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Case Report

En Bloc Excision of Thoracic Paraspinal Synovial Sarcoma with Subtotal Spondylectomy
胸椎脊柱旁的滑膜肉瘤之腫瘤整塊及椎体次全切除術

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ABSTRACT

We report a case of thoracic paraspinal synovial sarcoma in a 52-year-old man. It was treated with *en bloc* excision, subtotal spondylectomy, spinal and soft tissue reconstruction. The surgical technique, the approach of multilevel spinal osteotomy and literature review of this rare paraspinal tumour are discussed.

中 文 摘 要

我們報告一名患有胸椎脊柱旁滑膜肉瘤的五十二歲病人，以整塊切除術；椎体次全切除術；脊椎及軟組織重建手術作治療。並討論這項手術的技巧，多節段脊椎截骨術之入路及有關這類罕見癌瘤的文獻回顧.

Introduction

Synovial sarcoma is a malignant mesenchymal tumour. It is more common in children and young adult whose age is between 13 and 34 years. It accounts for 5–10% of 6000 cases of connective tissue sarcoma diagnosed each year in the US.[1] Synovial sarcoma arises from primitive mesenchymal cells and differentiates into synovial cells. It is usually a high-grade lesion which is associated with poor prognosis. It usually locates at the extremities, more frequently in lower limbs then in upper limbs. It usually presents as a deep soft tissue mass with gradual enlargement. Paraspinal synovial sarcoma is extremely rare.[2] The radiographs typically shows bone erosions in the transverse processes and the pedicles. The computed tomography (CT) scan may show a dumbbell tumour with soft tissue calcification. Magnetic resonance imaging (MRI) may reveal a heterogenous lesion with multilocular appearance and septation. Excision of paraspinal tumour with spinal involvement remained a surgical challenge for orthopaedic surgeons.[3] This report details one case of thoracic paraspinal synovial sarcoma treated with *en bloc* excision of the tumour, reconstruction of the spine and the soft tissue.

Case Report

A 52-year-old man presented with a painful back mass for 1 year in December 2007. Before this event, he was in good health. There was progressive increase in size of the mass for 2 months, and it was associated with weight loss of 10 lb in 3 months. There was no history of trauma or lower limb neurological complaint. His sphincter control was normal. On physical examination, there was a left paraspinal swelling at the mid-thoracic region. It measured 12 × 9 cm and was attached to the deep underlying structures. It was firm in consistency and mildly tender on palpation. There was no Tinel's sign or associated lower limb neurological deficits. Chest X-ray revealed no abnormal lung shadow. The radiographs of the thoracic spine showed normal alignment, and there was no bony destruction or abnormal soft tissue shadow. The white cell count, alkaline phosphatase and calcium levels were normal. The MRI of the thoracic spine showed a fusiform lobulated mass at left erector spinae muscle from T7 to T11 level, which measured 13 × 7.8 × 4.1 cm (height × width × depth). It contained acute and old blood, cystic content and hyperintense solid enhancing components. There was also enhanced T2 weighted signal in the left transverse process from T8 to T11 vertebrae. There was no extension into the spinal canal (Figures 1A and 1B). CT of the chest was normal. Bone scan showed enhanced uptake at T7 and T8 transverse processes. The histology of the fine-needle aspiration for cytology confirmed synovial sarcoma.

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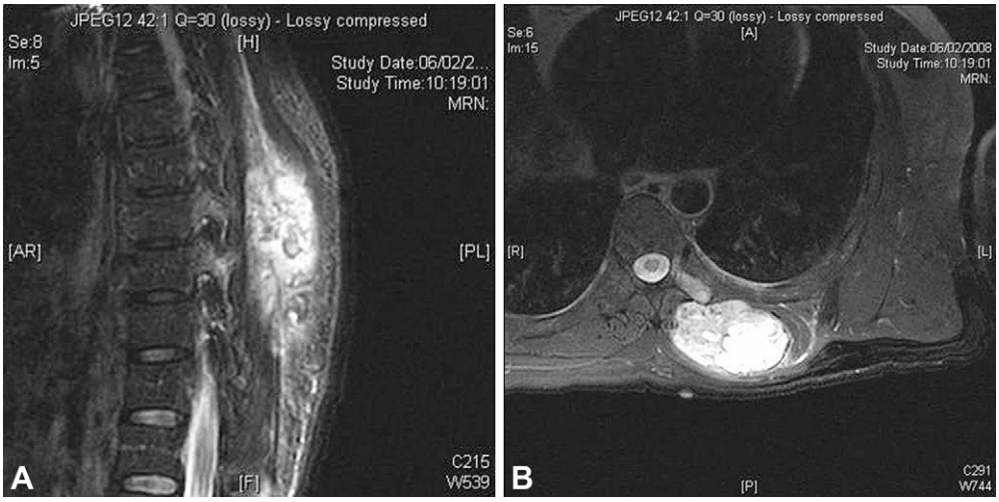

