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The effectiveness of using various neuroimaging methods in determining pathologies of the posterior cranial fossa.

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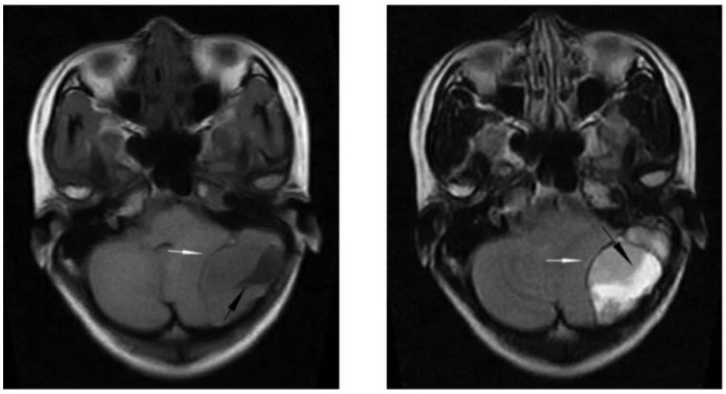
Introduction

Giant cell tumor (GCT) is considered an aggressive benign tumor. GCT of bone is a rare primary bone neoplasm that usually occurs in the epiphyses of long bones and rarely appears in the skull. GCTs of the skull account for only 1% of all GCTs and predominantly affect the sphenoid and temporal bones [1–6]. Primary GCTs of the posterior fossa are extremely rare. Here, we report a case of GCT in the posterior fossa and review the literature regarding its radiographic features and the surgical technique used for treatment. GCTs account for approximately 4–9.5% of all skeletal tumors and 18–23% of benign tumors [7]. This type of tumor develops by endochondral ossification, and the majority of GCTs (70–90%) arise in the epiphyses of long bones. Only 1% of GCT is present in the skull [1, 8], with the most common sites on the skull being the sphenoid and temporal bones. The fact that the sphenoid bone and the petromastoid portion of the temporal bone arise from endochondral ossification of the skull may explain why GCTs in the skull are predominantly found in the sphenoid and temporal bones [3, 5, 7]. Histopathological sections of these tumor types demonstrated an even distribution of multinucleated giant cells in a background of soft oval to short spindle stromal cells. Recent experiments have characterized the GCT as consisting of three cell types: osteoclast-like multinucleated giant cells, round mononuclear cells resembling monocytes, and spindle-shaped fibroblast-like stromal cells [12]. These studies further suggested that stromal spindle cells are responsible for tumor proliferation, and giant cells and monocytes are reactive tumor components [12, 13]. Compared to GCTs of long bones, GCTs of the skull lack the characteristic signs of expansion and the appearance of a “soap bubble” [14]. Moreover, GCT in the skull tends to be aggressive. Radiologically, this form of GCT usually shows significant cortical soft tissue destruction. On computed tomography, the appearance of a relict bone flap within the tumor is difficult to distinguish from calcification in chondroitic bone tumors of the skull base. MRI can be used to evaluate intramedullary and soft tissue expansion. On MRI, the tumor signal is irregular due to the onset of necrosis, bleeding and cyst formation. In this case, the CT and MRI characteristics are similar to those of tubular bone, which determines extensive expansion, necrosis and cyst formation within the tumor and obvious post-contrast enhancement. It is hypothesized that these characteristics may be related to location of the tumor.

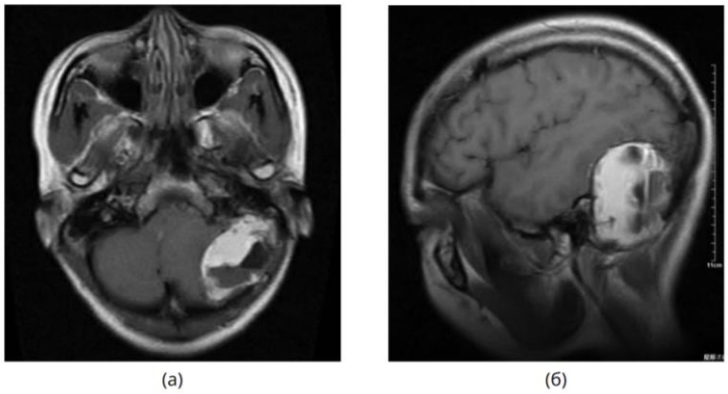


(а) (б)

