Global Pediatric Health
Volume 11: 1–6
© The Author(s) 2024
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/2333794X241266564
journals.sagepub.com/home/gph
Sage

A Rare Case of Infantile Myofibromatosis With Intra Cranial Involvement

Fatima Zahrae El Mansoury, MD[1], Zakia El Yousfi, MD[1], Ayman El Farouki, MD[2], Siham El Haddad, MD, PhD[1], Nazik Allali, MD, PhD[1], and Latifa Chat, MD, PhD[1,2]

Abstract

Infantile myofibromatosis is a proliferative disorder occurring during infancy and early childhood, marked by the development of nodular or diffuse lesions consisting of various mesenchymal elements. Intracranial involvement is infrequently reported. Here, we present the case of a 3-year-old girl exhibiting a rare manifestation of IM with intracranial parenchymal involvement, displaying a histological pattern documented in existing literature on patients with infantile myofibromatosis. Subsequent MRI follow-up revealed no signs of recurrence.

Keywords

infantile myofibromatosis, computed tomography, magnetic resonance imaging, intracranial, pediatric tumor

Received January 19, 2024. Received revised June 7, 2024. Accepted for publication June 12, 2024.

Introduction

Infantile myofibromatosis (IM) is among the most frequently occurring soft tissue tumors in infants. It is characterized by the emergence of nodular growths in the soft tissues, bones, and/or internal organs. IM mostly can be found in infants under 2 years, but it also happens in older children or even in adults.[1] IM can manifest as either isolated or multiple growths, leading to the use of the term "myofibromatosis."

The exact cause is still unknown, although there have been rare instances of familial cases reported.[2,3] However, it's essential to stress that the vast majority of myofibromas are sporadic and occur as isolated occurrences. The diagnosis must be confirmed by histologic, immunohistochemical, and genetic testing. The most commonly affected body areas are the head, neck, and trunk.[4,5] Here, we present a case of an infantile myofibromatosis with intracranial involvement, which is a rare presentation.

Case Report

A 3-year-old girl presented with a painless swelling on the right ear, which progressively increasing volume associated with otorrhagia. On clinical examination, a bleeding mass protruding through the right external auditory canal was noted. No signs of inflammation were seen in the overlying skin. No sensation or motor deficit in the right side of her face was identified.

The initial imaging, CT scan (Figure 1) and MRI (Figure 2) of the brain, revealed a mass centered on the right middle ear and extending intracranially opposite the temporal lobe with parenchymal infiltration. The lesion presents with cystic component with multiple fibrous septations as well as soft tissue component.

An excisional biopsy of the lesion protruding into the external auditory canal was performed. Microscopic analysis unveiled a clearly delineated lesion characterized by densely collagenized stroma, interspersed with scattered spindled to stellate cells displaying a non-aggressive chromatin pattern and inconspicuous cell borders. This pattern supports the diagnosis of IM.

The patient underwent immediate surgery during which most of the tumor was removed. However, complete removal was not feasible due to its intracranial involvement, so the intracranial portion of the tumor

[1]Hospital IBN SINA, Rabat, Morocco
[2]Université Mohammed V de Rabat, Rabat, Morocco

Corresponding Author:
Fatima Zahrae El Mansoury, Radiology Department Mother and Child, Hospital IBN SINA, Hôpital ibn sina Avenue bettouga suissi rabat, Rabat 10170, Morocco.
Email: fatidoly@gmail.com

