

## Anterior thoracic wall giant tumor – particular surgical procedure

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### Rezumat

#### *Tumoră gigantă toraco-abdominală – procedura chirurgicală particulară*

Autorii descriu cazul unui pacient în vârstă de 39 de ani, cunoscut cu un traumatism toracic în 1993, cu 7 ani anterior apariției tumorii. După un an și jumătate de terapie empirică, tumora începe să crească într-un ritm foarte alert, atingând 30/40/35 cm la data internării (martie 2003). Ca urmare a creșterii accelerate și a dimensiunilor tumorale, pacientului i s-a propus o intervenție chirurgicală particulară, cu îndepărtarea tumorii împreună cu peretele toracic anterior și o reconstrucție a acestuia folosind tehnica “spider-web”, plasă armată Thoratex® și flapsuri musculare. Rezultatul acestei intervenții a fost unul bun, pacientul reluându-și stilul de viață anterior în doar câteva luni. Menționăm că pacientul nu a venit la controalele planificate postoperator și nici nu s-a prezentat la oncolog. În 2007, la 4 ani după intervenția chirurgicală, pacientul a revenit cu recurență tumorală locală, motiv pentru care a urmat o nouă intervenție chirurgicală în limite oncologice, cu rezecție lărgită, îndepărtându-se tumora. Tumorile de perete toracic necesită un tratament chirurgical complex. Terapia empirică urmată de pacient și faptul că acesta nu a venit la control conform planificării nu au făcut altceva decât să îi prelungească suferința și au dus la necesitatea unei a doua intervenții chirurgicale.

**Cuvinte cheie:** tumoră sternală, reconstrucție complexă, condrosarcom

### Abstract

We describe the case of a 39 years old male known with an anterior thoracic traumatism in 1993 who observed an anterior thoracic wall tumor since 2000. After one and half year of empiric treatment the tumor starts growing very fast, reaching 30/40/35 cm by the date of his hospital admission (march 2003). Due to this accelerate growth and the size of the tumor the patient is proposed for a particular surgical procedure removing the tumor along with the anterior thoracic wall and the reconstruction using “spider web” technique, Thoratex® reinforced mesh and muscle flaps. This procedure had a good result, the patient returned to his anterior lifestyle few months after. The patient did not come for follow-up, although he was recommended to come every three months. Four years after surgery (2007) the patient came back with local recurrence of the tumor. In 2007 the patient underwent another surgical intervention, removing the tumor recurrence. Chest wall tumors are complex surgical conditions requiring complex treatment. The empiric treatment and the fact that the patient did not come as planned for follow-up, prolonged his sufferance, leading to a second surgical intervention.

**Key words:** sternal tumor, complex reconstruction, chondrosarcoma

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## Introduction

The chest cavity - which houses the lungs, heart, and other vital body parts - is a bone-and-muscle cage framed by the sternum (breastplate), spine, and ribs. During the last three decades several improvements in surgical and anesthetic techniques have allowed a better management of primary and secondary chest wall tumors. Despite these advances, the surgical management of primary malignant chest wall tumors remains difficult because of their impressive local aggressiveness and high recurrence rate. (1,2,3)

Surgical excision of malignant chest wall tumours may be either palliative or curative. Wide radical resection is essential to obtain long-term survival. (4,5) There are described two types of chest wall resections: single rib resection - which defines the resection of a single rib, and thoracic parietectomy - which defines the resection of a rib along with other structures (sternum, diaphragm, clavicle, lung, etc), the resection of at least two ribs or the resection of soft tissue (pectoralis major muscles) (6). Availability of chest wall reconstructive techniques allowed for more radical excision of some large malignant chest wall tumors. The most common techniques to reconstruct a full thickness defect are the use of alloplastic material and replacing soft tissue defects with myocutaneous flaps. (4,7)

## Case report

*A 39 years old male, smoker, known with an anterior thoracic traumatism in 1993 observed an anterior thoracic wall tumor since 2000. Although the tumor reached 4/5 cm during the next few months he did not address any physician, instead he followed some empirical treatment with herbal creams. For the next 18 months the tumor remains at about the same dimensions (4/5 cm); after this period of time the tumor started to grow very quickly, reaching 30/40/35 cm by the day of his hospital admission (march 2003, three years after the first sign of tumor growth).*

