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Case Report

Rehabilitation of a neonate with persistent caput succedaneum using cranial remoulding orthosis (helmet): a case report

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ABSTRACT

A second-born male child to nonconsanguineous parents was delivered by normal vaginal delivery following a difficult extraction at term and had a normal transition to postnatal life. At 40 days of life, the baby presented with a soft, boggy swelling in the posterior occipital region, which had been noticed since birth but was increasing in size gradually, and he was born through a difficult normal vaginal delivery. The preliminary diagnosis considered at admission was probable caput succedaneum, with a differential diagnosis of spontaneous CSF leak. Cranial ultrasound reports showed a cystic lesion measuring 37×28 mm in the right parietooccipital region, suggestive of caput succedaneum. So, the baby was aided by our rehabilitation team experts, who provided the cranial remolding orthosis (helmet) to the neonate, which would provide adequate soft, consistent compression. At 3 and a half months of age, the caput subsided, and the baby was doing clinically well with normal developmental milestones and a normal head circumference, appropriate for the age. Thus, the use of the helmet resulted in a significant improvement in the baby's condition, demonstrating the effectiveness of this intervention for treating persistent caput succedaneum. Therefore, this article highlights the importance of early intervention and specialized care in managing cranial deformities in neonates.

Keywords: Caput succedaneum, Cranial remolding orthosis, CSF, Neonate

INTRODUCTION

Caput succedaneum is a benign edema that appears on an infant's scalp after birth due to strain on the newborn's head during vertex (head down) and vacuum-assisted delivery by crossing cranial suture lines and the midline. Though it has a benign prognosis, one can misdiagnose it as a cephalocele.[1,2] Assessing caput succedaneum digitally can be subjective due to differences in interpretation.[3] Though the majority of caput succedaneum spontaneously resolves, the persistence of caput for longer than six weeks, can potentially be a sign of underlying problems that require treatment and cause anxiety for parents and pediatricians. In these situations, cranial imaging becomes essential to rule out spontaneous CSF leaks. In cases of prolonged caput, conservative waiting and observation techniques do not provide the parents or the infant any hope. Multidisciplinary care comprising paediatricians, neurologists, and occupational therapists is required in these situations. Rehabilitation can be an effective treatment approach for persistent caput, with cranial remolding orthoses (CROs) commonly used to help address all kinds of skull deformations by applying gentle

pressure to reshape the skull.[8-10] One of the studies supports the use of passive helmet therapy for improvement in deformational plagiocephaly in infants from birth to 18 months of age.[4] Clarren et al described the cranial molding orthosis in the scientific literature.[6] In ancient Peru, the concept of artificial cranial orthosis was developed. Using fixed boards and pads and external compression, infant skulls were artificially moulded.[7] Cranial remolding orthoses work on the same principle. They are usually custom-fitted and molded.

CASE REPORT

The subject in this case was a healthy 40-day-old male infant, born to non-consanguineous parents. In the initial postnatal period, the baby was presented with a soft, boggy swelling in the back of the head (posterior occipital region) since birth, with increasing size in the past few weeks. The infant's medical history showed that delivery was normal (difficult extraction). The initial diagnosis was caput succedaneum with a possibility of spontaneous cerebrospinal fluid leak. Based on the patient's ultrasound reports, a cystic lesion suggestive of caput succedaneum was diagnosed. Additionally, neurological assessments showed normal developments, and no abnormalities were detected. Due to affordability concerns and normal development, MRI was not pursued. So, the pediatrician referred the child to the rehabilitation department for further evaluation and intervention options. After considering every possible option, the team opted to treat the swelling around two months of age with a custom-made cranial remolding orthosis (helmet), which provides gentle, continuous compression.

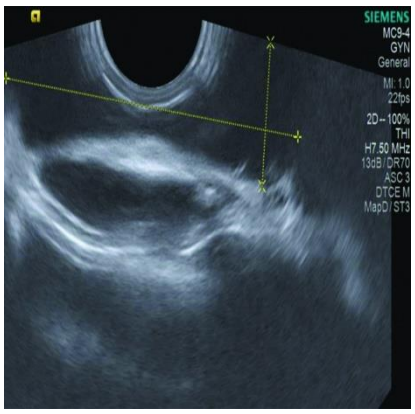

Figure 1: Ultrasound cranium.

Ultrasound cranium demonstrated a well-defined cystic lesion measuring 37×28 mm in the right parietooccipital scalp region, which crosses the suture lines, and no solid components and no obvious intracranial communications were noted, suggestive of caput succedaneum.

Treatment

The patient was monitored by the rehabilitation team to track the effectiveness of the orthosis. The custom-made cranial remolding orthosis applied gentle, consistent pressure to help reshape the head and potentially reduce the swelling.

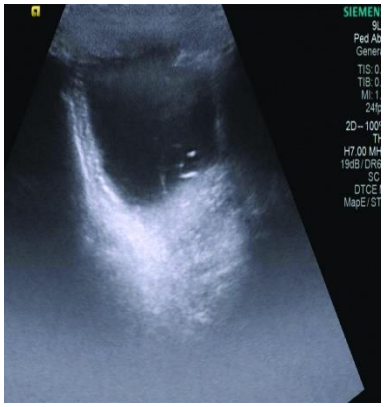

Figure 2: Ultrasound cranium.

Figure 3: Caput succedaneum child with cranial remolding (helmet) orthosis.

Figure 4: Post-operative procedure.