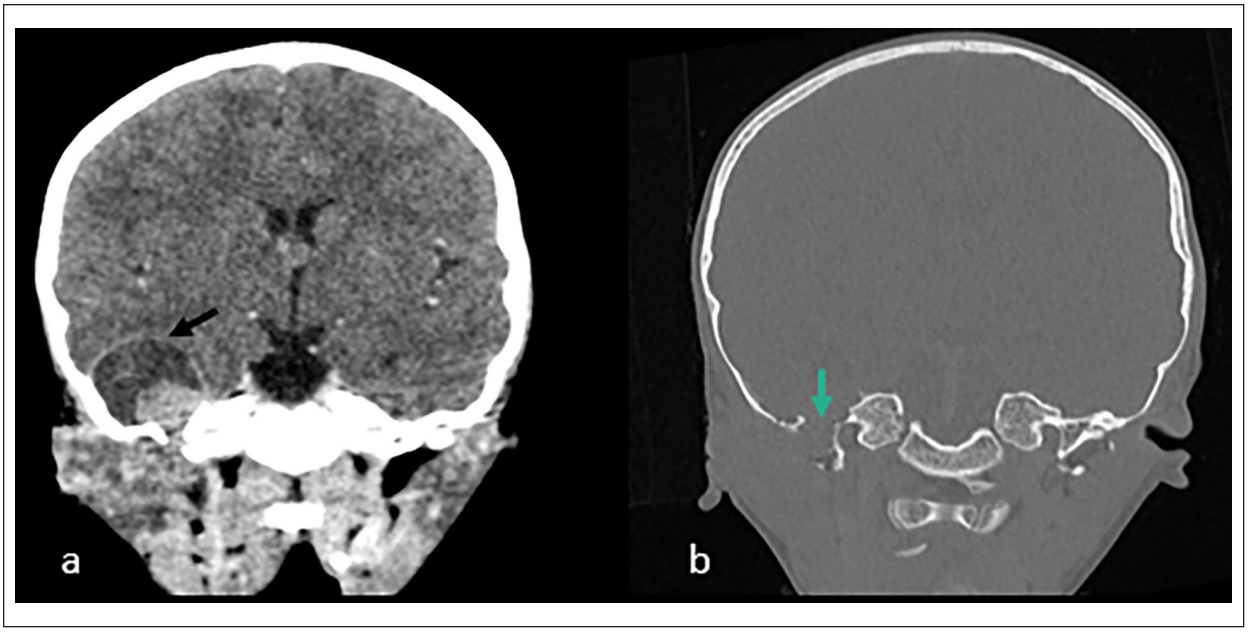

Figure 1. CT images at the time of presentation: coronal reconstruction in the parenchymal window (a) and in the bone window (b) showing the intracranial extension of the tumor (black arrow) with bone lysis (blue arrow).

