Immediate vulvar and vaginal reconstruction using the gluteal-fold flap: long-term results

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Summary The gluteal-fold flap was used to reconstruct vulvar and posterior vaginal wall defects in 40 patients. This is a fasciocutaneous, islanded flap based on the internal pudendal artery and vein perforators. The flap is robust and has the advantage of being away from the pathway of carcinoma spread. In addition it has minimal donor-site morbidity as the scar is hidden in a natural crease.

The incidence of vulvar carcinoma is 10 new cases per 100 000 population in the UK. It affects the 55-80 years age group and pathology comprises either of vulval intraepithelial neoplasia (VIN) or frank invasive carcinoma, predominantly squamous cell carcinoma. Treatment involves wide local excision or vulvectomy, with ipsilateral lymph node basin dissection reserved for palpable lymphadenopathy and/or for carcinoma of more than 2 cm diameter. Post-operative radiotherapy is given for advanced disease or where complete excision of the tumour is not achieved.

A wide variety of reconstructive techniques have been described mostly based on the skin and musculature of the groin and thigh region (Table 1). The senior author described a range of flaps based on the rich anastomotic vascular network of the perineum which were collectively termed as 'lotus petal flaps'. Within this group we specifically used fasciocutaneous flaps sited along the gluteal folds, based on the perforators from the internal pudendal artery. The anticipated advantages of this flap over the other 'lotus-petals' were that they were away from the pathway of carcinoma spread and the donor-site scar was concealed in the gluteal crease. Since this initial report we have used 56 gluteal fold flaps in 40 patients for vulvar and vaginal reconstruction. The versatility and safety of these flaps have been confirmed by others although their experience was limited to seven and 10 cases, respectively. We present our experience of the gluteal-fold flap including details of operative technique and assessment of form and function.

Patients and methods

From 1994 to 2002, 40 patients ranging in age from 45 to 76 years (mean age, 57 years) have undergone reconstruction with the gluteal-fold flap. Twenty-six patients have undergone resection for squamous cell carcinoma, 12 patients for vulval intraepithelial neoplasia.
neoplasia (I–III). One patient presented with a recto-vaginal fistula from Behcet’s disease of the rectum and another with bilateral recurrent hidradenitis suppurativa of the groin.

Applying the Federation of International Gynaecology and Obstetrics (FIGO) staging of vulvar cancer (1995)17 20 patients had carcinoma less than 2 cm diameter at presentation (Stage 1), 12 patients had carcinoma more than 2 cm diameter but confined to the vulva (Stage 2) and only six patients had carcinoma involving the perineum and/or inguinal lymphadenopathy (Stage 3).

Fifteen patients underwent bilateral radical vulvectomy, one patient underwent bilateral excision of hidradenitis of the groin, 16 patients underwent hemivulvectomy and a further seven patients had wide local excision for localised disease. One patient with Behcet’s disease of the rectum had fistulae penetrating the posterior vaginal wall and perineum. The operative approach in this case included excision of the entire fistula and all the surrounding unhealthy tissue. The resultant perineal wound was closed primarily and the posterior vaginal wall was reconstructed with a left-sided gluteal-fold flap. Twelve patients had a concomitant inguinal lymphadenectomy. Three patients had adjuvant therapy with external beam radiotherapy.

In total, 16 patients had bilateral gluteal fold flaps (n = 32 flaps) and 24 patients had unilateral gluteal-fold flaps (n = 24 flaps).

Operative technique

The patient is placed in the Lloyd-Davies position and the urinary bladder is catheterised. Prophylactic antibiotics are given at induction and for 48 h post-operatively. Oncological resection is performed by the gynaecologist. Gluteal-fold flaps are then drawn and the dimensions of the flap adapted to the size of the defect. The long axis of the flap is centred over the gluteal fold and maximum width depends on local tissue laxity allowing a tension-free closure of the donor site. With the pivot point at the ischial tuberosity, the upper incision is made down to muscle. The flap is raised with deep fascia from lateral to medial (Fig. 1(a)). Initially all the perforators encountered are preserved. When the most medial perforator is identified (Fig. 1(b)), the other lateral ones are divided. The accompanying vein is preserved and if possible, the cutaneous branches of the internal pudendal nerve are also incorporated within the flap.

![Figure 1](image-url) (a) A 65-year-old patient has undergone bilateral vulvectomy for carcinoma. (b) The right gluteal-fold flap is raised based from lateral to medial and based on the most medial perforator.