*At admission the patient did not showed any co-morbidities, the blood work was normal, excepting the hemoglobin value (11.4 g/dl) and a high number of leucocytes (14900/mm<sup>3</sup>).*

*The clinical examination showed a 30/40/35 cm pre-sternal tumor with a central area of necrosis, extending from the sternal manubrium to the xiphoid appendix (Fig. 1 A, B) and invading the anterior thoracic wall (ribs 4 and 5 on both sides) with the sternal insertions of both pectoral muscles on both sides.*

*The CT examination showed a bulky tumor mass in the pre-sternal soft tissue with maximum diameter of 25.8/30.3 cm, with heterogeneous structure, projected along the sternal body, with a pseudo capsule, infiltrating sternal insertions of both pectoralis major muscles, with extension into the anterior mediastinum through the intercostal spaces and osteolysis of the middle third of the sternum (Fig. 2 A). The scintigraphic exam showed a large round-oval area located above the sternum, on the median line, with lacunar aspect in both early and late stage; in angio-scintigraphic stage the examination*

*showed poor peripheral vascularization. The abdominal ultrasound did not show any modifications.*

*After establishing the exact patient status, the surgical intervention was indicated.*

*For the surgical intervention the patient was placed in a supine position with the upper limbs in abduction at 90 degrees and the tumor was isolated using "steri-drape". A "watermelon slice" incision was performed, followed by the dissection of the right skin flap, of pectoralis major muscle and tumor dissection from the sternum and ribs. The same procedure was conducted on the left side. Next was performed the ligation of the 5th right intercostal vascular pedicle, the resection of the 5th rib's anterior arch and the ligation of the right inferior internal mammary pedicle. After performing the same procedure on the left side, the sternal body was divided with the Gilly saw, removing the upper two thirds. For the removal of the 4th rib the same approach has been used, with the ligation of the superior branch of the internal mammary pedicle. The sternum was then divided again at the sternal angle level.*

*By this time the whole tumor was completely dissected from the thorax and we have proceeded its removal along with the anterior thoracic wall (Fig. 1 C).*

*The reconstruction of the anterior thoracic wall was performed using "spider-web" technique with Dexon® 0 threads, Thoratex® reinforced mesh anchored to the "spider-web", two right and two left flaps of pectoralis major muscle, placed over the reinforced mesh (puzzle-like) and skin suture. Both pleural cavities were drained for 48 hours.*

*Patient's postoperative evolution was favorable; the patient was discharged 12 days after the surgical intervention and was proposed for follow-up every three months (but the patient never came for follow-up).*

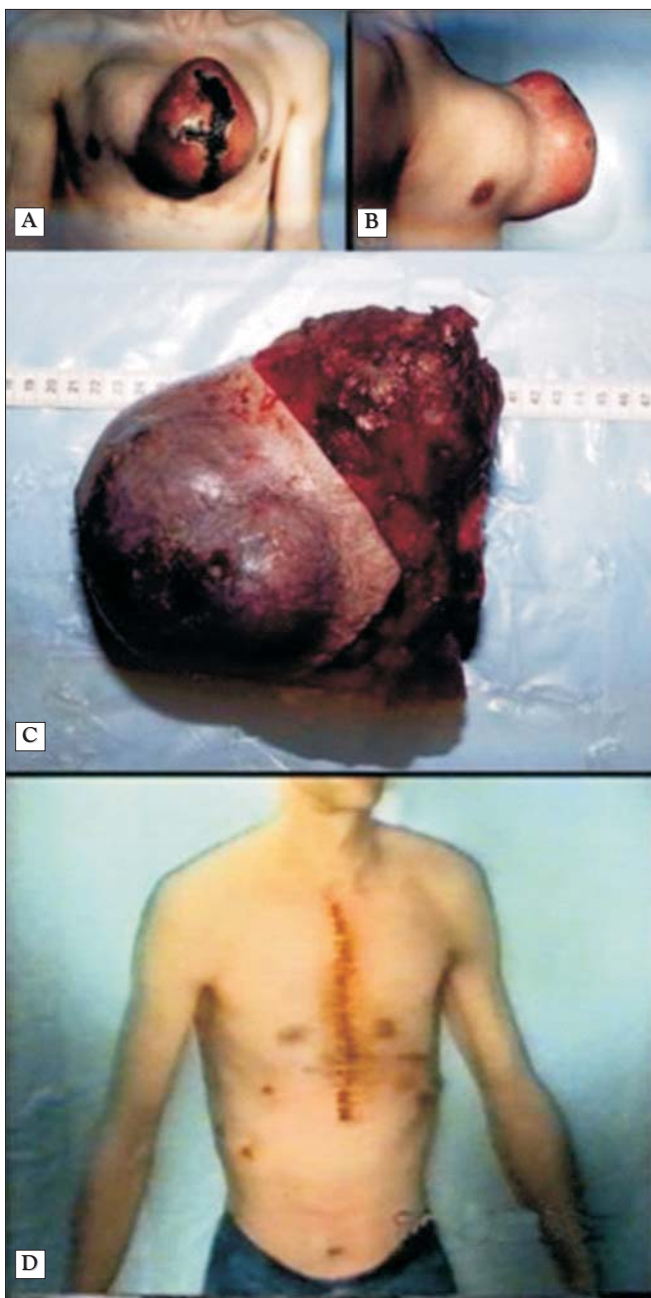
*Four years after (2007) the patient came back with local recurrence (size of 15/15 cm). He was admitted for a full clinical and laboratory investigations, with the intention for a second surgical intervention with radical intent. The complete examination showed no metastases, thus allowing the intended surgical intervention (Fig. 2 B, C, D).*

