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CASE REPORT

Deep circumflex iliac artery perforator flap: a new option for reconstruction of lumbosacral defects

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Abstract

Reconstruction of lower back defects is challenging. Since primary repair is often not possible to achieve, there is a need for local or regional flap transfer. This report presents a new technique of reconstruction of lumbosacral defects by deep circumflex iliac artery perforator skin flap based on a propeller flap design. A lower back scar contracture and contour deformity in a 10-year-old female patient required excision and flap reconstruction. Deep circumflex iliac artery perforator flap was marked in the groin region as an elliptical skin paddle and dissected as an island flap based on a dominant musculocutaneous perforator. Following creation of the lumbosacral defect, reconstruction was accomplished by flap rotation based on a propeller flap design around the perforator. Donor site was closed primarily in layers. Complete flap survival was noted with uneventful recovery. Revision was later performed for flap debulking and contour restoration with pleasing result at 1 year. Deep circumflex iliac artery perforator flap can be utilized for lower back defect reconstruction by means of a propeller flap design. It is offered as a new flap option for lumbosacral reconstruction. The technique allows well-vascularized tissue transfer while accomplishing primary closure of the donor site with easily hidden scar. The disadvantages include tedious dissection as well as absence of a dominant perforator in some cases.
Level of Evidence: Level V, therapeutic study.

Keywords Lumbosacral · Back · Reconstruction · Flap · Deep circumflex iliac artery perforator

Introduction

Reconstruction of lower back skin defects is challenging [1]. Primary closure typically is impossible to achieve, requiring use of vascularized tissue transfer. Several local, regional, and free flap donor sites have been described for repair in this area [1–13]. Given the complexity of such reconstructions in the lower back region, with flap failures leading to significant complications such as exposure of vital structures, neurological problems, or delayed healing [1], there is a need to define alternatives flap donor sites for the plastic surgeon to consider for the best outcome for the patient.

Groin territory has always been appealing for a flap donor site since it can often be closed primarily and the resulting scar can easily be hidden [14]. We have previously described the deep circumflex iliac artery (DCIA) perforator skin flap for reconstruction around lower abdomen and perineum [15]. Propeller flap design allows tissue transfer from a distant territory to the defect by 180 degrees turn around a perforator [16]. In this report, we present a technique of lower back reconstruction by DCIA perforator propeller flap which is offered as a new flap option for lumbosacral reconstruction.

Case report

A 10-year-old female patient was brought to the clinic by her parents with lower back deformity and pain. History revealed that she developed an abscess in the left posterior paraspinal region, requiring incision and drainage as an infant. This then healed with severe scar tethering and contour depression of the soft tissues in the lower lumbar region approximately 8 × 11 cm in size (Fig. 1). Patient also complained of chronic lower back pain and difficulty engaging in sports. A plan was made for scar excision and creation of healthy soft tissue cover with well-

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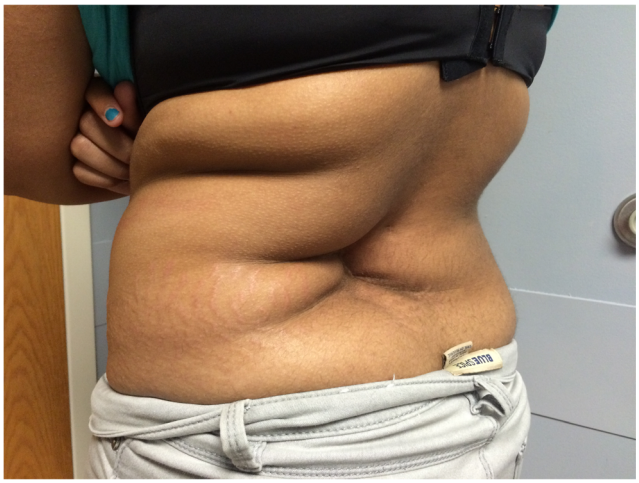