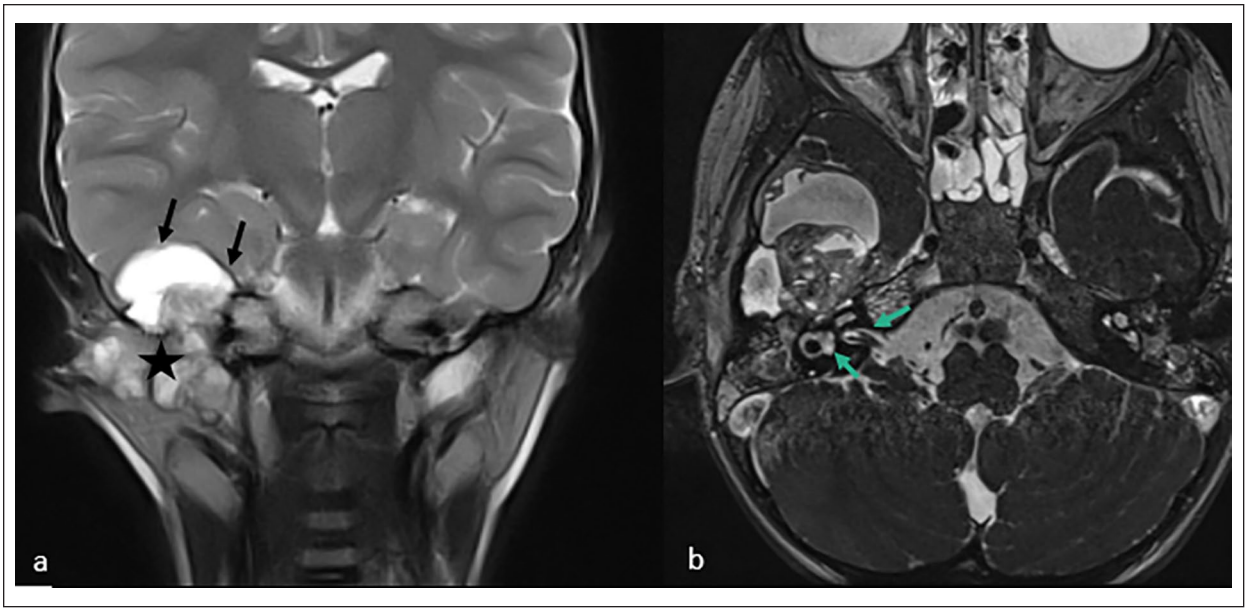

Figure 2. MR images at the time of presentation: coronal T2-weighted sequence (a) and axial steady-state gradient-echo sequence (b) showing the tumor (asterisk) with its intracranial extension (black arrows). The integrity of the inner ear and the internal auditory canal is noted (blue arrows).

was not removed. Following the surgery, the patient experienced increased swelling in the right ear and episodes of otorrhagia.

The follow-up brain CT scan 6 months later revealed an unfavorable progression, with a significant increase in the size of the tumor, which had doubled in volume, along with an extension of bone lysis and infiltration into the temporal lobe (Figure 3).

Confronted with this deterioration, the decision was made to perform a reoperation on the child to provide an

