



Chondrosarcoma of the spine : A report of three cases and literature review

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Chondrosarcomas of the spine are rare and are difficult to treat. Three cases of chondrosarcoma are presented, and a series compiling similar cases reported in the literature was established. This study shows that chondrosarcomas of the spine are generally smaller, more difficult to excise, and followed by higher local recurrence compared with chondrosarcomas in the peripheral skeleton. The most important prognostic factor for local control is wide or marginal tumour resection.

Keywords : chondrosarcoma ; spine ; treatment ; prognosis.

INTRODUCTION

The most frequent primary malignant bone tumour is chondrosarcoma (CS) (22). Six to ten percent of chondrosarcomas are localised in the spine (25) with the highest incidence in the thoracic area. Men are more frequently affected than women. Chondrosarcoma occurs most often in an adult population and is rarely seen under the age of 21. Tumour diameter is generally greater than 5 cm (15). Chondrosarcomas may originate from healthy bone (primary CS) or from chondromas or osteochondromas with sarcomatous degeneration (secondary CS). The basic treatment is complete surgical resection. Three cases of chondrosarcoma of the spine are reported. A review of cases reported in the literature is presented.

CASE N° 1

A 30-year-old man noticed a painful, slowly growing mass in the posterior aspect of his neck two months prior to his first consultation. He also complained of a reduced range of motion of the cervical spine. He had no past medical history. Physical examination was unremarkable except for the presence of a hard and tender cervical mass. Computed tomography as well as magnetic resonance imaging showed a mass arising from the posterior elements of the 4th cervical vertebra and containing a large amount of calcifications. Technetium bone scan revealed increased uptake over the cervical area. The search for metastatic lesions was negative. Differential diagnoses were osteochondroma and well differentiated chondrosarcoma. Open biopsy confirmed the diagnosis of grade I chondrosarcoma. The tumour was removed en bloc by extended bilateral section of the lamina of C4 and C5. No stabilisation of the spine was done. Histological examination confirmed the

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diagnosis of grade I chondrosarcoma. Surgical margins were free of tumour, so that the resection was considered wide. Postoperatively the patient complained of neck pain and paraesthesia in the territory of the ulnar nerve of the left upper extremity. He was treated with physical therapy and a neck collar. Pain decreased progressively and disappeared two years later. The patient is free of disease with a follow-up of 132 months.

CASE N° 2

A 53-year-old man had been operated for a vertebral tumour of the thoracic spine in 1963. The nature of this tumour was uncertain (teratoma, chondroma). The patient presented again, 30 years later, with a mass at the origin of the 11th left rib, which he had noticed over the past three months. This lesion was slightly tender. On physical examination a paravertebral mass was detected. On computed tomography imaging a first lesion was detected arising from the posterior arcs of the 10th, 11th and 12th left rib and a second lesion was attached to the body of the 11th vertebra. The two tumours exhibited areas of calcifications and osteolysis. Biopsy confirmed the diagnosis of grade I chondrosarcoma. Search for metastatic disease was negative. Functional respiratory tests were normal. Surgical excision consisted of an osteotomy of the 10th, 11th and the 12th ribs in their lateral part, allowing a large thoracotomy. Dissection of the aorta in front of the vertebral column was performed through this lateral approach and structures in front of the vertebral column were secured. Both tumours were removed *en bloc* by a posterior laminectomy and pediclectomy with resection of the lateral and anterior-lateral part the vertebral body of Th11 including the parietal pleura. Lung examination revealed a small contact lesion in the inferior left lobe. This lesion was also removed. The osteotomy section of the vertebral body of Th11 was treated with liquid nitrogen to obtain surface tumour necrosis because of the possibility of marginal resection. The defect of the thoracic wall was covered by a Teflon plate and the skin was sutured over it. Histological examination confirmed the diagnosis of grade I chondrosarcoma. The excised pulmonary

tissue showed a metaplastic area of bone. There was no complication during the postoperative course. With a current follow-up of 194 months the patient is still free of disease. Respiratory function is normal despite a slight thoracic shutter.

CASE N° 3

A 43-year-old man without any past medical history noticed a small paraspinal lump in the lumbar region in 1989. The lesion slowly increased in size over the following years. During the last 6 months the tumour grew faster, eventually resulting in an enormous mass which did not cause any pain. Standard radiographs and CT imaging detected an exophytic lesion arising from the lateral process and the vertebral body of L4 (figs 1 & 2). The mass was in contact with the lateral structures of L5 and the iliac crest. There was no invasion of the epidural space despite proximity to the spinal canal. The tumour size was 20 cm in its largest diameter. On computerised CT-scan chondroid calcifications and lytic areas were seen inside the lesion. The range of motion of the left hip joint was decreased compared to the contralateral hip. On physical examination a very hard and painless mass was detected. Technetium bone scan detected increased uptake inside the mass. Diagnostic work up for metastatic disease was negative. The size, localisation and slow and long lasting growth of the tumour as well as the imaging data suggested the diagnosis of a low grade chondrosarcoma. Because of this typical clinical presentation no biopsy was done. The tumour was removed using a longitudinal incision over the spinous processes from Th12 to S3 with a long lateral incision in the left lumbar area. After excision of the spinous processes of L3, L4, L5 a resection of the posterior part of the iliac wing was carried out. This allowed access to the anterior structures of the lumbar and sacral column. Using osteotomes and a high speed drill burr, a cut was done through the lamina, pedicle and vertebral body of L4 and L5. The tumour was removed *en bloc* with macroscopically healthy margins. Because of expected spinal instability a unilateral left arthrodesis using transpedicular screws and autologous bone graft between L4 and S1 was carried out. The postopera-

