OSTEOID OSTEOMA AND OSTEOBLASTOMA OF THE SPINE

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Seven patients with osteoid osteoma and four patients with osteoblastoma of the spine were followed after operative excision of the tumor. The patient group consisted of 11 patients, 6 females and 5 males, with mean age 14.4 years (4 to 20). The average follow-up period was 25.4 months with a range from 6 months to 4.5 years.

The lumbar spine was involved in eight cases, thoracic spine in two and cervical spine in one. In all cases, the lesion was located in the posterior vertebral elements with a common complaint of back pain on presentation. Aspirin or naproxen afforded good symptomatic relief in four patients. Two patients presented with painful scoliosis.

Full recovery followed complete excision in all cases. One case required posterolateral fusion and instrumentation due to instability created by excision of the lesion. Following surgery, pain complaint was completely relieved and by one case the spinal curvature had partially regressed.

An underlying osteoid osteoma or osteoblastoma of the spine must be strongly suspected in all young patients presenting with back pain and painful scoliosis. Preoperative evaluation should include a bone scan and computed tomography to lozalize the tumor accurately. If early diagnosis can be achieved, the scoliosis is reversible after excision of the tumor. When the spine becomes unstable due to the extet of the excision, stabilization may be required.

Keywords: *Osteoid osteoma, osteoblastoma, spine.*

Osteoid osteoma and osteoblastoma are benign bone-forming tumors that are histologically similar but may have a different natural history. Osteoid osteomas account for approximately 11% of all primary benign bone tumors and 10% of these occur in the spine. Osteoblastomas are directly related to osteoid osteomas and differ mainly in size. Osteoblastomas are langer than osteoid osteomas and differ mainly in size. Osteoblastomas are larger than osteoid osteomas. They are usually more than 2 cm in diameter. Osteoblastomas account for less than 1% of all bone tumors. More than 40% of reported cases have been located in the spine. The majority of these tumors present during the first two decades of life (1, 3, 6, 15).

These tumors often produce pain in the back or the neck and painful scoliosis or radicular or referred-type pain in the lower limb or the shoulder (1, 3, 9, 10, 15, 16). They should be included in the differential diagnosis of any young patient with these complaints. Early diagnosis and excision of these tumors are important to reduce the duration of pain and hopefull to reverse the associated scoliosis.

The purpose of this study is to evaluate the presentation, treatment of osteoid osteoma and osteoblastoma of the spine and the behaviour pattern of the scoliosis associated with these lesions.

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PATIENTS AND METHOD

Seven patients with osteoid osteoma and four patients with osteoblastoma of the spine were evaluated after operative excision of the tumor. 6 patients were girls and 5 boys with an average age of 14.4 years. (range 4 to 20 y.). The average follow-up was 25.4 months, ranging from 6 months to 4.5 years.

Eight cases involved the lumbar spine, two the thoracic spine and one the cervical spine. In all 11 patients the lesion was situated in the posterior vertebral elements such as the laminae, transverse processes and pedicles.

All patients complained of back pain on presentation. Aspirin or naproxen afforded good symptomatic relief in four patients with osteoid osteoma. Two patients presented with painful scoliosis. The clinical data are summarized in Table 1.

Radiography, computerized axial tomography and scintigraphy proved to be efficient for the diagnosis, which was confirmed histopathologically postoperatively.

Excision only was performed in 10 cases, one patient required posterior fusion with Cotrel-Dubousset instrumantation due to the development of instability.

