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Isolated dorsal vertebral Chondroblastoma: a rare case with review of literature

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Abstract: Accounting for approximately 1-2% of all bone tumors, chondroblastoma is a benign bone tumor that is locally aggressive too typically affects the epiphyses or apophyses of long bones. Less commonly affected sites include the talus and calcaneus of the foot and flat bones.Vertebral involvement by chondroblastoma is very rare, with advance pubmed search we could find only 30 cases, reported in literature of vertebral chondroblastoma.We are presenting one such rare case with review of available literature to evaluate clinical radiological and pathological characteristics of vertebral chondroblastoma.

Key words: Chondroblastoma, bone tumor, Vertebral involvement

Introduction

Accounting for approximately 1-2% of all bone tumors, chondroblastoma is a benign bone tumor that is locally aggressive too typically affects the epiphyses or apophyses of long bones. It arises from an outgrowth of immature cartilage cells (chondroblasts) from secondary ossification centers, originating from the epiphyseal plate or some remnant of it.[1] This tumour is known to be prevalent in children and young adults in the second decade of life[18] with predilection towards the male sex (male to female ratio 2:1). It commonly involves the femur, followed by the humerus and tibia with talus and calcaneus of the foot and flat bones being the less affected.[1]

However, its vertebral involvement is very rare and with advanced Pubmed search we could find only 30 cases of vertebral chondroblastoma, which have been so far reported in literature.

One such rare case with review of available literature to evaluate clinical radiological and pathological characteristics of vertebral chondroblastoma is discussed below.

Case report

History & clinical examination

A 30 year male patient was admitted with chief complaints of backache for two months which was gradually progressive and was

radiating to left subcostal region intermittently with aggravation of pain during walking or lifting any weight by forward bending. Patient also developed insidious onset rapidly progressive ascending type of weakness of both lower limbs for last two weeks. However he had no bowel or bladder complaints. There was no history of trauma, recent fever or tuberculosis.

On neurological examination: Tone of bilateral lower limbs was increased (modified Ashworth Grade 2). Power at hip and knee joints was 4/5 and ankle and below was 3/5(as per MRC grading).There was decreased sensation vibration & proprioceptionbelow 8th thoracic vertebra. The deep tendon reflexes of the lower limbs was exaggerated and Babinski sign was present bilaterally.

Radiological examination

Plain X-ray shows osteolytic lesion involving right side of D7 vertebrae. M.R.I. thoracic spine revealed bony expansile lesion involving D7 vertebra with involvement of right transverse process, spinous process and right posterior body with involvement of adjacent paraspinal soft tissue, causing compression of spinal cord and signal change in the cord. Patient was worked up for unknown primary and on lines of plasmocytoma which was negative.

Surgery

By a posterior approach, he underwent D7 laminectomy and a thorough intralesional excision involving the posterior elements and the vertebral body, with complete decompression of spinal cord. D7 spinous process and right sided lamina and posterior part of body were eroded out by tumor, which was greyish yellow and moderately vascular. It was located in epidural space and there was no breach in dura. After tumor debulking spinal cord returned to normal position and began to pulsate. Near total excision of tumor was achieved. A spinal stabilization was performed with a posterior fusion from D6 to D8 with pedicle screws and titanium rods

Post-operative course

Postoperatively patient was given thoracolumbar brace and gradually mobilized. There was gradual improvement in lower limb power and patient regained his normal power. There was no postoperative complication.

Histopathology

Showed multiple fragments of tumour composed of mononuclear oval to spindle cellsarranged in sheets with collagenised stroma. The cells show mild pleomorphism with nuclear groove and indentation intervening many thick and thin walled blood vessels, with chicken wire calcification andfocal cartilaginous differentiation. Scattered osteoclast type of giant cells were also seen. These histopathological findings wereconsistent with chondroblastoma (Figure 1).

Discussion

The term Chondroblastoma was described by Ernest Armory Codman, in 1931 as an epiphyseal chondromatous giant cell tumor of the proximal humerus, hence the term Codman Tumor [11]. This tumor was described to be benign in nature by Henry L.Jaffe and Louis Lichtenstein in 1942[12].