Figure 1. (A) The sagittal and (B) the transverse sections of the magnetic resonance images of the tumour.

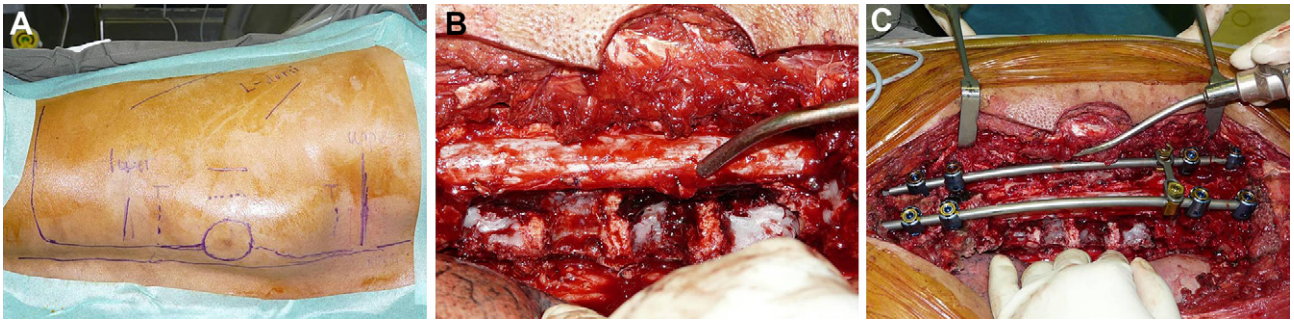

Figure 2. (A) The planned incision included the biopsy site (circled); (B) *en bloc* excision of the tumour; (C) spinal rod and pedicle system was used for stabilisation after subtotal spondylectomy.

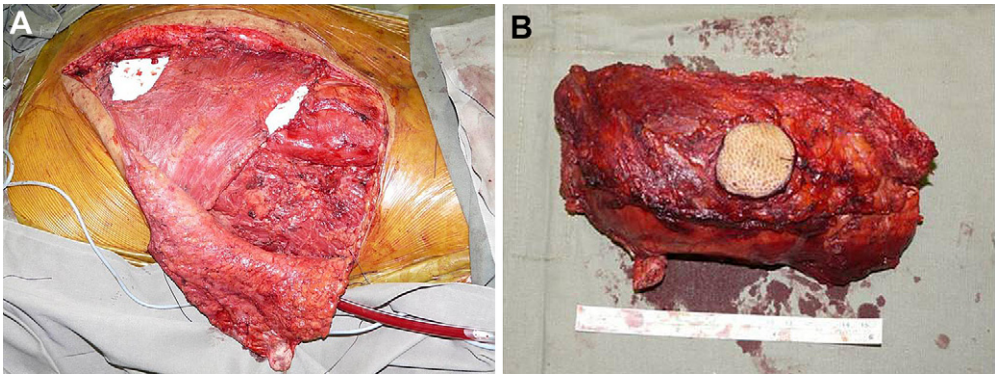

Figure 3. (A) Transpositional latissimus dorsi muscle flap for wound coverage. (B) the specimen.

