Scientific Research Publishing

Case Reports in Clinical Medicine, 2022, 11, 79-83
https://www.scirp.org/journal/crcm
ISSN Online: 2325-7083
ISSN Print: 2325-7075

Surgical Repair of Growing Skull Fracture: A Case Report

Youssouf Sogoba[1], Seybou Hassane Diallo[2], Moussa Diallo[1], Drissa Kanikomo[1], Boubacar Sogoba[1], Oumar Coulibaly[3], Mahamadou Dama[3], Mamadou Salia Diarra[4], Oumar Diallo[3], Youssoufa Maiga[2]

[1]Department of Neurosurgery, Gabriel Touré Teaching Hospital, Bamako, Mali
[2]Department of Neurology, Gabriel Touré Teaching Hospital, Bamako, Mali
[3]Department of Neurosurgery, Hôpital du Mali, Bamako, Mali
[4]Department of Neurosurgery, Hôpital Luxambourg, Bamako, Mali
Email: sogobayoussouf@yahoo.fr

How to cite this paper: Sogoba, Y., Diallo, S.H., Diallo, M., Kanikomo, D., Sogoba, B., Coulibaly, O., Dama, M., Diarra, M.S., Diallo, O. and Maiga, Y. (2022) Surgical Repair of Growing Skull Fracture: A Case Report. *Case Reports in Clinical Medicine*, **11**, 79-83.
https://doi.org/10.4236/crcm.2022.113012

Received: February 14, 2022
Accepted: March 19, 2022
Published: March 22, 2022

Abstract

Background: Growing skull fractures (GSF) are a rare complication of pediatric head trauma that comprises post-traumatic skull defect associated with an underlying dural tear and an intact arachnoid membrane. They are often misdiagnosed, and delay in management can lead to progression of the disease with neurological sequelae. GSF are rare and their incidence has been estimated as 0.05% - 1% of all pediatric skull fractures. This low incidence and the subtlety of its presentation often make diagnosis challenging with consequent delay in management. Surgery is recommended to treat GSF and involved dural repair with or without cranioplasty. In this paper, we report a case of a patient with GSF in whom the surgical repair was successful with good cosmetic and functional outcome. **Case Report:** A 12 months old girl was admitted to our neurosurgical department with right parietal swelling that had been gradually enlarging over 3 months. The history of the disease began when the girl was 1 month old with a fall with cranial impact resulting in head trauma with initial loss of consciousness. At presentation the girl was alert with normal consciousness. Clinical examination revealed the deformed skull with large pulsatile and painless swelling lesion in the right parietal region and hemiparesis on the left side. The CT scan revealed type 3 GSF including parietal bone diastasis with hypodense fluid collection that mimicked the leptomeningeal and porencephalic cyst. Surgical repair was performed. The post-operative course was uneventful and the child was discharged home five days after surgical intervention. **Conclusion:** GSF can lead to serious neurologic complications. Therefore educating parents on this potential outcome and close follow-up with clinical and imaging screening is recommended to screen children at risk for the development of the disease.

Keywords

Growing Skull Fracture, Head Trauma, Dural Tear

1. Introduction

Growing skull fractures (GSF) are a rare complication of pediatric head trauma that comprises post-traumatic skull defect associated with an underlying dural tear and an intact arachnoid membrane. They are often misdiagnosed, and delay in management can lead to progression of the disease with neurological sequelae. GSF are rare and their incidence has been estimated as 0.05% - 1% of all pediatric skull fractures [1] [2]. This low incidence and the subtlety of its presentation often make diagnosis challenging with consequent delay in management [3] [4] [5] [6] [7]. CT scan or MRI is the imaging modality study to confirm the diagnosis. Early surgical intervention is recommended to treat GSF and involved dural repair with or without cranioplasty. In this paper, we report a case of a patient with GSF in whom the surgical repair was successful with good cosmetic and functional outcome.

2. Case Report

This 12 months old girl was admitted to our neurosurgical department with right parietal mass that had been gradually enlarging over 3 months. The history of the disease began when the girl was 1 month old with a fall with cranial impact resulting in head trauma with initial loss of consciousness with no clinical lesion at the time. The patient was discharged home. At presentation 11 months later the girl was alert with normal consciousness. Clinical examination revealed the deformed skull with large pulsatile and painless swelling lesion in the right parietal region (**Figure 1**) and hemiparesis on the left side. The CT scan (**Figure 2**) revealed type 3 GSF including parietal bone diastasis with hypodense fluid collection that mimicked the leptomeningeal and porencephalic cyst. Results of routine laboratory studies were normal. Surgical repair was performed. The surgical technique consisted of performing duraplasty alone using autologous tissue with pericranium and watertight closure (**Figure 3**). The post-operative course

Figure 1. Clinical photograph showing the swelling in the right parietal region.

