

# Giant Intraparenchymal Schwannoma with Bone Remodeling: Case Report of a 17-year-old Boy

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## ARTICLE INFO

Received: 📅 April 20, 2020

Published: 📅 May 28, 2020

**Citation:** Yu Jen K, Ming Hsueh L, Martin Hsiu Chu L, Jen Tsung Y. Giant Intraparenchymal Schwannoma with Bone Remodeling: Case Report of a 17-year-old Boy. Biomed J Sci & Tech Res 27(5)-2020. BJSTR. MS.ID.004579.

## Abstract

We report a case of giant frontal intraparenchymal schwannoma in a 17 years old male who had initial symptoms of partial seizure without neurological deficit. Bone remodelling manifested as thinning of cortical bone overlying the tumour was noted which was not reported in previous intraparenchymal schwannomas.

**Keywords:** Intraparenchymal schwannoma; Frontal schwannoma; Huge schwannoma; Bone remodelling

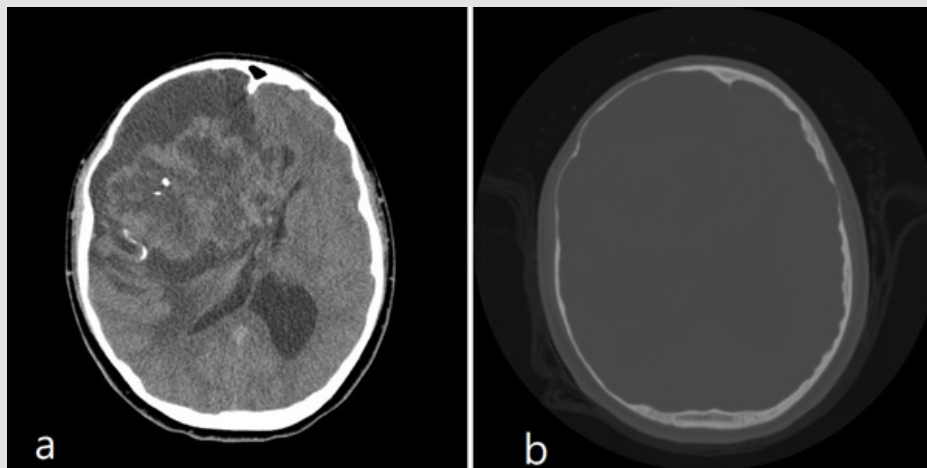
## Introduction

Intracranial schwannomas account for 8% of all primary brain tumours [1] and are derived from Schwann cells in the peripheral nervous system. Schwannomas constitute more than 80% of cerebellopontine angle tumours and are derived from the vestibular portion of the VIII cranial nerve. However, Intraparenchymal schwannomas that are not associated with cranial nerves are extreme rare. The symptoms in patients with intraparenchymal schwannoma include seizure, headache or focal neurologic deficits. Mostly, patients with intracranial schwannomas are diagnosed in the first or second decade of life. The surgical outcome is relatively good and curative. The most common location of the intraparenchymal schwannoma is over the frontal and temporo-occipital area from previous case reports [2]. We report a case of a giant frontal intraparenchymal schwannoma in a 17-year-old male.

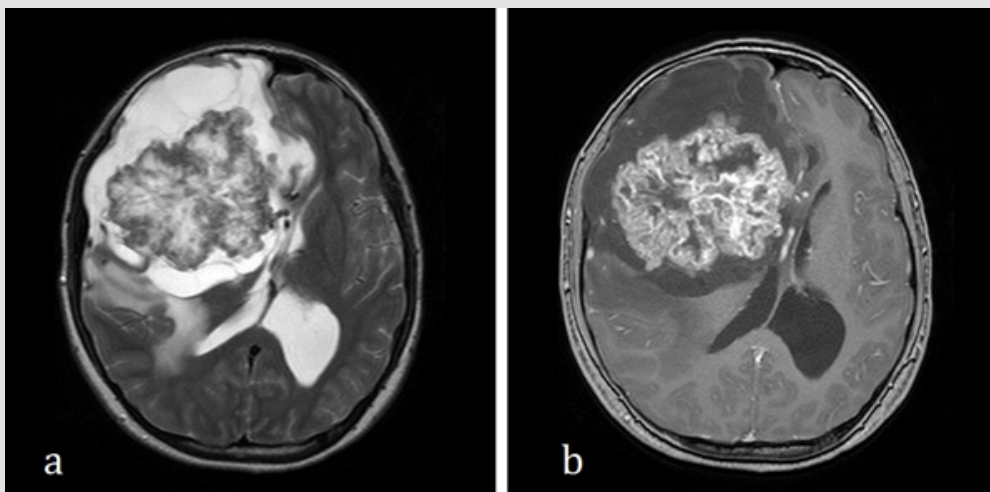
## Case report

This 17-year-old male patient encountered three episodes of partial seizures over a period of one month with upward gaze, tonic posture over left side and saliva drooling. He was admitted to our institute for evaluation. Physical examination did not reveal neurological deficit, neurocutaneous markers or other physical abnormality. He and his family members denied a history of

