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ARTICLE

Reconstruction of large perineal defects after advanced malignant tumour resection: a simple gluteal thigh flap modification

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ABSTRACT

Reconstruction of large defects in the perineal region, after resection of advanced malignant tumours is challenging because both coverage of the perineal skin defect and adequate filling of the pelvic space must be achieved simultaneously. This manuscript introduces a simple gluteal posterior thigh flap modification for the reconstruction of such defects. A trilobed flap, in the gluteal and posterior thigh regions, was designed to be of an adequate size to repair the dermal and pelvic floor defects. After the flap was elevated and rotated 90°, the posterior thigh portion was denuded. The lateral portion of the deep gluteal fascia was incised to allow medial advancement. Thus, the flap could be easily moved to fill the defect, without tension. To evaluate the results, we reviewed 8 patients with large (>10 cm in diameter) advanced perineal carcinomas. For each patient, the defect was successfully reconstructed using the technique described. A secondary operation was required for one patient, due to atheromatosis that developed several months after the operation. Another patient developed donor site wound dehiscence and was treated with skin grafting. The described technique facilitates the effective reconstruction of large perineal defects.

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Perineal defect; malignant tumour; reconstruction; gluteal thigh flap

Introduction

Regarding the treatment of large, advanced, malignant tumours in the perineal area, wide resection of the perineal skin and pelvic organs is often required. The reconstruction of the resultant perineal defects is challenging because of the creation of a substantial volume of dead space in the region. The space must be reconstructed to prevent postoperative complications, such as ileus, fistulas, and abscess formation. Although the gluteal thigh flap is considered an optimal reconstructive choice for these defects [1–3], it is often hard to sufficiently advance the flap into the deep perineal defect that extends into the pelvis. To overcome this problem, we used a modified gluteal posterior thigh flap. The flap can be used for pelvic floor defects deeper than 5–10 cm. This manuscript introduces our surgical technique.

Materials and methods

Patients

A total of 8 patients were treated using our modified flap technique between April 1998 and July 2019. Each patient had an advanced, malignant, perineal tumour of > 10 cm in diameter. All patients provided written informed consent for surgery and study participation.

Surgical technique

Plastic surgeons performed all reconstructions, immediately after tumour resection by colon and rectal surgeons. The flap surgery typically takes 3–4 h. Adequately sized skin incision lines were designed on each patient's gluteal and posterior thigh regions, according to the size of the defect, 2 small flaps were designed on the gluteus, and one large flap was designed on the posterior thigh (Figure 1(a)). The 2 small flaps facilitated wound closure after the flap rotation. After designing and creating the flaps, the posterior thigh flap was elevated. Dissection proceeded below the deep fascia, including the descending branch of the inferior gluteal artery (Figure 1(b)). Next, the flaps on the gluteal portion were elevated. At this point, the deep gluteal fascia was left intact to preserve the tissue around the superior and inferior gluteal vessels (Figure 1(c)). Thereafter, the flaps were rotated 90° (Figure 1(d)). The skin of the posterior surface of the thigh was denuded to remove the hair follicles (Figure 1(e)) because hair follicle remnants might cause postoperative atheromatosis. The flap was then inserted deep into the pelvic defect (Figure 1(f)). A considerable length of the lateral portion of the deep gluteal fascia is incised to reduce tension (Figure 1(g)). In addition, the gluteus maximus muscle could be incised and added to the flap, depending on the degree of flap mobility. By making this incision, the flap could be advanced an additional 4–6 cm, enabling sufficient filling of the pelvic defect. The donor sites were closed directly, without tension (Figure 1(h)). One or two drains were inserted into the pelvis, and the skin wound was closed with staples. The patient was kept in the prone or lateral position for 3 days to avoid compressing the flap, and ambulation was allowed on postoperative day 4.

