Cervical osteoblastoma resection and posterior fusion

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Learning targets

- To demonstrate the steps of posterior en bloc resection of cervical osteoblastoma using an ultrasonic bone scalpel.
- To show the management of possible epidural venous bleeding control.
- To demonstrate the technique of posterior cervical instrumentation and fusion.

Introduction

Osteoblastoma belongs to the category of benign skeletal tumors and represents ~1 % of primary bone neoplasms [1]. Its main incidence occurs during the second and third decade of life with a 2:1 male to female ratio [2]. Cervical osteoblastoma is predominantly located in the posterior elements of the spine [3]. This osteoblastic tumor is histologically similar to osteoid osteoma, but osteoblastoma is characterized by an extent superior to 1.5 cm [4, 5].

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Clinically osteoblastoma leads to unspecific neck pain, which is not relieved by aspirin, as it would typically occur in osteoid osteoma, stiffness and eventual deformities due to muscle contracture [6, 7]. Larger tumors may be recognized on conventional radiographs. The diagnosis is usually made by computed tomography (CT), where osteoblastoma appears as an inhomogeneous lytic and sclerotic mass with a radiolucent nidus surrounded by reactive sclerotic bone (stages 1 and 2 according to the Enneking staging system for benign lesions) [6, 8]. Some osteoblastomas appear more aggressive, as in the present case, and may demonstrate larger osteolytic components (stage 3 lesions). Magnetic resonance imaging (MRI) complements CT imaging and gives information on possible spinal cord, nerve root or vertebral artery compression, whereas bony lesions tend to be overestimated on MRI [5]. After diagnosis confirmation by biopsy, the appropriate treatment consists of complete marginal resection in stage 1 and 2 lesions. Stage 3 lesions require a larger resection to ensure removal of all surrounding tumor bearing tissue [8, 9].

Case description

A 27-year-old male complained of progressive neck pain during the last 2 years. He explained that extension increased the pain. Treatment by paracetamol and non-steroidal anti-inflammatory drugs, immobilization using a soft cervical collar as well as physiotherapy did not relieve his symptoms. Clinical examination revealed a tenderness

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and contracture of the paravertebral cervical, trapezius and scalenus musculature. Neurologic examination remained normal. Lateral, antero-posterior and flexion–extension radiographs of the cervical spine showed a tumor mass at the level of the lamina and spinous process of C3. CT demonstrated an osteolytic tumor, which had a close relationship to the C3 lateral masses and the C2 spinous process. MRI showed a tumor mass, which was well-limited to the posterior elements of C3 without spinal cord compression. A hypersignal around the tumor was evidenced after injection of Gadolinium contrast media. A preoperative CT-guided biopsy through the posterior midline of the neck confirmed the diagnosis of osteoblastoma.

Surgical procedure

The patient was placed on a Jackson table in supine position and Mayfield thongs stabilized the head. A slight reverse Trendelenburg position may be helpful to decrease venous bleeding. The bony landmarks were palpated, thus determining the level of the C6 and C7 spinous processes. A midline posterior approach that focused on C2 to C4 was performed. The paravertebral musculature was gently dissected from the posterior tumor mass and its capsule was left intact. The spinous processes and the laminae of C2 and C4 as well as the lateral masses were exposed, thus clearly individualizing the limits of the tumor mass. The supra and interspinous ligaments were removed from the cranial spinous processes of C4 and the ligamentum flavum was resected between C3 and C4 using a Kerrison rongeur. The tumor was adherent to the spinous process of C2. Therefore, a resection of the tumor including the caudal C2 spinous process and lamina as well as the medial portion of the C3 lateral masses was performed en bloc using an ultrasonic bone scalpel. Hemostasis was performed using Surgicel® that was applied to the dura without compression and which was replaced by a gelatin foam sponge later on. A posterior instrumentation using C2 isthmus screws (high riding vertebral artery) and C4 lateral mass screws was performed because partial bilateral C2–C3 and C3–C4 facet-joint resection would destabilize the cervical segment. The remaining lateral masses were shaved using a high-speed burr, and cancellous bone from the iliac crest was grafted. A cross-link was added to the instrumentation to enhance stability in axial rotation. A deep and subcutaneous drain was placed and wound closure was performed.

Postoperative information

Histological analysis confirmed that the en bloc resection had been complete without microscopic evidence of

osteoblastoma in the surrounding tissues. The patient started ambulation on the first day after surgery. The total hospital stay in a conventional department of spine surgery was 4 days. A soft collar was worn during 2 weeks when walking. After 6 weeks, physiotherapy was started on an ambulatory basis. He was pain free at this time. At 3-month follow-up, fusion was observed on cervical radiographs.

Discussion and conclusion

Marginal or en bloc resection represents the treatment of choice in aggressive osteolytic osteoblastoma [6–9]. This treatment limits the risk of local recurrence. Radiotherapy should only be an option for patients where a complete surgical tumor resection cannot be achieved. However, a possible malignant transformation has been described after radiotherapy [5]. The preoperative MRI with Gadolinium injection demonstrates the hyper-vascular character of osteoblastoma. Preoperative embolization has been suggested in some cases [3], but gentle dissection and progressive coagulation appeared sufficient when keeping outside of the tumor borders. Instrumented fusion should be considered if a complete or partial facet-joint resection is required to provide long-term stability and cervical sagittal balance.

Conflict of interest None.

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