Instructions to wear the helmet

Parents were advised to keep the helmet on the infant's head for a minimum of 12 hours daily. This emphasis on even pressure distribution which highlighted the goal of reducing the swelling in the occipital region

Follow-up assessment

The infant was evaluated again at three and a half months after utilizing the custom-made cranial remolding orthosis for one month. The positive aspect was that the

swelling in the caput succedaneum, or occipital region, has totally subsided. The infant met all anticipated developmental milestones and showed signs of normal development. The baby's head circumference fell within the typical range for its age. At assessment, the occipital region's swelling had completely resolved after utilizing cranial remolding orthosis for a month.

Positive outcome

The swelling was resolved and normal development was appropriate for age.

DISCUSSION

Skull deformities can cause a variety of problems, such as abnormal speech development, jaw asymmetry, temporomandibular joint dysfunction, abnormal muscle tone, ear misalignment, and middle ear abnormalities. They can also increase the need for special services during school age. In addition, deformities of the head and face are quite visible in both adults and children. The psychological fallout from having an unusual head or facial shape can lead to low self-esteem and bullying.[5] According to research, avoiding and correcting skull deformities would be advantageous for a child's overall physical and psychosocial well-being. According to Meyer-Marcotty et al study in 2018 of infants in the 4–10-month age range, infants between 4 and 6 months have the greatest neurocranial volume increase in comparison to the older subjects.[11] The cranial circumferential growth chart published by the CDC also revealed the faster growth of cranium in younger infants.[12]

So the rehabilitation team, including occupational therapists and orthotics specialists, discussed treatment options for the infant's head swelling and decided to create a custom-made cranial remolding orthosis (helmet) using a low-temperature thermoplastic sheet.

Fabrication and benefits of cranial remolding orthosis

Helmet construction

The rehabilitation team opted for a custom-made cranial remolding orthosis using a 2 mm thick, low-temperature thermoplastic sheet. The sheet was heated in an 80 °C water bath until moldable and then cooled under running water before application. A stockinette cloth was first placed on the infant's head, followed by the softened thermoplastic sheet. The team meticulously molded the sheet to ensure even pressure distribution from the top of the head to the neck region. The helmet was then trimmed and fitted for accuracy, with neck straps added for secure placement. The inner lining was padded with soft material for the infant's comfort. This material choice aims to provide consistent and even pressure distribution on the infant's skull, potentially reducing the swelling in the occipital region. It is recommended for cranial remolding orthosis due to its: moldability (it can be precisely molded to the infant's head shape for a customized fit); comfort (it ensures a comfortable fit by utilizing a low-temperature molding process that minimizes discomfort for the baby); pressure distribution (it allows for the application of gentle, even pressure to specific areas of the head, promoting effective cranial remolding orthosis).

CONCLUSION

This case demonstrates the successful use of a custom-made cranial remolding orthosis to address head shape concerns in an infant. Early intervention, combined with the expertise of the rehabilitation team, led to a positive outcome with no lasting effects. This case highlights the importance of custom-made cranial remolding orthosis which is a safe and effective treatment option for mild cases.

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REFERENCES

1. Ojumah N, Ramdhan RC, Wilson C, Loukas M, Oskouian RJ, Tubbs RS. Neurological neonatal birth injuries: a literature review. Cureus. 2017;9(12):1938.
2. Gerscovich EO, McGahan JP, Jain KA, Gillen MA. The revelation of caput succedaneum after instrumental assisted deliveries: exclusively diagnosed on ultrasonography: mini article of case series. J Clin Ultrasound. 2003:98-102.
3. Hassan WA, Eggebo TM, Salvesen KA, Lindtjorn E, Lees C. Intrapartum assessment of caput succedaneum by transperineal ultrasound: a two-centre pilot study. Aust N Z J Obstet Gynaecol. 2015;55(4):401-3.
4. Couture DE, Crantford JC, Somasundaram A, Sanger C, Argenta AE, David LR. Efficacy of passive helmet therapy for deformational plagiocephaly: report of 1050 cases. Neurosurg Focus 2013;35(4):4.
5. Graham T, Millay K, Wang J, Adams-Huet B, O'Briant E, Oldham M, et al. Significant factors in cranial remolding orthotic treatment of asymmetrical brachycephaly. J Clin Med. 2020;9(4):1027.

6. Clarren SK, Smith DW, Hanson JW. Helmet treatment for plagiocephaly and congenital muscular torticollis. J Pediatr..1979;94:43-6.
7. Ayer A, Campbell A, Appelboom G, Hwang BY, McDowell M, Piazza M, et al. The sociopolitical history and physiological underpinnings of skull deformation. Neurosurg Focus. 2010;29(6):1.
8. Goh JL, Bauer DF, Durham SR, Stotland MA. Orthotic (helmet) therapy in the treatment of plagiocephaly. Neurosurgical Focus. 2013;35(4):2.
9. Katzel EB, Koltz PF, Sbitany H, Emerson C, Girotto J. Real versus perceived improvements of helmet molding therapy for the treatment of plagiocephaly. Plast Reconstruct Surg. 2010;126(1):19-21.
10. Kluba S, Kraut W, Reinert S, Krimmel M. What is the optimal time to start helmet therapy in positional plagiocephaly? Plast Reconstruct Surg. 2011;128(2):492-8.
11. Meyer-Marcotty P, Kunz F, Schweitzer T, Wachter B, Böhm H, Wabmuth N, Linz C. Cranial growth infants-a longitudinal three-dimensional analysis of the first months of life. J Cranio-Maxillo-Fac Surg. 2018;46:987-93.
12. Growth Charts. Clinical Growth Charts. Available at: https://www.cdc.gov/growthcharts/clinical_charts.htm. Accessed on 28 June 2024.

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