

Clinical Science

# Abdominal wall reconstruction using a combination of free tensor fasciae lata and anterolateral thigh myocutaneous flap: a prospective study in 16 patients



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## KEYWORDS:

Abdominal wall reconstruction;  
Free flap;  
Human acellular dermal matrix

## Abstract

**BACKGROUND:** Reconstruction of the abdominal wall continues to be a challenging problem for plastic surgeons. Transposition of well-vascularized flap tissue is the most effective way to repair composite abdominal wall defects. We retrospectively reviewed the treatment of such patients and assessed the reconstructive technique using combination of an inlay of bioprosthetic materials and a united thigh flap.

**METHODS:** A retrospective review of patients' records in the department was carried out. In total, 16 patients who underwent immediate abdominal wall reconstruction between 2000 and 2013 were identified. Patients' health status, defect sizes, and surgical technique were obtained from medical charts.

**RESULTS:** The immediate reconstruction surgery of the abdominal wall was successful in all patients. One patient with dermatofibrosarcoma protuberans experienced recurrences at the former site. One patient died because of liver metastases at 21 months after surgery. No incisional hernia or infection in this series of patients was observed.

**CONCLUSION:** Full-thickness, giant defects of the complicated abdominal wall can be repaired successfully with relatively minor complications using this reconstructive technique.

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Management of tumor lesions occurring in the abdominal wall often involves excision of the neoplasm; en bloc resection of primary tumor along with adjacent tissue is required to achieve optimal local treatment and to minimize recurrence.<sup>1</sup> Because of the consequent giant defect with loss of multilayered abdominal structures after extensive resection, as well as the need for immediate reconstruction

if the viscera were exposed, such repairs are extremely challenging. A surgeon must reconstruct the abdominal wall with sufficient strength to prevent incisional hernia or bulge, while avoiding postoperative intraperitoneal complications. Moreover, a plastic surgeon should not neglect esthetic aspects during this complex reconstructive surgery.

Autologous tissue flap is the most commonly used technique in major reconstructions of the abdominal wall. The advantage of this ad integrum full-thickness abdominal wall reconstruction technique is that it causes no functional defect at the donor site and results in a good functional and esthetic reconstitution of the abdominal wall.<sup>2</sup> The most commonly performed fascial repair employs the tensor fascia lata (TFL).<sup>3,4</sup> This musculocutaneous flap with an aponeurotic component is harvested from the lateral part of the thigh. It eliminates the complications as well as intolerance to synthetic implants, rendering it a good replacement for the abdominal wall. Another frequently used flap is anterolateral thigh (ALT) myocutaneous flap based on the lateral circumflex femoral artery/vastus lateralis first described by Song et al,<sup>5</sup> and has been used with increasing frequency for reconstruction at various sites.<sup>6</sup> Thus, the common nutrient vessels lateral circumflex femoral artery makes TFL, vastus lateralis, and the overlying skin the ideal structures used for reconstructing large, composite abdominal wall defects. Very few reports in the literature describe the use of combined free flaps to reconstruct massive full-thickness abdominal wall defects.<sup>7-10</sup>

There are various synthetic materials and techniques available to restore the integrity of the abdominal wall. Sublay technique using polypropylene and expanded polytetrafluoroethylene (ePTFE) placement in the retromuscular prefascial space are the main standards for ventral hernia repair and are widely used in repairing the abdominal defects at present.<sup>11,12</sup> Nevertheless, sublay technique using polypropylene could induce adhesion to the intra-abdominal viscera and formation of enterocutaneous fistula.<sup>13,14</sup> ePTFE, on the other hand, has been reported to cause fewer adhesion to the bowel owing to its microporous surface structure. However, this prevents ePTFE from incorporating into the surrounding tissue.<sup>15,16</sup> Furthermore, abdominal wall tumors are frequently accompanied by bacterial contamination. Both the synthetic materials are not recommended in case of bacterial contamination, which leads to a high rate of postoperative mesh infection.

Recently, some biologic materials such as human acellular dermal matrix (HADM) and porcine small intestinal submucosa (SIS) were introduced for reconstructing the abdominal wall. HADM is derived from human cadaveric dermis. These biologics have the following advantages: enhance revascularization during wound healing process, maintain tensile strength, decrease adhesions, and resist infections.<sup>17</sup> It has been reported that the reconstruction of the abdominal wall with HADM after removing the previously placed infected synthetic meshes decreases the number of recurrent wound infections significantly.<sup>18</sup> Porcine SIS is an acellular biological extracellular matrix (ECM). Like

dermal ECM, SIS is primarily composed of type I collagen fibers, and also contains minor amounts of elastin and collagen types III, IV, and VI.<sup>19</sup> Ko et al<sup>20</sup> reported that SIS healing/remodeling provides sufficient tensile strength for the repair of ventral (anterior) abdominal wall defects when implanted using any of the 3 common techniques. Moreover, SIS contains glycosaminoglycans and proteoglycans that provide cell attachment and growth factor binding sites, sequester matrix degrading enzymes, and enhance cellular infiltration into injured tissue.<sup>21-23</sup> Given the beneficial role of these products in complex defects of the abdominal wall, the use of HADM and SIS is an ideal alternative to synthetic mesh for restoring the abdominal wall after tumor resection, especially in cases of infection or contamination.

The objective of this study was to present the experience in using a combination of TFL and ALT flap with HADM or SIS to repair giant defects of the abdominal wall after extensive tumor resection.

## Methods

### Subjects

A total of 16 patients with aggressive neoplasm encroaching full thickness in the abdominal wall between 2000 and 2013 were included in the study group (all patients were treated in the Department of Plastic and Reconstructive Surgery, Shanghai Ninth People's Hospital), and their baseline characteristics are summarized in [Table 1](#). Of these, 9 patients were men and 7 were women, with a mean age of  $49 \pm 11$  years (range 35 to 68 years). The average body mass index (BMI) was  $22.32 \pm 1.95$  kg/m<sup>2</sup> (range 19.2 to 26.5 kg/m<sup>2</sup>). The pathological results of the tumors were as follows: dermatofibrosarcoma protuberans (n = 12, 75%, including 3 recurrent dermatofibrosarcoma protuberans), desmoid tumor of the abdominal wall (n = 3, 18.75%), and cutaneous metastatic adenocarcinoma (n = 1, 6.25%). The locations were as follows: lower abdominal wall (n = 9, 56.25%, including 2 involving the groin area), upper abdominal wall (n = 6, 37.5%, including 1 involving the lower chest wall), and right lumbar region (n = 1, 6.25%). Two patients experienced wound infection or contamination. All but one patient received preoperative radiotherapy (the specific dose was unknown as the patient lost the medical record.). The size of the defects after tumor excision ranged from 96 to 504 cm<sup>2</sup> (mean 283.5 cm<sup>2</sup>). All patients were followed up to June 27, 2014 and the median duration of follow-up was  $39 \pm 27$  months (range 12 to 117 months).

HADM (Renov, Beijing, China) used in the study was 8 mm in thickness. A 20 × 7 cm SIS (Surgisis; Cook Medical, Bloomington, IN) graft was trimmed and sutured with 2/0 polydioxanone delayed absorbable material (Ethicon, Somerville, NJ). Latex drainage tube with 6 mm in diameter was used, and closed suction drains were placed above and below the omentum flap.

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