Osteoblastoma of the lumbar spine in an adolescent: A case report and review of literature

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Abstract

Introduction: Osteoblastomas are primary bone tumors representing 1% of all bone tumors and 10% of all spinal osseous neoplasms with a predilection for posterior elements.

Case report: A 13-year-old boy with insidious backache for six months presented with progressive radiating paraesthesia and claudication, restricted lumbar motion and positive straight leg test bilaterally with weakness of left ankle dorsiflexion. Radiograph showed an subtle expansile lytic lesion in the L3 posterior elements. CT and MRI revealed a space-occupying lesion of the L3 vertebra lamina, involving the left pedicle causing severe spinal canal stenosis. Excision of the posterior elements of the L3 vertebra including the facet and left pedicle and short segment fixation from L2-L4 using autogenous rib was done. At two years postoperatively, he was asymptomatic, neurologically normal, showing radiographic evidence of union with no recurrence.

Conclusion: Autogenous structural rib can be used for posterolateral fusion after osteoblastoma excision with potential instability.

Keywords: Osteoblastoma, back pain, rib graft, postero-lateral fusion, en-bloc resection.

Osteoid osteoma was first described by Jaffe in 1935 [1], osteoblastomas were described by Jaffe and Lichenstein in 1956 independently [2]. They are benign bone tumours constituting about 11% of all primary bone tumours [1-3]. The condition is more frequent in males, (male to female ratio of 2:1) and occurs during the second decade of life [1-3]. The most common location for these lesions is the spine with a preponderance for posterior elements of the spine constituting 30-40% of all the cases [1,3,4]. Two types of osteoblastoma have been described in the literature; conventional osteoblastomas and aggressive osteoblastomas, the latter being characterised by high alkaline phosphatase levels and size of more than 1.5 cms with paravertebral or epidural extension and lytic changes on radiographs [4].

Treatment of osteoblastomas of the spine involves en bloc excision of the lesion in Enneking stage 3 lesions and intralesional curettage in Enneking stage 2 lesions [5,6]. Radiotherapy is considered as an adjuvant or an alternative to surgical excision if excision demands unacceptable functional sacrifice or in non-accessible locations [7]. Recurrence can occur if excision is inadequate. Overall recurrence rates reported for osteoblastomas has been around 10 – 15% [2]. Recurrences are typically seen 5-10 years after index procedure [4].

We describe a case of osteoblastoma of posterior elements of L3 vertebra in a 13-year-old boy treated with en bloc excision and posterolateral fusion using rib autograft.

Case report

A 13-year-old boy presented to clinic with complaints of back pain of six months duration which was insidious in onset, gradually worsening with time. Pain was present during rest, radiated to both lower limbs associated with parasthesia, and claudication symptoms with walking, with relief on lying down with the hips and knees flexed. There was no history of trauma, heavy weightlifting, no unaccustomed activity, no history of fever, weight loss, loss of appetite, tuberculosis, no morning stiffness, or small joint pains. Past medical history was unremarkable. On examination there was restriction of movements of the lumbar spine and focal tenderness over the lumbar region. Power of ankle dorsiflexion on the left side was grade 3. Ankle jerk on the left side was diminished. Rest of the neurological examination was unremarkable. Radiograph showed a lytic lesion in posterior elements of L3. MRI revealed a space occupying lesion in the posterior...
elements of L3 involving the left pedicle and causing severe spinal canal stenosis. CT revealed a heterogeneous expansile bony lesion with lytic and sclerotic component arising from the spinous process of the L3 vertebra extending into the left pedicle (Figure 1-3). A PET-CT scan showed the solitary lumbar lesion with no other lesion elsewhere. Alkaline phosphatase level was 224 IU/L (Normal- 38 – 94 IU/L).