RESULTS

Postoperative disappearance of the pain symptoms was observed in all patients, and thy remained without pain until the most recent follow-up evaluation. All

Table 1. Clinical features of the patients

Case	Age, Sex	Vertebra	Location	Tumor	Pain		Scoliosis		Treatment	Follow up
					preop.	postop	preop.	postop		
1	17 M	T10	Pedicle	Osteoid ost.	+	-	15°	15°	Excision	26 mo.
2	16 F	L3	Pedicle	Osteoid ost.	+	-	40°	20°	Excision	24 mo.
3	5 F	L3	Pedicle	Osteoid ost.	+	-	-	-	Excision	38 mo.
4	11 F	L5	Pedicle	Osteoid ost.	+	-	-	-	Excision	4.5 y.
5	4 M	L5	Lamina	Osteoid ost.	+	-	-	-	Excision	18 mo.
6	15 M	L5	Pedicle	Osteoid ost.	+	-	-	-	Excision	20 mo.
7	19 F	L3	Pedicle	Osteoblast	+	-	-	-	Exc.+Post. Fus.+CDI	15 mo.
8	16 M	L4	Lamina	Osteoblast.	+	-	-	-	Excision	4 y.
9	20 F	T10	Trans. proc.	Osteoid ost.	+	-	-	-	Excision	8 m.
10	20 M	L3			+	-	-	-	Excision	8 mo.
11	16 F	C7	Lamina	Osteoid ost.	+	-	-	-	Excision	20

patients returned to normal daily activity levels within 6 months postoperatively.

During the follow-up evaluation 24 months postoperatively, a patient with 40° scoliosis preoperatively showed significant improvement of the deformity, to 20°. Improvement in this patient occurred despite the presence of significant vertebral rotation at the time of operation (Figure 1). The other patient with a 15° deformity, who had a 2- year history of pain, did not exhibit any correction in the deformity postoperatively.

Recurrence was not observed in any case.

DISCUSSION

As a result of their histologic similarity, osteoid osteomas and osteoblastomas are frequently considered together when assessing methods of evaluation and treatment. Most authors believe that both osteoid osteoma and osteoblastoma are variant manifestations of a benign osteoblastic process (3, 4, 6, 12, 18). The primary difference between the two lesions is the tendency of osteoblastomas to form less sclerotic but more expansile masses. Osteoid osteomas are more sclerotic, non-expansile, and become painful earlier in their de-

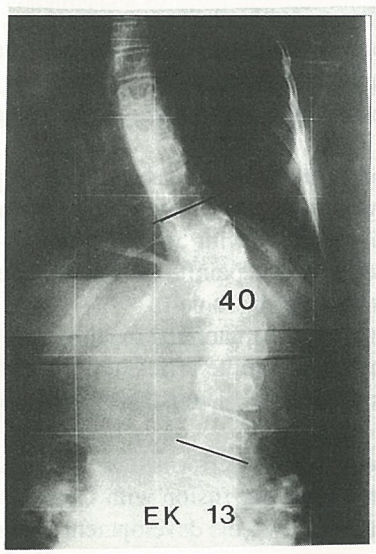


Figure 1.A.

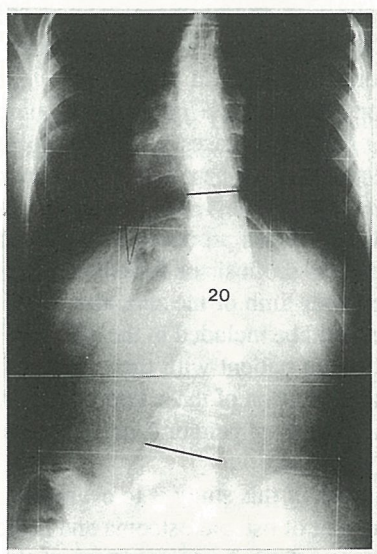


Figure 1.B.

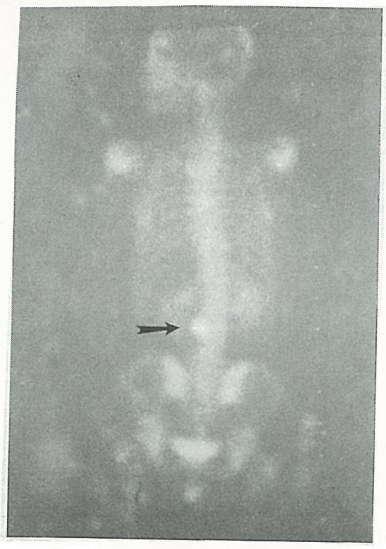


Figure 1.C.

