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CASE REPORT

Perineal and vaginal wall reconstruction using a combined inferior gluteal and pudendal artery perforator flap: A case report

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Received 13 December 2011; accepted 30 April 2012

KEYWORDS

Abdominoperineal excision;
Vaginal wall reconstruction;
Perineal reconstruction;
IGAP-flap;
Pudendal thigh flap;
Perforator flaps

Summary Reliable perineal and posterior vaginal wall restoration following extensive abdominoperineal excision or pelvic exenteration is a reconstructive challenge, especially if the rectus abdominis is unavailable or insufficient for transpelvic transposition. In this short report, we present a novel combined perforator-based technique, in which an inferior gluteal perforator flap is used for perineal reconstruction whereas vaginal reconstruction is performed simultaneously by means of a pudendal artery perforator flap. This procedure circumvents functional muscle loss, permits a tension-free closure of difficult three-dimensional defects and offers a high degree of reconstructive flexibility, which allows a straightforward and independent reconstruction of two different anatomical units.

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Distinct localisation, infiltration and extent of anorectal cancers indicate extensive tumour resection, such as abdominoperineal excision (APE) or pelvic exenteration. Nowadays, the practice of neoadjuvant radio-chemotherapy

enables primary surgery also for tumours that are far advanced at the time of diagnosis. The subsequent large perineal defect represents a reconstructive challenge which is further aggravated if the vaginal wall is involved.

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During the last decades various techniques including advancement-, rotation-, transposition- and free-flaps have been suggested for perineal and vaginal wall reconstruction.¹ One of the most established flaps for this purpose is the pedicled vertical-rectus-abdominis-myo-cutaneous (VRAM) flap.² However, this type of flap may be associated with abdominal wall weakness, subsequent hernias and is sometimes not applicable after extended abdominal surgery. A method to circumvent these disadvantages and to spare the underlying functional muscle is the use and development of fasciocutaneous perforator flaps.

Here, we present a novel two-component perforator-based technique following extended APE, in which the inferior gluteal perforator flap is used for perineal reconstruction whereas a pudendal artery perforator flap is independently used for the reconstruction of the posterior vaginal wall.

Case report and operative technique

A 43-year-old woman who suffered from Crohn's disease was referred to our hospital because of anal canal stenosis. As intra-operative biopsies revealed a malignant tumour arising from a former rectovaginal fistula, oncologic surgery was indicated, and extended APE including posterior vaginal wall resection was performed resulting in a large-scale defect (Figure 1). Final pathological assessment revealed a T4N0 mucinous adenocarcinoma. Due to a history of multiple abdominal operations including horizontal laparotomy, the transpelvic VRAM flap transposition was not applicable and a local perforator-based reconstruction of both defects was planned. Operation was performed secondarily with the patient in the prone position and Doppler ultrasound was used for preoperative perforator mapping. The right inferior gluteal artery was localised according to Higgins et al.³ along a line connecting the posterior superior iliac spine and the ischial tuberositas. The skin paddle was orientated transverse to the

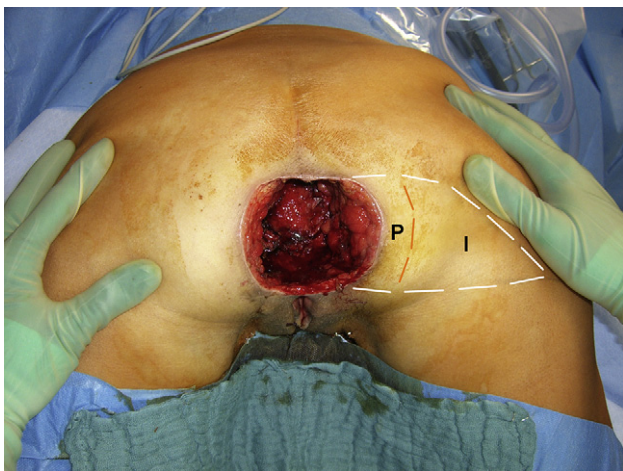


Figure 1 Perineal and posterior vaginal wall defect following extended abdominoperineal excision. The white marking line visualizes the upper and lower flap margins. The separating line between the pudendal (P) and the IGA (I) perforator flap is depicted in orange.

defect and designed in an elliptical fashion to include the lateral perforators of the inferior gluteal artery. Incision started at the inferior border and after detection of two adequate perforators, which arose from the pudendal and inferior gluteal artery, the preferred perforators were dissected carefully throughout their length to their origin. Afterwards, the superior margin of the flap was incised followed by its complete elevation. With its transverse orientation to the defect, the flap had a lateral extend of 19 cm, a width of 8 cm and a blood supply solely via the medial pudendal and the lateral inferior gluteal artery perforator (IGAP). The perforator flap was then completely split into two components, resulting in a medial pudendal artery perforator flap of 8 × 4 cm and a lateral IGAP-flap (Figure 2A, B, D). The pudendal artery perforator flap was then transposed into the posterior vaginal wall defect so that the skin paddle lined the mucosal side of the vagina (Figure 2C), thus providing the original circumferential dimension of the vagina. The IGAP-flap was transposed medially in a VY-fashion and the de-epithelised tip was used to fill the pelvic dead space (Figure 2E). The wounds healed uneventfully (Figure 3) and adjuvant radio-chemotherapy was initiated. Secondary vaginal stenosis was not noted.

Discussion

Extended cylindrical APE is an established surgical procedure for patients who suffer from carcinoma of the rectum and improves outcomes compared to the traditional APE which was first described by Miles in 1908.⁴ The subsequent larger defect is frequently located in an irradiated field due to (neo) adjuvant radio-chemotherapy and may be further aggravated, if vaginal wall resection is required. At this point, primary wound closure is unsuitable and more sophisticated reconstructive techniques are necessary to prevent wound breakdown, severe infection and vaginal stenosis. Herein, primary surgical goals are the transposition of well-vascularised tissue to fill the pelvic dead space and provide sufficient bulk as well as the reconstruction of the vagina to restore the sexual function. One of the most established reconstructive options in this context is the use of the inferiorly based VRAM flap, as it is reliable and provides adequate bulk for dead space obliteration.² We routinely performed single-stage transpelvic VRAM flaps in irradiated patients when APE is necessary in an interdisciplinary concept since 1996 in more than 120 patients and have validated this procedure with consecutive long-term follow-up data.⁵ However, flap harvest may be accompanied with a higher risk of abdominal wall weakness and herniation² and can be technically problematic when either rectus abdominis muscles or the pelvic entrance have been harmed by previous operations or no laparotomy is wished in revisionary cases. While the pudendal thigh fasciocutaneous flap has been frequently used for vaginal reconstruction, its use is limited in terms of extensive perineal volume loss due to its insufficient bulk.¹ The use of myocutaneous flaps based on the inferior or superior gluteal artery was previously described in the setting of APE and for closure of large-scale meningo-myelocele defects with good results due to a reliable skin paddle, a long pedicle and a sufficient tissue bulk.^{6,7} However, reduction of the gluteus muscle may cause

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