A retrograde analysis of 64 spinal osteoblastomas treated by surgery during the period 1963 - 2005 has been made. Spinal osteoblastomas were presented in 36% of all skeletal localizations. There were 44 male and 20 female patients. The average age of patients at the time of surgery was 14 years. Localizations of the osteoblastomas were cervical spine in 8 cases, dorsal spine in 16 cases, lumbar spine in 38 cases and sacrum in 2 cases. Osteoblastomas predominantly involved posterolateral vertebral elements, although in two cases a primary localization was in vertebral bodies. Neurological deficits were relatively moderate, but a paraplegia occurred in six patients. Scoliosis was present in 50% of cases, and their respective prognosis depended on the duration of the painful syndrome as well as on the age when the disease had set up. According to Enneking classification 30 patients were evaluated as stage 2 and 34 others as stage 3. Relapses were noticed in 8 (12.5%) patients. Clearly delineated lesions were treated by an intraleisional procedure, but aggressive ones were treated by a marginal surgery followed by additional radiotherapy (6 patients). The average follow-up period was 13 years.

Key words: spine, osteoblastoma, paraplegia

INTRODUCTION

Benign osteoblastoma is a very rare lesion presenting 1 percent of all primary bone tumors or about 2.5 – 3.0 percent of all benign bone tumors. Osteoblastoma had been recognized as a tumor entity by Jaffe and Lichtenstein in 1956. In an analysis of 364 osteoblastomas in different sites, Huvos reported that they been most frequently found in the spine, as much as 34 percent. In a comparative study of a considerable number of osteoid osteomas and osteoblastomas, Janin described their similarities as well as differences. In a large series of spinal osteoblastoma cases Nemoto demonstrated clinical and radiological features of the tumor. Boriani distributed osteoblastomas in his study according to Enneking’s classification of benign lesions. In this retrospective study we are reporting on 64 spinal osteoblastomas treated by surgery.

MATERIALS AND METHODS

During the 42 years long period between 1963 and 2005, 168 patients with the histological confirmed diagnosis of osteoblastoma had been treated in our institution. 64 of them had a spinal location of the tumor. All patients had been surgically treated. For the purpose of this study, all histological specimens have been retrograde revised by three pathologists, independent each to other. Osteoblastoma has been defined as a benign lesion with an abundantly vascularized stroma containing a great number of very active osteoblasts (creating osteoid and primitive osseous trabeculae with somewhat more regular orientation). Osteoblasts are usually larger with atypical nuclei and more frequent and sometimes pathological mitoses. Mineralization of bone trabeculae is uneven and irregular, osteoclasts are numerous especially around the zones of hemorrhage.

In a histological aggressive osteoblastoma bone trabeculae are broad and irregular. The deposited osteoid is usually stacked in layers (lamelated) but not trabeculated. Swollen, enlarged osteoblasts coating trabeculae or osteoid are a typical feature. The stroma is fibrous, made of spindle cells, with an increased cellularity and focus whirling cellular agglomerations. Into individual research cards had been notified patient’s complaints and their duration, clinical features, radiographic findings, surgical procedures, histological findings as well as the out-patient following-up. In the study we are trying to find location in respect to spinal segments as well as to the part of the involved vertebra. We analyzed all aspects of the pain (intensity, duration, existence of night - pains, control of pain by Aspirin and other
NSAID, radicular pain), mobility of the spine, neurological deficit and appearance of scoliotic deformity, as well. Respective sizes of tumors we have been determining by radiographic measurements and from operative protocols. Scoliosis have been measured after Cobb-Lippman’s method and degree of rotation after Nash-Moe’s one. Staging of osteoblastomas we have been estimating using clinical, histological and radiological data2, 3, 20.

Relapse rates have been taken into consideration only for patients primarily treated at our Institute. On the end, the final results of respective treatments have been obtained on the basis of complaints, clinical and radiographic findings and telephone inquiries.

RESULTS

From 64 examined patients, 44 (69%) were males and 20 (31%) females, indicating the sex ratio of 2.2:1. The age of males ranged between 6 and 26 years, in average 14, and in females it ranged between 8 and 18, in average 15 years. Periods between a setting up of initial complaints and the histological diagnosis ranged between one and thirty six months, averagely 14 months. 8 patients had their osteoblastomas on the cervical spine: 2 on the left and 6 of the right side, 16 other patients had their tumors on the dorsal spine: 12 of them on the right and 4 on the left side, in still other 38 patients osteoblastomas were on the lumbar spine: 14 on the left and 24 on the right side and finally, there was 2 patients with the tumor on the sacral bone on its right side. (Fig. 1)

All patients suffered from pain. 24 patients had pain of moderate intensity, but 40 of them had severe pain. Night pains were present in 28 patients and the radicular pain in 38. We could control the pain by Aspirin in 16 (25%) patients and in other 48 (75%) of them by non-steroid anti-inflammatory drugs (NSAID).