*The second intervention imposed a larger parietal resection, including the removal of the xiphoid appendix, both 6th ribs and a partial pericardial resection. The thoracic wall was reconstructed using the same "spider-web" technique and Thoratex® reinforced mesh anchored to the "spider-web", but the small parts defect was covered this time with greater omentum and the skin defect was repaired using split-thickness skin graft. Patient was discharged, but, once again, he did not come for any follow-up.*

*Five years after the second surgical intervention the patient comes back with multiple lung and bone metastases - the case was considered above the surgical resources.*

## Discussion

Chest wall tumors are complex surgical conditions requiring complex treatment, including thoracic surgery teams with plastic surgery training or mixed surgical teams (thoracic and



**Figure 1.** Preoperative aspect of the tumor (A, B); the removed tumor (C); postoperative aspect (D)

plastic surgeon). The surgical intervention must be within oncological limits and the parietal reconstruction must stabilize the remaining thoracic wall in order not to have paradox respiratory movements and pulmonary hernia. Chest wall reconstruction has been a complex problem in the past due to intraoperative technical difficulties, surgical complications, and respiratory failure caused by the chest wall instability and paradoxical respiratory movements (8).

The treatment of chest wall tumors by means of a broad sternal resection followed by a reconstruction based on the use of prosthetic materials proved to be an effective and safe solution that considerably improves the quality of life and



**Figure 2.** CT scan (A); Tumor recurrence – preoperative aspect (B); Postoperative aspect (C); 2 months postoperative aspect (D)



makes it possible to perform curative broad radical resections in the case of primary sternal resections (9).

The histological examination of the tumor diagnosed it as grade II chondrosarcoma with necrosis areas (approximately 50% of tumor) and hemorrhage areas, invading the cartilage and bone tissue of two ribs and sternum, muscle and soft tissues. The margins of the 4th and 5th ribs did not have any neoplastic infiltration. We hypothesize the reason for the recurrences could be small satellite tumors, too small to identify in soft tissue during surgery. Chondrosarcoma is the most common primary chest wall bone neoplasm and accounts for one-third of all primary malignant bone lesions. The treatment of chondrosarcoma at any site is complete resection (10). Local recurrence after margin-free, intentionally radical resection still remains a problem. It is well known that surgery is the treatment of choice because only complete resection can provide long-term survival. Histologically free margin of tumor that should be at least 4 cm plays a pivotal role to avoid recurrence.

The empiric treatment and the fact that the patient did not come as planned for follow-up, prolonged his suffering and lead to less than optimal results, with aggressive local recurrence four years after.

Although the patient did not come for planned follow-up, the surgical interventions prolonged his life with nine years. We think this is a good result, considering that the average 10-year survival rate after complete resection for patients with grade II chondrosarcoma is about 39.2%. (10)

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