

ILLUSTRATIVE CASE

Solving the Mystery of a 1-Month-Old Infant With Scalp Swelling: Search the Literature First

Kelly E. Wood, MD

CASE

A 29-day-old infant presented to the emergency department (ED) with increasing painless scalp swelling. The swelling was first noted 2 weeks ago. Since that time, it has doubled in size. The family denied a history of trauma.

She was born at term by cesarean delivery for failure to descend with fetal distress. Neither vacuum nor forceps were used. A fetal scalp electrode was placed during labor. After delivery, intramuscular vitamin K was administered. Her newborn course was complicated by hypoglycemia attributed to poor feeding. Scalp swelling was not present at birth or during the newborn hospitalization. There were no issues with jaundice and her newborn metabolic screen was normal.

Since discharge, she has been exclusively fed breast milk and has been growing well, with documented weight gain of 30 g per day.

The scalp swelling was first noticed by the family at 2 weeks of age. She was evaluated by her physician at 19 days of age and was otherwise well and asymptomatic. Our review of her symptoms was negative for fever or vomiting. An ultrasound revealed a 2.3 cm by 0.5 cm superficial fluid collection medially adjacent to the skull. It did not appear to communicate intracranially. On the basis of the images, it was believed to be a small focus of caput succedaneum or a small cephalohematoma. Per the radiologist, additional imaging may be warranted if the swelling did not resolve or demonstrate notable improvement over the next 4 to 6 weeks. The family was instructed to monitor the swelling at home.

The day of presentation, the swelling had doubled in size, prompting the parents to seek evaluation in the ED. In the ED, her vitals were all within normal limits and she was well appearing. The physical examination was notable for a 4 cm by 6 cm fluid-filled, transilluminating, fluctuant mass located in the midline posterior to the anterior fontanelle over the sagittal suture (Figs 1 and 2). It was nontender and nonpulsatile. The overlying skin was normal without discoloration, redness, or alopecia. Scalp veins were visible. The anterior fontanelle was open, soft, and flat. On neurologic examination, she had symmetric eyes with normal extraocular movements, normal tone, a strong suck, and intact reflexes. No jaundice or bruising was present. The remainder of her examination was normal (Figs 1 and 2).

On laboratory test results, the hemoglobin was 10.9 g/dL with a normal mean corpuscular volume, and the platelet count was 225 000/mm³. The results of the skull radiographs were negative for displaced skull fracture. Repeat ultrasound again noted a midline scalp subcutaneous fluid collection without definitive intracranial communication. Brain MRI was recommended. She was admitted to the hospital for observation and continued diagnostic workup. Written consent was obtained from the family.

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Address correspondence to Kelly E. Wood, MD, Stead Family Department of Pediatrics, University of Iowa Stead Family Children's Hospital, 200 Hawkins Dr, Iowa City, IA 52242. E-mail: kelly-wood@uiowa.edu

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*Stead Family Department
of Pediatrics, University
of Iowa Stead Family
Children's Hospital, Iowa
City, Iowa*



FIGURE 1 Axial photograph of scalp swelling.

Question: What are potential causes of scalp swelling in a young infant?

Discussion

The differential diagnosis of scalp swelling includes caput succedaneum, cephalohematoma, and subgaleal hemorrhage. All are typically present at birth. Caput is a subcutaneous collection of fluid that crosses the sutures and rapidly resolves hours to days after delivery. A cephalohematoma is a subperiosteal



FIGURE 2 Profile photograph of scalp swelling.

hemorrhage confined by suture lines. A subgaleal hemorrhage results from rupture of scalp veins. The boggy swelling crosses suture lines and progressively enlarges after birth and may have overlying bruising of the skin. Significant hemorrhaging can occur with subsequent hypovolemic shock. Less commonly, scalp swelling could be the manifestation of a coagulation disorder such as hemophilia and/or trauma including child abuse. Tumors, pseudocysts, and encephaloceles should be considered as well.¹

CASE CONTINUATION

Coagulation studies were normal. A skeletal survey and dilated eye examination were obtained to evaluate for other injuries suggestive of inflicted trauma (physical child abuse). Both were normal. Brain MRI with and without contrast showed a 1.1 cm by 4.2 cm by 5.2 cm simple subcutaneous fluid collection without enhancement (Fig 3). It did not enhance or extend intracranially. It was not consistent with a cephalohematoma because it crossed sutures. Per the radiologist, it may represent a subgaleal hematoma.

Question: Where is the anatomic location of the subgaleal space?

Discussion

The scalp is composed of skin, connective tissue, the scalp aponeurosis, loose connective tissue, and the periosteum. The subgaleal space is located between the scalp aponeurosis and the periosteum. This potential space extends from the supraorbital ridge to the nape of the neck and laterally to the ears. The aponeurosis is made up of several layers of highly-vascularized connective tissue. Disruption of these vessels can lead to hemorrhage. The terms “subgaleal” and “subaponeurotic” both refer to the same space.

CASE CONCLUSION

The diagnosis was made after reviewing the medical literature. The clinical course including examination and imaging were consistent with a benign subaponeurotic fluid collection (SFC) possibly related to minor trauma from the fetal scalp electrode placed during labor.

