

Trans-Retroperitoneal Omental Flap for Reconstruction of a Large Thoraco-Dorsal Defect, Following Oncological Resection - Case Report and Literature Review

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Rezumat

Lambou omental trans-retroperitoneal pentru reconstrucția unui defect extins toraco-dorsal, după rezecție oncologică – prezentare de caz și analiza literaturii

Această lucrare prezintă cazul unei paciente în vârstă de 76 de ani, cu o tumoră toraco-dorsală ulcerată extinsă, care a fost excizată de către o echipă chirurgicală mixtă (chirurgie plastică și chirurgie generală), iar defectul rezultat a fost închis printr-un lambou omental transpoziționat trans-retroperitoneal, acoperit cu grefe expandate de piele liberă despăcată. Sunt expuse etapele intervenției chirurgicale și evoluția postoperatorie. De asemenea, sunt discutate selecția procedurii chirurgicale ales și alternativele terapeutice, în conformitate cu datele din literatura de specialitate. În concluzie, lamboul omental poate să reprezinte o alternativă utilă și viabilă pentru acoperirea chirurgicală a defectelor extinse de perete toracic, prin aportul de țesut moale, pliant și competent imunologic. O abordare multidisciplinară (chirurgie plastică și generală, terapie intensivă) și o tehnică chirurgicală meticuloasă sunt esențiale pentru un rezultat favorabil al reconstrucției cu lamboul omental.

Cuvinte cheie: reconstrucție, defect toraco-dorsal, lambou omental trans-retroperitoneal

Abstract

This work presents the case of a 76-year old patient, with a large ulcerated thoraco-dorsal tumor, which was excised by a mixed surgical team (plastic and general surgery), and the resulted defect was closed by an omental flap, which was trans-peritoneal transposed and covered by split-thickness skin grafts. The surgical intervention steps and the postoperative evolution are exposed. The surgical procedure selection and the therapeutic alternatives are also discussed, according to data from literature. In conclusion, the omental flap can represent a useful and viable alternative for the surgical cure of large postexcisional chest wall defects, which ensures soft, pliable and immunologically competent tissue. A multidisciplinary approach (plastic and general surgery, intensive care) and a meticulous surgical technique are essential for the successful accomplishment of the reconstruction with omental flap.

Key words: reconstruction, thoraco-dorsal defect, trans-retroperitoneal omental flap

Introduction

The posterior chest wall defects may result from trauma, tumor resection or congenital anomalies such as spina bifida. These defects can provide significant surgical challenges for covering (1), especially when they are large, localized in difficult anatomical areas or when local tissues are deficient. In reconstructive surgery, the posterior chest wall defects can be managed by skin grafts, on well vascularized wound bed, or by various types of local, regional or distant flaps. The posttraumatic injuries and

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tumor resections, especially with the addition of radiotherapy, may preclude the utilization of muscle flaps for surgical coverage (1). In these patients, especially for large and deep defects, a good alternative is represented by the greater omentum, which has proved to be useful as a salvage procedure for these types of lesions (1, 2).

Case presentation

A 76-year old woman, thin and mildly anemic, was admitted to the Plastic Surgery Department of the County Emergency Hospital of Ploiesti, for the treatment of an extensive, ulcerated left thoraco-dorsal tumor, therapeutically neglected. A previous pathological examination of a tumor fragment revealed poorly differentiated squamous cell carcinoma (SCC), which infiltrated the dermis and the subcutaneous tissue.

After patient's detailed investigation and selection of appropriate surgical intervention, according to local extension and tumor localization, she underwent a complex procedure, through an interdisciplinary approach and collaboration of a lot of specialties: plastic surgery, general surgery and intensive care. The large ulcerated thoraco-dorsal tumor, 35/20 cm in size, as well as the axillary dissemination, were excised by the plastic surgeons, with oncological limit of resection in surface of 1-2 cm apparently unaffected skin. However, the complete radical resection was not possible in depth, due to the penetration of the tumor and to the infiltration of the deep tissues, including periosteum of the ribs. During the deep tissues excision, even appeared a pleural fistula by penetrating the parietal pleura, which was successfully treated by suture and pleural drainage.

