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Pathology in Focus

Benign osteoblastoma of the mastoid part of the temporal bone: case report

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Abstract
Osteoblastoma is a benign bone lesion that mainly affects the long bones and rarely the temporal bones. Very few cases have been reported in the literature. This paper reviews the literature, discusses the differential diagnosis, clinical presentation, and CT scan findings of such a condition and details our experience with a young patient who had a temporal bone (mastoid process) osteoblastoma.

Key words: Temporal bone; Osteoma, osteoid

Introduction

Osteoblastoma is an uncommon, benign, solitary, vascular, osteoid-forming bone tumour which is rich in osteoblasts. It most often involves the vertebrae and the long bones (Spjut, 1971; Nager, 1993). The literature contains a considerable number of terms describing this type of lesion e.g. osteogenic fibroma (Golding and Sisson, 1954; Lichtenstein, 1956) or giant osteoid osteoma (Dahlin and Johnson, 1954, but none of them seem perfectly correlated with the benign nature or the histological pattern of the lesion. These different terminologies continued to appear in the literature until Jaffe (1956) and Lichtenstein and Sawyer (1964) suggested the term 'benign osteoblastoma'.

This tumour frequently arises in the axial skeleton, including the craniofacial bones, mandible and spine. One-third of cases occur in the vertebral column and sacrum. The long bones, ribs, pelvis, tarsal and carpal bones account for another 35 per cent (Mirra *et al.*, 1976). Osteoblastoma may also, but rarely, affect the skull and could be monofocal or multifocal (Schajowicz, 1981). Tom *et al.* (1980), stated that only 13 out of 380 osteoblastoma cases reported in the literature were in the calvarium. Dahlin and Johnson (1954) reported one case of temporal bone osteoblastoma, but did not define its exact site.

In a review of literature, Byers (1968) reported four cases in the temporal bone. Later Lichtenstein (1972) published two more cases one of which was in the squamous part of the temporal bone. Ronis *et al.* (1974) reviewed the otolaryngological literature and described the first case involving only the temporal bone. Glasscock *et al.* (1978) published a case in which this type of lesion affected both the temporal and occipital bones. Potter *et al.* (1983), reported a second osteoblastoma case in which only the temporal bone was involved and quoted five other cases in the literature. Schuknecht (1993) stated that according to Potter *et al.* (1983), only five cases had been reported in the literature. On the other hand Nager (1993) mentioned that two cases listed in the Armed Forces Institute of Pathology (AFIP) OTR as having new bone in the temporal bone area, but their clinical details were not included and it was not quite clear whether or not they had been published. We present the 10th case of temporal bone benign osteoblastoma and the third case to affect only the mastoid temporal bone.

Case report

A 16-year-old female presented with a slowly growing, slightly painful left retroauricular mass of two years duration. She had no ear complaints regarding hearing, tinnitus, vertigo, nor facial nerve dysfunction. Her past medical history was unremarkable. Generally, the patient was healthy and well built. On examination, the left post-auricular area was found to be occupied by a 3–4 cm mass. The overlying skin was mobile showing no special signs including colour changes. The mass was tender, bony hard, well defined, smooth edged, adherent to the underlying bone and showed neither thrill nor transmitted pulsations.

Otoscopy revealed a completely normal tympanic membrane. Weber test was centralized. Audiometry showed normal pure tone thresholds. CT scan of the temporal bone (Figure 1), with and without constrast, showed an ill-defined homogeneous mass within the left mastoid bone, characterized by an increased volume of the diploic bone with new bone formation. Biochemical profile showed within-normal levels of serum calcium (9.7 mg/dl), phosphorus (4.5 mg/dl), serum alkaline phosphatase (78 U/l) while uric acid was 5.3 mg/dl.

