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Analysis of Radiological Manifestations of Scalp Swelling In Neonates

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ABSTRACT

Background : Scalp swelling remains as an important source of morbidity in neonates. The differential diagnosis for the examining physician is broad, the clinical findings are atypical and non-specific. Magnetic Resonance Imaging plays an important role in establishing the diagnosis.
Aim: To estimate the MRI manifestation of scalp swelling in neonates.
Methods and Materials: This study was a prospective study of 30 neonates who had scalp swelling. All the patients were from Government Kilpauk Medical College & Hospital, Chennai. Magnetic Resonance Imaging examination were done and interpreted by two radiologists. Study period from August 2015 to June 2016.
Results: 30 neonates with non-regressing scalp swelling were studied. All subjected to MRI brain, some cases needed computed Tomography to evaluate the calvarial defect. On analyzing the radiological manifestation of scalp swelling 6 neonate presented with encephalocele, 2 had dermoid and epidermoid cysts, 2 had vascular lesions,8 had cephalhaematoma, 8 had subgaleal haemorrhage, 1 had potts puffy tumour, 1 had non accidental injury and 1 had nasal glioma.
Conclusion: Scalp swelling is associated with high risk of morbidity and mortality in neonates. Correlating the radiological manifestations with clinical presentation can help in accurate diagnosis and appropriate management.

KEYWORDS neonate, scalp swelling, MRI

Introduction
Scalp swellings are common complaints in neonates and often a source of concern for parents. The differential diagnosis is broad and radiological evaluation is often requested. Initially plain Radiograph and Ultrasonogram are used. However they have limited role in differentiating the exact pathology. MRI is used as a solution tool in neonates with non-regressing scalp swelling where plain radiograph / USG finding are unclear. A wide spectrum of congenital lesions (eg. Encephalocele, nasal glioma,dermoid &epidermoid cysts, benign tumours) and acquired lesions (eg. Sarcomas, langerhan cell histiocytosis, metastatic neuroblastoma infectious or traumatic lesions) are commonly encountered. MRI clearly depicts the nature of abnormality and provides roadmap for neurosurgeon. The aim of this article is to analyze the radiological manifestation of scalp swelling in neonates and show how MRI helps the neurosurgeon in differentiating surgical from non-surgical condition. Neonatal scalp swelling are complex and may have important connection to the central nervous system, that can be seen only with cross sectional imaging modalities, mainly by MRI. MRI provides greater anatomic detail which is critical for surgical planning and with respect to malignant lesion is important in therapeutic planning and prognosis. MR provides more detailed information about the vascular anatomy. MRI offers excellent soft tissue contrast and advantage of multiplanar imaging. In addition MRA & MRV display the arterial and venous anatomy.

Subjects and Methods
In this prospective study 30 neonates with non-regressing scalp swelling were evaluated. MRI with MRA & MRV done for all neonates. MRI done using surface coil, for tiny lesions small flexible phased-array surface coil used over the area of interest to provide optimal anatomic detail. Sequences used, routine sagittal T1-weighted, axial T2- weighted, coronal T2 FLAIR were done along with angiogram sequences. Some neonates needed contrast enhanced T1-weighted sequence and CT.

All cases are from neonatology department of Kilpauk Medical College & Hospital, Chennai.

Study period from June 2014 to January 2016

Results
The spectrum of scalp swelling included were encephalocele (6), nasal glioma(1), dermoid & epidermoid cysts(2), haemangiomas/ vascular malformation(2), cephalhaematoma (9), subgaleal collection (8), potts puffy tumour (1),one case of sinus pericranii included in vascular malformation, non-accidental injury (1)(Table 1)

Table 1

S. No	MRI Features	No of cases(%)
1.	Cephalhaematoma	9(30%)
2.	Subgaleal collection/haematoma	8(26%)
3.	Encephalocele	6(20%)
4.	Dermoid / epidermoid cysts	2(6.6%)
5.	Vascular malformation	2(6.6%)
6.	Nasal glioma	1(3.3%)
7.	Potts puffy tumour	1(3.3%)
8.	Non accidental injury	1(3.3%)

FIG 1: Sagittal T2W Image -Occipital encephalocele with part of cerebellum as content.

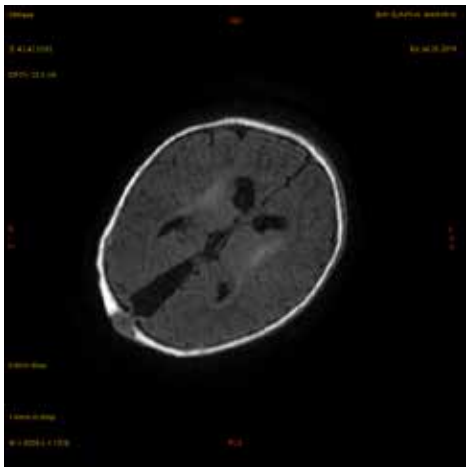

FIG 2: Axial FLAIR Image – Occipital encephalocele with meninges and dural sinus as content.

Discussion

Scalp swellings are important cause of morbidity in neonates and a cause of concern for parents. Rapid and accurate diagnosis of scalp swelling in neonates is very important because of frequent complications. The multiplanar MRI is the important in the diagnosis and to assess the abnormality and disease progression. MRI also gives the anatomy of the lesion and its extent. Apart from that it also provides details about other features of the lesions and associated abnormalities. (Dandy –walker malformation, chiari malformation, callosal abnormalities, vascular and migrational anomalies). Based on MRI findings the lesion can be categorized into surgical and non-surgical condition.

Few surgical conditions are encephalocele, sinus pericranii, dermoid and epidermoid. Non-surgical conditions are cephalhaematoma. MRI is the best imaging tool for defining the content of surgical condition(encephalocele) prior to surgery. It also tells us the extent of cerebral tissue in an encephalocele(-Figure 1 & 2) which helps in surgical planning.

Varying signal intensities in T1 and T2 weighted sequences helps to stage the haemorrhagic collection and to determine the age of the lesion in cepalhaematoma and subgaleal collection. Two cases required CT to evaluate the calvarial defect / lesion(non-accidental injury and pott puffy tumour).

MR Angiography and MR venography is used to demonstrate the arterial and venous involvement in these lesions. (Figure 2).

The signal intensity varies according to content of the lesion from pure fluid signal intensity (hypointense on T1W and hyperintense on T2W) to more complex signal intensity (hyperintense on T1W and hypointense on T2W). Epidermoid cysts typically show bright signal on diffusion weighted sequence.

Haemangiomas are isointense to muscle on T1W images and have bright signal on T2W images with internal flow voids.

A collection of scalp vein that communicate with intracranial dural sinuses is diagnostic of sinus pericranii.

PHACE Syndrome: large segmental or plaque like haemangiomas of the scalp and face are associated with extracutaneous manifestations.

(PHACE spectrum consists of posterior fossa malformations, haemangiomas, arterial anomalies related to the intracranial circulation, coarctation of aorta or cardiac anomalies and eye abnormalities)

Conclusion

There are varieties of scalp swelling in neonates which presents as visible lumps. These lesions range from simple cephalhaematoma to life threatening aggressive neoplasm and infections. Many lesions require surgical treatment. MRI provides essential information and suggest the diagnosis of scalp swelling in neonates. Practice of MRI should be considered in neonates with scalp swelling that can help to characterize these lesions and guide clinical management.

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