

## Management of chest wall tumors: 15 years clinical experience, a retrospective study of 52 patients

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### ABSTRACT

**Introduction:** Primary chest wall tumors are rare and it is more common originated from bone and cartilage tissue. The clinical manifestation is nonspecific. The main complaint is the pain but generally vague and fails to characterize a specific type or location and early diagnosis is compromised.

**Objective:** Evaluation of patients with thoracic wall tumors submitted to surgical treatment at a tertiary hospital for oncological care.

**Methods:** Retrospective study of 52 cases, between 1998 and 2013.

**Results:** There was a predominance of males, corresponding to 58% of the cases. The main histological types were osteosarcoma, Schwanomma and immature teratoma. Of the 52 cases, 5 of them were direct extension or metastasis of other sites that had as their first manifestation of the disease the mass of the chest wall. The main therapeutic modality was isolated surgery. The type of reconstruction most used to close the surgical defect was the first intention closure used in 25 patients, followed by the myocutaneous flap in 22 patients. The 5-year survival status of this population were 34.6% of the patients alive but alive with active disease in 13.4% of the sample.

**Conclusion:** Radical resection associated with reconstruction techniques allowed an increase in survival time. The priority is restoration of structural and functional integrity of the chest, work has been done to find ways of approach that combine a better chance of cure of the disease and a satisfactory quality of life for patients.

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### INTRODUCTION

Primary chest wall tumors are rare and represents less than 5% of all thoracic neoplasms.<sup>1,2,3</sup> These tumors may have varied origins, including bones and cartilage, soft tissue and eventually haematological disease.<sup>4</sup> It is most common originated from the cartilage and bone tissue and less frequently from soft tissue.<sup>5</sup> These bony chest tumors can account for only 5,9% to 8% of all bone tumors.<sup>6,7</sup> Risk factors for developing chest wall tumors comprise radiation exposure in this area, thoracic trauma, prior tumor specially in torax, familial syndromes.<sup>8,9</sup>

The clinical manifestation is nonspecific and the diagnosis was incidentally in most part of the time. In more than 20% of cases, the patients are asymptomatic, being diagnosed incidentally during chest X-ray examinations. When symptomatic, the main complaint is the pain, followed by the appearance of thoracic mass.<sup>1,2,10</sup> Pain is usually caused by neural or periosteal invasion of malignant neoplasms. As the complaint of pain is vague and fails to characterize a specific type or location, early diagnosis is compromised, and this complaint is often attributed to musculoskeletal pains, arthritis or recent traumas.<sup>1,10</sup> The initial efforts in evaluation and work-up of a chest wall mass should be to determine if it is a primary or secondary lesion because this guides treatment.<sup>11</sup> The presence of any chest wall mass in a child or a sternal mass in an adult should immediately raise the suspicion of a malignant tumor.<sup>12</sup>

The treatment of thoracic wall tumors is surgical in most cases, with wide resection. It is essential to perform radiological exams to determine the extent of injury and biopsy to differentiate between primary tumors with direct invasion of the chest wall, usually from

lung or breast cancer, or distant metastasis.<sup>1,13-15</sup> Radical resection with total elimination of the disease associated with the advancement of reconstruction techniques, including myocutaneous flaps and prosthetic material, allowed an increase in the survival time.<sup>16</sup> Communication between the resection and reconstructive teams is essential, and will ensure appropriate pre-operative planning, taking into account the various reconstructive options.<sup>17</sup>

Primary chest wall tumors account for 26% to 44% of chest wall resections that were performed at training medical centers.<sup>2, 12, 18-20</sup>

This study will show the experience of surgical treatment of thoracic wall tumors in the Oncologic Surgery Service of the Erasto Gaertner Hospital, a reference center for cancer treatment in southern Brazil, over a 15-year period, as well as oncologic outcomes.

### OBJECTIVE

Evaluation of histological types, types of treatment, complications and survival of patients with thoracic wall tumors submitted to surgical treatment at a Brazilian tertiary hospital for oncological care - Oncological Surgery Department, Erasto Gaertner Hospital.

### METHODS

Retrospective study of 52 cases, with data collection from the medical records and the Hospital Registry of Cancer of the Erasto Gaertner Hospital, from patients with chest wall tumor treated with thoracectomy between 1998 and 2013.

The exclusion criteria were patients not submitted to surgical treatment and patients that were treated with surgery in another hospital. Patients with loss of follow-up will

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not compute survival time, only in histological type statistics.

The variables that were analyzed: age, sex, clinical presentation, histology, surgical technique, acute complications, mortality, prevalence of recurrence, distant metastasis, adjuvant treatment, survival in at least 5 years.

