SURGERY

Anterolateral thigh flap for abdominal wall reconstruction. A case report

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Abstract

Abdominal wall reconstruction aims at restoring the anatomical, functional and aesthetic integrity of this region, while providing protection of abdominal viscera and prevent herniation. There are various techniques used for abdominal wall reconstruction. We present a difficult case of abdominal wall reconstruction performed with a pedicled antero-lateral thigh (ALT] flap with good postoperative results.

Keywords: abdominal wall reconstruction, hernia, ALT flap, pedicled flap

Introduction

Abdominal wall reconstruction aims to restore the anatomical, functional and aesthetic integrity of this region while providing protection of abdominal viscera and prevent herniation [1]. Before performing an abdominal wall reconstruction there are some issues to consider such as appropriate skin coverage, stable reconstruction of the fascial layer and an adequate contour of the abdominal wall, with precautions for a possible abdominal compartment syndrome post-operatively [2].

There are various techniques used for abdominal wall reconstruction such as progressive pneumoperitoneum, flaps and onlay or underlay of mesh [2]. The appropriate soft tissue and skin coverage can be obtained with primary closure of skin where possible, skin grafts, tissue expansion, local or regional flaps, or free tissue transfer. The choice of flap depends on the location and size of the defect [2]. Frequently used flaps include rectus abdominis muscle flap, rectus femoris muscle flap, external oblique muscle flap, latissimus dorsi muscle flap, tensor fasciae latae muscle flap, anterolateral thigh flap and omental flaps [3,4].

The ALT flap for abdominal wall reconstruction was first described by Kimata et al. in 1999 [5]. ALT flap can be used free or pedicled and it is based on the lateral circumflex femoral system. There are several advantages for using this flap which include a rich blood supply, a long vascular pedicle, which provides a long arc of rotation, and it can be combined with mesh to cover a large wall defect because of its anatomical features [6].

Case report

Informed consent was taken from the patient prior to any invasive procedure, Institutional Review Board (IRB) approval was not necessary for this type of study. A 49-year-old woman was referred to the General Surgery Department of the "Ion Chiricuță" Oncology Institute in Cluj-Napoca, Romania, for a incisional flank hernia. The hernia was caused by a left total nephrectomy (renal cell carcinoma) that was carried out through a left flank incision. Her past medical history also includes mild mental retardation and kyphoscoliosis.

Clinical examination of the patient showed a large flank hernia and

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kyphoscoliosis (Figure 1). CT examination revealed a large (15/16 cm) parietal defect at the level of the left flank and iliac fossa, with bowel loops and the greater omentum engaged in a voluminous hernia sac.

Figure 1. Patient with a large flank hernia and kyphoscoliosis.

The general surgery team reduced the hernia and reconstructed the abdominal wall with a polypropylene mesh (Figure 2). Soft tissue coverage was obtained with a local rotation and advancement flap. The skin flap showed mild congestion in the postoperative period, and eventually the wound became dehiscent with mesh exposure. An attempt was made to cover the mesh by advancing a local flap from the abdomen but the flap became partially necrotic with subsequent mesh exposure (Figure 3).

Because of the extent of the fascial/cutaneous defect the decision was made to transfer the patient to the Plastic Surgery Department for further treatment. The exposed mesh had to be removed and the abdominal wall had to be reconstructed full thickness, so the decision to use an ALT fascio-cutaneous pediculated flap was made. The necrotic abdominal flaps together with the mesh were removed. A small intestine loop was adherent to the underside of the mesh, therefore a small bowel segment of approximately 10 cm had to be resected, followed by an end to end enteral anastomosis. The peritoneal defect was repaired by dissecting and advancing bladder peritoneum and parietal peritoneum. To fill the remaining parietal defect a pedicled fascio-cutaneous ALT flap was designed on the left thigh. The flap was raised in a subfascial plane and pedicled on a single musculocutaneous perforator (Figure 4).

Figure 2. Hernia reduction and abdominal wall reconstruction with polypropylene mesh.

Figure 3. Abdominal flap necrosis with mesh exposure and ALT flap design.