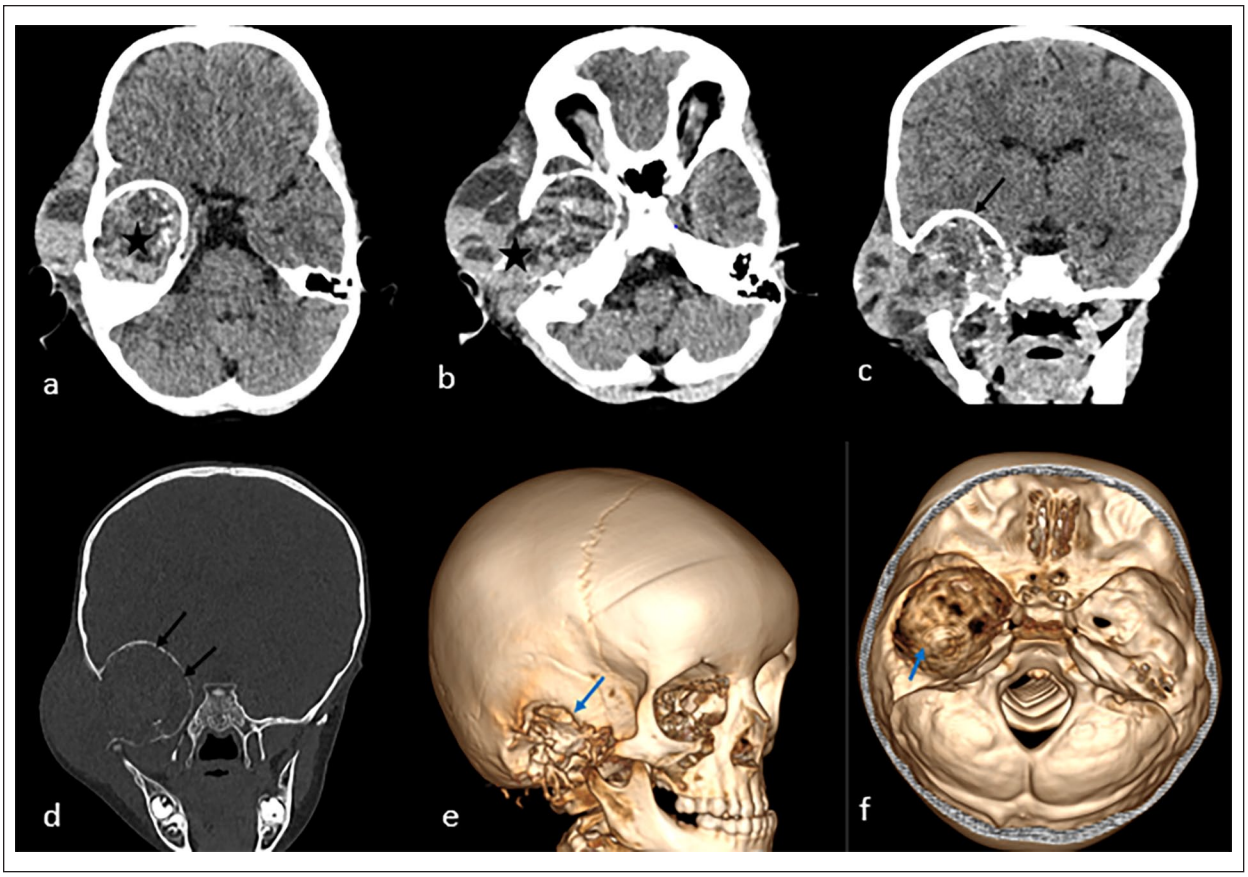

Figure 3. CT images 6 months after surgery: axial sections (a, b) and coronal reconstructions in the parenchymal window (c) and in the bone window (d) demonstrate a significant increase in the size of the tumor (black asterisk) with an accentuation of tumor extension into the temporal lobe and the formation of a peritumoral calcified shell (black arows). The 3D reconstruction (e, f) reveals bone lysis with deformation of the temporal bone corresponding to the tumor site (blue arrows).

opportunity for recovery. In the operating room, the surgeon completely removed the tumor while preserving the underlying dura mater. The clinical course after this second intervention was favorable, with the disappearance of otorrhagia and pain. However, noticeable facial asymmetry with right hemifacial paralysis was observed.

She was conservatively followed up until the age of 5, and her latest follow-up imaging showed a small residual cavity in the right temporal area with no remaining tumor residue (Figure 4).

Discussion

Infantile myofibromatosis is one of the most common myo-fibroblastic tumors in infancy and childhood.[4] While relatively uncommon in the general population, it stands out as the most prevalent fibrous tumor seen in infants. Typically, IM develops during a child's first 2 years of life and has presented in 61% of affected patients between birth and 5 months of age.

The precise cause and origin of IM remain unclear.[6,7] Familial IM follows an autosomal dominant mode of inheritance and is linked to PDGFRB germline variants.[2,8,9] Additionally, mutations in NOTCH receptor 3 (NOTCH3) have been observed in a specific subgroup of infantile myofibromatosis.[10]

Over time, this disorder has been referred to by various names, including congenital generalized fibromatosis, generalized hamartomatosis, multiple congenital mesenchymal tumors, diffuse congenital fibromatosis, and multiple vascular leiomyomas of the newborn.[11]

Infantile myofibromatosis can present as solitary or multicentric lesions, with or without visceral involvement. The solitary type is the most common, followed by the multicentric type without visceral involvement, and then the multicentric type with multiple visceral involvements.[5,12]

The case presented here had a solitary form with intracranial involvement, which is a rare condition. Only a few cases of solitary form with intracranial involvement have been reported.[4,13]