In view of the involvement of T7 and T8 transverse processes, *en bloc* excision of paraspinal tumour with subtotal spondylectomy was planned so as to achieve complete excision of the tumour. The operation was performed under general anaesthesia with the patient lying on right lateral position. Left paramedian incision was made with a 2-cm margin for the biopsy site, and a 3-cm margin cranially and caudally (Figure 2A). Left latissimus dorsi was raised as a muscle flap. The ribs were osteotomised from T7 to T11 levels, and the pleural cavity was entered. The level was confirmed with intraoperative fluoroscopy. The intercostal space between T7 and T8 was opened. The aorta was mobilised and the intercostal vessels were ligated. Spinal osteotomy was performed by burr from the antero-lateral aspect of vertebral bodies of T8 to T11 towards the posterior longitudinal ligament. The wound was then temporarily closed, and the patient was turned to a prone position. Right hemi-laminectomy from T7 to T11 was performed after stripping of the right paraspinal muscle from bone. With the dural sac under direct vision, the surgical excision was extended laterally to the left. The left intercostal nerves from T8 to T11 were clamped with clips. The specimen was rotated for direct vision to allow further osteotomy

from the front. The spinous processes, laminae, pedicles and transverse processes and part of vertebral bodies on the left side were included in the specimen (Figure 2B). There was a small tear of dura at T9 level, which was then repaired with 6–0 Prolene sutures. The pedicle screws were inserted at T6, T7, T12 and L1 levels (Figure 2C). Mixed allograft bone graft and synthetic bone substitute were used for the posterior spinal fusion. In view of the risk of cord damage, it was decided not to use brachytherapy. A chest drain was inserted. The defect of chest wall was closed with a Gortex sheet. The left latissimus dorsi muscle flap was used to cover the bone and soft tissue defect (Figures 3A and 3B)

Postoperatively, he was given local irradiation. There was no neurological deficit. Superficial wound infection was noticed after surgery, which was treated by repeated surgical debridement and skin graft. Eventually, the wound healed. The pathology showed tumour invasion into the vertebrae with multiple small foci in the bone marrow spaces. The medial resection margin reached the T9/T10 interspinous ligament was involved with tumour cells, but other margins were clear (Figures 4A and 4B). MRI was repeated in November 2008 and showed no local recurrence. Bone scan done in June 2009 showed no bone metastasis. However, CT scan of the thorax in July 2010 showed multiple lung nodules which were compatible with metastasis. Chemotherapy was given. At the last assessment in March 2011, he could walk independently with a stick and the back control was satisfactory. The radiographs of spine confirmed good spinal alignment and stable implants. He died of massive haemoptysis and pneumonia in April 2011.

Discussion

Paraspinal synovial sarcomas are extremely rare; only few cases have been reported in the literature. There was a case report of synovial sarcoma of the thoracic spine in a 60-year-old male patient, who presented with 5-month history of persistent right upper quadrant pain radiating to the back. The MRI showed large right paraspinal mass next to the T7 to T10 vertebrae and ribs, and bone scan also showed increased uptake at T7/8. An operation was done with postoperative external radiotherapy.[4] There was another case report of a 30-year-old man with paraspinal synovial sarcoma. He presented with back pain radiating to anterior right thigh and a gradually enlarging mass at thoracolumbar spine. CT scan showed a non-calcified soft tissue mass in the right paraspinal muscles with extension into the spinal canal and displacement of the thecal sac. Aspiration needle biopsy showed myxoid mesenchymal neoplasm.[5] Another report showed a case of paraspinal synovial sarcoma in a 13-year-old girl after radiation therapy to the left abdomen and pelvis for her left retroperitoneal neuroblastoma. Ultrasound showed a bilobed complex mass in the left paraspinal region. The MRI revealed extension of the mass through L3 to L4 with marked narrowing of the spinal canal. Operation was performed with bilateral laminectomy, decompression and debulking. Histological examination suggested synovial sarcoma.[6]

The treatment strategy of our case was *en bloc* resection so as to achieve a curative excision and hence might improve the prognosis of the patient. Anatomically, the majority of the tumour bulk located at the paraspinal soft tissue component. Due to the close proximity to the vertebral column, osseous spinal involvement due to local infiltration of tumour was likely. Further neural compromise was possible because of local tumour infiltration. The mainstay of treatment of synovial sarcoma is complete surgical excision with wide margin. However, *en bloc* excision of paraspinal tumour poses a great challenge because of the simultaneous removal of soft tissue, tumour and the adjacent vertebrae, with close proximity to the adjacent neurovascular and visceral structures. Therefore,