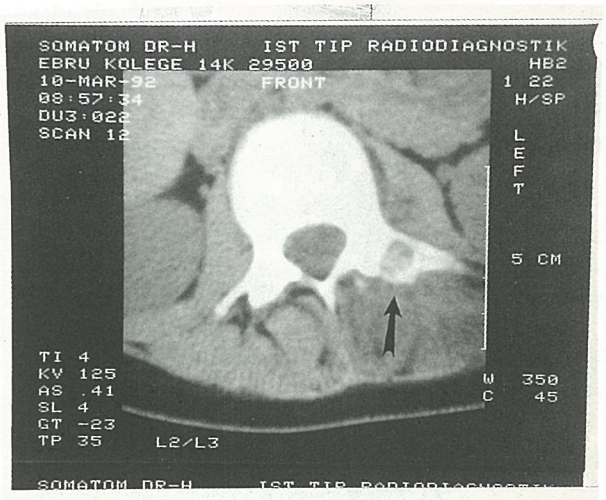


Figure 1.D.

Figure 1. This patient with 40° scoliosis preoperatively showed significant improvement of the deformity, to 20°.

velopment. Osteoblastomas, however, demonstrate enlargement and progression with possibility of late malignant transformation.

These tumors tend to occur in the lumbar spine, as demonstrated in this series. They also involve the posterior elements of the vertebra, especially in the region of the base of the transverse process. However, osteoblastomas, as a result of their propensity to expand, may grow to involve the posterior portion of the vertebral body adjacent to the pedicle. It is of interest that this site corresponds with the primary ossification centre for each half of the neural arch (3, 5, 7, 10, 14, 15, 17, 18). All tumors in our series occured in the posterior elements, especially the laminae and pedicles, as those in the literature.

Pain is the earliest and the most common symptoms. Pain increasing during the night, unrelated to physical activity and good response to aspirin or other antiinflamatory drugs, NSAIDs, are typical for osteoid osteomas. However, this is not the rule in all cases. Some series report reduction of pain in 90% of cases while some report a lower a rate (3, 10, 15, 18). Analgesic agents do not relieve pain associated with osteoblastomas as effectively as they relieve the pain of osteoid osteoma. All patients in our series complained of pain on presentation. However, aspirin and naproxen afforded good symptomatic relief only in four cases with osteoid osteoma. Two patients presenting expansion into the medullary cavity complained of radicular pain. Following surgery pain symptoms have totally disappeared.

Another important clinical symptom is scoliosis. In childhood and adolescence, true painful scoliosis is a rare incidence. The most common causes of painful scoliosis in these age groups are osteoid osteomas and osteoblastomas. Lesion site is usually at the apical region of the deormity and on the side of the concavity. Marsh et al (12) and Mehta (13) report development of scoliosis in 50% of spinal osteoblastomas. Pettine et al report 63% scoliosis in their series (15). In our series, only two cases presented with painful scoliosis (18%), this rate is lower than the rates in other series.

All authors agree that patient age and duration of the symptom are related to the prognosis of the deformity (1, 9, 15, 18). Following the removal of the painful stimulus, correction is probable in cases in whom scoliosis appears before skeletal maturation is completed and the duration of symptoms is less than