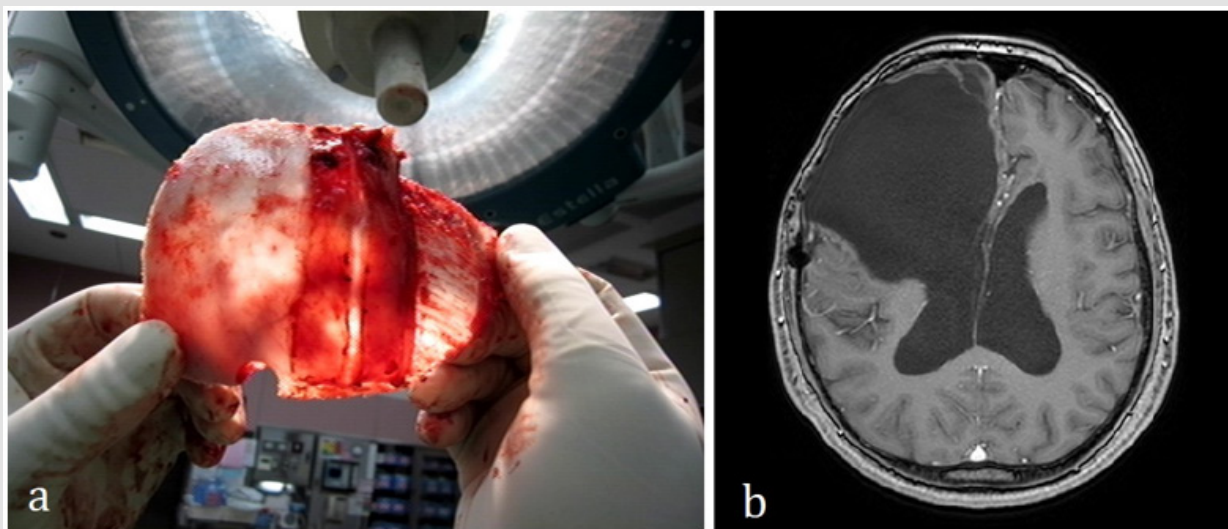
neurofibromatosis. Brain CT showed a large lobulated mass in the right frontal lobe with intra-tumoral calcification causing right-to-left shift of midline structure (Figure 1). T2-weighted MRI showed a 13 x 10 x 10 cm tumour with septate cystic part surrounding the main tumour with significant perifocal edema, the solid component enhanced heterogeneously with gadolinium which invaded into the corpus callosum at the genu of body (Figure 2) The patient received right frontal craniotomy and total excision of tumour with iCT navigation and CUSA aid. The skull bone overlying the tumour was noted to be very thin during craniotomy (Figure 3). Cysts with multiple septa filled with xanthochromic fluid and gel-like material was noted at the periphery of the tumour. After removal of the cystic part of the tumour, the tumour plane was well identified. The solid portion of the tumour was soft in consistency, white in colour, and had moderate vascularity and scattered calcifications. Follow up MRI at 4 years post-surgery showed no recurrence or residual tumour (Figure 3). Histopathological examination of the resected material disclosed the tumour cells that are s-100 protein (+), neurofilament (+), vimentin (-), EMA (-), GFAP (Equivocal), and MIB-1 (Trace) (Figure 4). Microscopically the tumour displayed areas of antoni A and antoni B, therefore, it is consistent with schwannoma.



