Osteochondroma of dorsal spine is a rare entity in paediatric age group but still it should be considered a differential diagnosis and once diagnosed treatment for such patients is en bloc resection.

Learning Point of the Article:
Osteochondroma of dorsal spine is a rare entity in paediatric age group but still it should be considered a differential diagnosis and once diagnosed treatment for such patients is en bloc resection.

Abstract

**Introduction**: Osteochondromas are the most common benign tumors of the bone accounting for 35% to 40% of all benign bone tumors. They present in two distinct clinical forms – solitary osteochondroma and multiple osteochondromas. Solitary osteochondroma accounts for 85% of all osteochondroma and is commonly seen in childhood and adolescence. They more frequently affect the appendicular skeleton and are rarely found in spine. Biopsy and imaging help in diagnosis and en bloc resection is the treatment of choice in symptomatic patients.

**Case Report**: We present a case of a 6-year-old girl who presented with swelling over back for 4 years. Radiological evaluation and biopsy were done and the patient was diagnosed with osteochondroma of the left lamina and spinous process of dorsal 12th vertebral body which was managed with extraperiosteal en bloc excision.

**Conclusion**: Osteochondroma of the lamina and spinous process of vertebrae is rare and can be effectively treated by extraperiosteal en bloc resection and has a good post-operative outcome.

**Keywords**: Osteochondroma, en bloc resection, posterior element, spine.

**Case Presentation**

A 6-year-old girl presented with complains of swelling over mid-back for 4 years. The swelling was insidious in onset and had gradually increased in size. The swelling was not associated with pain. The patient had a normal birth and developmental history with no other medical ailment.

Swelling measured 5x5 cm over the back. The swelling was hard, irregular, and fixed to the underlying bone. The skin over the swelling was free. There were no dilated veins or pulsations over the swelling. There were no scars, sinuses, and redness over and around the swelling.

**Anteroposterior and lateral plain radiographs of the dorsolumbar spine and computed tomography of the spine**
were suggestive of osteochondroma of posterior elements of dorsal 12th vertebrae (Fig. 1). Magnetic resonance imaging of the thoracic spine revealed heterogeneous lobulated lesion measuring 4.8x4x4.3 cm arising from the left lamina and spinous process of the 12th thoracic vertebra (Fig. 2). Core needle biopsy was done and histopathological examination was suggestive of osteochondroma.

The patient was planned for extraperiosteal en bloc removal of the tumor. A midline incision was taken over the tumor and complete excision including the perichondrium was done. Histopathology examination confirmed osteochondroma (Fig. 3).

Postoperatively, the patient was started with bedside mobilization and walking with the support of a walker from the 4th post-operative day. The patient had no pain and was able to walk freely without any support. At subsequent follow-up at 3 months, 6 months, and 12 months, no signs of recurrence were seen (Fig. 4).

