Osteoblastoma of the Spine

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Abstract

Objectives: To identify the factors that are associated with the development of scoliosis and its manifestations.

Summary of the background data: Painful scoliosis is a well-recognized presentation of osteoblastoma but as a result of small number of previous reports the outcome and habits of tumor in spine is not well-known.

Methods: Ten factors were assessed including: age, sex, duration of symptoms, site of the lesion, site of lesion in individual, Cobb angle at presentation, chief complaint at presentation, neurologic involvement, type of treatment, recurrence of tumor.

Result: Fifty Percent of patients had scoliosis. All of the lesions typically were present on the concave side of the curve. In the thoracic and lumbar spine 80% had scoliosis, but no scoliosis was seen on cervical and sacral regions.

All the patients were under 30 years. The mean time to diagnose at our center was 18.4 months. All of the patients with cervical involvement (2 patients) had deformity (Cock Robin) and restriction in range of motion. The lesion was in posterior elements in all of the cases and localized in only one side of the spine. Chief complaint was pain in 67%, deformity in 16% and both (pain and deformity) in 17%. Radiological exam was diagnostic in 58% of the cases.

Conclusions: Findings support the concept that scoliosis is secondary to asymmetric muscle spasm. The most common complaint is pain and then deformity. In the cervical spine deformity and restriction of motion are chief complaints.

In children, spastic pain was more obvious than deformity. Treatment is curetage as wide as possible. There was no recurrence.

Key words: Osteoblastoma, Scoliosis, Spine Tumor

Introduction

Osteoblastoma is a benign tumor usually larger than 2 cm, which manifests by osteoid and woven bone formation. Unlike Osteoid Osteoma (OO) no spontaneous regression has reported. Osteoblastoma (OB) makes 10% of all of spinal tumors.

The spine accounts for 32% of the lesions. In more than half of the cases it was associated with scoliosis. OB and OO are the most common etiologies of painful scoliosis. Tumor almost always
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involves posterior elements of the vertebra. Tumor involves cervical spine (40%), dorsal spine (21%), lumbar (23%), and sacral region (17%) [2].

Although in OB pain is less than OO but in a report studying 9 patients, all had pain [1]. Aspirin and other anti-inflammatory cannot relieve pain [1]. In about 5% of the cases reported in the literature, adjacent vertebrae is involved [1]. Intrallesional medications is often used as the only possible technical solution, and recurrence is reported to be around 10% [2].

Radiation therapy remains controversial and has been reported by some investigators to be ineffective [3, 4]. Some authors believe that radiation therapy should be used as an adjuvant to excision, in stage 3 tumors, which are not suitable candidates for enblock excision [3].

Credit for recognizing this tumors on an entity is given to Jaffe and Mayer, who described a case in 1932 [5]. Lichtenstein, in his book first published in 1952, called osteoblastoma, an osteogenic fibroma of the bone [6].

In 1975 Marsh et al reported 25 new cases of osteoblastoma, ten of which involve the spine [7]. The ratio of male to female was 2:1, and 80% of the patients were under 30 years of age. The duration of complaints prior to diagnosis on average was 17 months.

In 1958 Saituddin A. reported 44 museum cases of spinal osteoid and osteoblastoma and concluded that scoliosis is secondary to asymmetric muscle spasm in patients [8]. The lesion was presented on the concave side of the curve of all of museum patients with scoliosis. There was no association between any of the factors (age, gender, and duration of symptoms) with the development of scoliosis [9].

Patients and Methods

Twelve patients with diagnosis of spinal OB were identified from the orthopaedic museum of Shafa rehabilitation hospital, Tehran.

Clinical details and all available radiographs were reviewed by two orthopedic surgeons. Factors that were assessed include: age, sex, and location in spine and in vertebrae, duration of symptoms, chief complaint, degree of curves (Cobs), and direction of curves.

Figure 1. shows sex information. Table-1 lists the locations of tumor in the spinal column. Table-2 lists scoliosis incidences and location of tumor. Table-3 lists all patients' signs symptoms, treatments and other factors.

Results

The lesion was present on the concave side of the curve, for all cases. Scoliosis (lateral curvature more than 10 degree) was seen in 50% of the cases. Eight percent of lumbar and thoracic cases were associated with scoliosis, in all two cases of the cervical involvement no scoliosis were seen but torticollis and restriction of motion were the chief complaint. In sacral involvement pain was the chief complaint and no scoliosis was seen. All scoliosis cause pain and pain was aggravated at night. Aspirin and other anti-inflammatory agents could not relieve pain.

Under the age of 13, pain was more prominent than deformity. Eighty three percent of the cases were male. The average age of the patients was 16, (range from 6 to 30 years). The average duration of symptoms before the diagnosis was 18.4 months.

In all the cases tumor was in posterior elements of the vertebrae and in only one case tumor had involved the body of vertebrae. In this case second stage surgery by anterior approach was performed. In two cases, adjacent vertebrae were involved (from posterior). In three patients posterior spinal fusion and instrumentation plus tumor excision were done. The average follow-up time was 3.7 years.

