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Abstract
Introduction: Osteochondroma or exostosis are the most common benign tumors of the bone that usually occur in the long bones and rarely found in the spine. When present in the spine, however, they have a predilection for the cervical region. They occur in two forms as solitary and multiple hereditary forms. We have reported here a case of spinal cord compression due to osteochondroma arising from the T-12 vertebral body and left pedicle in a 13-year-old female who presented to us with spastic paraparesis.

Keywords: Multiple Hereditary Exostosis; Osteochondroma; Spinal cord compression.

Introduction
Spinal osteochondromas are of two types: (1) Spinal osteochondromas in patients with multiple osteochondromatosis, and (2) solitary spinal osteochondromas.¹ Solitary tumors usually arise at the cervical spine, markedly the atlantoaxial joint, while in patients with hereditary multiple exostosis they usually appear in the lumbar or thoracic spine.² Most are asymptomatic and seen incidentally during radiographic examination. We describe an unusual case of Osteochondroma of lower dorsal spine causing spinal cord compression and spastic paraparesis in thirteen year old girl.

Presentation of case
An 13-year-old female patient presented with complaints of multiple bony hard swellings in thorax, thighs, lower abdomen and left shoulder since the past 2 years with back pain since 7 months and weakness of both lower limbs with difficulty in walking since the past 4 months. Weakness in both the lower limbs was insidious in onset and gradually progressive over a period of 4 months. There was no bladder and bowel involvement. There was no history of trauma or onset due to lifting of heavy weight. There was no history of fever, night sweats and weight loss. On physical examination multiple, non-tender, fixed, bony hard swellings of varying sizes were present in the lower extremities, left clavicle, multiple ribs and bilateral pelvis. The local examination of spine was normal. The neurological examination revealed spastic paraparesis with reduced
sensation below L2 dermatome on both sides. There was weakness, decreased pinprick sensation, and hyperreflexia of his lower extremity. Positive Babinski response was also elicited. Bladder and bowel functions were intact. Radiograph of the lower dorsal spine was normal. Magnetic resonance imaging of the whole spine showed 2cm x 1cm bony mass arising from the posterolateral aspect of D11 vertebral body and left with cortex and medulla in continuity with vertebral body compressing lower spinal cord. There was marked cord compression seen at this level without change in signal intensity [Fig-1]. Excision of the lesion in the D12 vertebra was undertaken by posterior approach. Tumour mass was removed including lamina and pedicle of the 12th thoracic vertebrae on the left side along with cartilaginous cap. The excised tissue was sent for histopathological examination which was suggestive of the diagnosis of osteochondroma.

Postoperatively patient was kept in ward for 1 week in which dressing was done on 2nd and 6th post-operative day. Staple sutures were removed after 2 weeks post-operatively. Wound was healthy. The tone of bilateral lower limbs became normal 2 weeks post-operatively. The weakness and numbness improved over 2 months. The patient was able to ambulate on her own without any support at 2 months after surgery and there was full neurological recovery after 1 year postoperatively.
Discussion

Osteochondromas are the most common benign bone tumours presented as solitary (90%) or multiple lesions (10%).\(^3\) The involvement of the spine is very rare and comprises only 1.3%- 4.1% of all osteochondromas of the spine.\(^4\) With the best of our knowledge there are about 27 cases of thoracic vertebral exostosis in patients with Hereditary Multiple Exostosis (HME) has been described in the literature [Table/Fig-2]\(^2,4-27\) The multiple osteochondromas are present in HME. HME is a genetic disorder with autosomal dominance pattern and are associated with mutations in tumour suppressor genes EXT1 or EXT2 or EXT3 located on chromosome 8q, 11p and 19p respectively.\(^28\) OC are considered as developmental lesions rather than true neoplasms. Although aetiologically not clear, OCs are originated from the separation of epiphyseal growth plate cells followed by herniation through the periosteum adjacent the growth plate.\(^26\) The vertebral OC are more common in younger male patients as seen in our case.\(^22\) About 1% and 4% of solitary osteochondromas and 7% to 9% in hereditary multiple exostoses develop a spinal lesion.\(^27\) The spinal involvement and neurological Complications in multiple osteochondromas is higher than solitary variety.\(^28\) In HME, thoracic and lumbar vertebrae are more commonly affected, while in solitary type cervical spine is commonly involved.\(^17\) The involvement of sacrum is rare in both the types. A review of literature revealed about 27 cases of thoracic myelopathy due to spinal exostosis in HME [Table/Fig-4]. Mean age of the patients was 22.5 years. Nineteen patients were male while seven patients were female. D5 vertebrae (19%) were found to be most commonly affected. Though any part of vertebrae can be involved, the posterior arch is the most commonly affected.\(^24\) In present case pedicle and lamina both were involved. Patients may present with back pain, cosmetic deformity and or a palpable mass. Very rarely vertebral OC may extend into the spinal canal causing cord compression and present with neurological compromise as occurred in our patient. Myelopathy is predominantly seen with multiple OCs.\(^17\) The vertebral OCs are often small, sessile and easily missed on radiography. Computed tomography (CT) is useful to demonstrate spinal OCs which are small and have narrow stalk. In addition it is the best method to detect marrow, cortical continuity of vertebral OC though it was not done in our case. MRI of the whole spine should be performed in these cases to look for skip lesions or other masses and relation of
vertebral OC to the surrounding structures. Asymptomatic vertebral OC can be left as such and patients should be followed up. Review of literature showed surgery was done in majority of cases and resulted in good results in most patients.\(^2\),5,9,19,21-25 Surgical excision and decompression of spinal canal vertebral OC is required in these cases. Similarly the decompression and excision of the mass was done in our case.