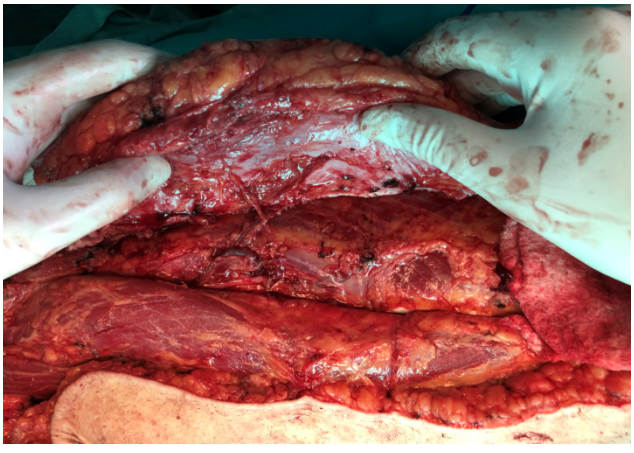

Figure 4. Fasciocutaneous ALT flap raised on a single perforator.

Figure 5. One year follow up visit showing good flap integration with no hernia recurrence.

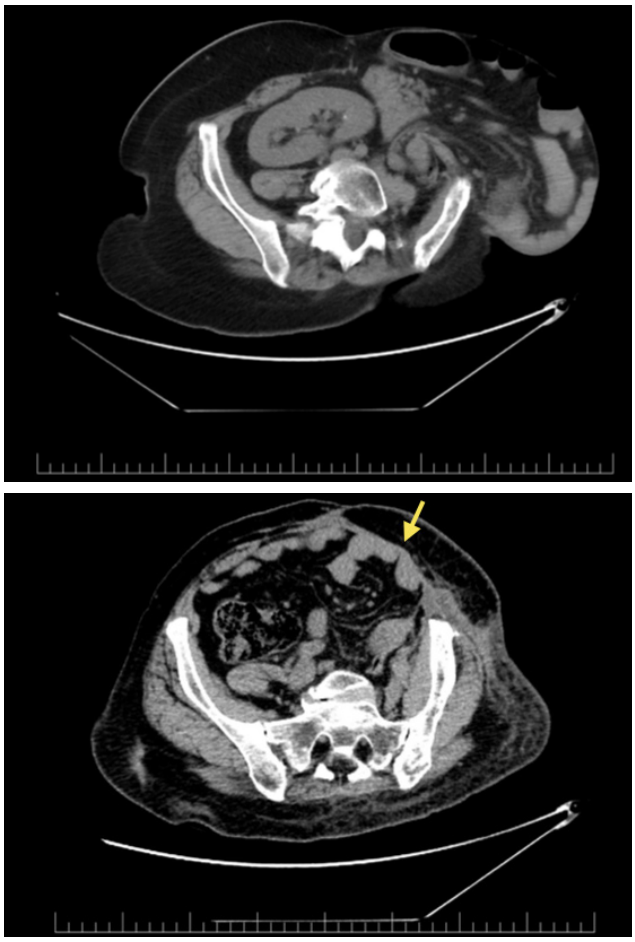

Figure 6. Preoperative and postoperative CT scan showing abdominal wall reconstruction with ALT flap, with restored fascial contour (arrow) and no recurrence.

The perforator was dissected to its origin in the descending branch of the lateral circumflex femoral artery and then up to the main circumflex trunk. When enough pedicle length was obtained, the flap was rotated over the inguinal ligament to the defect and sutured into place. The fascial component of the flap was used to reconstruct the abdominal defect while the skin paddle of the ALT covered the reconstruction. The donor site was closed primarily.

The postoperative period was uneventful, the flap was 100% viable, so the patient could be discharged on the 7th day post-op. She was instructed to wear a hernia support belt at all times for 6 months and to avoid any strenuous effort. She returned for follow-up visits at 1 month, 3 months, 6 months, one year (Figure 5) and two years. She showed no signs of hernia recurrence or any other complications.