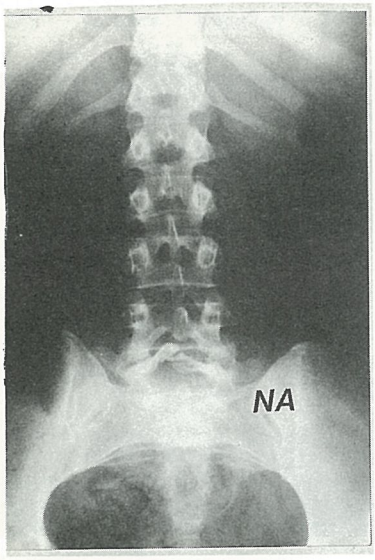
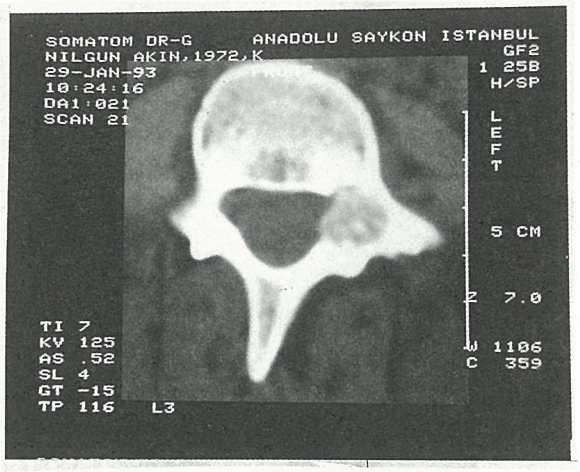


Figure 2.A.



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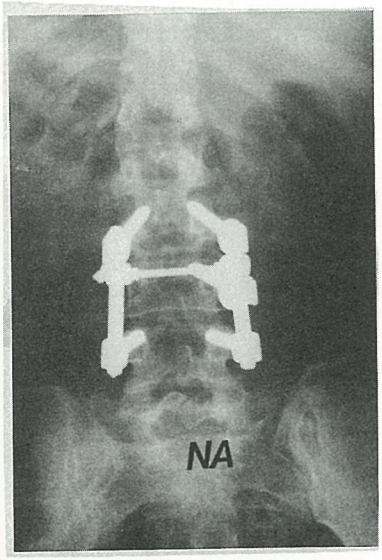

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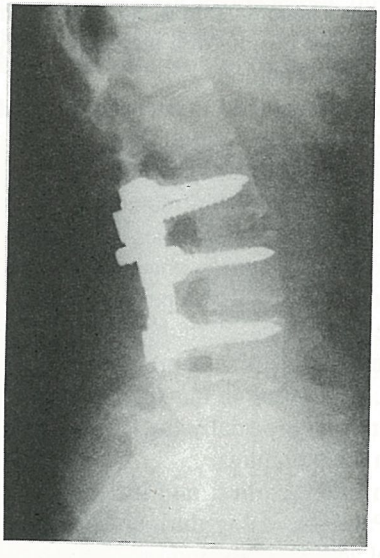

Figure 2.D.

Figure 2. This patient required posterior fusion with Cotrel-Dubousset instrumantation due to the development of instability.

15 months. In the growing child, the scoliosis, which may at first be secondary to paravertebral muscle

spasm, can deteriorate in the presence of the continued painful stimulus to develop vertebral rotation with structural characteristics. As Ransford et al. mention, it is possible that in the concavity of the curve there is increased pressure on the vertebral epiphysial growth plate resulting in retardation of growth. The unaffected half of the vertebral plate together with the neural arch continue to grow at the normal rate. This results in a true rotatory scoliosis. If the provocative stimulus is removed before a critical point is reached, the affected part of the vertebral epiphysis retains the capacity to recover, and given sufficient time for skeletal maturity, the scoliosis will resolve. Prolonged pressure on the growth plate beyond this critical point may cause permanent damage and the outcome may be a progressive scoliosis despite excision of the lesion (16). One case in our series showed correction of the deformity. In this case, the correction occured despite the presence of structural changes and the fact that the duration of the deformity was longer than 15 months. Therefore, we believe that even when the duration of symptom is long, it would be appropriate to excise the lesion and wait for the deformity to regress.