Total surgical removal of the tumour mass was accomplished through a retroauricular 'C'-shaped skin

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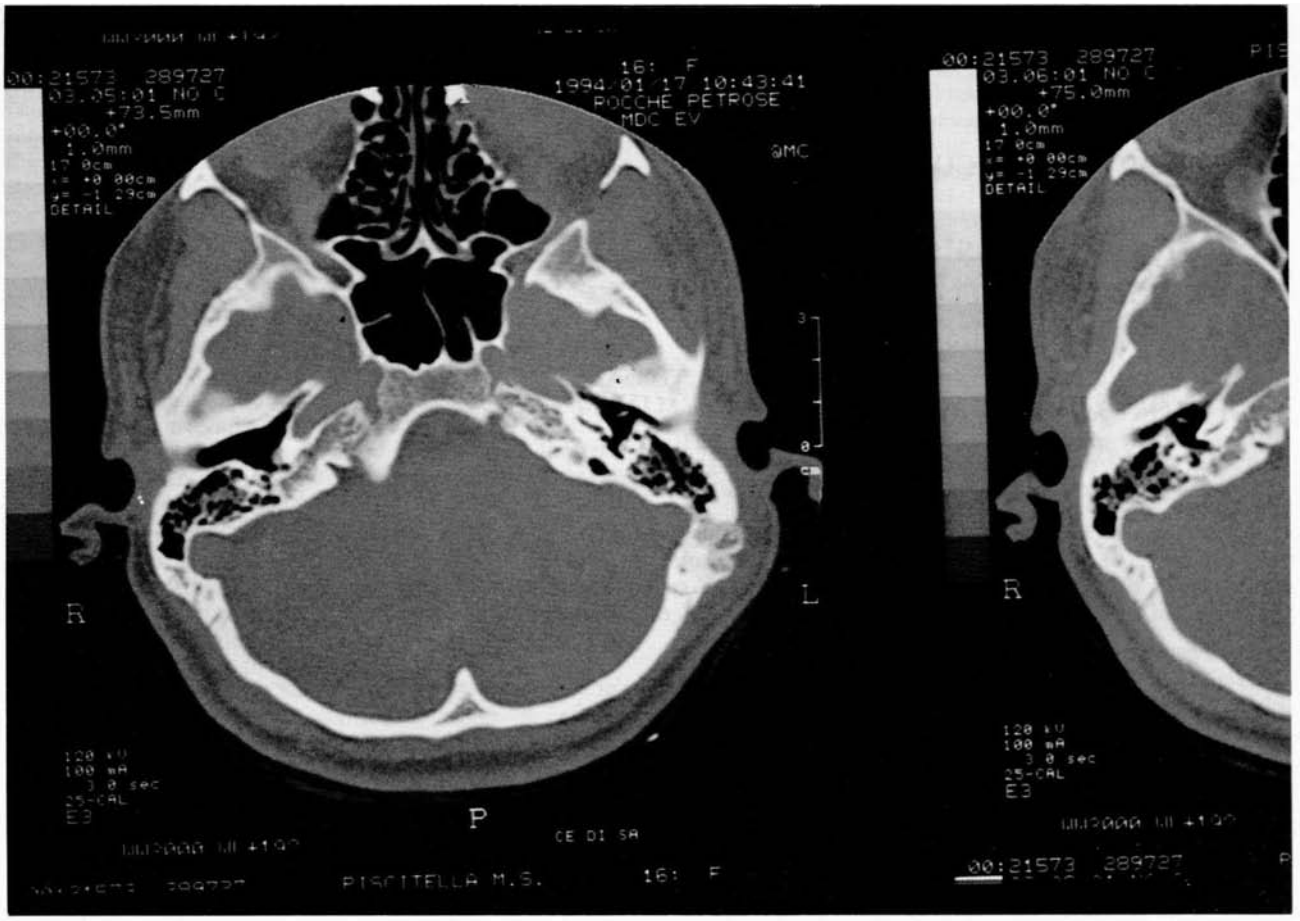

FIG. 1

Bone algorithm CT scan of the temporal bone, showing homogeneous mass characterized by an increased volume of the diploic bone with new bone formation.

incision. Using the otological drill, a well-defined, 3 cm brownish mass was drilled out of the mastoid from the area of the lateral sinus, the sinodural angle and the posterior fossa plate where it was adherent to the walls of the lateral sinus. The mass was noted to be more vascular and softer to drill than normal mastoid bone. Drilling was continued until normal bone was reached. Closure of the skin wound was in two layers.