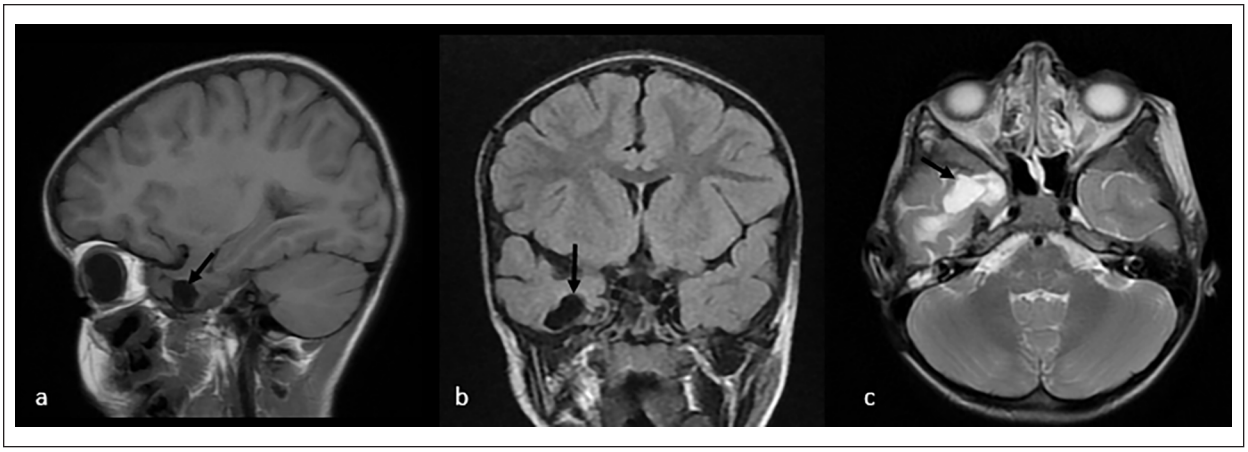

Figure 4. Follow up MR images: sagittal T1 sequence (a), coronal FLAIR sequence (b) and axial T2 sequence (c) showing a small residual cavity in the right temporal area (black arrows) with no remaining tumor residue.

The most frequent clinical presentations include the appearance of small nodules in the skin, muscle, or subcutaneous tissue, typically in the head, neck, and trunk regions. Bone lesions are rare in the solitary type, but are more prevalent in the multicentric type.[12]

Central nervous system involvement in infantile myofibromatosis is a rare occurrence, typically with lesions originating from the dura mater and infiltrating the skull, most frequently seen in solitary form. However, intracranial involvement has also been reported in some cases of multicentric IM.[14] So far, intracranial lesions have been characterized by an initial phase of rapid growth, followed by stabilization, and in many cases, spontaneous regression, possibly owing to apoptosis.[4,13]

The imaging features of IM are nonspecific. On radiographic images, bone lesions typically present as osteolytic areas, sometimes with sclerotic rims. Calvarial lesions tend to affect the temporal bone as in our case, followed by the parietal bone.[4] On US, such masses can show either a hyperechoic or anechoic center with a surrounding rim.[1,6]

On computed tomography examination, the tumor appears isodense and may exhibit calcifications, which is consistent with the findings on the CT scan in our case. On MRI, lesions associated with infantile myofibromatosis typically appear hypointense or isointense on T1-weighted images and hyperintense or isointense on T2-weighted images. They commonly exhibit strong contrast enhancement, which can range from nearly uniform to displaying a more irregular and heterogeneous pattern.[6,11,15]

The imaging findings associated with myofibromatosis are nonspecific and may resemble features observed in malignant or infectious conditions.[11] In our case, the imaging appearance was inconclusive, and histological study was pivotal for the definitive diagnosis. Imaging served as a preoperative assessment to accurately delineate the tumor's relationship with adjacent structure.