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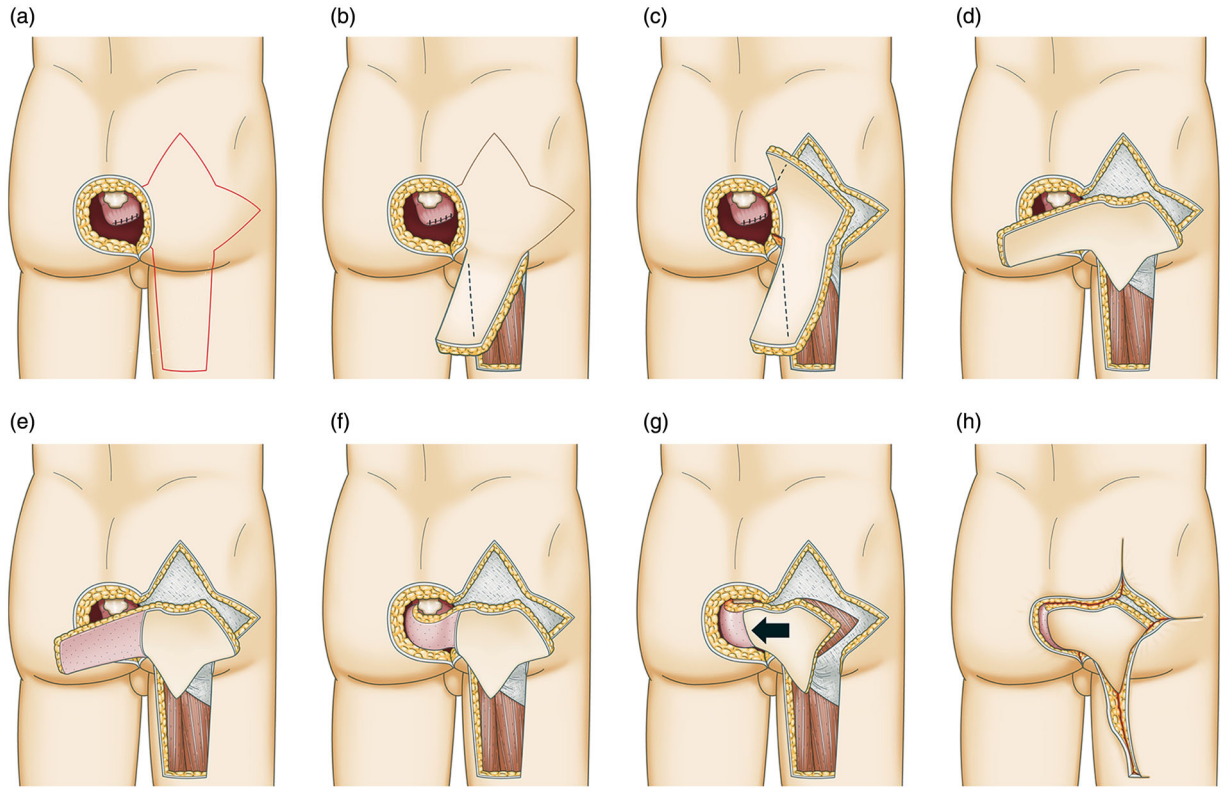

Figure 1. The reconstruction technique for the perineal defect. (a) Two small flaps are designed on the gluteus and one large flap is designed on the posterior thigh. (b) The posterior thigh flap is elevated. (c) The flaps on the gluteal portion are elevated. (d) The flaps are rotated 90°. (e) The posterior thigh flap is denuded. (f) The posterior thigh flap is inserted to the pelvis. (g) The lateral portion of deep gluteal fascia is incised. (h) The donor sites are closed directly.

Results

The patient profile data are shown in Table 1. All defects in the 8 patients undergoing perineal reconstruction were successfully closed (Figure 2). One patient developed a fistula 6 months after the operation, requiring a secondary procedure. The fistula had developed from atheromatosis caused by dermal secretions from the surface of the buried part of the flap. Another patient who had undergone two abdominal surgeries prior to the perineal reconstruction developed ileus 1 year after the operation. Although the exact cause of ileus was unclear, we assumed that partial intestinal obstruction was contributory. Ileus was resolved with conservative treatment. Regarding the donor site morbidity, 1 patient developed wound dehiscence in the posterior thigh 2 weeks after surgery; this was treated with a split-thickness skin graft.

Discussion

In order to manage large, advanced, malignant tumours in the perineal region, colon and rectal surgeons should be briefed on the reconstruction method, in advance. During the reconstruction, two issues must be resolved. First, adequate surface coverage of the defect must be secured; if some parts of the defect are left uncovered, infection might develop in the region. Secondly, the dead spaces in the pelvis must be filled with viable tissue; if any dead space is left inside the pelvis, the small intestine might become entrapped, causing ileus. Various methods have been reported for perineal defect reconstruction, including gracilis muscle flaps [4,5], rectus abdominis muscle flaps [6–8], gluteus maximus muscle flaps [9,10], and gluteal thigh flaps [11–14].

