

Giant Thoraco-abdominal Tumor – A Surgical Challenge. Case Report

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Rezumat

Tumoră gigantă toraco-abdominală – prezentare de caz

Obiective: Tumorile peretelui toracic, indiferent de localizare, anterioare, posterioare, laterale, au reprezentat pentru chirurgul toracic o provocare prin problemele tehnice și tactice pe care acestea le presupun. În unele situații, rezolvarea în cele mai bune condiții ale acestora au presupus echipe chirurgicale mixte: chirurg toracic, chirurg plastician, chirurg generalist, neurochirurg, etc.

Material și metodă: Prezentăm cazul total neobișnuit al unui pacient în vârstă de 45 de ani care prezintă o tumoră gigantă toraco-abdominală dreaptă care se dezvoltă de 22 de ani. Formațiunea tumorală ocupa jumătatea inferioară a hemitoracelui drept și a hemiabdomenului de aceeași parte, până la creasta iliacă. Formațiunea se dezvoltă și intratoracic cu invazia ultimelor 3 coaste, a diafragmului (parțial) și intra-abdominal cu invazia unei porțiuni hepatice și a rinichiului drept. Intervenția chirurgicală a pus echipei operatorii probleme deosebite legate de: asigurarea și pregătirea logistică, rezecția tumorii în bloc în limite oncologice, urmată de reconstrucție complexă toraco-abdominală. Evoluția pacientului a fost bună, fără nicio complicație.

Rezultat/Concluzii: Intervenția chirurgicală complexă și laborioasă s-a dovedit a fi singura soluție salvatoare, confortul de viață al pacientului datorită dimensiunilor tumorii devenise aproape de nesuportat.

Cuvinte cheie: tumora gigantă, reconstrucție complexă

Abstract

Background: During the last three decades, several improvements in surgical and anesthetic techniques have allowed a better management of primary and secondary tumors of the chest wall.

Objectives: Chest wall tumors, regardless of their location, anterior, posterior or lateral, have always been a challenge for the thoracic surgeon through technical and tactical problems they entail. The most common techniques to reconstruct a full thickness defect are by the use of alloplastic material and filling the soft tissue defect with myocutaneous flap.

Method: We present the unusual case of a 45 years old patient with a giant right thoraco-abdominal tumor, developing for the last 22 years. The tumor occupied the lower half of the right hemithorax and the right hemiabdomen, down to the right iliac crest. The tumor also developed inside the thoracic cavity, with the invasion of the last 3 ribs, of the diaphragm (partial) and with intra-abdominal invasion of a liver section and the right kidney.

Results: The surgery team had special problems related to: providing training and logistics, in-block tumor resection in oncological limits, followed by complex thoraco-abdominal reconstruction. The results were very good, with a favorable postoperative evolution, without any complications, the patient being discharged with the recommendation to come for follow-up on his condition.

Conclusions: A complex surgical intervention proved to be the only solution for saving the patient, for which the life due to the tumor's size became almost unbearable.

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Key words: giant tumor, complex reconstruction

Introduction

Surgery, and thus also the surgeon, besides the use of daily work with patients and ongoing training, stands in a continuous challenge.

Primary malignant thoraco-abdominal tumors are a heterogeneous group of tumors developing in the soft tissues of the thoracic cage and of the abdominal wall (1). A better management of thoraco-abdominal tumors has been achieved in the last decades due to improvements in surgical and anesthetic techniques. Despite these advances, the surgical management of malignant thoraco-abdominal tumors remains difficult due to their impressive local aggressiveness and high recurrence rate (2,3,4). A wide radical resection is essential to obtain long-term survival (5). The result of a tumor resection may be a full chest wall defect or a complex thoraco-abdominal wall defect. In a full chest wall defect alloplastic material is used, as well as myocutaneous flaps for replacing the soft tissue defects. A complex thoraco-abdominal wall defect has been widely reported to be using prosthetic mesh as a fascia substitute or reinforcement (6).

Our case report is an example of surgical challenge while in full knowledge of the fact that the only way to extend patient's life in satisfactory conditions was removing the lump, its giant size actually no longer relevant for oncological treatment.