**Discussion**

First described by Sir Astley Cooper in 1818, osteochondroma is the largest group of benign bone tumors, which are composed of spongy bone covered by a cartilaginous cap [4]. Many theories have been proposed to explain the etiology of osteochondroma, all of them relating to alterations to the growth plate [5]. Germ line mutations in EXT1 and EXT2 genes located on chromosomes 8 and 11 have been associated with the cause of the disease. Although it is most common benign tumors of the bone accounting for 35% to 40% of all benign bone tumors, it usually occurs in long bones and rarely involves the spine [1]. Only 3% to 4% of solitary osteochondromas arise in spine and occur in approximately 9% of patients who are affected by hereditary multiple exostosis. The tumors are thought to arise through a process of progressive endochondral ossification of aberrant cartilage of a growth plate [1, 5]. It affects mainly the cervical and dorsal spine, probably related to different durations of the ossification processes that occur in the secondary centers of ossification. It can be speculated that the more rapidly the ossification process of these centers develops, the greater the probability that aberrant cartilage will form is. In adolescence, secondary ossification centers, which lie in the spinous process, transverse process, articular process, and the endplate of vertebral body, complete the growth of the vertebral column. The tumor can be asymptomatic or symptomatic, either causing pain by pressure on adjacent soft-tissue structures when it grows posteriorly, or, more rarely, causing radicular or spinal compression symptoms, when it grows into the spinal canal [2, 5, 6, 7, 8]. On gross appearance, the lesion appears as firm, lobulated, pedunculated, or sessile mass varying in size, covered by fibrous tissue/perichondrium which is in continuity with the periosteum of underlying bone. Marrow and cortical continuity with the underlying parent bone defines the lesion and this feature is better visualized on computed tomography scan [5]. Magnetic resonance imaging is useful to determine the extent of neurologic structures compromise and it identifies lesions that look suspicious of malignant transformation [5]. Chang et al. performed an en bloc resection of the osteochondroma of transverse process of the left 5th cervical vertebrae of a 63-year-old male with symptoms getting relieved post resection [9]. Raswan et al. reported a case of vertebral osteochondroma arising from the lamina of 3rd cervical vertebra, presenting with features of compressive myelopathy in a 15-year-old boy. Total excision of the tumor was carried out along with lamina of C3 vertebra, the patient recovered significantly [10]. Ganesh et al. reported a case of a 9-year-old boy with osteochondroma of facet joint and the pedicle of 4th
| Author and Year                     | Number of patients | Age(year) / sex | Diagnosis                                      | Presentation                          | Outcome post resection                  |
|------------------------------------|--------------------|-----------------|-----------------------------------------------|---------------------------------------|-----------------------------------------|
| Pawar E et al                      | 14                 | 43 /male        | L4 Spinous process                           | Pain and hyposthesia                  | Good                                    |
|                                    |                    | 26 /male        | C1-C2 lateral mass                           | Swelling, pain and quadriplegia       | Good                                    |
|                                    |                    | 11 /male        | T1-7 laminar                                 | Swelling, pain and paraparesis        | Good                                    |
|                                    |                    | 60 /female      | C1 lateral mass                              | Pain, dysphagia and hyposthesia       | Restricted range of motion and dizziness post resection |
|                                    |                    | 34 /female      | C1-C2 lateral mass                           | Swelling, pain and quadriplegia       | Good                                    |
|                                    |                    | 17 /female      | C1 processus transverse                      | Swelling, pain and hyposthesia        | Good                                    |
|                                    |                    | 63 /female      | C5-C7 Lamina                                 | Swelling, dizziness and hyposthesia   | Good                                    |
|                                    |                    | 17 /female      | T6 vertebrae                                 | Paraparesis and hyposthesia           | Good                                    |
|                                    |                    | 49 /female      | C2-C3 Vertebral body                         | Quadriplegia and hyposthesia          | Worse                                   |
|                                    |                    | 68 /female      | L2 processus transverse and lamina           | Pain, hyposthesia and quadriplegia    | Good                                    |
|                                    |                    | 56 /female      | T5 vertebral body                            | Back pain, hyposthesia and paraparesis| Only Partial function recovery           |
|                                    |                    | 57 /female      | C5 vertebrae                                 | Dizziness and paraparesis             | Good                                    |
