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Case Report

Subgaleal hematoma evacuation in a pediatric patient: A case report and review of the literature

Tye Patchana[1], Hammad Ghanchi[1], Taha Taka[2], Mark Calayag[3]

[1]Department of Neurosurgery, Riverside University Health System, Moreno Valley, [2]Department of Neurosurgery, University of California, Riverside School of Medicine, [3]Department of Neurosurgery, Kaiser Permanente, Fontana, California, United States.

E-mail: *Tye Patchana - tyepatchana@gmail.com; Hammad Ghanchi - hammadghanchi@gmail.com; Taha Taka - ttaka013@medsch.ucr.edu; Mark Calayag - mark.calayag@kp.org

***Corresponding author:**
Tye Patchana,
Department of Neurosurgery,
Riverside University Health System, 26520 Cactus Ave,
Moreno Valley - 92555,
California, United States.

tyepatchana@gmail.com

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ABSTRACT

Background: Subgaleal hematoma (SGH) is generally documented within the neonatal period and is rarely reported as a result of trauma or hair braiding in children. While rare, complications of SGH can result in ophthalmoplegia, proptosis, visual deficit, and corneal ulceration secondary to hematoma extension into the orbit. Although conservative treatment is preferential, expanding SGH should be aspirated to reduce complications associated with further expansion.

Case Description: A 12-year-old African-American female with no recent history of trauma presented with a chief complaint of headache along with a 2-day history of enlarging 2–3 cm ballotable bilateral frontal mass. Hematological workup was negative. The patient's family confirmed a long history of hair braiding. The patient was initially prescribed a period of observation but returned 1-week later with enlarging SGH, necessitating surgical aspiration.

Conclusion: SGH is rare past the neonatal period, but can be found in pediatric and adolescent patients secondary to trauma or hair pulling. Standard workup includes evaluation of the patient's hematological profile for bleeding or coagulation deficits, as well as evaluation for child abuse. Although most cases of SGH resolve spontaneously over the course of several weeks, close follow-up is recommended. The authors present a case of a 12-year-old female presenting with enlarging subgaleal hemorrhages who underwent surgical aspiration and drainage without recurrence. A literature review was also conducted with 32 pediatric cases identified, 20 of which were related to hair pulling, combing, or braiding. We review the clinical course, imaging characteristics, surgical management, as well as a review of the literature involving subgaleal hemorrhage in pediatric patients and hair pulling.

Keywords: Hair braiding, Subgaleal hematoma, Subgaleal hemorrhage

INTRODUCTION

First described in 1819 as a "false cephalohematoma, and later coined in 1957, subgaleal hematoma (SGH) is a collection of blood in the potential space between the periosteum and galeal aponeurosis, within loose areolar tissue.[25,36] It comprises a fluctuant tissue swelling that crosses suture lines. The majority of the literature on SGH focuses on neonates. Indeed, SGH has been recognized to occur with an incidence of approximately 0.5/1000 births in neonates,[35] but similar studies are lacking for older children. Although rare, it may result in significant complications and has been associated with minor head trauma, including braiding in older children. It has also been associated with at least one report of pediatric hair pulling by an abusive adult.[13]

SGH is rare beyond the neonatal period and is typically associated with head trauma resulting in rupture of emissary veins traversing the subgaleal space.[36] Complications of SGH, though rare, may be serious; the structures of the orbit may be at risk with hematoma extension of blood into the orbit, resulting in proptosis, visual deficit, ophthalmoplegia, and corneal ulceration.[22,26,38] A characteristic clinical finding may present as a patient's inability to open their eyes.[1] Worse, if there is leakage of blood beyond subgaleal attachment points associated with the zygomatic arch, airway compromise and skin necrosis may result.[21] Von Willebrand's disease, the most common inherited bleeding disorder, has also been discovered in patient's manifesting with subgaleal hemorrhage following hair braiding.[28]

Recognition of the clinical manifestations and presentation is important for appropriate management. As advocated by other authors,[23] recognition of this phenomenon can prevent unnecessary interventions and reports to child protective services. This case report describes the case of a 12-year-old female patient who presented with chief complaint of headache and was found to have bilateral frontal ballotable fluid collections consistent with SGH. We conducted a literature review of SGH in the pediatric population and found it to be a rare occurrence, with 32 cases reported.

CASE DESCRIPTION

Our patient was a 12-year-old African-American female presenting with a chief complaint of headache, as well as a 2-day history of enlarging 2–3 cm ballotable bilateral frontal mass. The patient and her family denied any antecedent incidence of trauma, as well as any patient or family history of blood dyscrasias. The patient had an uncomplicated birth history, delivered vaginally at term, with no significant medical history or medication usage. Her family endorsed a long history of hair braiding since the patient was a toddler. With the exception of ballotable mass encompassing the bilateral forehead, the patient's examination was unremarkable. Computed tomography (CT) of the head [Figure 1] demonstrated subcutaneous hematomas along the bilateral scalp without evidence of underlying fracture or intracranial pathology.