A follow up CT, 6 months post-operatively, showed perfect flap integration, with fascial continuity of the abdominal wall and no hernia recurrence (Figure 6).

Discussion

Local options for abdominal wall reconstruction include primary closure, skin grafting, tissue expansion, negative pressure-assisted closure, component separation technique, prosthetic mesh and pedicled flaps [4,7-9].

Mathes classifies abdominal wall defects into two categories. Type I defects have an intact skin coverage, whereas Type II defects have an unstable or absent skin cover [10]. Defects of the abdominal wall can also be divided into partial thickness or full thickness. Partial thickness defects can be repaired with primary closure, negative-pressure assisted closure and skin grafting, whereas full-thickness defects require musculo-fascial reinforcement using flaps and a mesh [7].

Some of the most commonly used loco-regional flaps include the external oblique muscle, tensor fascia lata, rectus abdominis muscle, rectus femoris muscle, ALT with or without a portion of vastus lateralis muscle, latissimus dorsi muscle and omental flaps [7]. Using a fasciocutaneous flap is desirable in order to replace the complex and unique musculo-fascial system of the abdominal wall [11]. Two of the most used flaps for reconstruction of the abdominal wall are the tensor fascia lata (TFL) and ALT flaps.

The TFL flap provides a good reconstruction option due to its strength, it can be harvested with a skin paddle, but should be used with caution in the upper third of the abdomen because of its unreliability of the distal third of the skin paddle [7]. Therefore the TFL flap is mostly used for smaller defects close to the harvesting point. Sometimes the TFL flap may be used if good perforators for the ALT flap are not found [12]. Because its better reliability of blood supply, relative ease of dissection and pedicle length, the ALT flap is considered to be the

most effective choice for treating abdominal wall defects [13,14]. Moreover, the rich blood supply of the flap makes it more resistant to infection and reduces recovery time [5]. Advantages over the tensor fascia lata flap include larger skin paddle (better blood supply to the distal portion), larger pedicle length and better arc of rotation, this is why it is considered by some authors superior to the TFL flap [6].

Like in other types of flaps, the ALT flap can be used either as a pedicled or free flap. When using a pedicled ALT, it is important to tunnel the flap below the rectus femoris muscle (sometimes under the sartorius) proximally to achieve additional length of the pedicle and create a large subcutaneous tunnel into the abdomen without compressing the pedicle [5-7]. The pedicle length and the skin size dictate the maximum cranial reach of the flap. The long pedicle length also allows a wide arc of rotation, and in order to achieve extra length branches to the rectus femoris and tensor fascia lata can be divided [6,8]. In our case, the ALT flap was chosen in order to provide both structural support and skin coverage for this large defect.

For larger abdominal wall defects, multiple flaps can be used, sometimes in a flow-through manner. Abdominal wall reconstruction using 2 free ALT flaps has been previously described [14]. A pedicled ALT flap can include a innervated portion of the vastus lateralis muscle and due to its long neurovascular pedicle, can reach the periumbilical region [15]. Regarding the free versus pedicled ALT flaps, there are no studies which report an increased rate of complications in pedicled group [15]. Free flaps are usually used in supra-umblical defects or when the pedicle is not long enough [6]. For a functional aspect, a composite flap can be harvested which includes an innervated portion of muscle, either with its original innervation or with a nerve coaptation to the subcostal and intercostal nerves, with good function on follow up [4,16,17].

In our case, an ALT flap was chosen because of the large full thickness defect of the abdominal wall. By using a fascio-cutaneous flap, all layers of the defect can be reconstructed in a like with like manner. By removing the infected mesh and using autologous tissue a long lasting and stable result with good form and function can be achieved.

Conclusion

Abdominal wall reconstruction can be obtained using various surgical techniques, among which the ALT and TFL flap are the most frequent used. ALT flap is considered to be the most advantageous flap used for abdominal wall reconstruction because it can be used free or pedicled, it has a large skin paddle, good blood supply, larger pedicle length, better arc of rotation and relative ease of dissection. We present a very complex case in which a full thickness abdominal defect was reconstructed using a fascio-cutaneous ALT flap.

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