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WisdomGale

CASE REPORT

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A rare cause of peripheral facial paralysis in a child: Temporal bone fibrous dysplasia

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ABSTRACT

Fibrous dysplasia (FD) is a rare benign fibro-osseous disorder, with temporal bone involvement being uncommon and middle ear localization exceptionally rare. We report the case of a 5-year-old boy presenting with progressive left peripheral facial paralysis (PFP). Computed tomography of the petrous bone revealed an osteocondensing lesion encasing the tympanic and mastoid segments of the facial nerve and extending to the geniculate region. Magnetic resonance imaging showed slight hypotrophy of the left facial nerve without intracranial extension. Histopathological examination confirmed the diagnosis of FD. This case addresses an uncommon but important cause of progressive PFP in children, reinforcing the need for imaging in atypical or long-standing cases.

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Peripheral facial paralysis; fibrous dysplasia; temporal bone; facial nerve canal; pediatric imaging

Introduction

Peripheral facial paralysis (PFP) is a relatively common condition in children, and permanent facial nerve impairment can significantly affect their quality of life. The incidence of facial nerve palsy varies across the human lifespan. Among pediatric patients, it ranges from 2.7 to 10 people per 100,000 individuals, depending on the age group, being less frequent in children younger than 10 years of age [1]. Imaging plays an essential role in confirming secondary causes (infection, traumatic, or tumorous).

We report a case of fibrous dysplasia (FD) of the middle ear affecting the left facial nerve, and causing a progressive PFP.

FD is a rare, benign, congenital, non-hereditary bone pathology, leading to the production of immature fibrous tissue [2]. This case is considered a very rare presentation of FD of the temporal bone.

Management of temporal bone FD includes radiological monitoring in slowly progressing cases and surgical treatment for aggressive forms with significant symptoms, aiming to remove pathological tissue, restore function, and prevent complications [3].

Clinical Observation

We report a case of a 5-year-old male child with no particular medical history, presenting with progressive left facial paralysis over the past 3 years, with no history of trauma, no other neurological signs (in particular, there was no involvement of the other cranial nerves), and no history of fever or recent infection.

Clinical examination revealed grade V PFP with no with no sensory disordor no facial deformity, nor abnormalities on otoscopy.

The first line of investigations included a computed tomography (CT) scan of the petrous bone without contrast injection (Figs. 1–3). CT imaging demonstrated an osteocondensing lesion involving the left mesotympanum and Eustachian tube, encasing the tympanic segment (F2) and the mastoid segment (F3) of the facial nerve, and extending to the geniculate region of the facial canal. We noted a relation with the uncodo-malear joint, and the other elements of the ossicular chain were intact. In addition,

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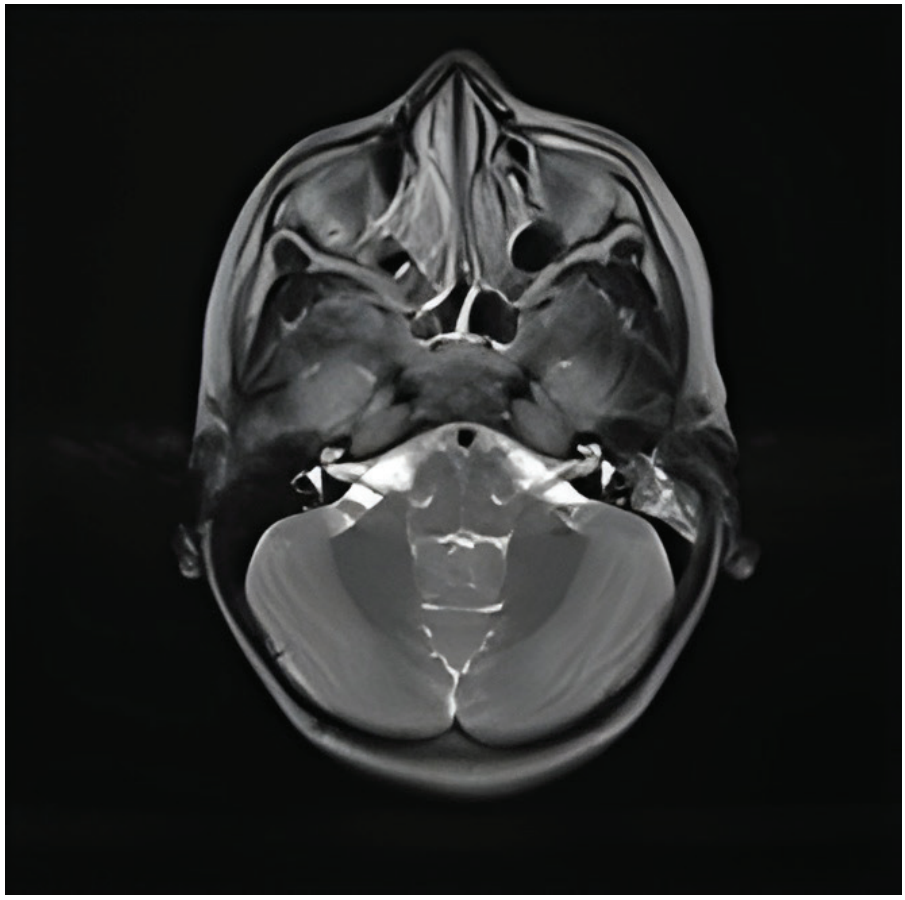