Data were analyzed in the SPSS program version 17. The statistical method included the descriptive analysis of absolute and relative frequencies, test of means and X<sup>2</sup>.

### RESULTS

There was a predominance of males, corresponding to 58% of the cases, while the female sex corresponded to 42% of the cases.

The main histological types were osteosarcoma, Schwannoma, immature teratoma and lipoma, each presenting 3 cases (table1).

Of the 52 cases, 5 of them were direct extension or metastasis of other sites that had as their first manifestation of the disease the mass of the chest wall. Three cases were direct extension of pulmonary neoplasm, one case of endometrial adenocarcinoma metastasis and one case of breast ductal carcinoma metastasis was diagnosed before the primary tumor.

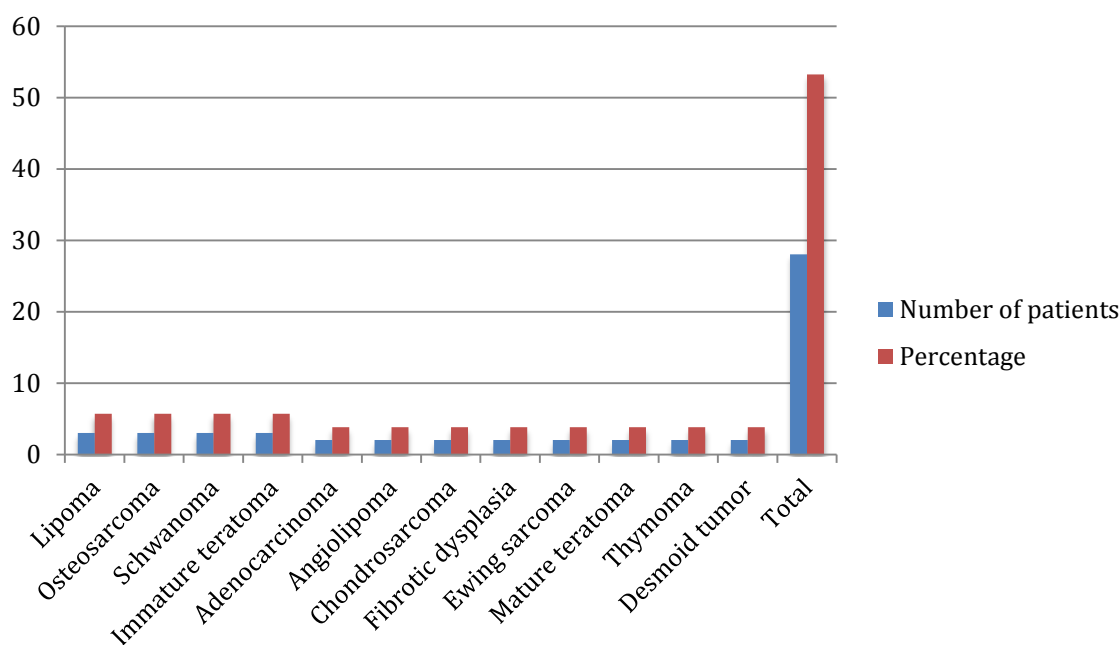


Table 1. Distribution of histological types on our population.

The main therapeutic modality was isolated surgery, indicated for 67% of the patients. Adjunctive radiotherapy was indicated in 3 cases due to poor margins. In two cases neoadjuvant chemotherapy was indicated: one case per PNET tumor and the other by Ewing's

sarcoma. Adjuvant chemotherapy was performed in 5 patients with the diagnosis of myeloma, osteosarcoma, breast adenocarcinoma, immature teratoma, and undifferentiated carcinoma (table 2).

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Type of treatment	Number of patients	Percentage
Surgery	35	67%
Neoadjuvant chemotherapy	2	3 %
Adjuvant chemotherapy	6	12%
Adjuvant radiotherapy	3	6%
Adjuvant radiotherapy and chemotherapy	3	6%
Others	3	6%

Table 2. Type of treatment applied.

The main complication was surgical wound infection, with incidence of 6%, followed by suture dehiscence, which corresponded to 3% of the complications. There was no need to remove the prosthesis in any patient.

The type of reconstruction most used to close the surgical defect was the first intention closure used in 25 patients, followed by the myocutaneous flap with rotation of the dorsal large muscle used in 22 patients. When the defect involved the resection of more than two ribs, acrylic cement was used for support with or without myocutaneous flap in 16 patients. The acrylic prosthesis is individually made after the measurement the chest wall defect. It is placed between two polypropylene mesh and then fixed to ribs and/or sternum with monofilament wire stiches ( figure 1).