Fig. 1 Preoperative view of the back deformity

vascularized flap reconstruction from the groin donor site. Intraoperatively, the patient was placed in the right lateral decubitus position. A hand-held doppler examination revealed an excellent signal approximately 5 cm posterior and 3 cm superior to the iliac crest at the site of a DCIA perforator. Therefore, an elliptical skin paddle (25 × 8 cm) was marked in the left groin parallel to the iliac crest and centered slightly above it, allowing for primary closure of the donor site (Fig. 2). The flap extended medially all the way to the axis of the femoral vessels and laterally to the lateral limit of the deformity in the lower back region. The superior border was incised first down to the underlying deep fascia of the abdomen, followed by careful dissection from superior to inferior direction until the DCIA perforator was identified. The perforator was then dissected intramuscularly though the abdominal wall muscles. Although it initially appeared to be relatively small in caliber, its caliber significantly increased as it dived into the muscle. The operating microscope was utilized at this stage of intramuscular dissection to avoid any inadvertent injury. Several small side branches were coagulated with bipolar cautery or ligated as needed. Once the pedicle was prepared for approximately 3 to 4 cm in length, the inferior border of the flap was incised and a completely island flap created (Fig. 3). At this point, lower back scar excision was performed. The flap was transposed 180 degrees around the perforator (see Video 1, supplemental content which demonstrates DCIA perforator propeller flap rotation to lower back) and secured to the edges of the defect without any tension. Excellent doppler signals confirmed flap perfusion as well as clinical examination with skin color, capillary refill, and dermal bleeding. The donor incision in abdominal wall muscles and fascia and skin was closed primarily in layers over a suction

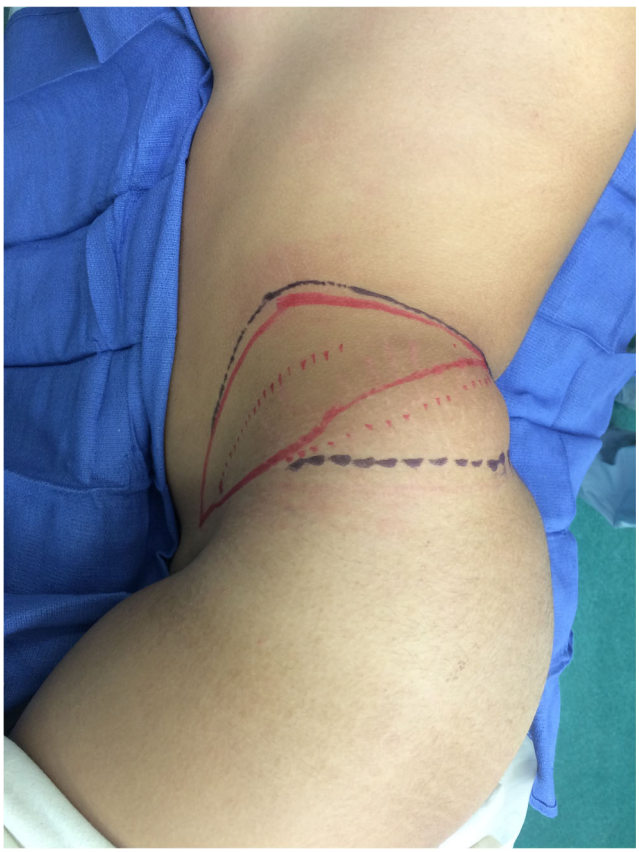

Fig. 2 Flap design (red mark) for DCIA perforator skin flap in the left groin region as an elliptical skin paddle parallel to iliac crest. The contour of the left flank is also shown with black mark

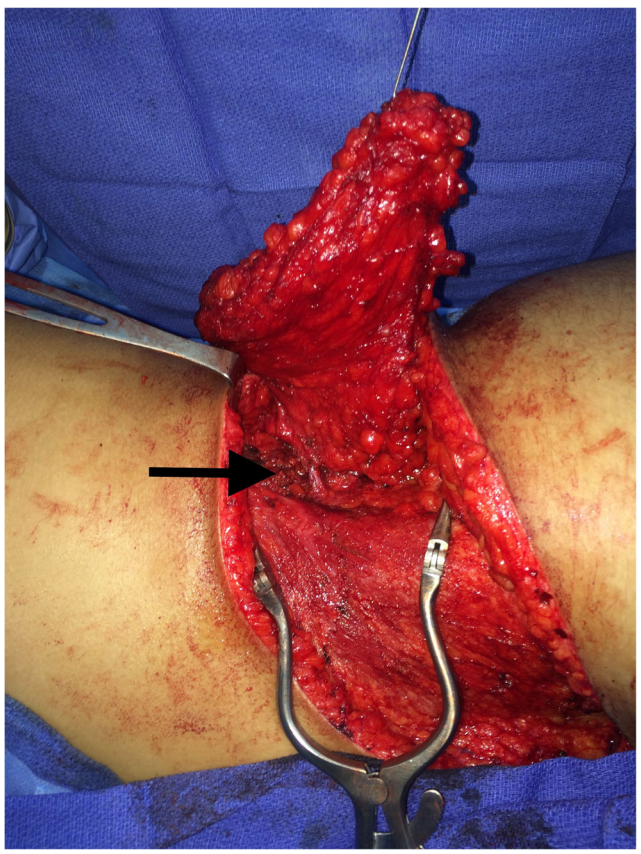

Fig. 3 Left DCIA perforator skin flap based on a large perforator (arrow). Patient's head is to the left of the picture

