Temporal Evolution of Subpial Hemorrhage in Neonate

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At 2 days of age, a newborn male child presented with seizures and evolving focal neurological deficits post-normal delivery. APGAR scores were normal. The delivery itself was uneventful, with minimal instrumentation. MR was advised to exclude ischemia/hemorrhage.

Surprisingly, MR imaging findings [Figure 1] were in keeping with the presence of subpial hemorrhage.

Subpial hemorrhage as a distinct diagnostic entity was introduced as a case series by Friede RL,[1] where they described the presence of extra-axial hemorrhage dissecting between the cortical surface and the pia mater. Subpial hemorrhage has been typically described in neonates and infants. The most common location is along the temporal lobes.[2]

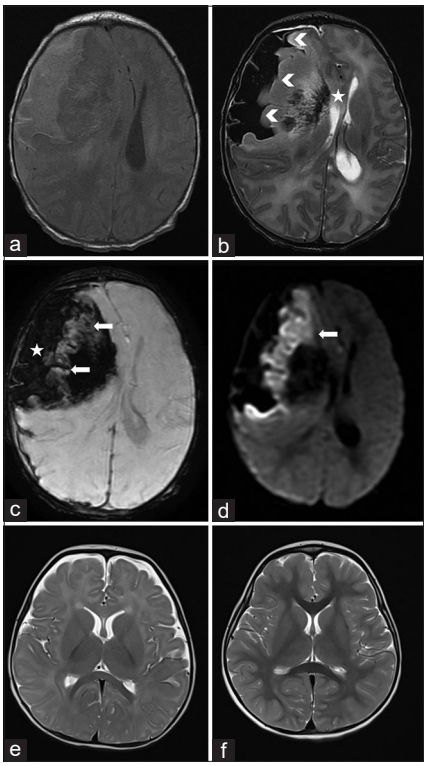

Figure 1: Evolution of subpial hemorrhage. Axial T1WI (a), T2WI (b), SWI (c), DWI (d), Axial T2WI (e) and Axial T2WI (f). (a) and (b). There is localised pooling of blood products along the right frontal region which is seen closely opposing the underlying sulci causing inward displacement of the gyri (arrow heads). In addition significant mass effect is seen in terms of left midline shift and falcine herniation (star). (c) There is significant blooming in keeping with hemorrhage (star) along with prominence of the medullary veins within the subjacent parenchymal (arrow). (d) There is a fan shaped area of restricted diffusion along the inner margin of the underlying brain parenchyma (arrow). (e) There is complete resolution of Subpial Hemorrhage at 6 months. (f) No neurological abnormality and normal exam at 15 months

Although pathology has not conclusively shown the presence of a possible potential space, it is believed that a bleeding into the glia limitans (the outermost layer of neural tissue comprising of foot processes), which is present between the pia mater and cortical surface, creates a 'space' and is thought to be the pathological basis of subpial hemorrhage. The veins in the subpial space have a paucity of the trabecular network; hence a venous injury results in direct decompression of superficial hemorrhage and subsequent contiguous dissection along the subpial space.[2,3] Additional clinical evidence is in the absence of xanthochromia in CSF samples of patients with subpial hemorrhage.

Our patient's follow-up imaging was available at 6 and 15 months of age [Figure 1], showing complete recovery, indicating an excellent prognosis. There was no evidence of seizures or focal neurological deficits.

Overall, the etiology of subpial hemorrhage remains obscure. Treatment should be symptomatic, with particular attention to antiepileptic medication. Possible differential diagnosis includes arterial occlusion with hemorrhagic transformation, venous hemorrhagic infarct, or cortical contusion related to unsuspected birth trauma. In isolated subpial hemorrhage without any other concurrent brain injury or insult, the patients usually show near complete recovery on follow-up with an excellent prognosis.[4,5] Treatment is symptomatic with attention to appropriate antiepileptic medication.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

References

1. Friede RL. Subpial hemorrhage in infants. J Neuropathol Exp Neurol 1972;31:548-56.

2. Zhuang X, Jin K, Li J, Yin Y, He S. Subpial hemorrhages in neonates: Imaging features, clinical factors and outcomes. Sci Rep 2023;13:3408. doi: 10.1038/s41598-023-30332-5.
3. Matsubara N, Kanagaki M, Ito S, Matsushima C, Ide M, Kitamura R, *et al*. Neonatal subpial hemorrhage along the medial side of the temporal lobe: Two case reports. Radiol Case Rep 2022;17:1881-6.
4. Barreto ARF, Carrasco M, Dabrowski AK, Sun LR, Tekes A. Subpial hemorrhage in neonates: What radiologists need to know. Am J Roentgenol 2021;216:1056-5.
5. Cain DW, Dingman AL, Armstrong J, Stence NV, Jensen AM, Mirsky DM. Subpial hemorrhage of the neonate. Stroke 2020;51:315-8.

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