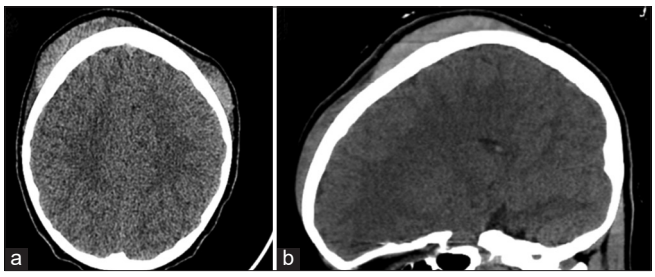

Figure 1: (a) Axial noncontrast CT head demonstrating bilateral subgaleal fluid collections and (b) sagittal noncontrast CT head demonstrating collections along the frontal and parietal aspects of the calvarium.

Laboratory results demonstrated normal platelet aggregation, Von Willebrand, and Factor 8 and Factor 13 testing. The patient presented without fever, and the rest of her vital signs were unremarkable. The patient was subsequently discharged with follow-up with a pediatric neurosurgery clinic in 2 weeks. One week later, the patient returned with an enlarging subgaleal fluid collection. Magnetic resonance imaging (MRI) of the brain with and without intravenous gadolinium was performed, demonstrating an interval increase in bilateral frontal and parietal scalp hematoma to 2.3 cm, compared to prior noncontrast CT of the head [Figure 2]. Again, no intracranial pathology was identified.

Although most cases of SGH resolve spontaneously within a few weeks, and therefore, the risk of infections secondary to aspiration and drainage is usually deferred, our patient returned with a worsening clinical course. Therefore, the risks, benefits, and alternatives to bedside drainage were explained to the patient's family, who decided to proceed.

Given increasing size and overall worsening clinical course of the SGH, the intervention was prompted. A 24 gauge butterfly needle connected to the syringe was inserted into the epidermis in a Z-shaped fashion and slowly advanced with negative pressure at the center of the forehead behind the hairline until a flash of fluid was noted. Only one insertion of the needle was required. Approximately 300 mL of dark, motor oil-like fluid [Figure 3] was aspirated under sterile technique, with a reduction in mass and bogginess of the forehead. Cytological studies demonstrated histiocytes, lymphocytes, and blood without the presence of malignant cells. Gram stain was negative for any organisms as well as negative final cultures. After the drainage, the patient received compression bandages and the family was advised to stop braiding. Finally, the patient resumed regularly scheduled follow-up with both her pediatrician and pediatric neurosurgery clinic without any recurrence to date.

DISCUSSION

SGH results from the collection of blood between the aponeurosis and the periosteum of the skull. The mechanism likely involves accumulation of blood in the subgaleal layer, where emissary veins drain superficial scalp veins to the dural sinuses.[1] The previous reports in the literature have cited spontaneous SGH with workup uncovering blood dyscrasias, including impaired platelet aggregation,[14] Vitamin K deficiency,[30] or deficient/nonfunctional coagulation factors.[4,12,29] Accordingly, a comprehensive hematological workup should ensue when presented with a pediatric patient with a diagnosis of SGH, especially without

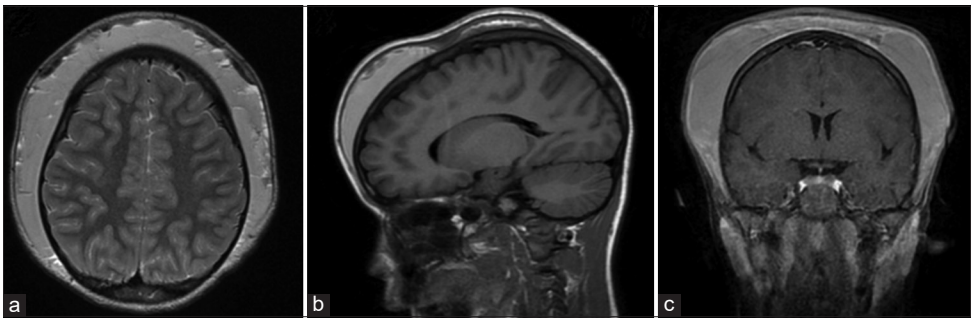

Figure 2: (a) Axial T2 MRI brain demonstrating bilateral subgaleal fluid collections, enlarged compared to noncontrast CT had a week prior, (b) sagittal T1 flair brain demonstrating collections along the frontal and parietal aspects of the calvarium, and (c) coronal noncontrast T1 MRI of the brain demonstrating bilateral subgaleal hematoma formation.

Table 1: Demonstrates the salient features of these articles, including year of publication, age, and sex of the patients.