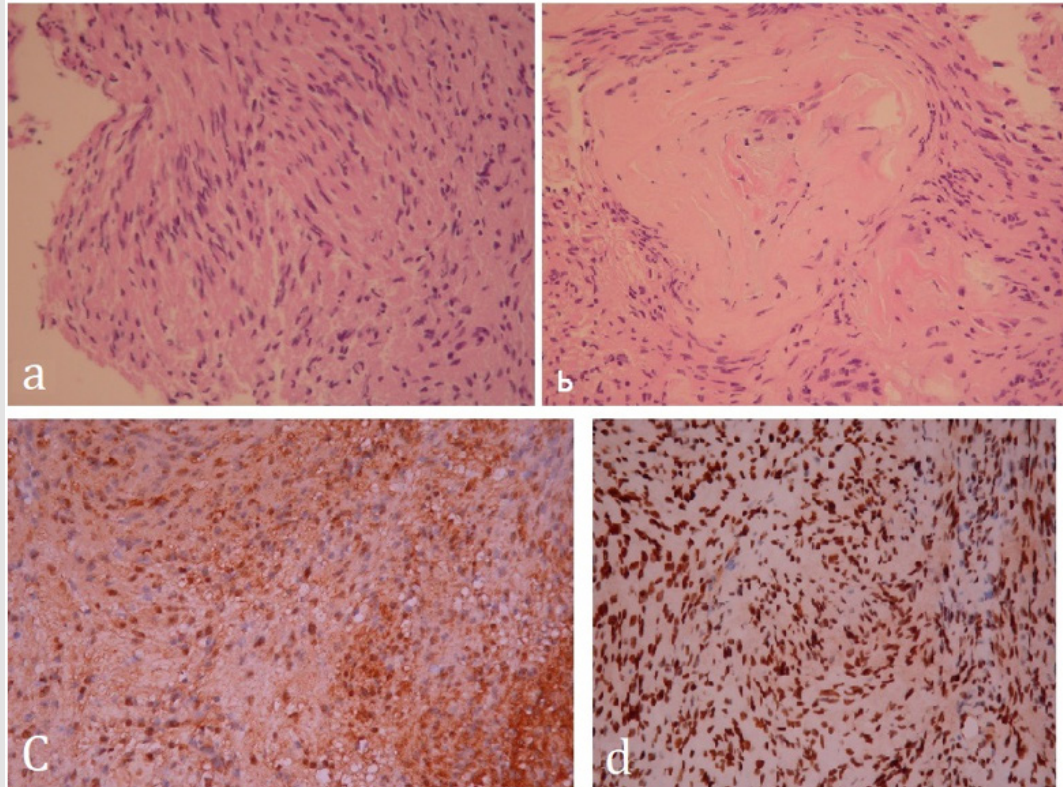
**Figure 1:** a. Non-enhanced brain CT showed a right frontal tumour with internal calcification and right-to-left shift of midline structure.  
 b. bone window showed right frontotemporal cortical bone scalloping.



**Figure 2:** a. T2-weighted MRI showed septate cystic part surrounding solid part tumor with perifocal edema. b. T1-weighted gadolinium-enhanced MRI showed heterogenous enhancement of the solid part tumor.



**Figure 3:** a. Paper thin cortical bone. b. Follow up post-operative T1-weighted MRI 4 years later showed no recurrence of tumor.



**Figure 4:** Photomicrography showed a. spindle cell elongated nuclei and fibrillary cytoplasm (antoni A). b. Paucicellular with loose edematous and mucinous stroma (antoni B). C. S-100 diffusely positive d. Positive in neurofilament.

## Discussion

Intraparenchymal schwannomas have been reported in the cerebral hemisphere, sub-frontal, cerebellum, brainstem, sella and in the fourth ventricle [3]. To our knowledge, this giant intraparenchymal schwannoma measuring 13 x 10 x 10cm is the largest volume compared with reported articles [4]. Currently the origin of intraparenchymal schwannoma remains controversial. Menku et al. divided these theories into 2 categories according to histogenesis: developmental and non-developmental groups [5]. Developmental theories postulate that tumour develops from aberrant neural crest cells within the central nervous system or ectodermal Schwann cells transformed from mesenchymal pial cells [6]. Non-developmental theories assume that Schwann cells from adjacent structures give rise to intracranial schwannoma [7]. Despite of the large tumour size and attack of seizure, our patient did not have neurological deficits. The skull bone surrounding this tumour had remodelled into paper-thin cortical bone possibly due to long term compression by the tumour and this finding has not been reported in previous intraparenchymal schwannomas. We assume that these phenomena are due to the slow growing characteristic of this large intraparenchymal schwannoma.

Skull bone remodelling and thinning has rarely been reported due to intraparenchymal tumour, smooth cortical expansion and remodelling with cortical thinning is usually associated with benign slow growing processes [8] such as, porencephalic cysts or

arachnoid cysts. Like in previous report, intracranial schwannomas mostly occur in children and young adults [9], which when coupled with the slow growing process, it might be congenital in nature, although current evidence remain uncertain. In comparison of our case to those reported, the developmental theory is more likely, due to the young age of diagnosis and cortical bone scalloping from the chronic increase in intracranial pressure and tumour compression [10], however, there are only few molecular and histological evidence to support this theory, thus further studies are warranted.

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ISSN: 2574-1241

DOI: 10.26717/BJSTR.2020.27.004579

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