These tumors often produce pain before they are visible on roentgenograms, as both tumors occur most commonly in the cancellous lamina and pedicle of the vertebrae, where early, roentgenographically detectable sclerotic changes may not occur. Therefore, dependence on routine roentgenograms can often delay the diagnosis. In contrast to osteoid osteomas, plain roentgenograms are usually sufficient to make the diagnosis of osteoblastoma. The technetium bone scanning is a helpful adjunctive tool for the localization of a small lesion in the evaluation of the patient with painful scoliosis. Tecnetium bone scanning can aid in establishing the diagnosis while the roentgenograms are still negative, by showing a non-specsific but intense, well-defined local uptake of activity. The advent of computarized axial tomography has an important influence on the surgical treatment of these lesions. CT allows a precise localization of the nidus and distinguishes the centre of the lesion from the surrounding sclerosis. Direct roentgenograms provided detection of the lesion in only two cases in our series. In two cases with scoliosis, diagnosis was achieved by CT scanning of the area detected through scintigraphy.

With radiculopathy or myelopathy, one may consider performing CT myelography or MRI imaging.

It is a common belief that the choice of treatment for these tumors is surgical excision of the lesion (1, 2, 3, 4, 6, 8, 14, 15, 17, 18). The results generally show that in 90-95% of cases the pain symptoms disappear and the painful scoliosis may regress spontaneously given that surgical excision is performed before the critical period (1, 9, 16, 18).

However, in recent years, long-term non-steroidal antiinflamatory drug therapy is reported as an alternative approach in the therapy of osteoid osteomas, when surgical therapy would be complicated and disabling (11). This effect is thought to be a result of the inhibition of prostaglandins. Kneisl et al. found that the use of non-steroidal anti-inflamatory drugs on a long-term basis was often as effective as operative treatment for osteoid-osteomas in their series of patients (11).

Despite the fact that spinal osteoid osteomas carry the potential to regress spontaneously or respond to medical therapy, early surgical intervention is still essential in that it provides early reconstruction of spinal mobility and return to normal daily activity levels and also regression of the deformity before structural changes appear. Moreover, potential complications of long-term medical therapy should also be kept in account. Therefore, we believe that medical therapy should be reserved for patients in whom surgical intervention could be more deleterious than the current complaints themselves. There are situations in which a lesion is inaccessible to the surgeon even with the most carefully planned operative exposure and in which removal may cause complications or disability. In such instances, complete excision of the lesion might result in disability more severe than that associated with the original condition.

Complete extirpation of the nidus is the most predictable way to cure osteoid osteoma and should be the goal of surgical intervention. Rates of local recurrence are inversely related to the aggressiveness of surgery. Intralesional resection or curettage has the highest, and en block resection the lowest recurrence rates (2, 6, 15, 18). Proper pre- and intraoperative localization of the tumor is critical to ensure an adequate resection and minimize the chance of recurrence. Therefore, preoperative CT scanning is of utmost importance.

Osteoblastomas are slowly growing lesions that are locally expansive and destructive, yet marginal resection of the lesions appears to be curative. In the vertebrae, intralesional curettage is often used. Intralesional procedures such as curettage are associated with a high recurrence rate. Most authors recommend complete extirpation when possible and believe this to be curative in most cases (5, 6, 18). Radiation therapy remains

controversial and has been reported by some investigators to be ineffective. Weinstein believes that radiation therapy should be used only as a final option when a patient is not a candidate for further surgical intervention (18). Malignant transformation, spinal cord compression, and aggravation of spinal cord compression has been reported (17).

Fusion and instrumentation may be necessary when instability develops following excision of these tumors. Instrumentation provides a decrease in the time period required to return to normal daily activity levels.

CONCLUSION

An underlying osteoid osteoma or osteoblastoma of the spine must be strongly suspected in all young patients presenting with back pain and painful scoliosis. Preoperative evaluation should include a bone scan and computed tomography to localize the tumor accurately. If the diagnosis is made early, the scoliosis is reversible after excision of the tumor. When the spine becomes unstable due to the extent of the excision, stabilization may be required.

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