|                                    |                    | 16 /male        | T5-6 processus spinous and processus transverse | Paraparesis and hyposthesia          | Good                                    |
|                                    |                    | 15 /male        | C2-C3 lamina                                 | Quadriplegia                          | Good                                    |
|                                    |                    | 57 /male        | Right inferior articular process of L4 vertebral body | Right leg pain over L5 dermatome      | No symptoms at 6 years follow up        |
|                                    |                    | 63 /female      | Superior articular process of right S1 vertebral body | Motor weakness at right lower extremity | Motor weakness gradually improved and no complaints at 7 years follow up |
|                                    |                    | 48 /female      | Right L4 inferior articular process          | Low back and left leg pain over L5 dermatome | Leg pain relieved but mild low back pain still present at 3 years follow up |
|                                    |                    | 32 /male        | Inferior articular process of right L4 vertebral body | Pain in right buttock and lateral surface of thigh | Symptom free immediately after resection |
|                                    |                    | 62 /male        | Inferior articular process of right L4 vertebral body | Pain involving bilateral buttocks and legs | Pain relieved and post-operative course uneventful |
|                                    |                    | 20 /female      | Right lateral side of C1, extending to C2 and spinous process of C5, and C7 | Pain in the cervical region, accompanied by paresthesias in the right upper limb | Asymptomatic |
|                                    |                    | 21 /male        | Spinous process of L2, L3, L4                | Low back pain                         | Asymptomatic |
|                                    |                    | 70 /male        | Spinous process of 5th lumbar vertebrae      | Pain                                  | Completely relieved from pain            |
|                                    |                    | 17 /male        | Posterior vertebral body of T9 vertebrae     | Bilateral feet numbness and gait difficulty | Complete neurologic recovery             |
|                                    |                    | 15 /male        | Lamina of C3 vertebral body                  | Compressive myelopathy                | Normal power in all 4 limbs by 10th post operative day |
|                                    |                    | 48 /female      | posterior arch of C1                         | Numbness, paresthesia and difficulty in walking | Symptoms improved immediately after surgery and No residual deficit |
|                                    |                    | 6 /female       | Left C6 lamina                               | Neck pain                             | Good                                    |
|                                    |                    | 35 /male        | Posterior elements of T12                   | Mid back pain                         | Good                                    |
|                                    |                    | 11 /male        | C6 vertebrae                                 | Right posterior neck swelling         | Good                                    |
|                                    |                    | 36 /female      | Right C3 lamina                              | Neck pain and progressive myelopathy  | Good                                    |
thoracic vertebrae extending into the spinal canal superiorly up to 3rd thoracic vertebral level on the left side with severe spasticity of both lower limbs with features of myelopathy. He underwent a 3rd and 4th thoracic vertebral laminecemy and total excision. There was a significant improvement in the lower limb spasticity and was independent for activities of daily living at 6 months follow-up [11]. Rosa et al. reported a case of spinous process osteochondroma of 5th lumbar vertebrae, and after marginal excision, the patient was relieved of pain [12]. García-Ramos et al. reported two cases of spinal osteochondroma, one of spinous process of 2nd, 3rd, and 4th lumbar vertebra and other of the right lateral side of 1st cervical vertebrae, extending to 2nd cervical vertebrae, and spinous process of 5th and 7th cervical vertebrae, in both the patients, resection was done with excellent post-operative outcome [13]. Lotfinia et al. reported a case of solitary osteochondroma arising from the posterior arch of 1st cervical vertebrae, causing left-sided ascending numbness and paresthesia and difficulty walking which were relieved after excision through posterior approach [14]. An extensive review was done in PubMed, SCOPUS, and Ovid Medline with keywords being spinal osteochondroma, lumbar spine osteochondroma, and cervical spine osteochondroma. Out of the 34 cases, 31 had good post-operative outcome and only 3 had residual symptoms post-resection of tumor (Table 1). Hence, when symptomatic, the treatment of choice of osteochondromas should be surgical resection. The resection can be achieved in the majority of cases without spinal instrumentation because it rarely compromises the spinal stability, as osteochondromas show focal growth in the posterior elements. The most concerning complication of osteochondromas is malignant transformation, fortunately a rare complication [15, 16].