After oncological resection of the tumor, the postexcisional defect was closed by an omental flap, covered with split-thickness skin grafts. The omental flap was harvested and transferred by the general surgeon, through open laparotomy, dissection, skeletonization following the section of the left gastroepiploic artery and externalization of the omentum through a retro-peritoneal and transparietal breach. The flap was carefully spread and arranged at the postexcisional thoraco-dorsal defect by the plastic surgeons and then covered by a split-thickness skin graft, harvested from the left thigh (Fig. 1). Two suction drainages were placed, one in peritoneum and another in pleural cavity.

The postoperative evolution was good, uneventful, with skin grafts revascularization and integration (Fig. 2), quasi integral survival of the flap, with only a very limited superficial necrosis (Fig. 3), elimination of the peritoneal and pleural drainages and satisfactory recovery of the patient.

A further thoraco-abdominal CT scan was performed three weeks later and highlighted multiple bilateral pulmonary nodules, left pleurisy, and possible hepatic metastasis.

Discussions

The chest wall reconstruction after oncological resection can be accomplished by a series of methods, selected according to:

- Nature, size, extension and localization of the defect,



Figure 1. Extended left thoraco-dorsal defect reconstructed by omental flap, covered with expanded split-thickness skin grafts

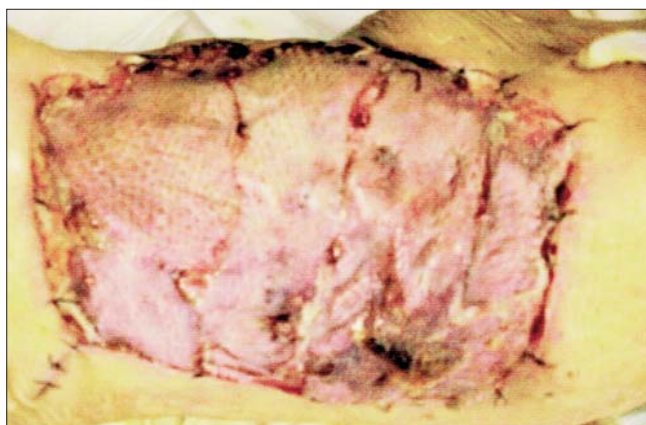


Figure 2. Survival of the omental flap and revascularization of the flap, one week later



Figure 3. After other 10 days, integration of skin grafts and very limited superficial necrosis of the flap, at the upper pole

- Local and surrounding available tissues,
 - General status of health and prognosis of the patient (3).
- According to these parameters, the coverage with an adequate stability of the significant chest wall defects can be

provided by the following surgical techniques:

1. Pedicled muscular or musculocutaneous flaps are usually the first choice, such as latissimus dorsi, vertical or transverse rectus abdominis and pectoralis flaps (3). In patients with inadequate posterior musculature, the rectus abdominis muscle flap could be used for a stable coverage of posterior important wall defects. It can be designed as a transverse rectus abdominis musculocutaneous (TRAM) flap or vertical rectus abdominis musculocutaneous flap, retroperitoneal tunneling or direct transabdominal transfer with tunneling through the retroperitoneum (1). An alternative could have been the coverage of the defect with a reversed latissimus dorsi muscle flap based on the intercostals and paraspinous vessels (1).
2. Breast flap, in certain cases (3).
3. Free flaps in selected cases, when the local options for reconstruction are not available, due to previous use, earlier scars or radiotherapy (3).
4. Omental flap, transferred as a pedicled or free flap. It can also be placed over a synthetic mesh or rib grafts, for additional stability and to prevent paradoxical movement (3, 4). The advantages of the omental flap are its plastic features (easily malleable and moldable tissue), immune competency, resistance to infection and rich vascularization, with rapid adhesion and growing of neoformation capillaries (2).