The gracilis muscle flap method involves the muscle being elevated from the medial thigh along with the overlying skin and transferred to the perineal region. This reconstruction method is advantageous because of its technical ease. The donor site morbidity is minimum and the bilateral flap can be raised easily to fill the large defect. However, since the blood supply from the muscle to the overlying tissues is unstable, the overlying skin may become necrotic. The rectus abdominis muscle flap method is supposedly the most commonly used method for the pelvic defect reconstruction. It requires transfer of the muscle and overlying fat and skin to the perineal region, consequently providing sufficient volume of tissue to fill the pelvic dead space. However, in our view, this may sometimes be unsuitable for patients with colostomy, urostomy, gastrostomy or any other previous abdominal surgery. In addition, this method sometimes causes postoperative abdominal incisional hernia. In the gluteus maximus muscle flap method, the muscle and overlying tissues are transferred medially in a V–Y fashion, or in a rotating fashion, to cover the defect. This method is useful if the defect does not extend to the pelvic region. However, in cases where the tumour involves wide areas of the perineal region, the medial aspect of the gluteus maximus muscle flap is removed along with the tumour. This shortens the available flap, making it difficult for it to reach the pelvic defect.

In the traditional gluteal thigh flap method, the inferior part of the gluteus maximus muscle and the tissues of the posterior compartment of the thigh are used to fill the pelvic defect. The advantage of this flap is that this portion of the posterior thigh is usually not exposed to radiotherapy. Moreover, since the flap contains abundant vascular network between the descending branch of the inferior gluteal artery and the soft tissues of the posterior

Table 1. Patient profiles.

No.	Age Sex	Disease	Skin defect size Width (cm)	Skin defect size Length (cm)	Depth of the pelvic defect (cm)	Reconstruction	Flap size (thigh portion) Width (cm)	Flap size (thigh portion) Length (cm)	Operation time (minutes)	Complications
1	63 F	Anal carcinoma (SCC)	10	8	5	Gluteal thigh flap	10	18	639	None
2	67 M	Anal carcinoma (SCC)	15	12	8	Gluteal thigh flap	10	25	779	None
3	45 M	Anal carcinoma (mucinous carcinoma)	10	10	6	Gluteal thigh flap	9	18	805	Fistula formation
4	58 F	Anal carcinoma (SCC)	13	7	7	Gluteal thigh flap	9	20	669	None
5	64 F	Anal carcinoma (SCC)	6	10	8	Gluteal thigh flap	10	20	574	None
6	48 M	Recurrent rectal carcinoma (adeno carcinoma)	9	13	8	Gluteal thigh flap + gracilis muscle flap	10	16	765	Ileus
7	36 M	Anal carcinoma (SCC)	18	10	9	Gluteal thigh flap	12	25	772	Donor site wound dehiscence
8	72 F	Anal carcinoma (SCC)	12	8	10	Gluteal thigh flap	9	22	560	None

SCC: Squamous cell carcinoma.