Figure 1. A non-contrast cranial MRI (1.5 Tesla) T2-weighted axial image: revealed mild hypoplasia of the left facial nerve, along with opacification of the air cells of the left mastoid process.

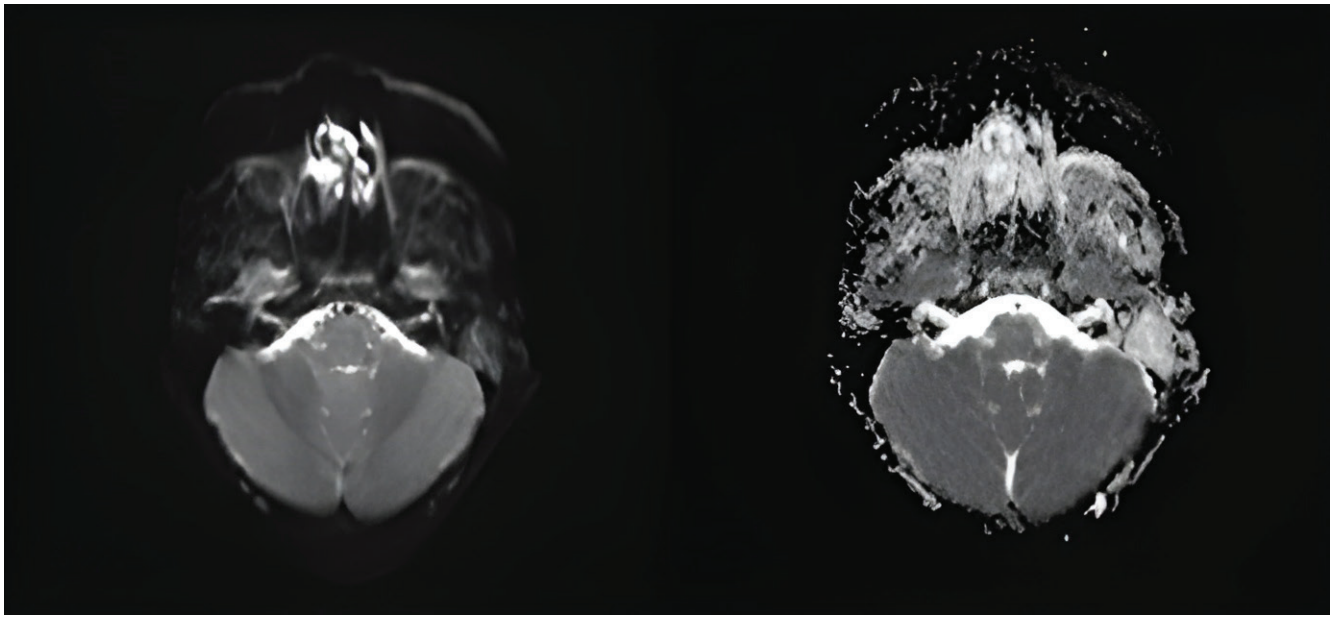


Figure 2. Diffusion MRI sequences with ADC mapping: no mass effect within the temporal region or diffusion restriction.

there was a slight contact with the otic capsule with integrity of the cochleovestibular elements.