### Table/Fig-2: Previously reported cases of thoracic vertebral osteochondromas

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Age</th>
<th>Sex</th>
<th>Family History</th>
<th>Level</th>
<th>Origin</th>
<th>Presenting Complaint</th>
<th>Surgery</th>
<th>Outcome</th>
<th>Follow Up</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannon</td>
<td>1954</td>
<td>23</td>
<td>F</td>
<td>Yes</td>
<td>D 10</td>
<td>NR</td>
<td>Weakness tingling numbness</td>
<td>Laminectomy</td>
<td>Good</td>
<td>NR</td>
<td>No complication</td>
</tr>
<tr>
<td>Larson et al.</td>
<td>1957</td>
<td>33</td>
<td>M</td>
<td>No</td>
<td>D 3</td>
<td>CVJ</td>
<td>Paraplegia</td>
<td>Yes</td>
<td>Good</td>
<td>NR</td>
<td>-</td>
</tr>
<tr>
<td>Decker &amp; Wei</td>
<td>1969</td>
<td>15</td>
<td>M</td>
<td>No</td>
<td>D10</td>
<td>CVJ</td>
<td>Parapareses</td>
<td>Yes</td>
<td>Good</td>
<td>NR</td>
<td>Associated cereb</td>
</tr>
<tr>
<td>Biauu</td>
<td>1975</td>
<td>48</td>
<td>M</td>
<td>NR</td>
<td>D 1</td>
<td>CVJ</td>
<td>NR</td>
<td>Yes</td>
<td>Good</td>
<td>NR</td>
<td>-</td>
</tr>
<tr>
<td>Twersky et al.</td>
<td>1975</td>
<td>53</td>
<td>M</td>
<td>No</td>
<td>D 5</td>
<td>CVJ</td>
<td>NR</td>
<td>Yes</td>
<td>Worsened</td>
<td>NR</td>
<td>Associated costal</td>
</tr>
<tr>
<td>Becker &amp; Epstein</td>
<td>1978</td>
<td>17</td>
<td>M</td>
<td>NR</td>
<td>D 2</td>
<td>CVJ</td>
<td>NR</td>
<td>Yes</td>
<td>Good</td>
<td>NR</td>
<td>-</td>
</tr>
<tr>
<td>Ho &amp; Lipton</td>
<td>1979</td>
<td>58</td>
<td>F</td>
<td>Yes</td>
<td>D 1</td>
<td>D 2</td>
<td>Laminectomy 15-year gradual progression</td>
<td>Poor</td>
<td>12 Mo</td>
<td>No recovery</td>
<td></td>
</tr>
<tr>
<td>Old &amp; Triplett</td>
<td>1979</td>
<td>21</td>
<td>F</td>
<td>Yes</td>
<td>D 1</td>
<td>D 2</td>
<td>Weakness</td>
<td>NR</td>
<td>Good</td>
<td>NR</td>
<td>-</td>
</tr>
<tr>
<td>Buur &amp; Morch</td>
<td>1983</td>
<td>33</td>
<td>M</td>
<td>Yes</td>
<td>D 4</td>
<td>Pedicle</td>
<td>Spastic paraparesis</td>
<td>Laminectomy</td>
<td>Good</td>
<td>7 Mo</td>
<td>-</td>
</tr>
<tr>
<td>Moriwaka et al.</td>
<td>1990</td>
<td>9</td>
<td>M</td>
<td>NR</td>
<td>C 7</td>
<td>P e</td>
<td>Pain thigh, couldn’t</td>
<td>L a a</td>
<td>Improve d/compl</td>
<td>3 Mo</td>
<td>-</td>
</tr>
<tr>
<td>O’Brien et al.</td>
<td>1994</td>
<td>14</td>
<td>F</td>
<td>NR</td>
<td>D 10</td>
<td>P e d ic le</td>
<td>Decreased sensation with paresthesia</td>
<td>Wide laminectomy</td>
<td>Good</td>
<td>1 Mo</td>
<td>-</td>
</tr>
<tr>
<td>Quirini et al.</td>
<td>1996</td>
<td>24</td>
<td>M</td>
<td>NR</td>
<td>D 8</td>
<td>VB endplate</td>
<td>Difficulty in walking,</td>
<td>Excision</td>
<td>Good</td>
<td>NR</td>
<td>-</td>
</tr>
<tr>
<td>Govender &amp; Parbhoo</td>
<td>1999</td>