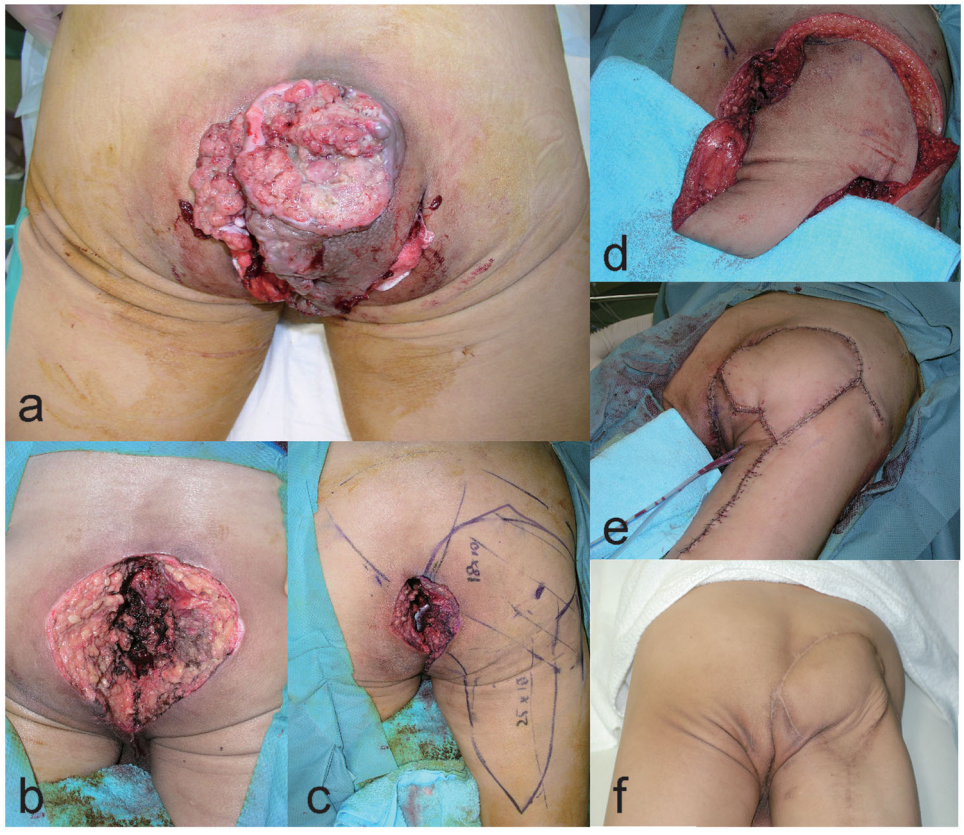

Figure 2. Defect reconstruction using the gluteal thigh flap method. (a) A poorly differentiated squamous cell carcinoma of the anus, involving the perineal skin. (b) After the tumour resection, a 15 × 12 cm defect remained. (c) Flap design. (d) The elevated flap. (e) Postoperative appearance. (f) Appearance 1 year later.

thigh, the posterior thigh portion of the flap can be elongated almost to the posterior knee, if necessary [15–17]. Owing to the constant vascular network, preoperative angiograms are not necessarily required. In past gluteal thigh flap studies, the flaps were often used to reconstruct pressure ulcers in the ischial and sacral regions. However, a different approach was needed for defects produced by the removal of malignant perineal tumours that took the defect's extension into the pelvic region into consideration. In the treatment of advanced malignant tumours of the perineal region, pelvic exenteration is necessary [18–20], leaving a pelvic defect with a considerable volume. Thus, reconstruction of the defect requires a substantial volume of tissue. For this purpose, we placed tension-releasing incisions on the gluteal fascia and/or the gluteus maximus muscle and medially advanced the gluteal thigh flap. To facilitate donor site wound closure, the gluteal skin incision was modified by the creation of 2 small flaps, designed on the superior and lateral regions of the gluteus. After the flap rotation, the small superior flap was transferred to fill the lateral skin defect. The small lateral flap was also transferred to fill the skin defect on the posterior thigh. Hence, the entire skin defect could be closed with decreased tension.

This technique enables effective flap advancement and, consequently, an adequate amount of tissue was available to fill the pelvic defect. Oomen et al. have stated that the gluteal thigh flap should not be used to reconstruct defects deeper than 8 cm in the description of their pelvic defect reconstruction protocol [21]. However, even pelvic defects deeper than 10 cm can be effectively reconstructed using our modified technique. The flap has

high viability because the base can be kept wide enough to contain both the superior and inferior gluteal vessels.

Since the skin secretes sweat and sheds dead tissue, the flap buried into the pelvic space may develop atheromatosis, if skin is left attached to the flap. In one of our patients, atheromatosis developed in the perineal region, 6 months after the surgery, requiring a secondary procedure to remove the remaining skin. To prevent such complications, the skin must be completely removed from the portion of the flap that is inserted into the pelvis.

Conclusion

This technique is useful for reconstructing large perineal defects caused by extended resection of malignant perineal tumours.

Author contributions

Yusuke Shimizu: acquisition of data, conception and design, drafting the article, final approval.

Kazuo Kishi: acquisition of data, drafting the article, final approval.

Disclosure statement

No potential conflict of interest was reported by the author(s).

References

[1] Hurwitz DJ, Zwiebel PC. Gluteal thigh flap repair of chronic perineal wounds. Am J Surg. 1985;150(3):386–391.