There was a local recurrence in 3 patients. In one of them, with a diagnosis of pulmonary adenocarcinoma, the recurrence was in less than 3 months and the death occurred in

the sequence with no possibility of salvage treatment. Another case of relapse was by histological type of Ewing's sarcoma, the relapse occurred after 17 months of the surgical treatment and radiotherapy was performed to control the disease, but it evolved to death in 7 months due to disease progression. The last patient, with immature teratoma, had 87 months disease-free being treated with rescue chemotherapy and is alive to date.

In 11 patients there was progression of disease with appearance of metastases in the lung, bones, central nervous system (CNS) and liver in this order. Of these, only 1 is alive, with diagnosis of chondrosarcoma, 39 months after treatment.

The 5-year survival status of this population was lifted in a timeless fashion, and 34.6% of the patients were alive but alive with active disease in 13.4% of the sample. The incidence of patients who died due to the disease was 19.23%. In 16 patients it was not possible to collect information.

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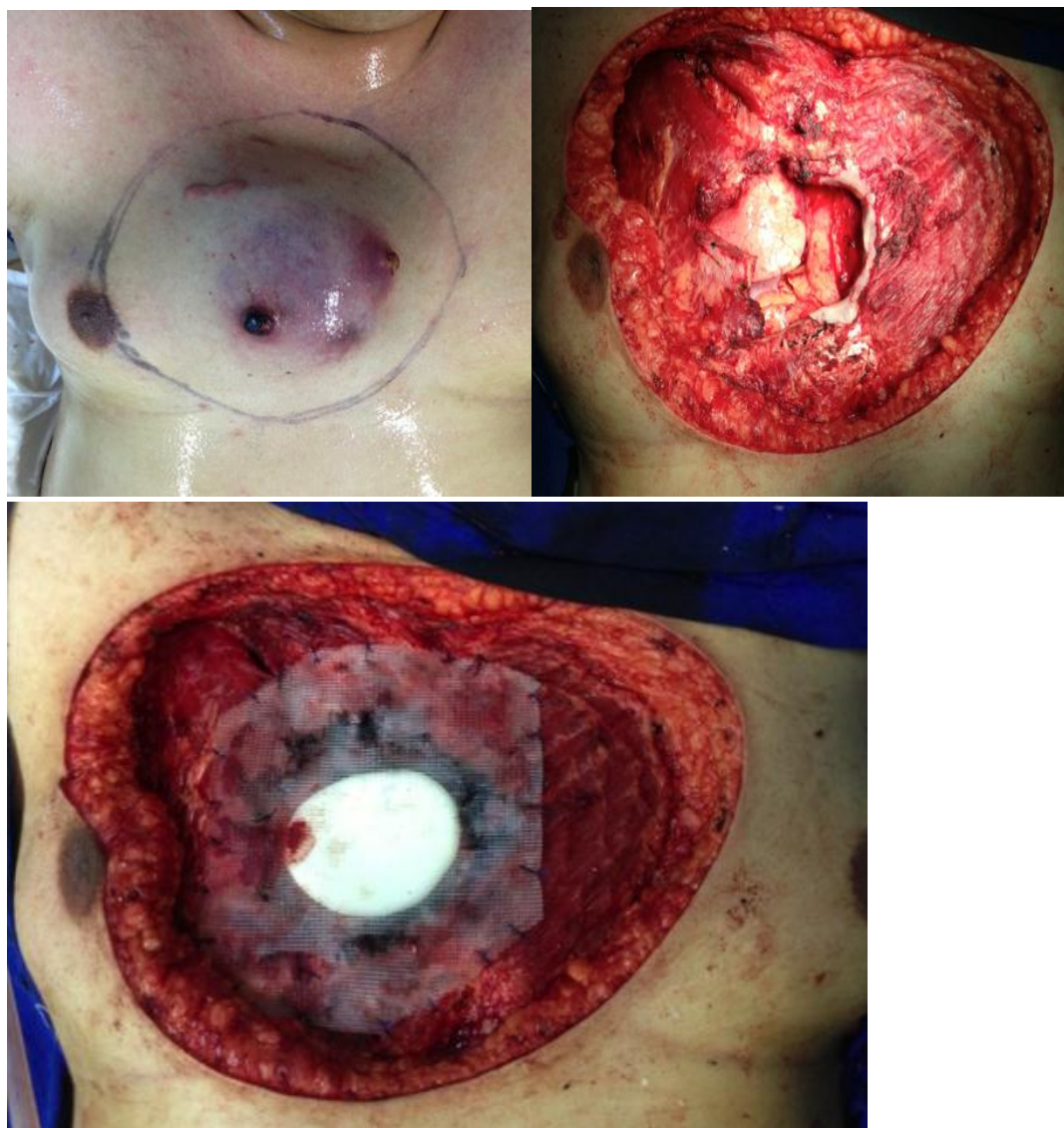


Figure 1. Resection of synovial sarcoma on chest wall with immediately reconstruction using acrylic cement and polypropylene mesh.