Table I. – Compilation of case reports

Authors	Age, sex	Localisation	Grade	CS 1/2	Resection type	FU A/D	Recurrence/Metastasis
Prevedello (22)	F 80	CT	0	1	W	A 84	N84/N84
Prevedello (22)	M 25	T	0	1	W	A 12	N12/N12
Vertzyas (25)	F 8	T	1	1	M	A 144	N144/N144
Sakayama (23)	M 58	C	2	1	IL	A 36	Y12/N36
Krepler (14)	F 16	T	0	1	W	A 58	N58/N58
Ohue (21)	M 48	C	1	1	W	A 36	N36/N36
Herman (11)	M 12	LS	3	1	M	NS	NS
Yunten (26)	M 18	C	1	2	W	NS	NS
Ogose (20)	M 17	T	1	1	W	A 36	N36/N36
Zibis (27)	F 41	C	3	1	W	NS	Y
Mandelli (17)	M 65	T	0	1	W	A 12	N12/N12
Bohlman (4)	F 23	C	0	NS	N	D 5	Y5
Vanderhoof (24)	M 42	T	2	1	IL	D 24	Y7/Y24
Crowell (6)	M 13	T	1	2	W	A 4	N4/N4
Crowell (6)	M 18	T	1	2	M	A 1	N1/N1
Blaylock (3)	M 43	C	1	1	M	A 12	N12/N12
Arlen (1)	M 56	C	0	1	M	D 36	Y6
Camins (5)	F 66	CT	2	1	W	D 8	N8/N8
Camins (5)	F 20	C	2	1	W	A 1	N1/N1
Mummaneni (19)	F 53	T	1	1	W	NS	NS
Dernevik (7)	M 20	T	0	1	M	D 16	Y12/N16
Doh (8)	M 41	T	3	1	W	D 18	Y12/Y18
Hirsh (12)	F 46	T	1	1	IL	A 216	Y62/N216
Gürsel (9)	M 18	CT	0	1	IL	NS	NS
Marmor (18)	F 64	L	0	1	W	NS	NS
Hasegawa (10)	M 59	T	1	1	W	A 18	N18/N18
Gebhart	M 30	C	1	1	W	A 132	N132/N132
Gebhart	M 53	T	1	1	W	A 194	N194/N194
Gebhart	M 43	L	1	2	M	A 36	N36/N36

Sex : female (F), male (M) ; Age (years) ; Localisation : cervical (C), thoracic (T), lumbar (L), sacral (S) ; Grade: not specified (0), low (1), intermediate (2), high (3) ; Primary or secondary chondrosarcoma (CS 1 or 2) ; Resection type : intralesional (IL), marginal (M), wide (W), no resection : biopsy (N) ; Follow-up (FU in months). Alive (A) or dead (D) ; Recurrence and metastasis : yes (Y) or no (N) and the time interval in months) to the diagnosis of recurrence and metastasis. Not specified (NS).

tive course was uneventful and the patient did not present any neurological deficit. Histopathological examination confirmed the diagnosis of grade I chondrosarcoma arising from an osteochondroma and histological margins were clean. After a follow-up of 36 months the patient is still free of any recurrent or generalised disease.

REVIEW OF CASE REPORTS

A review of 26 spinal chondrosarcomas published by 24 different authors in the literature has been done. The three cases presented here were added to this series. Sex, age, tumour size and site,

symptoms, tumour type and grade, presence of metastatic disease, differential diagnosis and therapeutic approaches as well as postoperative course and complications were analysed.

RESULTS

Among the 29 chondrosarcomas of the spine, 13 were low grade, four intermediate and three high grade lesions. One tumour had features of dedifferentiation. Grade was not documented in nine cases. There were 10 women and 19 men. Median age was 41 years (range : 8 to 80). Tumour site was thoracic in 14, cervical in nine, lumbar in two, lumbar-sacral



Fig. 1. — Patient N°2 : 53-year-old male with chondrosarcoma of the 10th rib and vertebral body of T10.