Фигура 2.Опухолевая ткань обозначена изоинтенсивной наT_1взвешенное изображение (а) и слегка гиперинтенсивное наT_2чутье (б) относительно белого вещества. Расширяемый внутренний столик черепа гипоинтенсивен наT_1взвешенное изображение иT_2чутье (белая стрелка). Область некроза гипоинтенсивна наT_1взвешенное изображение и гиперинтенсивность наT_2чутье (черная стрелка).

There is space in the posterior fossa relative to the skull base for GCT expansion; thus, by the time the patient develops obvious symptoms, the tumor volume has become relatively large. In addition, there are no overlapping structures in the posterior fossa and there are clear signs of damage.

Surgery and radiation therapy are the common treatment strategies used for GCT in long bones due to the high recurrence rate after surgery and the inoperable nature of the tumor. Treatment of GCT in the skull depends on the location of the tumor. Because the skull base is surrounded by many important blood vessels and nerves, the fact that PCT tumors are predominantly located in the sphenoid and temporal bones makes total surgical excision dangerous and impossible.



(а) (б)

Рисунок 3.Опухолевая ткань заметно усилена гадолинием.T_1взвешенная МРТ в аксиальной плоскости (а) и сагиттальной плоскости (б).

Thus, it is postulated that treatment with surgical excision and radiation therapy is a rational method of GCT for the skull base. In the case series reported by Bertoni et al [7], treatment strategies including surgical resection and radiotherapy were used.

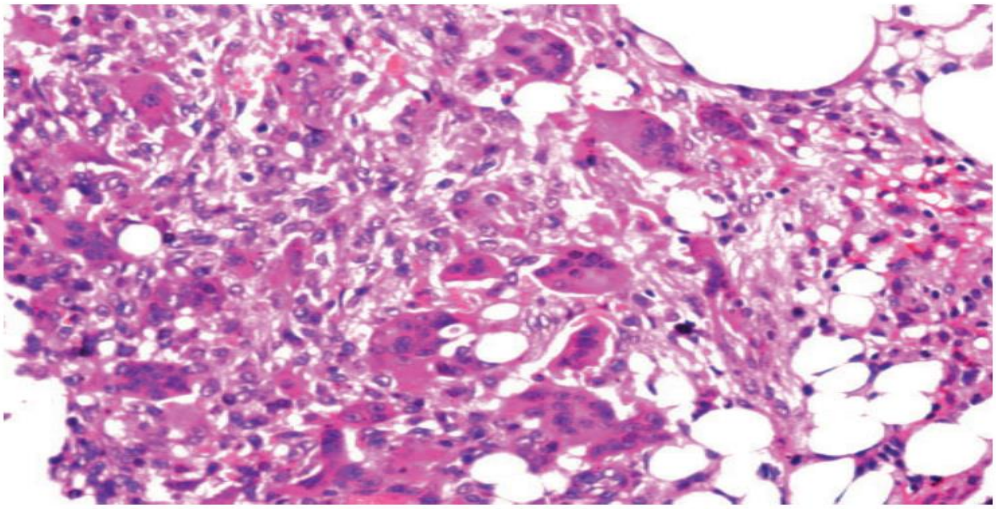


Рисунок 4.Окраска опухоли гематоксилином и эозином (исходное увеличение)620) выявляются крупные, многоядерные, гигантские клетки, равномерно рассеянные среди стромальных клеток овальной или веретенообразной формы.

After follow-up, the treatment efficacy was satisfactory. However, GCTs arose from other areas of the skull as well as from the braincase, making complete surgical removal possible. It is unclear whether radiation therapy was ultimately necessary. In two cases involving the calvarium reported by Coumbaras et al. [15] and Ulu et al. [16].

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