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Localised thoracic sarcomas: Outcome improvement over time at a single institution

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Abstract ***Purpose:*** To assess changes in survival over time in patients affected by thoracic soft tissue sarcomas treated at a single institution.
Patients and Methods: Patients with localised adult-type deep thoracic soft tissue sarcoma surgically treated at our institution between 1980 and 2012 were retrospectively reviewed. Patients were categorised into two groups according to timing of their first operation, i.e. surgery done before or after 31st December 2001 (so called 'early years' and 'recent years' groups, respectively), since a more extended surgery was used in the second interval. Overall survival (OS) and crude cumulative incidence (CCI) of local recurrence (LR) and distant metastases (DM) were calculated for each time period.
Results: Three-hundred-thirty-seven patients were identified. Median follow-up was 4.7 years. Tumour size and rate of critical site involvement were larger in 'recent years', while the distribution of all other tumour- and patient-related factors was identical in the two periods. Despite this, OS and CCI of LR were significantly better in 'recent years' as compared to 'early' ones, the 5-year OS increasing from 58% to 72% and the CCI of LR dropping from 22% to 11%. CCI of DM was equal in the two periods.

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Conclusion: Reference institutions for sarcomas may have improved their outcome in the last years. Although biases of retrospective analyses need to be discounted, it is possible that optimal exploitation of a series of subtle improvements in sarcoma treatment may make a difference in results achievable today.

1. Introduction

Thoracic soft tissue sarcomas (STS) are a heterogeneous group of rare tumours accounting for 0.3% of all adult malignancies.[1] They can originate from different anatomical structures, i.e. chest wall, lung, pleura, trachea or bronchi, mediastinum, nerves, heart or vessels, and are made up by different histological subtypes.[2]

Surgery is the mainstay of therapy, but little is known about their specific prognostic factors and outcome.

Published series are relatively few. In general, they are limited to specific sites of tumour origin[3–10] and consist of limited numbers of patients recruited over long time spans.

Advances in surgical techniques, especially in the field of vascular and chest wall reconstructions, as well as in preoperative imaging facilities, have recently allowed to obtain better resections even in most challenging presentations.[11–14] Moreover, a multimodal approach has been increasingly used in the management of high-risk thoracic STS to improve tumour resectability and local control.[15]

We performed a retrospective analysis of thoracic STS patients surgically treated at our institution in a 30-year time span to investigate prognostic factors and the long-term outcome, focusing on major changes in survival over time.

2. Patients and methods

We included all consecutive patients affected by localised thoracic STS surgically treated at the Fondazione IRCCS Istituto Nazionale dei Tumori, Milan, Italy, from January 1980 to March 2012.

Patients presenting at our centre with second or further local recurrence, as well as with metastatic disease, were excluded.

Bone sarcomas, heart and great vessels sarcoma, oesophageal sarcomas, breast sarcomas, and cases with STS arising from the skin or subcutaneous tissue were excluded. We also excluded small round cell sarcomas, and desmoid-type fibromatoses.

Histopathological diagnosis was reviewed and reclassified according to the updated World Health Organisation (WHO) criteria.[2] The French Fédération Nationale des Centres de Lutte Contre le Cancer (FNCLCC) grading system was applied to all cases.[16]

Resections were classified as macroscopically complete, in the absence of macroscopic tumour left behind or incomplete. All macroscopic complete resections were further classified according to the closest surgical margin, which was microscopically categorised as positive (tumour within 1 mm from the inked surface) or negative (absence of tumour within 1 mm from the inked surface).[17]

The indication to radiation therapy was given by both the operating surgeon and the radiation oncologist, in principle when a higher risk of relapse was supposed to exist on clinical grounds. External beam radiation was used in all these cases, and doses ranged from 45 to 70 Gy (median 60 Gy).

Chemotherapy was given at the discretion of the multidisciplinary institutional Sarcoma Board or as part of ongoing clinical trials. Anthracycline-based regimens were used, most often combined with ifosfamide.

After surgery, all patients were regularly followed-up by contrast enhanced computed tomography (CT) scan or magnetic resonance imaging (MRI), in general every 4 months for the first 2 years, then every 6 months for the following 3 years, then yearly.

In the last 10 years, we performed more extended surgical resections, as listed in Supplementary Table 1. Moreover, perioperative chemotherapy was more broadly used.

We arbitrarily decided to split patients into two calendar groups, in order to explore whether these technical and strategic changes were associated to any improvement in the outcome over time. We compared patients operated in the last 10 years (from January 2002 on, i.e. 'recent years') with those operated before (from 1980 to December 2001, i.e. 'early years').

This analysis was approved by the Institutional Ethics Committee.

2.1. Statistical analysis

Continuous variables were presented as mean values ± standard deviation (SD) and median with inter-quartile range (IQR), and categorical variables as numbers and percentages, as listed in Table 1. Comparisons among groups for continuous variables were performed using a two-sided Student's *t*-test, after checking that data were normally distributed, and two-sided Wilcoxon's rank-sum test was used otherwise, and for categorical variables using contingency table analysis with the Chi-square test.

The primary end-points of the study were overall survival (OS), local recurrence (LR) and distant metastases (DM). For each end-point, the time to event