The various surgical applications of the greater omentum are favored and supported by its special properties and attributes, in the following ways (5):

- The omentum is an intensely vascularized organ, able to provide a great amount of angiogenic factors, which induce the neovascularization of the nearby tissues;
- Its significant lymphatic system has antiinfectious properties, is able to absorb large amounts of edema fluids and to remove metabolic wastes and toxic substances;
- It is a rich source of various growth factors, neurotransmitters, neurotrophic factors and inflammatory mediators;
- Moreover, it contains omnipotent stem cells that can differentiate into a variety of cell types;
- It also ensures an outstanding plastic material against inflammation and irradiation.

Due to its dimension and properties, the greater omentum has been successfully used in various modalities and in a lot of surgical specialties. For instance, in gastrointestinal surgery, the most common use of omentum is as an adjunct to intestinal surgery, wherein it can be wrapped around the sites of anastomosis, in order to provide a rich source of blood vessels and inflammatory cells necessary for healing (5).

In plastic and reconstructive surgery, the omentum represents a versatile and remarkable reconstructive tool, with increasing applications (5). As a pedicled flap or as a free flap, the omentum can be used for face, scalp, neck, upper extremities, chest wall, axillary, postmastectomy, esophageal and faringeal reconstructions (3, 5,6).

The omentum can also be laparoscopically harvested for

chest wall, breast and intrathoracic (hiatal hernia) reconstruction (7-12). The omental flap has also been used for reconstruction of full thickness defects of anterior abdominal wall, in conjunction with artificial mesh and covered by skin grafts (13-15). In certain cases, such as reconstruction after sternectomy for deep sternal wound infections following cardiac surgery, the omental flap can be combined with pedicled muscle flap (pectoralis major double flap), in order to control wound infection and to reduce hospitalization time (16).

If the transferred omentum becomes congested, it can also be treated with the vacuum-assisted closure (VAC) system to decompress fluid from the edematous omental flap and to provide the development of a healthy granulation tissue. In this procedure, after the omentum is inset into the wound, it is covered with a sheet of petroleum gauze and the wound VAC, with settings of 75 mm Hg intermittent suction. The VAC is changed every 48 hours during the early postoperative period (approximately 5 to 7 days). This time allows the appearance of a healthy bed of granulation tissue, as well as the possibility to surgically debride nonviable portions of omentum as necessary and to recontour and reinsert the omental flap as needed. A meshed split-thickness graft is then applied and covered with a light petroleum dressing and a new VAC sponge for 3 to 5 days at 75 mm Hg of continuous suction (1).

The clinical beneficial effect of omental flap for difficult wounds has also been confirmed through experimental studies, which demonstrated that omental flap coverage rapidly adheres and promotes the healing of refractory defects, serving as a source of extensive inflammation and granulation, as well as a pliable and well-vascularized tissue (17).

In the reported case, due to the penetrating and invasive nature of the tumor (poorly differentiated squamous cell carcinoma) and to the possible pulmonary and hepatic metastasis, the prognosis is reserved and the long-term flap evolution depends on the local recurrences, which unfortunately appeared only three months later (Fig. 4) and were managed therapeutically by excision and skin grafting.



Figure 4. Local tumoral recurrences, after only three months following the reconstruction, with good integration of the omental flap and of the skin grafts

Conclusions

1. Large and deep posterior chest wall defects are difficult to be managed by usual surgical procedures, as adjacent tissues are often deficient and sometimes irradiated.
2. The omental flap can represent a useful and viable alternative for the surgical cure of large postexcisional chest wall defects, which provides stable wound coverage by soft, pliable and immunologically competent tissue.
3. A multidisciplinary approach (plastic and general surgery, intensive care) and a meticulous surgical technique are essential for the successful accomplishment of the reconstruction with omental flap.
4. The subsequent evolution of the patient depends of the basic tumoral disease, related to the eventually recurrences and to the oncologic required management.

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