Under microscopic examination, the lesion exhibited well-defined characteristics, comprising a densely collagenized stroma. Within this stroma, the cells displayed a distinctive spindle-shaped fibroblast-like morphology, characterized by pale pink cytoplasm and elongated nuclei when stained with hematoxylin-eosin. Calcifications are commonly observed, and the rate of mitotic activity is only slightly elevated.[6,13]

The differential diagnosis should include other conditions that can cause soft tissue tumors to enlarge on the scalp in pediatric patients, primarily cranial fasciitis, which is a benign fibroproliferative condition of the scalp.[16] On imaging, both CT and MRI scans may show similarities to myofibromatosis and other soft tissue tumors. Biopsy is necessary for confirmation and accurate diagnosis.[16,17]

The choice of treatment for myofibromatosis depends on the tumor's location. While spontaneous regression has been documented in many cases, recurrence has also been reported.[6] Surgical removal should be considered primarily in cases where the lesion affects vital functions. In our case, the tumor progressively invaded the base of the skull and extended intracranially. After a giant recurrence following the initial surgery, the second surgery was successful.

In uncommon cases of the multicentric type with multiple visceral involvements, treatment with vinblastine and methotrexate chemotherapy has been utilized, and it has demonstrated positive outcomes.[6,18]

Managing patients who do not respond well to treatment or experience a relapse with multifocal disease can be particularly challenging. For those individuals who

carry a mutation in the kinase domain, targeted tyrosine kinase inhibitor therapy is a potential treatment option.[10,18]

Conclusion

In conclusion, infantile myofibromatosis (IM) presents with a range of clinical manifestations. Involvement of the intracranial area is exceedingly rare, and a definitive diagnosis is typically confirmed through histopathological examination. Molecular genetic testing is becoming increasingly important in the diagnostic.

Imaging plays a crucial role in accurately describing the radiological extent of the tumor in relation to nearby anatomical structures.

The choice of treatment depends largely on the child's condition, the size of the tumor, and its location. Solitary and multicentric myofibromas may spontaneously regress, but for growing or large lesions, surgical excision is often the appropriate treatment.

Abbreviations

IM: infantile myofibromatosis; CT: computed tomography; MRI: magnetic resonance imaging.

Author Contributions

FZEM contributed to conception and design; contributed to acquisition; drafted manuscript; critically revised manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring itegrity and accuracy. ZEY contributed to design; contributed to analysis; drafted manuscript; critically revised manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring itegrity and accuracy. AEF contributed to design; contributed to interpretation; drafted manuscript; critically revised manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring itegrity and accuracy. SEH contributed to conception; contributed to interpretation; drafted manuscript; critically revised manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring itegrity and accuracy. NA contributed to conception; contributed to acquisition and interpretation; drafted manuscript; critically revised manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring itegrity and accuracy. LC contributed to conception; contributed to analysis and interpretation; drafted manuscript; critically revised manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring itegrity and accuracy.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Ethics Approval

Our institution does not require ethical approval for reporting individual cases or case series.

Informed Consent

Written informed consent was obtained from a legally authorized representative(s) for anonymized patient information to be published in this article.

ORCID iDs

Fatima Zahrae El Mansoury https://orcid.org/0000-0001-6443-3217
Zakia El Yousfi https://orcid.org/0009-0005-0841-5475

