be followed are: (1) complete bursectomy should be ensured to prevent subsequent recurrence, (2) avoid the use of vasoconstrictors such as epinephrine during bursectomy and flap elevation, (3) flap elevation is performed in a subfascial plane and the perforators are approached from lateral to medial, (4) sciatic nerve should not be exposed during elevation of IGAP flap, (5) adequate dissection of the pedicle should be done so that the flap can comfortably reach the defect without
any undue tension on the pedicle and suture line, (6) skeletonization of the pedicle is debatable. Verpaele et al. (1999) recommended full vessel skeletonization. On the other hand, Koshima et al. (1993) did not recommend full vessel skeletonization so as to prevent any kinking or twisting of the pedicle which can cause vasospasm or total blockage of blood flow resulting in total flap necrosis. In this series, we report full vessel skeletonization in 4 of the 14 cases. All flaps survived completely without any complications, (7) stretching, kinking, twisting or compression of the vascular pedicle should be avoided during flap inset. Postoperative recommendations are: (1) maintaining optimal nutritional status as optimal healing exists when serum albumin is maintained above 2.0 g/dl, (2) control of spasm, diabetes should be maintained, (3) patient should keep a prone position for a period of 2 weeks after which sutures are removed, and (4) sitting advancement after removal of sutures.

Recurrence is a common problem encountered by plastic surgeons following pressure ulcer reconstruction. Recurrence rate varies widely ranging from 0% (Seyhan et al. 2008) to 29% (Wei, 2009). In our series no recurrence occurred during the follow up period. The gold standard at achieving 0% recurrence rate was achieving good patients’ compliance to pressure relief strategies.

Limitations to the gluteal artery perforator flap also exist. Long term hospitalized patients may be cachexic and thus there will be an insufficient amount of subcutaneous tissue available in the flap resulting in dead space especially in ischial ulcer reconstruction. Dead space, if present, will require muscle flap transposition surgery. Also, pedicle dissection may be difficult for inexperienced surgeons.

5. CONCLUSION

Despite few shortcomings, the merits of versatility of the flap with minimal donor site morbidity, minimal intraoperative blood loss, preservation of gluteus maximus muscle for further reconstructive options make the pedicled gluteal artery
perforator flap the flap of choice in reconstruction of sacral and ischial pressure ulcer.

6. REFERENCES