[2] Achauer BM, Turpin IM, Furnas DW. Gluteal thigh flap in reconstruction of complex pelvic wounds. Arch Surg. 1983;118(1):18–22.

[3] Komuro Y, Takato T, Ueda K, et al. Experience with U-shaped gluteal thigh flap for reconstruction of radionecrosis in the sacral region. Ann Plast Surg. 1993;31(5):475–478.

[4] Vermaas M, Ferenschild FT, Hofer SO, et al. Primary and secondary reconstruction after surgery of the irradiated pelvis using a gracilis muscle flap transposition. Eur J Surg Oncol. 2005;31(9):1000–1005.

[5] Heath PM, Woods JE, Podratz KC, et al. Gracilis myocutaneous vaginal reconstruction. Mayo Clin Proc. 1984;59(1):21–24.

[6] Tobin GR, Day TG. Vaginal and pelvic reconstruction with distally based rectus abdominis myocutaneous flaps. Plast Reconstr Surg. 1988;81(1):62–73.

[7] Ho K, Warrier S, Solomon MJ, et al. A prepelvic tunnel for the rectus abdominis myocutaneous flap in perineal reconstruction. J Plast Reconstr Aesthet Surg. 2006;59(12):1415–1419.

[8] Soper JT, Secord AA, Havrilesky LJ, et al. Rectus abdominis myocutaneous and myoperitoneal flaps for neovaginal reconstruction after radical pelvic surgery: comparison of flap-related morbidity. Gynecol Oncol. 2005;97(2):596–601.

[9] Ramirez OM, Hurwitz DJ, Futrell JW. The expansive gluteus maximum flap. Plast Reconstr Surg. 1984;74:757–770.

[10] Goi T, Koneri K, Katayama K, et al. Modified gluteus maximus V–Y advancement flap for reconstruction of perineal defects after resection of intrapelvic recurrent rectal cancer: report of a case. Surg Today. 2003;33(8):626–629.

[11] Hurwitz DJ. Closure of a large defect of the pelvic cavity by an extended compound myocutaneous flap based on the inferior gluteal artery flap. Brit J Plast Surg. 1980;33(2):256–261.

[12] Hurwitz DJ, Swartz WM, Mathes SJ, et al. The gluteal thigh flap: a reliable, sensate flap for the closure of buttock and perineal wounds. Plast Reconstr Surg. 1981;68(4):521–530.

[13] Hurwitz DJ, Walton RL. Closure of chronic wounds of the perineal and sacral regions using the gluteal thigh flap. Ann Plast Surg. 1982;8(5):375–382.

[14] Yanai A, Bandoh Y, Tsuzuki K. Bilateral gluteal thigh flaps for closure of large defects in the lumbosacral region and perineal region. Plast Reconstr Surg. 1991;88(4):703–706.

[15] Rosen JM, Mo ST, Liu A. Experience with the island inferior gluteal thigh flap compared with other local flaps for the reconstruction of the pelvic area. Ann Plast Reconstr Surg. 1990;24(6):498–509.

[16] Rubin JA, Whetzel TP, Stevenson TR. The posterior thigh fasciocutaneous flap: vascular anatomy and clinical application. Plast Reconstr Surg. 1995;95(7):1228–1239.

[17] Fujii M, Terashi H, Hashikawa K, et al. Functional reconstruction of large anogenital defects with bilateral V-Y advancement posterior thigh fasciocutaneous flaps. J Plast Reconstr Aesthet Surg. 2007;60(11):1208–1213.

[18] Baik SH, Kim NK, Lee KY, et al. Factors influencing pathologic results after total mesorectal excision for rectal cancer: analysis of consecutive 100 cases. Ann Surg Oncol. 2008;15(3):721–728.

[19] Mortenson MM, Khatri VP, Bennett JJ, et al. Total mesorectal excision and pelvic node dissection for rectal cancer: an appraisal. Surg Oncol Clin N Am. 2007;16(1):177–197.

[20] Koh PK, Seow-Choen F, Kwek BH. Total mesorectal excision: the unrecognized pelvic plane. Dis Colon Rectum. 2006;49(2):280–283.

[21] Oomen JW, Spauwen PH, Bleichrodt RP, et al. Guideline proposal to reconstructive surgery for complex perineal sinus or rectal fistula. Int J Colorectal Dis. 2007;22(2):225–230.