After pre-operative work-up, consent and general anaesthesia, patient was positioned prone; exposure of L2-L4 levels was done after level confirmation. En bloc excision of the L3 lamina including the facet joint and left pedicle was done as these were involved. Posterior stabilisation with pedicle screws at L2 and L4 was done. Posterolateral fusion was performed to prevent iatrogenic instability and autogenous rib graft (left 10th rib) was harvested for fusion (Figure 4). The estimated blood loss was 200 ml. Closure was performed and the patient was extubated, the post-operative period was uneventful. Histopathological examination of the resected specimen confirmed the lesion to be osteoblastoma (Figure 5).

Patient followed up every six months and at two years’ post-operatively has had no symptoms or radiological evidence of recurrence of the disease or implant loosening (Figure 6, 7, 8).

**Discussion**

**Clinical presentation:** Osteoid osteomas and osteoblastomas of the spine are uncommon tumours which may present with atypical symptoms and normal radiological findings in the initial course of the disease and thus may lead to delays in diagnosis [2]. It may present as persistent, dull back pain. Other presentations may include a painful scoliosis. Scoliosis is usually convex
opposite to the side of the lesion. Radiculopathy and neurological deficit with cauda equina syndrome can occur if the lesion impinges on the nerve roots or the spinal cord [3]. Thus, backache should not be presumed to be postural or inflammatory if long-standing and with red flags.

**Investigations:** Plain radiographs maybe less sensitive in picking up the lesion in early stages as lytic lesions cannot be identified on radiographs unless there is approximately 50% bone destruction [4]. CT scan and MRI provide detailed information of the extent of the lesion, involvement of adjacent structures, distortion of local anatomy and intra-spinal extent of the lesion. A PET-CT scan detects involvement of other regions and allows staging.

**Pathology:** Osteoblastomas are known to be more aggressive tumours. Locally aggressive tumours can cause mass symptoms. Malignant transformation of osteoblastomas has also been reported [2].

Literature summary is shown in Table 1.

**Treatment:** Enneking staging has been used by many authors to guide the method of treatment [4,7]. Intra-lesional excision has been advised for Enneking stage 2 lesions and en-bloc resection for stage 3 [7]. Pre-operative arterial embolization has been shown to reduce intra-operative blood loss [8]. Surgical resection is the conventional treatment of choice for spinal osteoblastomas after meticulous surgical planning. Intraoperative use of navigation provides accurate localisation facilitating complete removal [9]. In this case interbody fusion was avoided as it would violate compartments. Stabilisation is warranted if excision of intervertebral joints or facets is done [5].

Minimally invasive options like CT-guided radiofrequency ablation and image guided cryoablation may avoid need for fusion. Recently fully endoscopic resection has been described for spinal osteoblastoma. Use of denosumab preoperatively has been reported to regress tumour, ossify and facilitate resection [10].

To conclude, Autogenous rib graft can be used as a structural graft for posterolateral fusion after osteoblastoma excision with potential instability.

**Clinical relevance**

Back pain in adolescents should not be considered as postural or inflammatory especially when associated with red flags. The patient should undergo appropriate investigations to reach a diagnosis. Autogenous rib can be reliably used as a structural graft for posterolateral fusion.
Table 1: Review of Literature