### Table 1  Reconstructive options for the vulva

<table>
<thead>
<tr>
<th>Type</th>
<th>Author, year</th>
<th>Flap design</th>
<th>No. of cases</th>
</tr>
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<tbody>
<tr>
<td>Skin graft</td>
<td>Rutledge, 1968</td>
<td>-</td>
<td>10</td>
</tr>
<tr>
<td>Random pattern</td>
<td>Woodruff, 1971</td>
<td>Local flap (skin only)</td>
<td>4</td>
</tr>
<tr>
<td>Random pattern</td>
<td>Moschella, 2000</td>
<td>V-Y sliding</td>
<td>14</td>
</tr>
<tr>
<td>Myo-cutaneous</td>
<td>McCraw, 1976</td>
<td>Gracilis</td>
<td>22</td>
</tr>
<tr>
<td>Myo-cutaneous</td>
<td>Chafe et al., 1983</td>
<td>Tensor fascia lata</td>
<td>13</td>
</tr>
<tr>
<td>Myo-cutaneous</td>
<td>Breach, 1990</td>
<td>Rectus abdominis</td>
<td>16</td>
</tr>
<tr>
<td>Fascio-cutaneous</td>
<td>Hirshowitz, 1982</td>
<td>Sup-medial thigh</td>
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<td>Gluteal-thigh</td>
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<tr>
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<td>Wang et al., 1987</td>
<td>Medial thigh</td>
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<tr>
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<td>Groin flap</td>
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<tr>
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<td>Spear et al., 1994</td>
<td>Mons pubis</td>
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<td>'Lotus-petal'</td>
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<td>Niranjan, 2002</td>
<td>Gluteal-fold</td>
<td>40</td>
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<tr>
<td>Free flap</td>
<td>Maxwell, 1990</td>
<td>Radial forearm</td>
<td>1</td>
</tr>
</tbody>
</table>

* Current series.
bundle. The flap is then islanded on the perforator and inset into the defect (Fig. 2). Skin closure is achieved in two layers.

Post-operatively patient-controlled analgesia is given, usually for the first 3 days. The patients are advised to keep their thighs abducted and are allowed to sit out for meals and on the toilet but advised not to sit on the gluteal wounds for prolonged periods during the first week. The trans-urethral catheter is removed within 3-5 days. The mean hospital stay was 7 days with a range between 5 and 9 days. Patients were followed up at 2 weeks post surgery and then at intervals of 3 months for 1 year. Photographs were taken at each clinic visit with appropriate consent (Figs. 3 and 4).

Follow-up and assessment

Thirty-five patients attended a review clinic with a follow-up range between 3 months and 4 years (mean = 16 months). One patient died 6 months after the operation with metastatic disease. Patients were given a questionnaire with four questions and were asked to tick either ‘yes’ or ‘no’ to the following questions—(1) pain within 1 week of operation?; (2) pain between 1 week and 3 months of the operation?; (3) pain after 3 months of the operation?; (4) have you engaged in sexual activity after the operation? and (5) are you pleased with the aesthetic result of the surgery? A clinical assessment was carried out to assess sensation with cotton-wool and a 23 gauge needle and quality of the donor-site scar.

Results

Forty-eight of the 56 (86%) flaps survived completely. There was partial loss of six (11%) flaps in four patients. In three of these patients, the wounds healed uneventfully with dressings. One patient underwent a further local ‘lotus-petal’ flap reconstruction. In one patient, a 76-year-old diabetic, there was total loss of both flaps (3%) within the first post-operative week. This necessitated surgical debridement and a subsequent split skin graft reconstruction. One patient succumbed within 6 months of surgery with metastatic spread of her disease.

Thirty-five patients attended for follow-up in a General Plastic Surgery clinic and were assessed by a fourth year Specialist Registrar and a Staff Nurse. Twenty-nine of the 35 patients (29 out of 35 patients = 83%) experienced considerable pain during the first post-operative week and 5 (five out of 35 patients = 14%) suffered pain, mainly on sitting, up to 3 months after the operation. Only one patient (one out of 35 patients = 3%) had pain lasting more than 3 months primarily due to the formation of a hypertrophic scar at the donor site.

Ten out of the 52 flaps (19%) retained some sensation, both to light touch and pin-prick. The
rest of the reconstructions (42 flaps, 81%) were insensate.

Six of the 35 patients (six of 35 patients, 17%) had returned to sexual activity within 6–9 months of their operation. Thirty of the 35 patients (30 out of 35 patients, 86%) were satisfied with the aesthetic result of their reconstruction. Three patients (three out of 35 patients, 9%) found their unilateral reconstruction bulky. Two patients (two out of 35 patients, 6%) were dissatisfied with the lack of hair in the flaps.