Case report

A 45-year old male was admitted with a giant right thoraco-abdominal wall tumor, first observed by the patient 22 years ago, slowly growing in time, until 4 years ago when it began to grow faster than before. While during the first stages of tumor development the patient ignored it, only its growth over the last 4 years, combined with the discomfort it created led him to consult several specialists. Most of them considered his case beyond therapeutic resources.

At the time he came to our practice the tumor extended

from the right costal margin (8th rib) to the right iliac crest and from the spine (right paravertebral muscles) towards the anterior medial line (right rectus abdominis muscle)(Fig. 1).

The CT examination revealed a giant tumor mass which seemed to develop from the 8th–10th ribs lateral arch, inside the right hemiabdomen, to the right iliac crest, compressing and displacing the abdominal viscera, invading the right kidney, 7th hepatic segment and the muscular structures at this level (right costal margin) (Fig. 2).

The ultrasound also showed a giant thoraco-abdominal tumor with intense heterogeneous structure, multiple calcifications and well vascularized, which incorporates a big part of the right liver lobe and the superior renal pole, the kidney being displaced medially.

The patient did not suffer from any important cardiology condition and the laboratory findings did not show any significant biologic alterations.

Logistics

Preoperative preparation focused on supplying all the materials required by such an important surgical intervention (suture wires, surgical staplers and enough stapler cartridges, multiple mesh types for reconstruction, blood and other fluids). The surgical team exercised several positions of the patient on the operating table in order to find the most appropriate approach for removing the tumor without exposing any of them to any undesired risks during the surgical intervention.

The operative technique

The surgery started with a watermelon-slice incision centered on the long tumor axis, followed by the dissection of two parietal myocutaneous flaps, one medial and one lateral, freeing the tumor (Fig. 3). After tumor liberation from the iliac crest the peritoneum was accessed – tumor invasion at this level. Dissection continued posterior to the level of the quadratus lumborum muscle (the tumor invaded this muscle) and the lateral part of the paravertebral muscles (also invaded by the tumor). Ascendant dissection followed with complete removal of the 11th and 12th ribs from the joints, antero-lateral arch of the 10th and 9th ribs and the right hemi diaphragm (the 8th rib was healthy) (Fig. 4).

After slowly displacing the mass the surgical team noticed the tumor invasion of the 7th hepatic segment – the hepatic

Figure 1. Tumor and patient view before surgery (A – anterior, B – lateral, C – posterior)

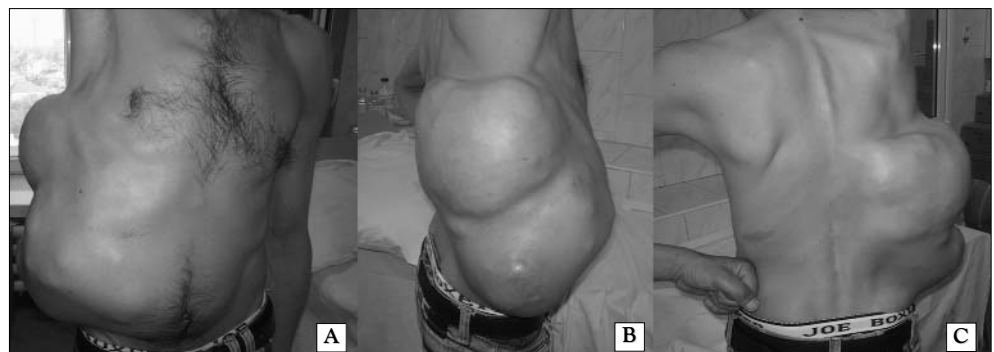


Figure 2. CT view of the tumor (A – thoracic level, B – abdominal level)