<table>
<thead>
<tr>
<th>NAME</th>
<th>AUTHOR/ JOURNAL/ YEAR</th>
<th>SAMPLE</th>
<th>SEX</th>
<th>MEAN AGE (YR)</th>
<th>LEVEL</th>
<th>INVOLVED AREAS OF THE VERTEBRA</th>
<th>SYMPTOMS</th>
<th>AGGRESSIVE THERAPY</th>
<th>INCREMENTS AND OUTCOMES</th>
<th>TECHNIQUE</th>
<th>BIOPSY</th>
<th>IMPLANTS</th>
<th>COMPLICATIONS</th>
<th>CONCLUSION</th>
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</thead>
<tbody>
<tr>
<td>Management of osteoblastoma and osteoid osteoma of the spine in childhood</td>
<td>Sudan Breda et al/ Journal of Neurosurgery Pediatrics/ 2008</td>
<td>35</td>
<td>M: 26, F: 9</td>
<td>12</td>
<td>11C, 1L, 5S</td>
<td>Pain, radiculopathy, stiffness, numbness, weakness</td>
<td>NA</td>
<td>Subtotal or total excision</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>Spinal OBL and OBL can be a challenging management problem in pediatric patients. In conservative therapy fails, surgery using modern image-guided ablation and spinal instrumentation can provide a symptom relief and tumour control.</td>
<td></td>
<td></td>
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<tr>
<td>Staging and treatment of osteoblastoma in a mobile spine: a review of 31 cases</td>
<td>Aksel Domenico et al/ Eur Spine J/ 2010</td>
<td>31</td>
<td>M: 16, F: 15</td>
<td>17</td>
<td>11C, 1L, 1S</td>
<td>Pain, stiffness, weakness, radiculopathy, numbness</td>
<td>NA</td>
<td>Pre-operative embolization, Percutaneous excision, CT guided biopsy</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>Peri-operative embolization is effective in confirming stage 2 and elective excision in stage 3.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Osteoblastoma of the sacrum: report of 18 cases and review of literature</td>
<td>Pietro Ruggieri et al/ Spine/ 2014</td>
<td>18</td>
<td>M: 14, F: 4</td>
<td>3L-54</td>
<td>None, radiculopathy, lumbosacral radiculopathy</td>
<td>NA</td>
<td>NA</td>
<td>CT guided biopsy, Percutaneous excision, Wide excision</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>Surgical resection can cure, difficult in diagnosis and complicated treatment choices, resection is successful, local adjuvants did not reduce recurrence. Percutaneous embolization is recommended.</td>
<td></td>
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</tr>
<tr>
<td>Surgical management of osteoblastoma of the sacrum and review of literature</td>
<td>Rupak Funder et al/ Turkish Neurosurgery/ 2016</td>
<td>5</td>
<td>M: 4, F: 1</td>
<td>28</td>
<td>3C, 1T, 1S</td>
<td>Precocious elements of the spine, Pain, weakness, deformity, radiculopathy</td>
<td>NA</td>
<td>Pre-operative embolization, Percutaneous excision</td>
<td>NA</td>
<td>CT guided biopsy, Pedicled screws, Allograft</td>
<td>NA</td>
<td>Aggressive surgical resection can minimize the risk of recurrence although it may still occur after complete excision. Removal of the precocious elements surgically makes future limb tumours in OBL rare.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CT guided radiosurgery: role of stereotactic radiosurgery and its long-term follow-up</td>
<td>Francesca Aggini et al/ International Journal of Hyperthermia/ 2008</td>
<td>17</td>
<td>M: 2, F: 16</td>
<td>26</td>
<td>7T, 4I, 8S</td>
<td>None, radiculopathy, lumbosacral radiculopathy, weakness, numbness</td>
<td>CT guided biopsy, Percutaneous excision, Wide excision</td>
<td>CT guided biopsy, Pedicled screws, Allograft</td>
<td>NA</td>
<td>CT guided radiosurgery ablates a focal lesion in the spine with the advantage of being minimally invasive.</td>
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<tr>
<td>Cure osteoblastoma resection to malignancy? A challenge in the diagnosis making process of a benign spine tancure</td>
<td>Aishlde Mathew et al/ World Neurosurgery/ 2019</td>
<td>2</td>
<td>M: 0, F: 2</td>
<td>33</td>
<td>3T, 5OBL</td>
<td>Body, lumbosacral pedicles, radicular pain, numbness</td>
<td>CT guided biopsy, Percutaneous excision, Wide excision</td>
<td>CT guided biopsy, Pedicled screws, cage</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>Cure osteoblastoma resection to malignancy? A challenge in the diagnosis making process of a benign spine tancure.</td>
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References


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Source of Support: NIL

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