Subgaleal hematoma in pediatric patients				
References	**Year**	**Age (years)**	**Sex**	**Mechanism**
JAMA editor	1934	8	M	Hair pulling
Hamlin[13]	1968	3	F	Accidental trauma
Cantu[2]	1971	15	M	Hair pulling
Faber[9]	1976	5	F	Hair pulling
Falvo *et al.*[10]	1981	9	F	Hair combing
Falvo *et al.*[10]	1981	4.5	F	Hair combing
Kirkpatrick *et al.*[17]	1986	12	F	Un-known
Lee *et al.*[19]	1988	13	F	Nonaccidental trauma
Madhu *et al* [20]	1990	13	M	Hair pulling
Cooling and Viccellio[5]	1991	2	M	Accidental trauma
Pomeranz *et al.*[26]	1995	6.5	F	Accidental trauma
Palmer *et al.*[24]	1998	0.75	F	Hair braiding
Palmer *et al.*[24]	1998	10	F	Hair braiding
Guirgis *et al.*[12]	2002	5	M	Accidental trauma
Yip *et al.*[39]	2003	13	M	Hair pulling
Vu *et al.*[36]	2004	8	F	Hair braiding
Raffini and Tsarouhas[28]	2004	17	M	Hair braiding
Fujisawa *et al.*[11]	2005	12	F	Hair pulling
Seifert and Püschel[33]	2006	3	M	Nonaccidental trauma
Karcioglu *et al*[15]	2008	8	F	Accidental trauma
Onyema *et al.*[23]	2009	2.5	F	Hair braiding
Kim and Taragin[16]	2009	9	F	Hair braiding
Hutspardol *et al.*[14]	2010	9	F	Spontaneous/dyscrasia
Koizumi *et al.*[18]	2010	15	M	Spontaneous
Shamji and Jacoby[34]	2015	2	F	Nonaccidental trauma
Edmonson *et al.*[7]	2016	16	M	Hair combing
Er *et al.*[8]	2017	8	F	Hair pulling
Wajima *et al*[37]	2017	14	M	Unknown
Puri *et al.*[27]	2019	13	M	Hair pulling
Scheier *et al.*[31]	2019	10	F	Hair combing
De Vito and Mankad[6]	2019	11	F	Hair pulling
Bowen and Liker[1]	2020	4	M	Hair pulling

a history of obvious trauma. In addition, the presentation may be delayed due to the large potential space. Indeed, this potential space is large enough to hold approximately 250 mL, an amount that can be life-threatening to neonates.

The diagnosis was confirmed through noncontrast CT head, as well as MRI of the brain with and without contrast. Although most cases of subgaleal hemorrhage resolve spontaneously over the course of weeks, a trial of bandage

Figure 3: Approximately 300 mL of dark, motor oil-like fluid was aspirated under sterile technique, with a reduction in mass and bogginess of the forehead.

compression has also been advocated,[3] as a prelude to surgical intervention. Ultimately, conservative treatment is preferential due to the risk of infection which can spread through the emissary veins to the dural sinuses secondary to more invasive interventions.[15,36] Normally, SGH resolves spontaneously within a 1–5 week period;[17,23,36] however, in cases such as the one presented by the authors where further expansion continues, thereby increasing the risk of orbital expansion or calcification of stagnant blood, aspiration should be performed.

A literature review was conducted utilizing Google Scholar and PubMed. Both neonatal (birth up to 4 weeks) and adult cases were excluded from the search. The most comprehensive literature review to date was performed by Scheier *et al*. and included 16 pediatric cases involving hair pulling or straightening.[32] In total, 29 pediatric case reports of SGH were identified, comprising 32 pediatric patients in the literature, 20 of which were found to be associated with hair pulling, combing, or braiding.[6,7,8,9,11,16,20,27,31,39] We also identified several cases secondary to unknown causes or causes other than hair pulling or combing.[18,19,33,34,37]. [Table 1] demonstrates the salient features of these articles, including year of publication, age, and sex of the patients. Our literature review emphasizes that continued growth despite conservative treatment warrants intervention in many cases.[2,10,28,36] In the large majority of cases where the SGH was limited in size and presented without complications, no intervention was performed; however, frequent follow-up was necessary.[5,13,23,24]

CONCLUSION

SGH is rare past the neonatal period but can be found in pediatric and adolescent patients. Standard workup includes evaluation of the patient's hematological profile for bleeding or coagulation deficits, as well as evaluation for child abuse. Although most cases of subgaleal hemorrhage resolve spontaneously over the course of several weeks,[36] close follow-up is recommended. The authors present a case of a 12-year-old female presenting with enlarging subgaleal hemorrhages who underwent surgical aspiration and drainage without recurrence. We review the clinical course, imaging characteristics, surgical management, as well as a review of the literature involving subgaleal hemorrhage in pediatric patients and hair pulling.

Declaration of patient consent

Patient's consent not required as patients identity is not disclosed or compromised.

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Conflicts of interest

There are no conflicts of interest.

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