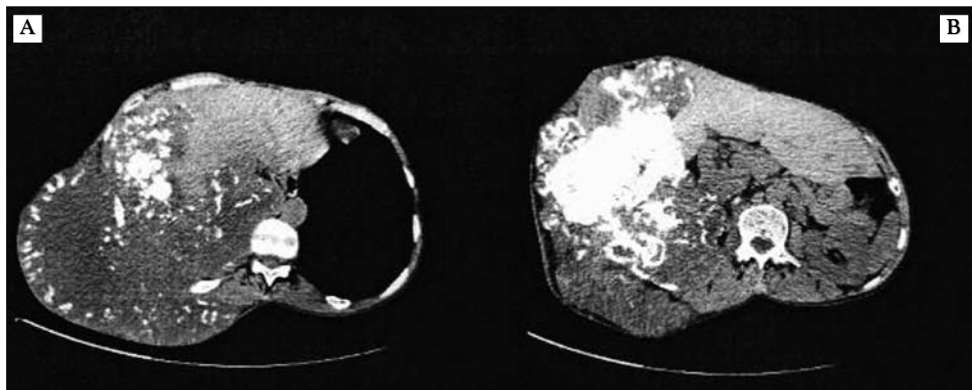


Figure 3. Watermelon incision; tumor exposure



Figure 4. Tumor dissection from the iliac crest

segment was removed, followed by hemostasis on the liver tranche (Fig. 5). The liberation of the tumor from the anterior abdominal wall continued towards the median line (right rectus abdominis muscle was not invaded by the tumor). Now the tumor was completely freed from the thoraco-abdominal wall and was sustained vertically by the surgical team. Reassessment of the abdominal cavity showed the right kidney invaded by the tumor – right nephrectomy was performed (along with the excision of the right adrenal gland and perinephritic fat tissue). The tumor could be completely displaced from the patient and its total weight was 8.5 kilograms (Fig. 6).

Inspection of the remaining abdominal cavity revealed a coprolite at the appendix level and appendectomy was performed.

The remaining parietal defect extended from the 8th rib to the iliac crest and from the spinous apophyses of the vertebra to the rectus abdominis muscle, including the right hemidiaphragm.

The reconstruction of the diaphragmatic and abdominal parietal wall was performed using 30 x 30 cm GORE® DUALMESH® Biomaterial. The mesh was fixed at the posterior diaphragmatic level and anterior on the 8th rib (high reinsertion



Figure 5. Hepatic segmentectomy

of the reconstructed diaphragm). Using the same mesh the surgical team rebuilt the abdominal wall from the 8th rib to the iliac crest. The mesh was fixed to the iliac crest, to the paravertebral muscles (posterior) and right rectus abdominis muscle (anterior)(Fig. 7, 8). Lateral and medial myocutaneous