### DISCUSSION

Primary thoracic wall tumors are a heterogeneous group of neoplasms that originate from bones, soft tissues, or cartilage.<sup>4</sup> Due to the small number of such lesions and a significant number of these patients being asymptomatic, adequate diagnostic and therapeutic approach is required and other assessments should be considered.<sup>1,2</sup> In most cancer centers, staging is performed with chest tomography using contrast targeting lesions

close to vessels and magnetic resonance imaging may complement the study of mediastinal lesions and extensive involvement of soft tissues.<sup>14</sup> The role of PET/CT in evaluating chest wall tumors is enthusiastic, however, it's necessary to combined with CT and MRI to adds useful information, since the evidence is not strong enough to support its use as a sole modality.<sup>11</sup>

Malignant tumors of the thoracic wall occur at a later age, around the age of 60 years old; clinically the lesions are more extensive



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when compared to the benign ones. The studied population had a mean age of 39.8 and a median of 42.5 (minimum of 4 and maximum of 76 years).

Approximately 50-80% of thoracic wall tumors are malignant. Among the most common benign lesions are osteochondromas, chondromas, fibrous dysplasia, and desmoid tumor. On the other hand, the most common malignancies include sarcomas, chondrosarcomas and Ewing's tumor.<sup>1,3,10,14</sup> In our study we showed Schwannoma, lipoma and fibrotic dysplasia as benign tumors more frequent. As immature teratoma, ostegnosarcoma and adenocarcinoma were the most frequent malignant tumors.

Most malignant soft tissue tumors of the chest wall are sarcomas and if the above treatment was surgery alone, overall 5-year survival is approximately 66%, with 5-year survival for high-grade tumors significantly less than those with low-grade histology, 49% versus 90%, respectively.<sup>21</sup> One variety of PNET of the chest wall is called Askin tumor. In our study there was one case. This subtype is extremely local aggressive, presents as an large mass with bone destruction and can grow into the lung.<sup>22</sup>

Chest wall masses have vast potential etiologies and the diagnoses and therapeutics are very challenger. Most chest wall tumors require extensive resection for their appropriate treatment. Required margin length is controversial. Resection must ensure negative margins because a positive margin is the most important risk factor for local failure and potentially affects survival.<sup>23</sup> It consists of block removal of the lesion including skin, soft parts, rib and sternum, lung, pericardium and diaphragm if they are involved with a wide margin of 4-5 cm.<sup>1-3,15,24-27</sup> Lymph node dissection should only be performed in the presence of obvious disease.<sup>28</sup>

Resections are usually indicated when there is a chance of cure for the patient.

Primary thoracic wall tumors account for less than 30% of resection indications, most of which are associated with direct invasion of the chest wall by lung or breast cancer. Rare are the times in which resection is indicated for palliative control, usually when associated with the presence of infection, ulcerated lesion or pain control.<sup>1-3,15,24-27</sup>

Neoadjuvant chemotherapy is recommended in the treatment of bone tumors such as Ewing sarcoma and osteosarcoma.<sup>29</sup> The role of chemotherapy in other tumors that are surgically resectable is questionable.

Radiation therapy can be given either preoperatively or postoperatively with equal efficacy.<sup>11</sup> Postoperative radiation therapy decreases local recurrence rates in patients with marginal resections or positive margins.<sup>30</sup>

Radical resection with complete elimination of the disease associated with the advancement of reconstruction techniques, including myocutaneous flaps and / or synthetic mesh, allowed an increase in survival time.<sup>16</sup> In our study, this method was used in 42% of the cases, associated with reconstruction with synthetic material (polytetrafluoroethylene and / or methyl methacrylate). Usually the lesions are of significant size, requiring alternatives for the correction of the chest wall after resection. The priority is restoration of structural and functional integrity of the chest. Reconstruction after resection is necessary to prevent respiratory deficits (paradoxical movement) and for mechanical protection of mediastinal structures. In this sense, work has been done to find ways of approach that combine a better chance of cure of the disease and a satisfactory quality of life for patients.<sup>1,2,24,26</sup>

Morbidity and mortality after chest wall resection are mainly related to the alterations in pulmonary mechanics. Hazel et al reported rates of mortalities up to 7% and morbidity rates of up to 46% after chest wall resection followed by reconstruction.<sup>31</sup>

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