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Solitary fibrous tumour of pleura: CT differentiation of benign and malignant types

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AIM: To analyse and compare the computed tomography (CT) features of benign and malignant types of histopathologically proven cases of solitary fibrous tumours of pleura (SFTP).

MATERIALS AND METHODS: Retrospective analysis of preoperative CT images of 28 cases of histopathologically proven and classified SFTP from three participating institutions was performed. Patient demographics and lesion characteristics including size, borders, presence of a pedicle, extension into the fissure, attenuation, enhancement, pleural effusion, and calcifications were recorded and correlated with the final histopathological diagnosis. Type and results of preoperative biopsy were also recorded. Follow-up imaging and the clinical charts were reviewed to identify recurrence.

RESULTS: Out of 28 cases (15 women and 13 men), 18 were proven to be benign and 10 were malignant. The mean age of patients was 58.1±15.9 and 66.5±11.8 years (p=0.1564) for benign and malignant tumours, respectively. The median (interquartile range) diameter was 6.05 (3.2–10.9) cm for benign and 15.7 (7.1–17.5) cm for malignant type tumours (p=0.0291). Tumours had lobulate borders in 28% (5/18) of benign cases and in 80% (8/10) of malignant cases (p=0.0163). Extension into adjacent fissure was seen in 22% (4/18) of benign lesions and 40% (4/10) of malignant lesions (p=0.40). A pedicle was present in 17% (3/18) of benign and 10% (1/10) of malignant lesions (p=1). Heterogeneous attenuation was present in 61% (11/18) of benign and 90% (9/10) of malignant lesions (p=0.19). Calcification was present in 17% (3/18) of benign tumours and in 70% (7/10) of malignant tumours (p=0.0113). Pleural effusion was present in 6% (1/18) of benign and 40% (4/10) of malignant lesions (p=0.04). Only 1/13 preoperative fine-needle aspirates yielded diagnosis of SFTP. Preoperative diagnosis of SFTP was made in all cases (11/11) with core biopsies. At follow-up (1–10 years, mean 3 years), local recurrence occurred in 3/6 (50%) patients with malignant SFTP and in none of the 10 patients with benign SFTP.

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CONCLUSION: No definite imaging feature to differentiate benign from malignant SFTP was found. Large size, lobulate borders, presence of calcification, and ipsilateral pleural effusion were the only CT features predictive of malignancy. In suspected cases, core biopsies should be performed rather than fine-needle aspiration.

Introduction

Solitary fibrous tumours are rare neoplasms of mesenchymal origin. The latest World Health Organization (WHO) classification of soft-tissue tumours includes them under the category of tumours of fibroblastic/myofibroblastic origin.[1] Although uncommon, solitary fibrous tumours may occur in various parts of the body including the head, neck, thorax, abdomen, and extremities. In the thorax, the commonest site of origin is the pleura with around 80% arising from the visceral pleura.[2] Other less common sites of origin in the thorax include the mediastinum, lung parenchyma, and soft tissues. Solitary fibrous tumours of the pleura (SFTP) are usually benign lesions with relatively indolent behaviour, typically growing undetected for several years. Between 12% and 37% of SFTP are classified as malignant and may behave aggressively.[3] Malignant histology is associated with decreased survival, higher recurrence rate following treatment, and overall poor prognosis.[4] Because malignant histopathological features of SFTP can be focal or patchy, distinction between benign and malignant SFTP is rarely established preoperatively, even on histological specimens achieved from core-needle biopsy. Surgery is considered the standard of care as it provides definite diagnosis and ensures better outcome in cases of malignant tumours.[1,2] As biopsy distinction between malignant and benign forms is unreliable, *en bloc* and wide resection is routinely performed to decrease the chances of recurrence.

Computed tomography (CT) of the chest plays an important role in the detection and characterization of these lesions and often allows a presumptive diagnosis. Moreover, CT is crucial in preoperative planning and provides information regarding size, location, and invasion of adjacent structures. The purpose of the present study was to compare preoperative CT findings in histopathology-proven cases of benign and malignant SFTP and to identify features that may help in predicting the nature of the tumour preoperatively.

Material and methods

A retrospective search of the electronic records was performed for cases of resected and histopathologically proven SFTP that had undergone preoperative CT at three participating institutions within a period of 9 years (September 2003 to December 2012). This HIPAA (Health Insurance Portability and Accountability Act) compliant study was approved by the respective institutional research and ethics boards.

Electronic records of the included 28 patients were reviewed for age, sex, initial presentation, and type of symptoms. Follow-up results of imaging and outpatient appointments were also recorded to identify recurrence and were correlated with final tumour type.

All 28 tumours were surgically resected and had preoperative CT performed before surgery. Chest CT examinations were performed at the three institutions on different CT systems with variable techniques (range of section thickness: 1.25–5 mm). Contrast-enhanced CT images were available in 17/28 (61%) patients. Chest CT images were independently evaluated by two thoracic radiologists (fellowship trained with 1 year of experience) blinded to the nature of the tumour at histopathology. Discrepant observations were resolved in consensus. Imaging features evaluated included lesion size (maximum diameter in axial images), margins (smooth or lobulate), calcification, presence of a pedicle, contrast enhancement, heterogeneity of the tumour matrix, and extension into interlobar fissures, pleural effusion, and signs of frank invasion of adjacent structures. Type (fine-needle aspiration or/and core biopsy) and results of preoperative biopsy were also recorded and correlated with final histopathological outcome.

Histopathological diagnosis of malignant and benign SFTP was made by two thoracic pathologists by analysing surgical specimens (16 patients) and histopathology reports (12 patients). Discrepant observations were resolved in consensus. Resected specimens and reports were examined for histological features including hypercellularity, haemorrhage, necrosis, cellular atypia, mitosis, borders, and heterologous elements in both benign and malignant SFTP. Recently proposed WHO classification for solitary fibrous tumours and a scoring system were used for histological analysis.[5–7]

Statistical analyses were conducted using SAS version 9.3 (SAS Institute, Cary, North Carolina, USA'). All statistical tests were two-sided and significance was set at $p<0.05$. Age was reported as mean and standard deviation. The independent *t*-test was used to test for a significant difference in age. Tumour size was expressed as median and interquartile range. Wilcoxon's rank sum test was applied to compare the differences in tumour size. All categorical variables were presented as numbers and percentages and compared using Fisher's exact test.

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