Histopathological examination (Figure 2) showed a vascular bone-forming tumour with osteoblasts rimming osteoid and bony trabeculae. No mitosis or anaplasia was seen. No evidence of malignancy was found.

Discussion

Recognition of this benign bone neoplasm is of practical importance because of the challenging and difficult differential diagnosis. Clinically, the tumour presents a similar picture to the much smaller (<1 cm) osteoid osteoma. However, the latter has a predilection for the bony cortex. An osteoblastoma is usually situated in the medulla. Osteoid osteoma is first noted by pain which is accentuated at night and rapidly relieved by aspirin. Osteoblastoma is less painful and is first noticed by virtue of its mass more than pain (Nager, 1993). The ages of osteoblastoma patients vary from five to 78 years but most patients are between 10 and 35 years (Dalinka, 1972; Ronis *et al.*, 1974; Potter *et al.*, 1983; Dorfman, 1989; Nager, 1993; Schuknecht, 1993). Schajowicz (1981) noted that more than 50 per cent of his patients were under 20 years of age and only eight were below 10 years of age. Schuknecht (1993) reported that 80 per cent of patients were under 30 years of age. The male to female ratio is reported as 2:1 (Ronis *et al.*, 1974). If the temporal bone or the middle ear are affected it may cause a hearing impairment of the conductive type because of impingement on the middle ear structures as in a case described by Ronis *et al.* (1974).

Microscopically, the tumour contains an osteoblastic connective tissue stroma which is highly vascular and reveals osteoid and primitive bone deposition (Mirra *et al.*, 1976; Schajowicz, 1981; Potter *et al.*, 1983: Nager, 1993; Schuknecht, 1993). The bony trabeculae are more orderly than those seen in an osteosarcoma. Osteoblasts are present in abundance and vary in size and shape but do not show abnormal mitotic activity nor nuclear atypicality seen in an osteosarcoma. Osteoclasts as well as other multinucleated giant cells may be very numerous, especially in relation to areas of extravasated blood.

The literature contains some histological reports which show that an osteoblastoma can be confused with an osteoid fibroma, giant cell tumour or osteosarcoma (Ronis *et al.*, 1974). On the other hand, some authors such as Golding and Sisson (1954), and Lichtenstein (1956) described it as an 'osteogenic fibroma', while Dahlin and Johnson (1954) included it with a 'giant osteoid osteoma'.

Benign osteoblastoma has been described by some authors (Mayer, 1967; Dalinka, 1972; Lichtenstein, 1972) as being followed by a malignant recurrence some years after initial surgical removal, while others (Dorfman and Weiss, 1984) described the malignant version of an