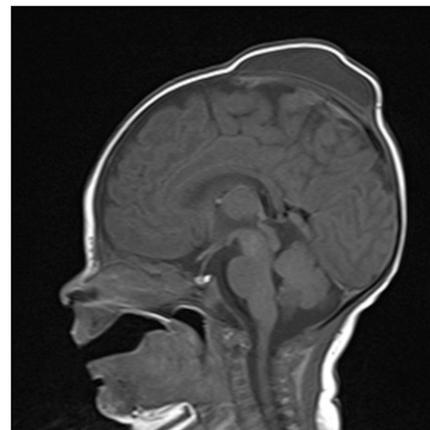


FIGURE 3 MRI sagittal image showing a nonenhancing frontoparietal subcutaneous scalp fluid collection that crosses suture lines.

Overnight, the scalp swelling remained stable and the infant was deemed clinically well. She was discharged from the hospital with local follow-up.

Question: How common is this condition and how is it diagnosed?

Discussion

SFCs are a rare cause of scalp swelling in infants. Since its first description in the literature in 2002, multiple small case series have been published.² The largest series to date involved 11 infants.³ The swelling is not present at birth and presents later with a mean age of presentation varying between 7 and 9 weeks.^{2,3} The youngest described infant was 3 weeks old at presentation.³ Wang et al⁴ had 3 infants present at 6 months of age or older. One case involved a 7-year-old child who developed a left parietal SFC 1 month after trauma to the left eyebrow.²

SFCs are diagnosed clinically on the basis of the characteristic findings of a soft, nontender, ill-defined, mobile fluctuant scalp swelling that crosses suture lines. Additional diagnostic testing including imaging is typically not needed but is frequently obtained. In the case series by Smith et al,³ 8 of the 11 infants had imaging. All 6 of the infants in the case series by Hopkins et al² had imaging. Imaging modalities vary but most commonly involve skull radiographs or cranial ultrasound.^{2,3,5}

Of the infants imaged, all had normal intracranial findings without extra intracranial connections, skull fractures, or vascular malformations.^{2,3,5}

The etiology of SFCs is unknown, but cases are frequently associated with instrumental delivery, particularly vacuum-assisted delivery.³ Cases involving infants delivered by emergency cesarean delivery and prolonged labor have been reported.^{4,6} Petraglia et al⁶ reported 3 infants who all had scalp electrodes placed during labor. They postulated that scalp trauma from the electrode placement caused a cerebrospinal fluid (CSF) leak.⁶ Other theories include defective lymphatic drainage and liquefaction of small delivery hemorrhages with subsequent exudative collection of fluid.²

Three infants described by Schoberer et al⁷ had therapeutic drainage of the fluid. One infant had 2 aspirations performed. Each time the fluid reaccumulated only to later resolve spontaneously. The fluid was serosanguinous, supporting the theory that SFC are related to birth trauma. CSF markers β_2 -transferrin and β -trace protein were present in the aspirate fluid.⁷ It was postulated that the CSF originated from undetected microfractures or disruption of venous connections between the scalp and dural sinuses at the time of delivery.⁷

SFCs resolve spontaneously. Needle aspiration of fluid has not been associated with quicker resolution, and frequently the fluid reaccumulates rapidly.⁴ Time to resolution varies ranging from 1 to 24 weeks.^{2,3} Adverse outcomes have not been reported.^{3,4}

As in our case, many providers have not encountered a case of SFC previously. Worthen et al¹ surveyed parents of 69 infants who posted blogs on a patient-support Web site describing clinical features of SFC. Seventy-five percent of infants were evaluated in a primary care setting and 38% in the ED.¹ All participants reported that providers were unaware of

the clinical features of SFC, which led to imaging in 100% of cases and included exposure to radiation (53% cases), repeated evaluation, and in some cases referral to specialists and/or suspicion of child abuse (9 cases).¹ Many responders felt medical evaluation increased rather than relieved their concerns.

Although most infants are evaluated in an outpatient setting, knowledge of SFC is important for hospitalists. In the case series by Wang et al,⁴ 3 of the 4 infants that presented to the ED were admitted. In any setting, physical child abuse must be considered for an infant presenting with scalp swelling and no history of trauma, because subaponeurotic or subgaleal hemorrhage has been described with inflicted head trauma.⁵ Although SFC is a clinical diagnosis, the evaluation should be individualized and appropriate diagnostic testing should be ordered if there are any concerns. Skull radiographs to evaluate for fracture and scalp ultrasound to confirm the location of the fluid are reasonable initial diagnostic studies in such cases. If physical signs of trauma such as bruising are present or a skull fracture is identified, a full diagnostic workup including skeletal survey should be performed.

CONCLUSIONS

SFCs are a benign cause of scalp swelling that present around 2 months of age. The diagnosis is clinical and the swelling will spontaneously resolve over time. Management is conservative and should include parental reassurance. Providers need to be aware of SFCs to avoid unnecessary testing and parental emotional distress.

LEARNING POINTS

- SFCs are benign causes of scalp swelling that resolve spontaneously anywhere from weeks to months.

- The diagnosis is clinical; therefore, testing and/or imaging are unnecessary and can be harmful.
- When encountering an unknown clinical condition, reviewing the medical literature is imperative.

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