The craniofacial CT scan did not find other osseous lesions of the cranial vault or skull base.

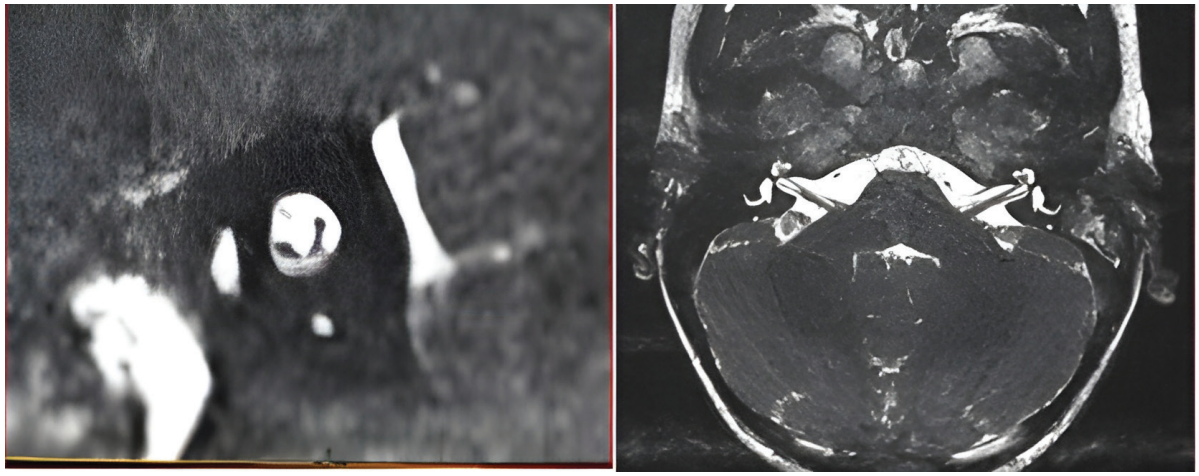


Figure 3. MRI (high-resolution T2-weighted sequences): slightly hypoplastic appearance of the left facial nerve, associated with opacification of the air cells of the left mastoid process. No mass effect was observed in the temporal region, and no signal abnormalities were noted in the labyrinthine structures. These findings were consistent with FD of the petrous bone.