Conclusion

Osteochondroma is a relatively common bone tumor, accounting for 35–40% of all benign bone tumors, but occurs infrequently in the spine accounting for <3% of all osteochondromas. The best approach to treatment in almost all symptomatic cases is marginal excision of the tumor. Meticulous surgical excision, with complete resection of the cartilaginous cap of the tumor, is important in preventing recurrence. When tumor excision is performed adequately, the outcomes are excellent with very low recurrence rates.

Clinical Message

Osteochondroma is less common in spine and can be treated effectively by extraperiosteal en bloc resection.

References

1. Qasem SA, Deyoung BR. Cartilage-forming tumors. Semin Diagn Pathol 2014;31:10-20.
2. Gaetani P, Tancioni F, Merlo P, Villani L, Spanu G, Baena RR. Spinal chondroma of the lumbar tract: Case report. Surg Neurol 1996;46:534-9.
3. Thangavel M, Sivaram R, Jan W, Tariq A, Shanmugasundaram S. Extraarticular extrasynovial solitary osteochondromatosis of the ankle: A rare case report and review of literature. Int J Surg Case Rep 2020;75:61-5.
4. Schramm G. Pathogenesis of cartilaginous exostoses and enchondromas. Arch orthop 1929;27:421.
5. D’Ambrosia R, Ferguson AB Jr. The formation of osteochondroma by epiphyseal cartilage transplantation. Clin Orthop Relat Res 1968;61:103-15.
6. Carrera JE, Castillo PA, Molina OM. Lumbar lamina osteochondroma and root compression. Report of a case. Acta Ortop Mex 2007;21:261-6.
7. Kumar SM, Rai BK, Kumari SS, Noel VC. Solitary osteochondroma of L4 spinous process-a rare presentation. J Evol Med Dent Sci 2013;2:9520-4.
8. Xu J, Xu CR, Wu H, Pan HL, Tian J. Osteochondroma in the lumbar intraspinal canal causing nerve root compression. Orthopedics 2009;32:133.
9. Chang DG, Park JB. Osteochondroma arising from the transverse process of the lower cervical spine in an elderly patient. World Neurosurg 2019;130:450-3.
10. Raswan US, Bhat AR, Tanki H, Samoon N, Kirmani AR. A solitary osteochondroma of the cervical spine: A case report and review of literature. Childs Nerv Syst 2017;33:1019-22.
11. Ganesh S, Jonathan GE, Patel B, Prabhu K. Solitary facet joint osteochondroma of the upper thoracic spine: An unusual cause of cord compression in the pediatric age group. Neurol India 2018;66:555-6.
12. Rosa B, Campos P, Barros A, Karmali S, Ussene E, Durão C, et al. Spinous process osteochondroma as a rare cause of lumbar pain. Case Rep Orthop 2016;2016:2683797.
13. García-Ramos CL, Buganza-Tepole M, Obil-Chavarria CA, Reyes-Sánchez AA. Spinal Osteochondroma: Imaging...
How to Cite this Article
Pawar E, Gavhale S, Bansal S, Dave H, Yadav A, Akshay KS. Solitary Osteochondroma of Posterior Elements of the Spine: A Rare Case Report. Journal of Orthopaedic Case Reports 2020;10(8):1-5.

Diagnosis and Treatment. Case report. Cir Cir 2015; 83:496-500.

14. Lotfinia I, Vahedi A, Aeinfar K. Cervical osteochondroma with neurological symptoms: Literature review and a case report. Spinal Cord Ser Cases 2017;3:16038.
15. Altay M, Bayrakci K, Yildiz Y, Erekul S, Saglik Y. Secondary chondrosarcoma in cartilage bone tumors: Report of 32 patients. J Orthop Sci 2007;12:415-23.
16. Gille O, Pointillart V, Vital JM. Course of spinal solitary osteochondromas. Spine (Phila Pa 1976) 2005;30:E13-9.
17. Zaijun L, Xinhai Y, Zhipeng W, Wending H, Quan H, Zhenhua Z, et al. Outcome and prognosis of myelopathy and radiculopathy from osteochondroma in the mobile spine: A report on 14 patients. J Spinal Disord Tech 2013;26:194-9.
18. Kuraishi K, Hanakita J, Takahashi T, Watanabe M, Honda F. Symptomatic osteochondroma of lumbosacral spine: Report of 5 cases. Neurol Med Chir (Tokyo) 2014;54:408-12.
19. Pham MH, Cohen J, Tuchman A, Commins D, Acosta FL. Large solitary osteochondroma of the thoracic spine: Case report and review of the literature. Surg Neurol Int 2016;7:S323-7.
20. Yakkanti R, Onyekwelu I, Carreon LY, Dimar JR. Solitary osteochondroma of the spine-a case series: Review of solitary osteochondroma with myelopathic symptoms. Global Spine J 2018;8:323-39.
21. Garg B, Batra S, Dixit V. Solitary anterior osteochondroma of cervical spine: An unusual case of dysphagia and review of literature. J Clin Orthop Trauma 2018;9:S5-7.
22. Milton CK, O’Connor KP, Smitherman AD, Conner AK, Martin MD. Solitary osteochondroma of the cervical spine presenting with quadriparesis and hand contracture. Surg Neurol Int 2020;11:51.

| Conflict of Interest: Nil |
| Source of Support: Nil |
| Consent: The authors confirm that informed consent was obtained from the patient for publication of this case report |