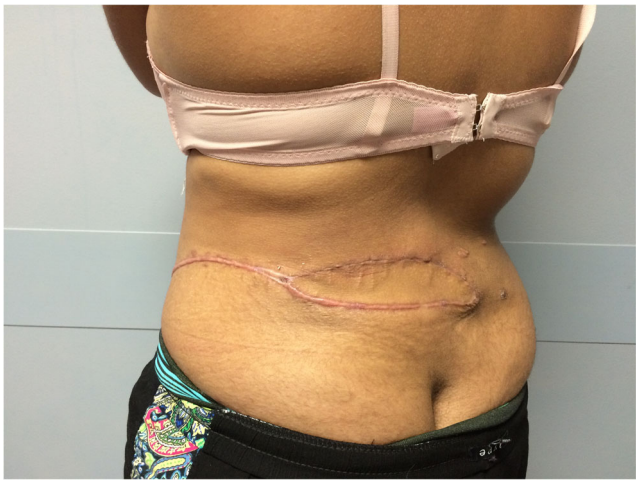

Fig. 4 Late postoperative result at 1 year following debulking

drain. The patient had an uneventful recovery with complete survival of the flap. A revision surgery with flap debulking and opposite flank liposuction was performed 6 months later for contour and symmetry. The patient and family were pleased with the result and pain symptom was relieved significantly. Postoperative evaluation at 1 year did reveal hypertrophic scarring for which silicone gel sheet application was recommended (Fig. 4).

Discussion

Taylor et al. [17] demonstrated the DCIA as a reliable and consistent pedicle for transferring groin skin and iliac bone as an osteomyocutanous flap. Safak et al. [18] were able to design the flap with a perforator-based skin paddle. This technical modification decreased the obligatory muscle cuff of the iliac crest osteomyocutanous flap, making it less bulky. Our study was the first to report the DCIA perforator skin flap without any bony component. The flap was successfully used as a pedicled skin flap for reconstruction around lower abdomen and genitalia or as a free flap [15].

In this report, DCIA perforator flap is presented as a new local flap option for lower back reconstruction. From an esthetic point of view, the groin is a favored donor site as the scar in this location is easily covered. The flap is a true perforator flap, with its musculocutaneous perforator supplying the skin island, obviating the need for any muscle sacrifice. A large elliptical skin territory can be safely carried with the flap along the iliac crest from medial groin region to lower back [15]. This case experience proved that the propeller flap design for DCIA perforator flap allows tissue transfer efficiently to the lower back.

There are several alternatives for flap reconstruction of lumbosacral defects [1–13]. This report merely represents another option to be considered for repair of this challenging location. As with any flap application, an algorithmic approach is recommended for flap selection which difficulties or complications arise. While some studies reported a relatively high rate of presence of DCIA perforators [19], Safak et al. [18] noted that a "dominant" perforator was evident in only approximately 30% of the cases which the authors agree with based on our previous experience. Therefore, in such cases of inability to identify a dominant perforator after the superior incision is made, the authors recommend transferring the flap based on a lumbar artery perforator [9, 12, 13]. If this is not feasible either, then the superior incision can be closed and procedure aborted and another flap option considered. Although a preoperative CT angiography was not available in this case, it can certainly provide valuable information about the presence of perforators and alternative flap options [12].

DCIA perforator propeller flap can be considered a new flap option for lower back reconstruction as it can safely transfer skin from a favorable donor site with direct closure and relatively hidden scar. However, it is not without drawbacks; the "dominant" perforator is not always present. It does require experience with DCIA anatomy and use of iliac crest osteomyocutaneous flap. Although the perforator may initially appear to be small in caliber, intramuscular dissection reveals a larger size as the perforator dives into the muscle. This dissection is admittedly tedious and operating microscope is recommended. Since this report is a case description only, the study has limitations and further experience is needed to better evaluate safety and efficiency.

Compliance with ethical standards

Funding None.

Conflict of interest Mustafa Akyurek and Mark Albert declare that they have no conflict of interest.

Ethical approval This research involved a human participant and accepted principles of ethical and professional conduct was followed.

Informed consent A written informed consent was obtained from the patient and filed.

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