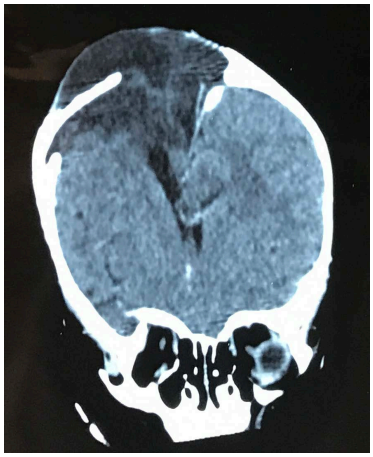
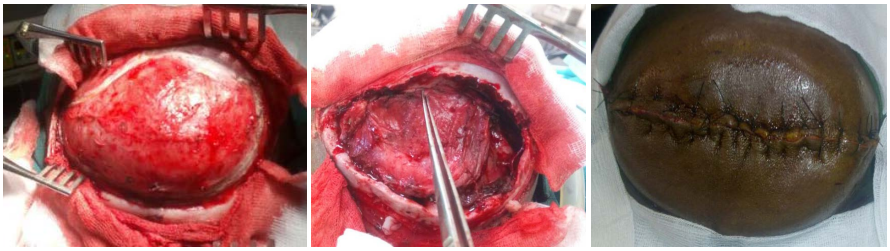


Figure 2. CT scan showing type 3 GSF including parietal bone diastasis with leptomeningeal and porencephalic cyst.



(a) (b) (c)

Figure 3. Operative photograph showing (a) Exposure after skin incision; (b) Bone defect and duraplasty and (c) Skin closure.

was uneventful and the child was discharged home five days after surgical intervention. Good cosmetic outcome as well as good functional outcome was obtained at 6 months follow-up.

3. Discussion

The first description of growing skull fracture (GSF) was reported by Howship in 1816 [8]. GSF is an unusual complication of pediatric head trauma occurring mainly in children under the age of 30 months [1] [2] [9] [10]. It can also occur following craniosynostosis repair [11], or as a complication of traumatic assisted delivery using obstetrical forceps or vacuum. Other terms used to describe GSF includes leptomeningeal cyst, traumatic leptomeningeal cyst, and craniocerebral erosion [12]. GSF are more common in young children, particulary those under 3 years of age due to the thinner calvarium increased malleabililty of the skull and rapid cranial in this age group. In our case, the trauma occurred when the girl was 3 months old and the diagnosis was made 9 months later. The pathogenesis of GSF is not completely understood but many hypotheses have been described in the literature. GSF requires a skull fracture, rupture of the dura which occurred at the time of initial fracture, immature membranous bone formation, and the presence of an outward driving force like growing brain, hydrocephalus,

or edema. Swelling or a defect of the scalp is usually the main clinical presentation [13] [14]. This swelling is very often the reason for consultation with the doctor. The delay in treatment can lead to progression of a GSF with neurological deficits, such as seizures, hemiparesis, mental retardation, and headaches [15] [16]. In addition to the swelling of head, our patient had left hemiparesis due to the long delay of nine months before the diagnosis. CT scan is the most common imaging modality used to confirm the diagnosis of GSF. MRI also is one of the imaging modality but there is no consensus about it superiority to CT scan. In our case, CT scan was sufficient to confirm the diagnosis of GSF. According to the natural history described by Naim-Ur-Rahman *et al.* [17], GSF was classified in 3 types. Type 1 lesions comprising of GSF with leptomeningeal cyst, whereas type 2 lesions contain gliotic brain, and type 3 are associated with a porencephalic cyst. Our patient was been classified as type 3. Surgical technique in GSF includes duraplasty, cranioplasty or combined dura-cranioplasty. In our case, duraplasty alone using autologous tissue with pericranium was the surgical technique. According to the literature, cranioplasty is not essential for the surgical treatment of GSF. Surgical repair of GCF is often associated with complications like infection. No complications were found in our case and Good cosmetic outcome as well as good functional outcome was obtained at 6 months follow-up.