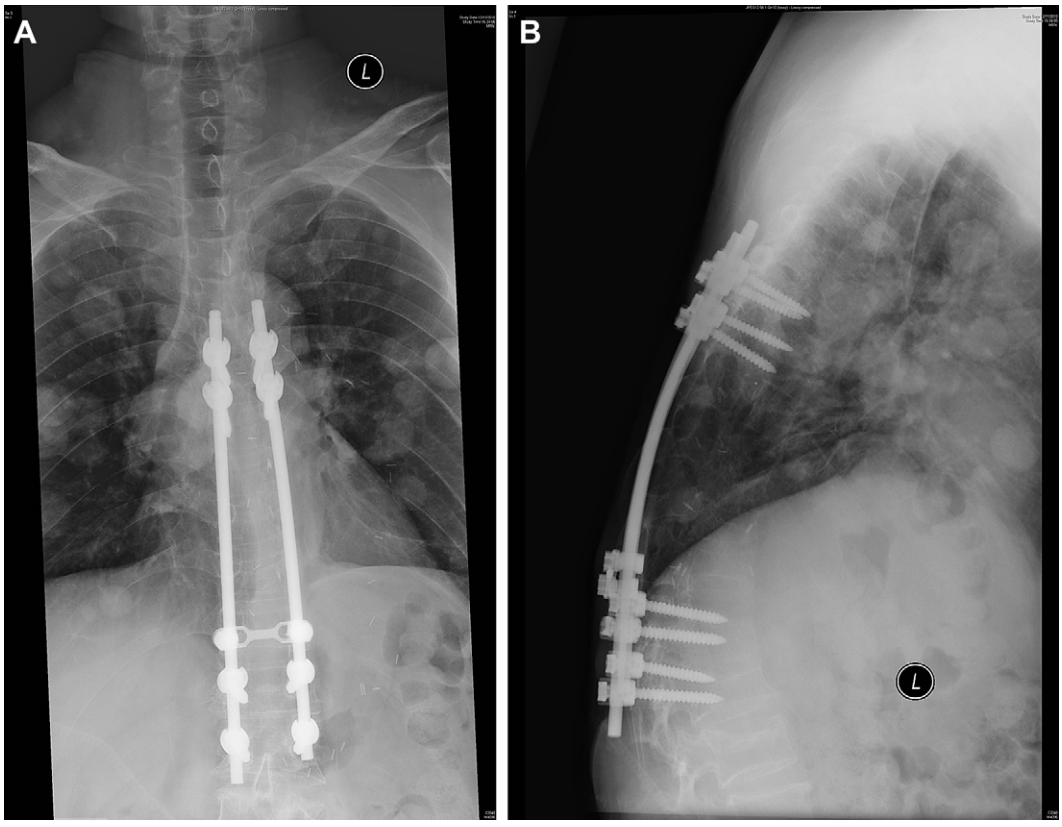

Figure 4. The postoperative (A) anteroposterior and (B) lateral radiographs of the thoracolumbar spine.

borderline margin would be expected. One of the major technical difficulties is the approach of multilevel spinal osteotomy. Surgical approach with inside-out osteotomy is a safer option, but it requires spinal cord retraction which can cause iatrogenic spinal cord injury. Surgical approach with outside-in osteotomy is technically easier but may increase the risk of spinal cord injury. We chose an outside-in osteotomy using burr with attention to avoid injury to the underlying spinal cord. Navigation and spinal cord monitoring may also be helpful in this regard. A Gortex sheet and latissimus dorsi muscle flap were used for soft tissue reconstruction. It gave satisfactory soft tissue coverage for the vertebral body and implant after extensive tumour excision. Pedicle screw fixation and spinal fusion provided satisfactory three-column support for the vertebral column. This allowed immediate stability and postoperative mobilisation, and also prevented possible scoliosis in the future.

The treatment of synovial sarcoma includes wide resection followed by adjuvant radiotherapy or chemotherapy. The response to treatment depends on the biological behaviour of the tumour and also the adequacy of the therapy.[3] Brachytherapy had been considered in our case but was not given to our patient eventually because the brachytherapy tubes would be in close proximity to the spinal cord. External irradiation was therefore given instead. Synovial sarcoma typically recurs within 2 years.[7] Remission rates can be up to 40% with clear surgical margins or when an adjuvant radiation therapy is used. Risk factors of poor prognosis include age more than 25 years old, tumour size of more than 5 cm and tumour with more than 20% of poor differentiation. The lungs and lymph nodes are the most common sites of metastasis. The 10-year survival rate is 25% for those more than 40 years of age.[8,9] Our patient suffered from lung metastasis after 2½ years. However, he could still maintain satisfactory function and walking ability despite the distal metastasis.

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