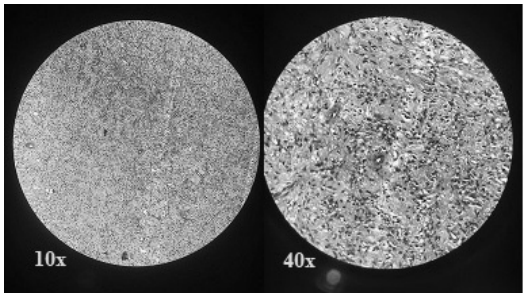

Figure 1 - Histopatholgical slide showing cells mild pleomorphism with nuclear groove and indentation intervening many thick and thin walled blood vessels, with chicken wire calcification and focal cartilaginous differentiation.cartilage with chicken wire apparence

Although chondroblastoma occur most often in the epiphysis of the major tubular bones, this tumor can appear in any secondary ossification center, such as greater trochanter. One of the rare location of this tumor is vertebrae due to presence of a secondary ossification centre. First case of Chondroblastoma of the mobile and nonmobile spine was reported in 1957[5].

The incidence of vertebral chondroblastoma is 1.4% of all chondroblastomas, and 30 cases have been reported in the English (28 cases)[4] and Korean literature (two cases)[5,6] (Table 1). The most common location in spine is cervical followed by thoracic spine[2].

The most common presenting complaint is localised pain. The clinical findings are somewhat nonspecific and vary depending on the tumor extent and level of involvement. This tumor has a typical radiological finding of an eccentric osteolytic lesion, frequently accompanied by a thin sclerotic rim. Vertebral chondroblastomas may sometimes appear malignant radiologically due to bony destruction and/or soft tissue extension, as compared to chondroblastomas of the extremities, which are usually well demarcated from surrounding bony tissue[2,4,7,12,13]. However, these findings are nonspecific in vertebral chondroblastomas thus not of much diagnostic help. Spinal cord compression and/or neurological deficit occasionally accompany the lesion[2,4,14]. Therefore, the possibility of vertebral chondroblastoma should be kept in mind if vertebral mass imaging findings are reminiscent of a malignancy such as a destructive bony lesion with large soft mass formation or spinal invasion.

The differential diagnosis includes both benign and malignant lesions, including tuberculous spondylitis, eosinophilic granuloma, aneurismal bone cyst (ABC), giant cell tumor, chondromyxoid fibroma, osteoid osteoma, osteoblastoma, chondrosarcoma, and metastasis. The final diagnosis should be confirmed by histological examination. As far as size is concerned these tumors range from 2.3 cm to 8.2 cm (diameter). With respect to histological findings vertebral chondroblastoma are not different from chondroblastomas at other usual sites. This tumor is defined to be cellular with sheets of uniform round- to polygonal mononuclear cells with well-defined cytoplasmic borders which have clear to slightly eosinophilic cytoplasm with occasional nuclear grooves admixed with scattered giant cells[3]. Importantly, chondroid differentiation and characteristic chicken-wire calcification are needed to confirm the diagnosis admixed with scattered giant cells. Approximately 35-50% of chondroblastomas show matrix calcification [4,14] and more than one-third of chondroblastomas contain secondary ABC-like changes [3,10].