Over none of them radiotherapy was performed. There was no recurrence during follow-up period. Enbloc removal and bone grafting was performed.

In laboratory studies complete blood count was normal, but ESR was elevated in four cases. ESR returned to normal at follow-up period. After surgery (enbloc resection or intrallesional curettage) no progression of scoliosis was seen. There was no pseudo-
Table-1: Localization of Tumor in Spine

<table>
<thead>
<tr>
<th>Localization</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervical Spine</td>
<td>2</td>
</tr>
<tr>
<td>Dorsal Spine</td>
<td>4</td>
</tr>
<tr>
<td>Lumbar Spine</td>
<td>4</td>
</tr>
<tr>
<td>Sacral spine</td>
<td>2</td>
</tr>
</tbody>
</table>

Table-2: Scoliosis Incidence In Patients with Spinal Osteoblastoma

<table>
<thead>
<tr>
<th>Localization</th>
<th>Incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervical tumor</td>
<td>None</td>
</tr>
<tr>
<td>Dorsal tumor</td>
<td>75%</td>
</tr>
<tr>
<td>Lumbar tumor</td>
<td>75%</td>
</tr>
<tr>
<td>Sacral tumor</td>
<td>None</td>
</tr>
<tr>
<td>Total</td>
<td>50%</td>
</tr>
</tbody>
</table>

Table-3: Different Parameters in Reviewed Cases

<table>
<thead>
<tr>
<th>Sex</th>
<th>Age</th>
<th>Neurologic exam Before surgery</th>
<th>Presenting symptoms (chief complaint)</th>
<th>Location of tumor</th>
<th>Prop curve (cobb) degree</th>
<th>Treatment</th>
<th>Follow up (Years)</th>
<th>Remark at follow</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>23</td>
<td>N</td>
<td>Pain</td>
<td>L4</td>
<td>60</td>
<td>PSF+H.R</td>
<td>3</td>
<td>No Pain</td>
</tr>
<tr>
<td>M</td>
<td>21</td>
<td>N</td>
<td>Scoliosis + Pain</td>
<td>L1</td>
<td>50</td>
<td>PSF + H.R</td>
<td>6</td>
<td>No Pain</td>
</tr>
<tr>
<td>F</td>
<td>16</td>
<td>Paraparesia</td>
<td>Pain</td>
<td>L3</td>
<td>40</td>
<td>PSF + H.R</td>
<td>2/5</td>
<td>Wound Infection</td>
</tr>
<tr>
<td>M</td>
<td>7</td>
<td>Radiculopathy</td>
<td>Pain</td>
<td>L4</td>
<td>No Curve</td>
<td>En bloc</td>
<td>10</td>
<td>No Pain</td>
</tr>
<tr>
<td>M</td>
<td>13</td>
<td>Normal</td>
<td>Pain</td>
<td>T6</td>
<td>No Curve</td>
<td>En bloc Resection</td>
<td>2/5</td>
<td>No Pain</td>
</tr>
<tr>
<td>M</td>
<td>23</td>
<td>Normal</td>
<td>Pain</td>
<td>T8</td>
<td>35</td>
<td>En bloc</td>
<td>3/5</td>
<td>No Pain</td>
</tr>
<tr>
<td>M</td>
<td>6</td>
<td>Normal</td>
<td>Pain + Scoliosis</td>
<td>T10</td>
<td>48</td>
<td>En bloc Resection</td>
<td>2</td>
<td>No Pain</td>
</tr>
<tr>
<td>M</td>
<td>15</td>
<td>Normal</td>
<td>Deformity R.O.M.</td>
<td>T12</td>
<td>48</td>
<td>En bloc Resection</td>
<td>5/5</td>
<td>No Pain</td>
</tr>
<tr>
<td>F</td>
<td>12</td>
<td>Normal</td>
<td>Deformity R.O.M.</td>
<td>C5</td>
<td>No Curve</td>
<td>En bloc Resection</td>
<td>2</td>
<td>No Pain</td>
</tr>
<tr>
<td>M</td>
<td>10</td>
<td>Normal</td>
<td>Deformity R.O.M.</td>
<td>C3</td>
<td>No Curve</td>
<td>En bloc Resection</td>
<td>2</td>
<td>No Pain</td>
</tr>
<tr>
<td>M</td>
<td>16</td>
<td>Normal</td>
<td>Pain</td>
<td>S2</td>
<td>No Curve</td>
<td>En bloc Resection</td>
<td>2/5</td>
<td>No Pain</td>
</tr>
<tr>
<td>M</td>
<td>30</td>
<td>Normal</td>
<td>Pain</td>
<td>S1</td>
<td>No Curve</td>
<td>En bloc Resection</td>
<td>4</td>
<td>No Pain</td>
</tr>
</tbody>
</table>

Discussion

OO and OB are the most common lesions, producing a painful scoliosis. Age and sex presentations were the same as previous articles. Two patients had neurologic problems prior to surgery, one with paraparesis and one with root radiculopathy. In a review, 30% had radiculopathy. Since from pain to radiologic signs it last long, every patient with painful scoliosis must be observed and the apex of curve especially concave side by reviewed.