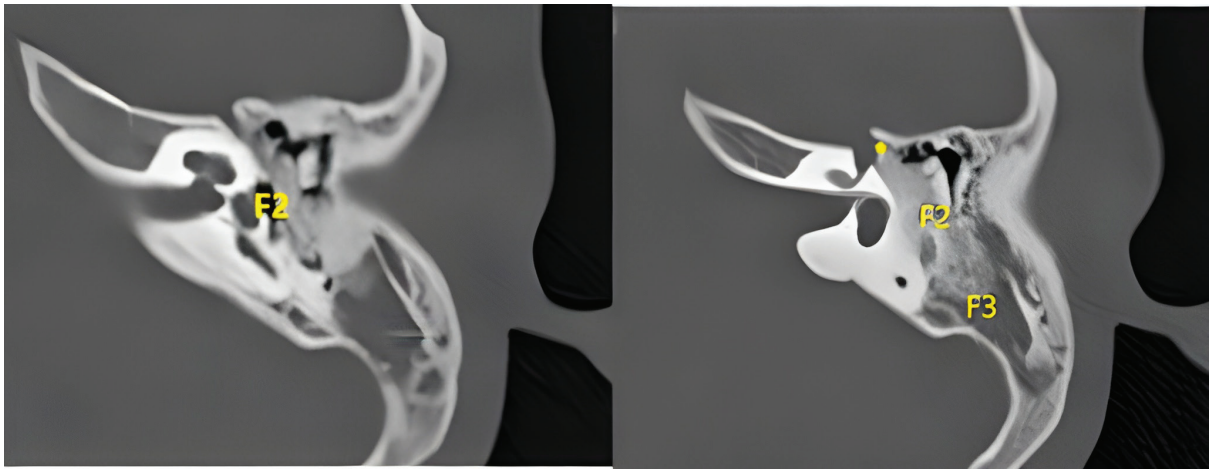


Figure 4. Axial CT scan of the petrous bone without contrast enhancement, revealed an osteocondensing lesion involving the left mesotympanum and the Eustachian tube, enveloping the tympanic segment (F2) and the mastoid segment (F3) of the facial nerve.

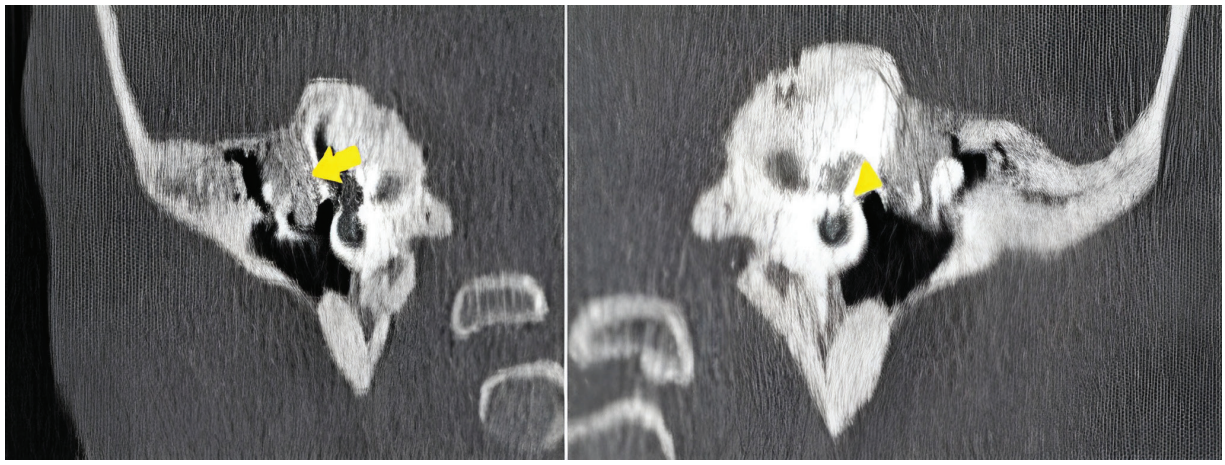


Figure 5. Coronal CT scan of the petrous bone without contrast enhancement, revealed the same osteosclerotic lesion of the left petrous bone. The craniofacial CT scan did not find other osseous lesions of the cranial vault or skull base.

A non-contrast cranial magnetic resonance imaging (MRI) (1.5 Tesla) revealed a slightly hypotrophic appearance of the left facial nerve, with left mastoid air cell opacification (Figs. 4 and 5). No mass effect within the temporal region, and no signal abnormality of the labyrinthine structures was identified, with no evidence of intracranial extension.

The appearance was suggestive of FD of the petrous bone.

A surgical biopsy was indicated. Histological examination confirmed the diagnosis of FD, with no sign of malignity.

Discussion

FD presents in three forms – monostotic (including craniofacial), polyostotic, and polyostotic with endocrinopathies [3]. FD lesions typically become apparent during the first few years of life, expand over childhood, and reach final disease burden in late adolescence. Lesions become less metabolically active in adulthood. The location and evolution of the FD lesions and the degree of involvement in each bone dictate the potential complications. Involvement of the appendicular skeleton can lead to fractures, long bone deformities, and impaired ambulation. Axial skeletal involvement can result in rib fractures and scoliosis, which can rarely be progressive [2].

Temporal bone FD accounts for 24% of fibrous bone dysplasias [4]. The diagnosis of FD is based on a combination of clinical, biological, and, above all, radiological findings, and can be confirmed by pathological examination [5].