TABLE I

Author	No. of cases	Sex/age	Neurological deficit	location	Extent	Operation	Follow-up
Braczewski et al (1957) [2]	1	M/28	Yes	T3/T4	STE	Laminectomy and debulking	24 months symptom-free
Ehalt et al (1967) [3]	1	M/12	NS	Cervical spine	NS	Surgical treatment	Recurrence
Wisniewski et al (1973) [4]	1	M/17	No	C1, C2	STE	Curettage	NS
Akai et al (1986) [5]	1	M/48	No	S1	STE	Curettage	120 months Recurrence and death from renal failure
Hoeffel et al 1987 [6]	1	M/9	Yes	C7	STE	Repeated surgery	72 months Recurrence and death from tetraplegia
Howe et al (1988) [7]	1	M/16	Yes	C5, C6	ST E	Combined anterior and posterior surgery	No information
Kurth et al (2000) [8]	1	M/62	No	T1, T2	ST E	Repeated surgery	4 recurrences Malignant transformation
Shin et al (2001) [9]	1	F/36	NO	L1	NO	Mass excision	14 months NED
Leung et al (2001) [10]	1	F/54	Yes lower lim weakness	L5	SCE and STE	Intracapsular tumor excision, L5 vertebrectomy	Two recurrences then lost to follow-up
Nishida et al (2001) [11]	1	M/19	Yes tetrapresis	C5, C6, C7	SCE and STE	Thorough curettage. combined anterior and	2 years and 3 months NED Neurologic deficit fully recovered NED

						posterior approaches	
Attar et al (2001) [12]	1	M/48	No	T2	SCE	Thorough curettage. combined anterior and posterior approaches	NS
Shung et al (2003) [13]	1	M/54	Yes Cauda equine syndrome	L5	SCE and STE	Combined anterior and posterior surgery. intralesional excision	Two recurrences Death after 44 months
Ilaslan et al (2003) [14]	9	Mean age 28, 6M & 3F	NS	C2,T5, L1, S1	SCE in 6 cases & STE in all cases	NS	NS
Vialle et al (2005) [15]	2	F/55, F/23	No	L4/L3	NS	Vertebrectomy in two cases	6 years NED 3 years NED
Lee YH et al (2005) [16]	1	M/40	Yes lower extremity weakness	T7	SCE and STE	Combined anterior and posterior surgery, T7 vertebrectomy	NS
Sohn et al (2009) [17]	1	M/21	No	L4	Lung metas-tasis	Total laminectomy of L4, thoracic surgery for pulmonary biopsy	3 years NED
Mohamed et al (2011) [18]	1	M/46	No	T12L1	STE	Total laminectomy T11T12L1	Died one day after operation because of bleeding
Hernández Martínez et	1	F/30	No	L4	NO	NS	NS

al (2011) [19]							
Kim SA et al (2011) [20]	1	M/25	No	L3	SCE	Total tumor resection	18 months NED
Osman W et al(2014) [21]	1	M/18	Yes B/l paraperesis	D12	STE	Total laminectomy T11T12L1 with D10 to L2 fusion	12 years With lacal relapse after 12 years
Giri P.J et al (2017) [22]	1	M/17	Yes B/l paraperesis	D8		D6 D7 laminectomy	NS

NS: non specified, STE: soft tissue extension, SCE: spinal canal extension, NED: non evidence of disease

Treatment modality of this tumor is usually simple curettage with bone grafting. Recurrence depends on anatomical location. Chondroblastomas of the spine behave more aggressively due adjacent vertebrae destruction and resulting neurological complications [2,7,10,17,18] with a higher rate of relapse and mortality. Hence, efforts should be directed towards complete excision which is the recommended treatment modality for vertebral chondroblastomas[2,10,11]. However, frequent involvement of the spinal canal and paraspinal muscles makes it difficult to completely remove the tumor without neurological deficit. Local recurrence occurs in about one-third of patients[4,17,18] and is apparently higher than that of extraspinal chondroblastoma, which is 5-18% [3,11,13].This may be attributed to the frequent extension to adjacent soft tissue and the spinal canal, which hinders complete resection [11]. High recurrence rate and difficult complete resection necessitates the need for follow up over the long-term post surgery.

To summarise this was a case report of chondroblastoma arising in the lumbar spine with a sincere effort to review the relevant literature. For any vertebral mass appearing aggressive on imaging findings chances of it being vertebral chondroblastoma should be kept in mind and a histopathology should be performed to confirm the same. One should not forget that vertebral chondroblastomas may behave differently from those of chondroblastomas of the extremities. Lastly, long-term clinical follow-up is required as far as vertebral chondroblastomas are concerned.

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