References

1. Zhao G, Zhu M, Qin C, Liu X, Zhao X. Infantile myofibromatosis: 32 patients and review of the literatures. *J Pediatr Hematol Oncol*. 2019.
2. Puzenat E, Marioli S, Algros MP, et al. Myofibromatose infantile familiale. *Ann Dermatol Venereol*. 2009;136(4):346-349. doi:10.1016/j.annder.2008.10.034
3. Smith A, Orchard D. Infantile myofibromatosis: two families supporting autosomal dominant inheritance. *Australas J Dermatol*. 2011;52(3):214-217. doi:10.1111/j.1440-0960.2011.00730.x
4. De Martino L, Tresserras-Giné G, Quaglietta L, et al. Giant intracranial infantile myofibromatosis of the skull base: report of two cases. *Childs Nerv Syst*. 2022;38(4):837-841. doi:10.1007/s00381-021-05271-z
5. Al Qawahmed R, Sawyer SL, Vassilyadi M, Qin W, Boycott KM, Michaud J. Infantile myofibromatosis with intracranial extradural involvement and PDGFRB mutation: a case report and review of the literature. *Pediatr Dev Pathol*. 2019;22(3):258-264. doi:10.1177/1093526618787736
6. Hausbrandt PA, Leithner A, Beham A, Bodo K, Raith J, Windhager R. A rare case of infantile myofibromatosis and review of literature. *J Pediatr Orthop B*. 2010;19(1):122-126. doi:10.1097/BPB.0b013e32832e4756
7. Inoue M, Tanaka S, Nakatomi H, et al. Intracranial infantile myofibromatosis mimicking malignant brain tumor: a case report and literature review. *World Neurosurg*. 2016;93:487.e15-487.e20. doi:10.1016/j.wneu.2016.06.105
8. Hettmer S, Dachy G, Seitz G, et al. Genetic testing and surveillance in infantile myofibromatosis: a report from the SIOPE Host Genome Working Group. *Fam Cancer*. 2021;20(4):327-336. doi:10.1007/s10689-020-00204-2
9. Lu VM, Jue TR, McDonald KL, Rovin RA. The survival effect of repeat surgery at glioblastoma recurrence and its trend: a systematic review and meta-analysis. *World Neurosurg*. 2018;115:453-459.e3. doi:10.1016/j.wneu.2018.04.016
10. Arts FA, Sciot R, Brichard B, et al. PDGFRB gain-of-function mutations in sporadic infantile myofibromatosis. *Hum Mol Genet*. 2017;26(10):1801-1810. doi:10.1093/hmg/ddx081

11. Merciadri P, Pavanello M, Nozza P, et al. Solitary infantile myofibromatosis of the cranial vault: case report. *Childs Nerv Syst*. 2011;27(4):643-647. doi:10.1007/s00381-010-1382-9
12. Miwa T, Oi S, Nonaka Y, et al. Rapid spontaneous regression of multicentric infantile myofibromatosis in the posterior fossa and lumbar vertebra. *Childs Nerv Syst*. 2011;27(3):491-496. doi:10.1007/s00381-010-1306-8
13. Kaplan SS, Ojemann JG, Grange DK, Fuller C, Park TS. *Intracranial Infantile Myofibromatosis with Intraparenchymal Involvement*. Pediatric neurosurgery, Volume 36, Issue 4. April 2002. www.karger.com/journals/pne
14. Holzer-Fruehwald L, Blaser S, Rossi A, Fruehwald-Pallamar J, Thurnher MM. Imaging findings in seven cases of congenital infantile myofibromatosis with cerebral, spinal, or head and neck involvement. *Neuroradiology*. 2012;54(12):1389-1398. doi:10.1007/s00234-012-1111-z
15. Tsuji M, Inagaki T, Kasai H, Yamanouchi Y, Kawamoto K, Uemura Y. Solitary myofibromatosis of the skull: a case report and review of literature. *Childs Nerv Syst*. 2004;20(5):366-369. doi:10.1007/s00381-003-0874-2
16. Xiang Y, He S, Zhou Z, Gan Q, Jin K. Cranial fasciitis in children: clinicoradiology features and management. *BMC Pediatr*. 2022;22(1):551. doi:10.1186/s12887-022-03610-w
17. Wagner RD, Wang EK, Lloyd MS, Lam SK, Khechoyan DY. Cranial fasciitis: a systematic review and diagnostic approach to a pediatric scalp mass. *J Craniofac Surg*. 2016;27(1):e65-e71. doi:10.1097/SCS.0000000000002230
18. Mudry P, Slaby O, Neradil J, et al. Case report: rapid and durable response to PDGFR targeted therapy in a child with refractory multiple infantile myofibromatosis and a heterozygous germline mutation of the PDGFRB gene. *BMC Cancer*. 2017;17(1):119. doi:10.1186/s12885-017-3115-x