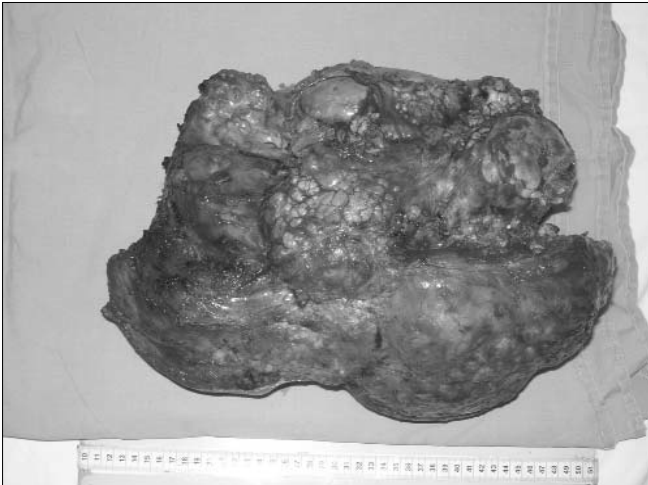


Figure 6. Tumor after excision

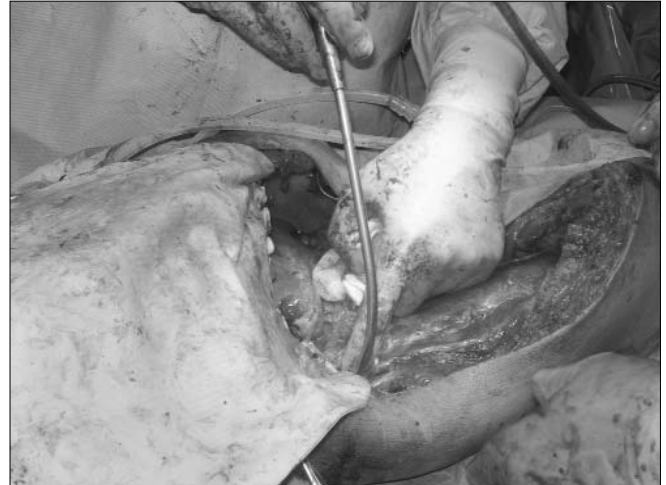


Figure 7. Right hemi diaphragm reconstruction

flaps were sutured above the mesh, after properly draining the thoracic cavity, the abdominal cavity and the space between the mesh and the myocutaneous flaps used for reconstruction.

Results

Immediate postoperative result was spectacular: the patient had been mobilized from the 2nd postoperative day, being included in kinetherapeutic programs. Thirty days after surgery patient's overall condition was more than satisfactory (Fig. 9), with normal social and professional integration and a very good quality of life (he regained the ability to have a normal walk and sleep). For complementary treatment the patient was directed to the oncological service.

Discussions

Considering the dimensions of this tumor mass, its liberation and dissection from thoracic or abdominal structures/viscera could be performed without endangering the patient's life by modifying its position (slipping over) or gearing up with thoracic/abdominal viscera only while a part of the surgical team sustained it.

The surgery was not performed until some adequate pre-operative measures have been taken: interdisciplinary consults (general surgery, anesthesiology and cardiology), ensuring



Figure 8. Right abdominal wall reconstruction

enough blood for transfusion, if necessary, logistics, surgical team and exercises with patient's positioning.

The surgical piece weighted about 10 kilograms (with adjacent tissue), while the patient with the tumor weighted together 47 kilograms. Considering these conditions, patient's life was almost impossible. Walking was difficult because he couldn't maintain balance (and the center of gravity) hence

Figure 9. 30 days postoperative aspects (A – lateral view, B – anterior view)



walking position was a vicious one. The only position in which the patient could sleep was in a chair with armrests, the tumor being practically sustained by the armrest. Any change in position, right or left lateral decubitus, was immediately followed by the onset of severe acute respiratory failure. All these aspects were taken into account when performing surgery. The surgical team consisted of five surgeons because once the tumor was partially released by a part of the team, the other part had to sustain it.

The histological examination of the tumor diagnosed it as soft tissue sarcoma. Soft tissue sarcomas are quite rare neoplasms, which may occur in the abdominal cavity and retroperitoneal, thoracic and abdominal wall, extremities, head and neck. More than 50 histologic subtypes have been described (7). Their etiology is yet to be agreed upon, although certain risk factors have been identified: genetic syndromes, radiation exposure, trauma and chemical agents.

Management of patients with giant tumors is difficult and many issues still remain controversial regarding early detection, the role, type and timing of surgery, as well as the value of non-operative therapies (8).

The present surgical procedure achieved a satisfactory wide resection of the tumor, which involved the surrounding muscular layer to a vast extent. The macroscopic limits of the tumor have been exceeded by more than 3 cm, thus the complete resection of the rectus abdominis muscle was not considered necessary. Reconstruction of the abdominal wall after such a wide resection can be accomplished either by using plastic surgery techniques, such as myocutaneous innervated free flaps (9), or by prosthetic reconstruction techniques (10). A sort of combination of the two techniques was chosen due to the fact that it allows a more extensive resection; furthermore, it does not require laborious maneuvers involving blood vessels and nerves (we did not use free innervated myocutaneous flaps, we used continuous myocutaneous flaps).

We conclude that thoraco-abdominal wall tumors are indeed, as stated before, complex surgical conditions and they require multi-disciplinary surgical teams (thoracic surgery,

general surgery, plastic surgery). The surgical intervention has to be within oncological limits for best results (11). Although extensive surgery had been performed, the evolution of our patient is decided by the individual response to the oncological treatment.

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