FD of the temporal bone is characterized by its variable presentation, most often revealed by external auditory canal (EAC) stenosis, causing conductive hearing loss with a risk of developing EAC cholesteatoma. Middle ear involvement is rare, causing otorrhea, ossicular fixation, and occasionally facial paralysis [6].

CT can be contributive, especially in screening for complications (skull, maxillofacial or costo-vertebral lesions) or for non-displaced fractures; MRI is little used [2]. MRI for better depiction of soft tissue involvement, particularly extension to intracranial structures [6].

CT scan is the radiological modality of choice for craniofacial lesions, allowing for better bone analysis, especially in temporal FD to determine the extent of involvement of the ossicles, facial nerve, and inner ear structures. The main radiological patterns are:

- Pagetoids: the most common type, characterized by a mixture of sclerotic and osteolytic tissue areas, responsible for the characteristic ground-glass appearance. (The type found in our case).
- Sclerotic: dense, homogeneous bone lesions.
- Cystic: rare, in the form of an osteolytic lesion surrounded by marginal osteosclerosis [3].

The lesions usually cause cortical thinning due to enlarged fibro-osseous masses within the bone. The periosteal reaction is not usually present unless it is associated with a pathological fracture. Lesions usually are enhanced after intravenous contrast administration [7].

Isolated middle ear involvement was described in one case in the literature, by Yu Hon Wan et al. [8] as an irregular avidly enhancing lesion on MRI, centered in the left geniculate fossa. The CT scan showed a similar ground glass opacity with an abnormal widening of the labyrinth and the tympanic segment of the left facial canal [8].

The clinical differential diagnosis of FD of the temporal bone includes ossifying fibroma (OF), osteoma, hemangioma, unifocal Langerhans' Cell Histiocytosis (Eosinophilic Granuloma), and metastatic lesions. Among them, OF is the most important because it is difficult to differentiate histopathologically. FD consists of fibrous connective tissue containing bone trabeculae at different maturity stages. There is no osteoblastic activity in FD. OF are composed of acellular mineralized material and fibroblastic stroma containing lamellar bone. Of the two slow-growing lesions, OF are clinically more aggressive and typically present with well-defined borders and radiolucent images with disorganized calcifications [9].

MRI is indicated to assess intracranial and soft tissue extension. Lesions are typically low to isointense on T1- and T2-weighted images and show moderate to marked enhancement with gadolinium [4].

Bone scintigraphy is performed at the start of treatment to detect all bone lesions in FD; dysplastic lesions are hyperfixating [5].

Radiography is often sufficient for diagnosis. In patients with an atypical monostotic lesion or

suspicion of malignancy, biopsy is required to establish a diagnosis of FD. It may be performed surgically or under radioguidance. Histologically, the FD lesion shows medullary proliferation of fibrous tissue enclosing immature osteogenesis [2].

The therapeutic management of FD of the temporal bone is based on two methods: For young children with slow progression, radiological monitoring is indicated (wait-and-scan protocol). Surgical management is indicated in aggressive forms in the presence of significant clinical symptoms causing cosmetic deformity, cranial nerve palsy, neurological symptoms, hearing loss, dysphagia, or respiratory difficulties. The surgical procedure chosen should focus on removing pathological tissue, restoring function, and preventing complications [3].

Conclusion

FD of the temporal bone is an uncommon entity, and isolated middle ear involvement causing progressive PFP remains exceptionally rare. This case illustrates the crucial role of high-resolution CT in identifying characteristic fibro-osseous changes and assessing the relationship of the lesion to critical structures. MRI complements CT by evaluating soft tissue involvement and excluding intracranial extension. Histological confirmation remains necessary in atypical presentations. Early diagnosis and appropriate multidisciplinary management are essential to prevent functional impairment and guide therapeutic decision-making, whether through radiological surveillance or surgical intervention.

Conflicts of interest

The authors declare no conflict of interest(s).

Ethical approval

The authors declare that they have obtained informed consent from the patients referred to in this article. The authors also declare that all personal details of the patient have been removed.

Author contributions

All the authors contributed to the conduct of this research work. The authors have read and approved the final version of the manuscript.

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