4. Conclusion

GSF can lead to serious neurologic complications. Therefore educating parents on this potential outcome and close follow-up with clinical and imaging screening is recommended to screen children at risk for the development of the disease.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] Liu, X.S., You, C., Lu, M., *et al.* (2012) Growing Skull Fracture Stages and Treatment Strategy. *Journal of Neurosurgery Pediatrics*, **9**, 670-675. https://doi.org/10.3171/2012.2.PEDS11538

[2] Erahin, Y., Gülmen, V., Palali, I., *et al.* (2000) Growing Skull Fractures (Craniocerebral Erosion). *Neurosurgical Review*, **23**, 139-144. https://doi.org/10.1007/PL00011945

[3] Ramamurthi, B. and Kalyanaraman, S. (1970) Rationale for Surgery in Growing Skull Fractures of the Skull. *Journal of Neurosurgery*, **32**, 427-430. https://doi.org/10.3171/jns.1970.32.4.0427

[4] Arseni, C. and Ciurea, A.V. (1981) Clinicotherapeutic Aspects in the Growing Skull Fracture. A Review of the Literature. *Child's Brain*, **8**, 161-172. https://doi.org/10.1159/000119980

[5] Naim Ur, R., Jamjoom, Z., Jamjoom, A., *et al.* (1994) Growing Skull Fractures: Classification and Management. *British Journal of Neurosurgery*, **8**, 667-679. https://doi.org/10.3109/02688699409101180

[6] Muhonen, M.G., Piper, J.G. and Menezes, A.H. (1995) Pathogenesis and Treatment of Growing Skull Fractures. *Surgical Neurology*, **43**, 367-372. https://doi.org/10.1016/0090-3019(95)80066-P

[7] Leung, G.K., Chan, K.H. and Hung, K.N. (2011) Growing Skull Fracture in an Adult Nine Years after Blunt Head Trauma. *Journal of Clinical Neuroscience*, **18**, 855-857. https://doi.org/10.1016/j.jocn.2010.09.020

[8] Shyamal, C.B., Piyush, K., Christina, N., *et al.* (2015) John Howship (1781-1841) and Growing Skull Fracture: Historical Perspective. *Journal of Neurosurgery Pediatrics*, **16**, 472-476. https://doi.org/10.3171/2014.12.PEDS14484

[9] Lende, R.A. and Erickson, T.C. (1961) Growing Skull Fractures in Childhood. *Journal of Neurosurgery*, **18**, 479-489. https://doi.org/10.3171/jns.1961.18.4.0479

[10] Wang, X., Li, G., Li, Q., *et al.* (2013) Early Diagnosis and Treatment of Growing Skull Fracture. *Neurology India*, **61**, 497-500. https://doi.org/10.4103/0028-3886.121918

[11] Zemann, W., Metzler, P., Jacobsen, C., *et al.* (2012) Growing Skull Fractures after Craniosynostosis Repair: Risk Factors and Treatment Algorithm. *Journal of Craniofacial Surgery*, **23**, 1292-1295. https://doi.org/10.1097/SCS.0b013e31825435d5

[12] Abuzayed, B., Tuzgen, S., Canbaz, B., *et al.* (2009) Reconstruction of Growing Skull Fracture with *in Situ* Galeal Graft Duraplasty and Porous Polyethylene Sheet. *Journal of Craniofacial Surgery*, **20**, 1245-1249. https://doi.org/10.1097/SCS.0b013e3181acdfaf

[13] Saleh, A., Aboulfetouh, I., Mosad, N., *et al.* (2010) Growing Skull Fractures: Clinical Study of 10 Patients. *The Egyptian Journal of Neurology, Psychiatry and Neurosurgery*, **47**, 249-254.

[14] Prasad, G.L., Gupta, D.K., Mahapatra, A.K., *et al.* (2015) Surgical Result of Growing Skull Fractures in Children: A Single Centre Study of 43 Cases. *Child's Nervous System*, **31**, 269-277. https://doi.org/10.1007/s00381-014-2529-x

[15] Donahue, D.J., Sanford, R.A., Muhlbauer, M.S., *et al.* (1995) Cranial Burst Fracture in Infants: Acute Recognition and Management. *Child's Nervous System*, **11**, 692-697. https://doi.org/10.1007/BF00262233

[16] Rinehart, G.C. and Pittman, T. (1998) Growing Skull Fractures: Strategies for Repair and Reconstruction. *Journal of Craniofacial Surgery*, **9**, 65-72. https://doi.org/10.1097/00001665-199801000-00014

[17] Naim-Ur-Rahman, Jamjoom, A.H. and Jamjoom, Z.A. (1996) Growing Skull Fractures: Surgical Management of Difficult and Atypical Cases. *Acta Neurochirurgica* (*Wien*), **138**, 1088-1093. https://doi.org/10.1007/BF01412312