Bone scan is positive in early periods of disease. No false negative bone scan has been reported.

In all patients with painful scoliosis and normal x-ray, bone scan is recommended.

Radiographic characteristics is diagnostic, and in 60% of our cases the radiographic report prior to biopsy was osteoblastoma as the first differential diagnosis. Radiologic signs include: location of tumor in posterior elements, reactive bone around the lesion, cortical expansion and bone trabeculation in tumor matrix.

The most common differential diagnosis in our patients was as follows: OOS, osteosarcoma, osteochondroma and tuberculosis. Vertebral body involvement was rare.

In all cases tumors originate from posterior elements and in only one case, body was involved secondarily.

A neoplasm involving only vertebral body, is unlikely to be an osteoblastoma. Since the OB is a highly vascular tumor, during surgery gross pathology resembles Aneurysmal Bone Cyst (ABC). Plain x-ray is diagnostic but CT scan helps to localize the tumor and appropriate approach during surgery. Bone scan shows increased uptake. Benign behavior of the tumor is questionable and malignant behavior and lung metastasis leading to death has been reported.

Angiography for assessment of tumor expansion is sometimes helpful. Marsh BW reported high cure rate even after incomplete surgical resection. In our cases resections done en bloc as much as possible. There was no recurrences three years after surgery. No radiotherapy was done. There are some reports of sarcomatous changes after radiotherapy.

Surgical treatment and tumor excision makes patients painfree. Scoliosis can be returned to normal but delay in surgery makes scoliosis structural. In tumors of stage 2, lesion is intracontoral, but in stage 3 marginal resection must be done. If treatment has been performed before 6 months from the onset of disease, scoliosis disappears after tumor resection. In structural scoliosis or unstable spine, after tumor resection instrumentation and fusion is needed. For spinal OB curettage and marginal resection is enough. In progressive tumor, wide resection is needed.

References

Osteoid ostema and osteoblastoma of the spine; The jur. Of bone & joint surgery; 
March 3, 354-61, 1986
orthopedics & Related Research, 91 March, 1973, 141-51
11. Marsh, B.W.; Bon Figlio M.; Brady, L.P.; and 
Enderking, W.F.; Benign osteoblastoma: 
Range of manifestations, J. Bone & Joint surgery. 57-A; 1-9 Jan, 1975
12. Mehta, M.H., and Murray, R.O.; Scoliosis 
13. Moleden RA, Dahlann DC, Beabout JW: the 
14. Mamrani Tonal, B.D. Crawford J. Campbell, M.D. Geunghwan Ahin, M.D., Alain L. 
Schiller, M.D. and Henry J. Mankin, M.D. 
Osteoblastoma: classification and Report 
of 16 patients; clinical orthopedics & 
Related Research, 167 July 222-35; 1982
15. Mirm Joseph M: Bone Tumors. Vol one, 
16. Narsh B. W., M.D., Gainesville, M. Bonfiglio, 
M.D.: Benign osteoblastoma. Range of 
manifestations. The J. of bone & joint 
surgery, 57-A:1-9, Jan, 1975
17. Osmun Nemoto, MD. Richard P. Moser, Jr., 
LTC, MC, USA, BRIDG E. Vandem, LTC, 
Junacki, MD, Frederick W. Gilkey, LTC; 
Osteoblastoma of spine a review of 75 
cases; Spine, 15; 1990, 1272-80
18. Roger P. Jakson, MD., Frederick W. 
Reckling, MD., Frank A. Mantz, M.D.: 
Osteoid ostema & Osteoblastoma, 
similar histologic lesion with different 
natural histories, Clinical orthopedics & 
Related research, 128 Oct. 1977, 303-11
19. Safiuddin, A. FRCR, J. White, FRCS, Z. 
Sherazi FRCR, M.I. Sheikh, FRCR, C.Natali, 
FRC (orth) A.O. Ranatford, FRCS: Osteoid 
ostema & Osteoblastoma of the spine, 
Factors associated with the presence of 
scoliosis. 278 may 1992, 37-45.
20. Weinstein James, Stafano Bonani, Laura 
campanacci: Pediatric spine. Spine 
neoplasms, 2nd ed. LWW, 2001, page 691.
21. George W. Wood II, Campbell’s Operative 
Orthopedics, Other disorders of spine 
neoplasms, 2nd ed. LWW, 2001, page 691.
22. George W. Wood III, Campbells’ Operative 
Orthopedics, Other disorders of spine, 
23. Vgocen V.D, Hersh M. Arane bone tumor 
in an un usual location; osteoblastoma 
the vertebral body; com put med imaging 
graph, 1992; 16:11-6
24. Watanabe M. Kiihara, Y. Matsvde, Y, et al.: 
Benign osteoblastoma in the vertebral 
body of the thoracic spine; Spine 1992; 
17: 1432-4.