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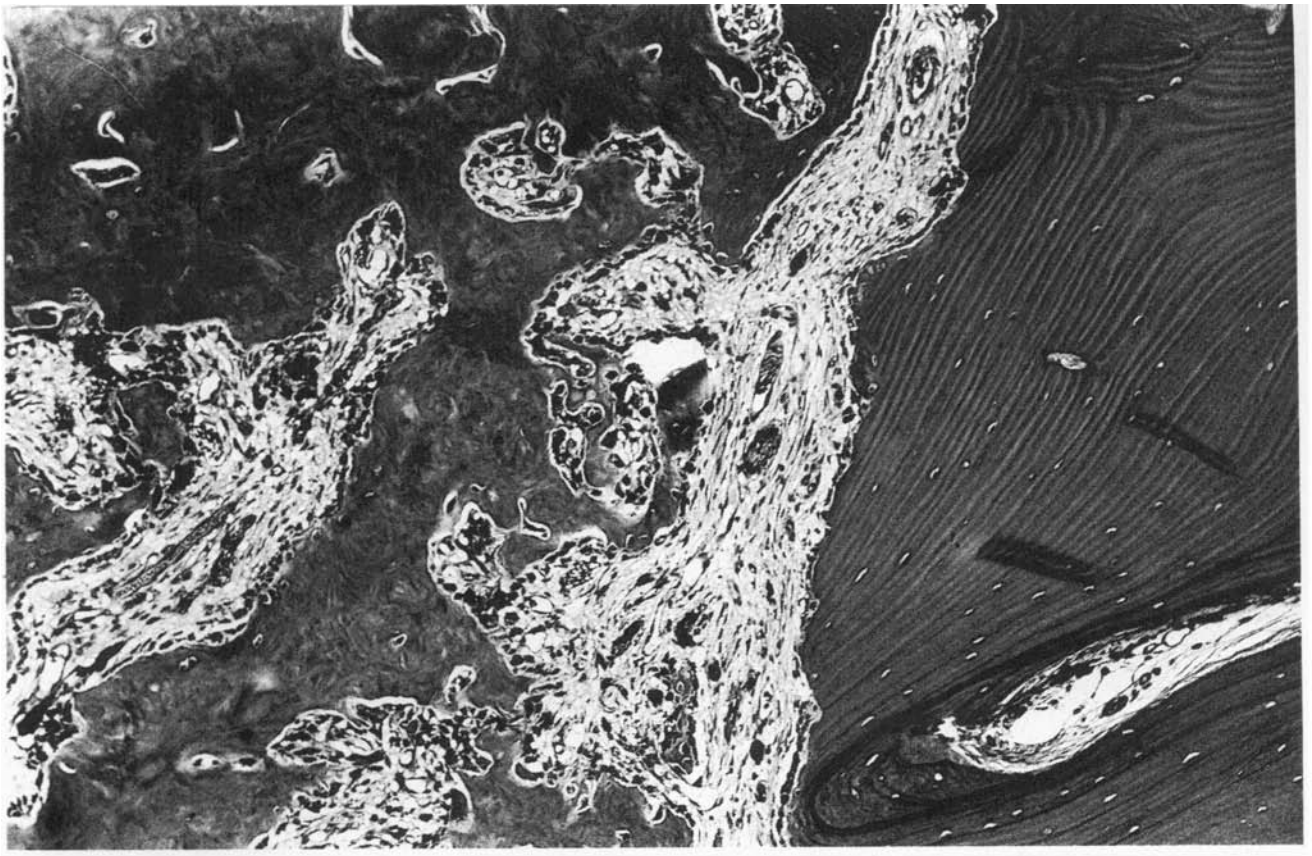

FIG. 2
Photomicrograph showing osteoblast rimmed bone trabeculae, with vascular stroma, and margin of normal bone.

osteoblastoma as an aggressive osteoblastoma or osteoblastoma-like low grade osteosarcoma.

Radiological evaluation of reported cases depended on the radiological techniques available at the time of their diagnosis. Lichtenstein and Sawyer (1964) stated that although the radiological picture lacks specificity it is helpful to note that no matter how much the lesion has expanded a bone, it remains delimited by a thin shell of cortical new bone. Ronis *et al.* (1974) using plain X-ray in Chamberlain-Towne view described an osteolytic lesion in the right temporal bone at the level of the middle ear mainly at the hypotympanum for which an arteriography was suggested to rule out the possibility of a glomus tumour. On plain X-ray, Potter *et al.* (1983) described it as an osteolytic defect partially surrounded by a sclerotic margin with loss of the mastoid air cells. In the case reported by Potter *et al.* (1983), the lesion involved the postero-superior external canal wall and the aditus. CT scan of the case showed the mass to be well defined with a density between that of soft tissue and normal bone. There was extensive bone destruction and some intracranial extension with sclerosis of the adjacent bone. Because of the enhancement of the CT scan angiography showed a homogeneously stained vascular mass which was permeating the right temporal bone. The feeding vessels were an enlarged middle meningeal artery and a smaller component from the superficial temporal artery.

Because of the benign nature of the neoplasm previous authors (Lichtenstein, 1956; Ronis *et al.*, 1974; Glasscock, 1978; Potter *et al.*, 1983) suggested conservative treatment, with local excision or shaving of the lesion to the border of normal-looking bone.

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