Spinal rigidity, associated initially with painful scoliosis and decreased forward bending, was observed in 40 patients. Torticollis was present in four patients, but scoliosis in 50%. The tumor was commonly located near the top of the scoliosis concavity. The level of a respective lesion has been coinciding closely with the curvature top, except in 8 patients who all had the location in the fifth lumbar vertebra. Those patients had their curvature tops somewhat superiorly to the lesions, as well as noticeable pelvic obliquities.

The average size of thoracic scoliosis, being six sinistroconvex and two dextroconvex, amounted 28 degrees, ranging between 14 and 39 degrees and with a rotation of the first degree in 6 patients and without rotation in 4 of them.

Average size lumbar scoliosis (16 dextroconvex and 8 sinistroconvex amounted 28 degrees, ranging between 14 and 39 degrees and with a rotation of the first degree in 6 patients and without rotation in 4 of them.

Average size lumbar scoliosis (16 dextroconvex and 8 sinistroconvex amounted 18 degrees, ranging between 10 and 32, with the first degree of rotation in 8 patients and without is in the rest 16 of them). A positive Lasegue’s (strait leg rising) sign had 16 (50%) patients. The neurological deficit was usually of a slight nature, but in six patients developed a spastic paraplegia with sphincter incontinence. Two of these patients completely recovered, but the other four remained in the state of a spastic paraparesis permanently.

The average size of the osteoblastomas in our series amounted 32 mm in diameter, except six tumors which had much bigger dimensions: two of them were located on the cervical spine with the size of 80 x 40 mm Fig. 2, other two were on the dorsal spine with the size 100 x 50 mm Fig.3 and last two tumors were on the lumbar spine with the size of 90 x 45 mm.

| POSITION OF VERTEBRA INVOLVED IN 64 PATIENTS WITH BENIGN OSTEOBLASTOMA OF THE SPINE |
|---------------------------------|---|---|---|---|
| Vertebral body only             | 2 | 2 | 2 | 2 |
| Lamina only                     | 4 |   |   |   |
| Pedicle only                    |   | 8 |   |   |
| Body plus two or more posterior elements | 2 | 6 | 2 |   |
| Posterior elements              | 2 | 8 | 26|   |
| TOTAL                           | 8 | 16| 38| 2 |
All patients were treated surgically. 48 (75%) have been cured practically by the first procedure and, from them, 30 (stage 2) by an intralesional procedure and the other 18 patients (stage 3) by a marginal procedure followed by radiotherapy in 4 patients.

The other group consisted of 16 patients (stage 3) and from 8 was primarily treated at our institution: they underwent several procedures before attaining a cure, on account of their relapses. The other 8 from the same group had been primarily treated elsewhere by laminectomies, but because of emerging relapses, the final surgery was performed in our institution.

On the basis of Enneking’s classification of benign tumors we distributed the osteoblastomas in our series as follows: 30 patients were with stage 2 and 34 with stage 3. Those osteoblastoma cases which had been diagnosed and treated before the appearance of Enneking’s classification, were estimated retrograde on the basis of a meticulous revision of respective clinical, radiographic and histological findings.

Postoperative following – up ranged between 6 and 420 months, in average 26 years. The relapse rate in patients primarily treated in our institution amounted 12.5%.

The results of treatment we have been evaluating by subjective complaints, clinical features and radiological examination. First of all we have taken into consideration the presence of pain, spinal mobility and the presence of scoliosis or kyphosis and of a neurological deficit. At the end of treatment there were: excellent 30 (47%), very good 18 (28%), good 12 (19%) and bad 4 (6%).

**DISCUSSION**

In our series, osteoblastomas have been appearing most frequently in the period of first two decades of life (70%), especially in the 14-th year. It has been more frequent in males. The lumbar spine was the most frequent site of the lesion and on the vertebra itself the predominant sites were its posterior elements. We could observe 4 primary localizations on vertebral bodies, what presents a rarity.

The main and dominant symptom in all our patients was pain, which increased by activity and effort and demanded some stronger analgesics than Aspirin. Radicular pain was frequent, too (60%).