Fig. 2. — Chondrosarcoma of L4, preoperative view

in one and cervical-thoracic in three patients. The median diameter of the tumour documented in only eight cases was 5.5 cm (range : 3 to 22). Four chondrosarcomas clearly arose from pre-existing osteochondromas. The most frequent symptoms were neurological deficit (17 patients), pain (16 patients) and restriction of movement (5 patients). All patients only had localised disease. Surgical biopsy was done in 15 patients. The diagnosis of chondrosarcoma in the other patients was based on the imaging. Resection of the tumour was considered wide in 17, marginal in 7 and intralesional in 4 patients ; the type of resection was not specified for one patient. One patient died after biopsy. Vertebral arthrodesis using internal fixation was done in seven cases. Eight patients received radiation therapy after surgery and four had adjuvant chemotherapy. Among postoperative complications, the neurological status was worsened in six patients. Three cases had general complications like pulmonary embolism, deep venous thrombosis, hypothermia problems and haemorrhage. The overall recurrence rate could be established for 24 patients whose evolution was documented : it was 33.3% (8/24). Among 14 patients with wide resection, two presented a recurrence (14.2%),

versus two of six (33.3%) with marginal resection; all three patients (100%) with intralesional resection whose evolution was documented presented a local recurrence. Among 21 patients whose evolution was documented, two (9.5%) developed metastatic lesions.

DISCUSSION

Chondrosarcomas of the spine are rare. Larger series of this particular localisation have been published but no information on tumour characteristics and treatment outcome has been clearly described (2). A compilation of case reports or small series has been done in order to determine epidemiologic, diagnostic and treatment characteristics of this particular tumour localisation (1,3-8,10-12,14,17-27). When tumour characteristics were compared with those in peripheral localisations, no differences could be found regarding age, sex and tumour grade. Median age was 41 years with a higher number of males. Most chondrosarcomas were low or intermediate grade. Because symptoms appear earlier, the size seems to be smaller (median size : 5.5 cm) in chondrosarcomas of the spine compared to peripheral chondrosarcomas (median size in

femoral and pelvic localisation is 11 and 13 cm respectively) (13). Concerning the level of spine involvement, the thoracic spine (48%) is the most frequent localisation, followed by the cervical (31%) and lumbar region (7%); 13% are localised in transitional anatomical localisations. Although it is not always possible to identify a predisposing lesion, 86% are considered to be primary and 14% secondary tumours. The association between chondrosarcoma and breast cancer is known (10,16,18,22) and has also been found in this series. Among clinical signs, neurological deficit (59%) was predominant followed by pain (55%), presence of a painless mass (28%) and joint stiffness (17%). Most chondrosarcomas were low grade (65%), whereas 20% were grade II and 15% grade III lesions.

Two patients with respectively grade II and III lesions developed distant metastasis (7%). Biopsy had been done in 52% of patients. In the other cases the diagnosis was based on the imaging. This approach is defensible because treatment will not be fundamentally different between low grade chondrosarcoma and a large osteochondroma. The optimal treatment of spinal chondrosarcoma should be wide or at least marginal surgical excision with tumour free margins at the resection level. This is sometimes very difficult to achieve. Among 28 chondrosarcomas the resection had been considered wide in 61%, marginal in 25% and intralesional in 14%. The type of resection was not specified for one patient; the local evolution was not documented for five of the remaining 28 patients. The type of resection performed as well as the local evolution were thus available for 23 patients. Two patients out of 14 who had a wide resection presented a local recurrence (14.2%), versus two out of six who had marginal resection (33.3%), and all of three patients who had intralesional resection (100%). This result suggests that there is a difference in outcome between large and marginal tumour resection. Intralesional resection does not provide acceptable tumour control. Radiation therapy and chemotherapy either as primary or adjuvant treatment did not show any benefit. Postoperative complications are mainly increased neurological impairment (20%), deep venous thrombosis and haemorrhage. These complications are the result of the difficult surgical

procedure, where tumour resection is limited by the presence of the spinal cord, intraabdominal vessels, bowel and nerve roots. This explains the long hospital stay.

CONCLUSION

After being confronted with three chondrosarcomas of the spine in our institution, a compilation of case reports published between 1970 and 2004 was done in order to constitute a more representative series of chondrosarcomas localised in the spine. Epidemiological, clinical as well as treatment features were established for this particular tumour localisation. Main differences with peripheral chondrosarcomas were smaller size, more difficult surgery, less good tumour margins during surgical resection and higher recurrence rate. In order to obtain long-term tumour control, achieving tumour-free margins after surgical resection is the most important prognostic factor for absence of local recurrence. Our recommendation is aggressive tumour excision only if wide or marginal resection is feasible.

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ERRATUM

The name of one of the authors of the following paper, published in our February 2008 issue, was misspelled as MAFFULI. The correct spelling is MAFFULLI as indicated below :

Total hip replacement for acute femoral neck fracture : A survey of National Joint Registries

Murali Krishna SAYANA, Palaniappan LAKSHMANAN, Jeetender Pal PEEHAL, Charles WYNN-JONES,
Nicola MAFFULLI
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