Discussion

The ideal vulvo-vaginal and perineal reconstruction following cancer resection should incorporate the following features: reliable and robust flap, flap away from the pathway of carcinoma spread, protective sensation of the flap, good cosmesis and minimal donor-site morbidity. The gluteal-fold flap fulfils these criteria.

Eighty-six percent of the flaps in our series survived completely and healed by primary intention. Eleven percent of the flaps suffered tip necrosis due to venous congestion. These complications occurred early in our series primarily due to excessive skeletonisation of the vascular pedicle. In the latter cases, excess tissue was left intact with the perforator pedicle to augment its’ venous drainage and this has vastly reduced the problem of congestion. Two out of the 56 flaps (3%) underwent complete necrosis in the early post-operative period and required surgical debridement and split skin graft reconstruction. This was mainly due to the patient’s unstable cardio-vascular status compounded by an underlying diabetic microangiopathy.

Three of the patients underwent post-operative radiotherapy and in these cases flap vascularity was not compromised. The reliability of these flaps has been confirmed by anatomical studies carried out by Hashimoto et al.15 In their anatomic dissections the internal pudendal artery and vein have a constant exit point just medial to the ischial tuberosity. An average of 3.4 perforators were seen to be arising from the bundle along its course from the medial edge of gluteus maximus to the vulva. Also, the sub-dermal plexus of the skin along the gluteal fold was directly supplied by these perforators. This finding has helped us to address the main problem with the gluteal-fold flap—bulk. In order to maximise flap vascularity we have previously raised the gluteal-fold flap as a fasciocutaneous unit. This did make the flap bulky and was the principle cause of aesthetic dissatisfaction amongst the patients. We have now modified our technique and raised the last six flaps in our series supra-fascially. These flaps have healed well producing an aesthetically pleasing result (Fig. 5).

The majority of patients in our series presented with early disease (all within FIGO stages 1–3) and histopathological clearance was obtained in all cases. The gluteal folds in these patients provided adequate skin and soft tissue to cover safely the resultant defects from the extirpative surgery. However, if the cancers were to present at a more advanced stage with extensive regional spread, then the gluteal-fold flaps may be insufficient and a distant option such as the myo-cutaneous rectus abdominis flap may be more suitable.

Lymphatic drainage from the vulva is principally to the medial thigh and groin lymph nodes.18 In our series with a mean follow-up period of 16 months there were no cases of local, recurrent disease and this may be due to adequate surgical clearance and also that the gluteal-fold flap does not lie in the pathway of carcinoma spread.18 This is a distinct advantage of this technique over other forms of reconstruction which use tissues overlying the mons pubis and the groin.

Only 10 flaps (19%) in our series retained protective sensation. These were cases in which it was possible to incorporate a sensory nerve within the pedicle. Six of the 35 patients (17%) resumed sexual activity within 6–9 months of the reconstruction. However, the rest did not have any sensation within the flaps but were not particularly concerned. In contrast, the seven gluteal-fold flaps reported by Moschella5 did regain acceptable sensation within 3–6 months. However, due to the relatively small number of patients in this series and the lack of clarity of the method of sensory

Figure 5  Aesthetic result at 4 months after a bilateral vulvar reconstruction. These flaps were raised supra-fascially and are less bulky and well-contoured.
gluteal-fold flap (Fig. 6). The perineal wound was closed primarily and the posterior vaginal wall. The resultant perineal wound healed well (Fig. 4) and pain on sitting settled within 3 months following the operation. This is being managed with analgesia and general pressure-relieving measures.

The gluteal-fold flap has also proven to be useful in reconstruction of the posterior vaginal wall. One patient with Behcet’s disease of the rectum underwent extensive resection of the rectum and the posterior vaginal wall. The resultant perineal wound was closed primarily and the posterior vaginal wall was reconstructed with a left-sided gluteal-fold flap (Fig. 6).

Another patient underwent clearance of bilateral recurrent hidradenitis suppurativa of the groin and immediate reconstruction with gluteal fold flaps. This provided a stable and aesthetically better form of reconstruction than a split skin graft.

Our experience to date with the gluteal-fold flap for vulvar and posterior vaginal wall reconstruction has been favourable. Advantages over other fasciocutaneous and musculocutaneous approaches are that it is away from the pathway of carcinoma spread and there is minimal donor-site morbidity. Disadvantages are bulk which we have addressed by raising the flaps suprafascially and the relative lack of hair and sensation which was not a major concern in the majority of patients in our series.

References