There were six paraplegias with incontinence in patients with osteoblastomas on dorsal spine.

Scolioses were initially painful, functional, but afterwards they had different developments, dependent on the duration of pain as well as on the age of the respective patient. Kyphoses, on the other hand, were purely iatrogenic deformities as a consequence of large laminectomies and facetectomies.

Standard radiograms are still of a great value in diagnosing spinal osteoblastomas in current practice. An osteoblastoma with sacral localization was more difficult to be detected on a standard radiogram because of the presence of faces and gas in intestines. Fig. 4.

That is why, before the introduction of CT and MRI, we often had to use tomography and macrography. The bone scintigraphy is valuable when the pain syndrome is present, but the visualization on standard radiograms is not convincing enough.
In our own practice we sometimes used angiography, especially for osteoblastomas localized on the cervical spine, when it was desirable to scan the tumor vascularity as well as a possible involvement of the vertebral artery. CT and MRI have nowadays a tremendous value in diagnostics or preoperative planning with defining the exact boundaries of the tumor, its possible penetration through the cortex or the presence of the tumor soft tissue. For lesions designated as stage 2, an intraslesional surgery is sufficient, but for lesions with stage 3, a marginal surgical procedure with an additional radiotherapy must by apply. A particular attention deserves the tumor soft tissue mass, which had been described by other authors, too, and which invades the spinal channel exerting a pressure on to the neural tissue. The mass pushes back the dural sac both of medulae and of roots. The surgeon must be ready to dissect this soft tissue mass of the dura in order to make a decompression of the neural elements.

If the stability of the spine is disturbed as a consequence of the tumor size or an inevitable radicality of the procedure, an immediate instrumental stabilization and spondylodesis are indicated, anterior, posterior or both procedures at the same stage.

We subjected 6 our patients to a postoperative radiotherapy, all with relapsing tumors, by a total tumoral doses of 46 Gy. In our series we did not observe multiple osteoblastomas or remote metastases.

A high rate of relapses presented a particular problem. It is possible that beside the other factors, for such relapse arising might be responsible a wrong estimation of tumor behavior, or inconvenient surgical procedure or unapplied radiotherapy when needed.

CONCLUSION

Though the osteoblastoma is a benign tumoral lesion, when it is localized on the spine, it may be the cause of a painful torticollis or a painful scoliosis, as well as of severe neurological damage associated with subsequent serious handicap. It is very important to differentiate this tumor from an osteoid osteoma, because these two changes are similar in all, even in histological features. Nevertheless, the osteoblastoma is different from an osteoid osteoma by its size, a more aggressive growth menacing neural structures and spinal stability, and a higher rate of relapsing. On account of that, a meticulous diagnostics should be performed, a staging of the tumor made and an adequate surgery and supplementary radiotherapy applied.

SUMMARY

OSTEOBLASTOM KIČMENOG STUBA

Retrogradnom analizom obradjena su 64 osteoblastoma kičmenog stuba lečena operativno u periodu od 1963 - 2005. Osteoblastomi kičmenog stuba činili su 36% svih koštanih lokalizacija.

Bilo je 44 muških i 20 ženskih pacijenata. Prosečna starost bolesnika u vreme operacije bila je 14 godina. Lokalizacije osteoblastoma su bile u vratnoj kičmi u 8 slučajeva, ledjnoj kičmi u 16 slučajeva, lumбалnoj kičmi u 11 slučajeva, krsnoj kosti u 2 slučaja i skrčnom i bokovnom kosti u 19 slučajeva.

Neurološki deficiti su bili relativno umereni, ali je paraplejija bila prisutna u 5 slučajeva, a paraplegije u 1 slučaju. Skolioza je bila prisutna u 30 slučajeva, a hemiplagija u 2 slučajeva. Prognoza skolioze je zavisila od trajanja bolnog sindroma, kao i od doba lečenja. Prema Ennekingovoj klasiﬁkaciji 30 bolesnika je bilo u drugom stadijumu i 34 u trećem stadijumu bolesti. Recidivi su bili...
prisutni u 8 (12.5%) bolesnika. Jasno ograničene lezije su tretirane intralezionim procedurama, a agresivne lezije su tretirane marginalnim ekscizijama nakon čega je sledila i dodatna radioterapija (6 pacijenata). Prosečno vreme praćenja je bilo 13 godina.

Ključne reči: kičmeni stub, osteoblastoma, paraplegija.

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