<td>14</td>
<td>F</td>
<td>NR</td>
<td>D 8</td>
<td>Neural arch</td>
<td>Weakness of both lower limbs and urinary</td>
<td>Po ste rio</td>
<td>Good</td>
<td>3 Mo</td>
<td>Misdia gnosed Tubercu</td>
</tr>
<tr>
<td>Mermer et al.</td>
<td>2002</td>
<td>15</td>
<td>M</td>
<td>Yes</td>
<td>D 5</td>
<td>VB</td>
<td>Weakness of right lower limb</td>
<td>Anterior decom pression of T4-</td>
<td>Good</td>
<td>6 Mo</td>
<td>one or two clonus beats</td>
</tr>
<tr>
<td>Faik et al.</td>
<td>2004</td>
<td>17</td>
<td>M</td>
<td>NR</td>
<td>D 2</td>
<td>Pedicle/ VB</td>
<td>spastic paraparesis</td>
<td>Good</td>
<td>Good</td>
<td>NR</td>
<td>No complication</td>
</tr>
<tr>
<td>Bess</td>
<td>2005</td>
<td>11</td>
<td>F</td>
<td>Yes</td>
<td>D 5</td>
<td>VB</td>
<td>Ataxia, Hyperreflexia</td>
<td>Observation</td>
<td>Good</td>
<td>29 Mo</td>
<td>No complication</td>
</tr>
<tr>
<td>Roach et al.</td>
<td>2009</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>Quadruplegia Progressive weakness</td>
<td>E x c i s i on</td>
<td>Partia lly resol ved</td>
<td>N R</td>
<td>N R</td>
</tr>
<tr>
<td>Ezra et al.</td>
<td>2010</td>
<td>4</td>
<td>M</td>
<td>Yes</td>
<td>C 7</td>
<td>L a m i</td>
<td>Pain in neck &amp; B/L Leg Difficulty in walking urinary</td>
<td>L a m i</td>
<td>Improved</td>
<td>NR</td>
<td>Residual deficits included right arm and</td>
</tr>
<tr>
<td>Gunay</td>
<td>2010</td>
<td>36</td>
<td>F</td>
<td>YES</td>
<td>D 12</td>
<td>Pedicle</td>
<td>Pain, Weakness,</td>
<td>Excision</td>
<td>Laminect</td>
<td>Good</td>
<td>44 Mo slight hyposesthesia</td>
</tr>
<tr>
<td>Lotfinina</td>
<td>2010</td>
<td>31</td>
<td>M</td>
<td>YES</td>
<td>D 8</td>
<td>Face t</td>
<td>B/L Paresthesia,</td>
<td>Laminect</td>
<td>Poor</td>
<td>NR</td>
<td>Partial Improvement</td>
</tr>
<tr>
<td>Tian et al.</td>
<td>2011</td>
<td>16</td>
<td>M</td>
<td>YES</td>
<td>D 6</td>
<td>VB endplate</td>
<td>progressive weakness</td>
<td>L a m i</td>
<td>Good</td>
<td>12 Mo</td>
<td>-</td>
</tr>
</tbody>
</table>
Fig. 3 Intraoperative findings: dorsal approach showing osteochondroma excision from the dorsal T-12 vertebra along with postion of the patient and the excised osteochondroma from the spine.
Conclusion

Though spine is very rare site for osteochondroma it can be seen in cases of Hereditary Multiple exostosis. A vertebral Osteochondroma should be excluded in all patients with hereditary multiple exostosis who presents with spinal pain and neurological deficit. Early imaging is helpful in diagnosing spinal Osteochondroma. Surgical intervention usually yeilds good outcome.

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Author contributions: All authors have made substantial contributions to the publication of this case report.

References


