VOLUME - 12, ISSUE - 08, AUGUST - 2023 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Original Research Paper

Neurosurgery

SUBDURAL EFFUSIONS WITH HYDROCEPHALUS FOLLOWING TRAUMATIC BRAIN INJURY IN A PAEDIATRIC PATIENT – A CASE REPORT

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ABSTRACT Subdural effusion with hydrocephalus (SDEH) is a rare complication of traumatic brain injury. It has been proposed that a subdural effusion with hydrocephalus (SDEH) can be treated effectively with a ventriculoperitoneal shunt (VP shunt). we report a 3 months old male baby had traumatic brain injury and diagnosed with subdural effusions with hydrocephalus. Baby was treated with programmable VP shunt and patient's clinical condition improved significantly. Subdural effusions with hydrocephalus can be safely and effectively treated with VP shunting, without directly treating the subdural effusion which subsides along with the treatment of hydrocephalus. However, it is extremely important to make an accurate diagnosis of an SDEH and differentiate this condition from other subdural collections which require different management.

KEYWORDS : Subdural effusion, Hydrocephalus, Ventriculo peritoneal shunt, subdural peritoneal shunt.

INTRODUCTION

External hydrocephalus is a well-established entity in infants which is benign and usually resolves without shunting [1, 2]. The term "External Hydrocephalus" has also been used to describe the presence of extra ventricular cerebrospinal fluid (CSF) collections accompanied by hydrocephalus, particularly in cases of adults suffering from aneurysmal subarachnoid haemorrhage and severe head injuries [3–6]. Several other terms have been used to describe this entity [7] which has lead to confusion about this disease. However, the fact that this form of hydrocephalus does not have a benign course and needs in many cases surgical management [3, 6–9] demonstrates the need for a different term other than "external hydrocephalus." The term subdural effusion with hydrocephalus (SDEH) has been used in the literature previously [6, 8] and describes more accurately the nature and the severity of this condition, thereby differentiating it from the benign subdural collections of infancy and subdural hygromas. A subdural peritoneal (S-P) shunt or single burr hole drainage are the preferred methods of treating subdural hygromas [10,11]. In addition, the management of subdural effusions may require multiple unsuccessful surgical procedures (burr hole drainage of the subdural collection or S-P shunts). These procedures have only a temporary effect in cases of SDEH, since the real cause of this condition is the hydrocephalus and the communication between the ventricles and the subdural space which allows the CSF to be diverted outside the ventricles. Any attempt to treat the subdural collection directly, in cases of SDEH, before the permanent management of the hydrocephalus increases significantly the risk of developing a central nervous system (CNS) infection with subsequent further delay in V-P shunt implantation.

Case Report

A 3 months year old male baby brought with alleged history of road traffic accident four-wheeler passenger hit against over heavy object. On examination Glasgow coma scale (GCS) was E1V1M3, CT brain was taken which showed left frontal haemorrhagic contusion with subarachnoid haemorrhage and diffuse cerebral edema(fig 1).

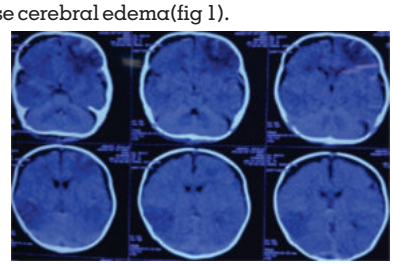

Fig 1- CT Brain Plain Axial Images Showing Left Frontal Haemorrhagic Contusion With Subarachnoid Haemorrhage And Diffuse Cerebral Oedema.

Patient was intubated in view of low GCS and treated with anti edema measures, neuroprotectives and anti-epileptics. Patient's GCS was not improved significantly, hence CT brain was repeated which showed subdural effusion bilaterally with hydrocephalus and resolving frontal contusion (fig 2).

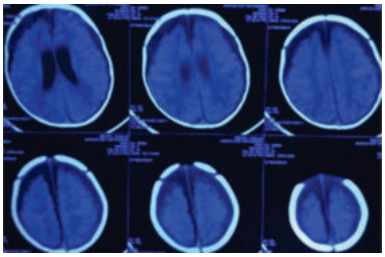

Fig 2- CT Brain Plain Axial Images Showing Resolving Left Frontal Contusion With Communicating Hydrocephalus And Subdural Effusion.

Planned for programmable VP shunt initially and subdural effusion drainage later. Patient underwent programmable VP shunt followed which baby's GCS improved significantly. Baby started to take feeds normally. Baby was discharged on 16th POD in a stable condition with good cry and activity(Fig 3).

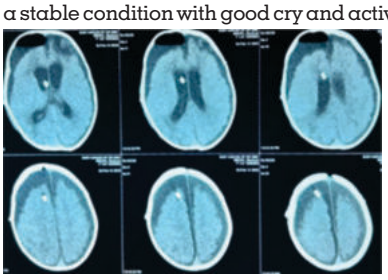

Fig 3- Post op CT Brain Plain Axial Images Showing Right Side Shunt Tube In Situ.

DISCUSSION

Subdural effusions with hydrocephalus (SDEH) in adults have been described after aneurysm rupture and subarachnoid haemorrhage, [3, 4, 6, 7] after neurosurgical procedures [3, 4, 6, 8] and severe head injuries [3, 4]. The pathophysiological mechanisms of this disorder include the free communication of the ventricles, and the subdural space due to the rupture of some part of the arachnoid membrane, particularly basal

cisterns or lamina terminalis tear, which then allows fluid to flow into this compartment. The SDEH occurs when the abnormal CSF circulation is combined with communication between the subdural space and the ventricles. The CSF is diverted to the subdural space because the convexity of the brain has less resistance compared to the ependyma of the ventricles and the formation of the subdural CSF collection requires less pressure than the ventricular enlargement [8]. In addition to the free communication between the ventricles and the subdural space, the dysfunction in CSF absorption at the level of the arachnoid granulations is necessary for the development of a CSF subdural effusion with hydrocephalus. Severe head injuries are associated with hydrocephalus because of abnormal CSF circulation due to posttraumatic subarachnoid haemorrhage, arachnoid tear, cranial surgery, and particularly craniectomy [12–17]. The primary problem in SDEH is the hydrocephalus, and we do agree with the opinion of Yang et al. for surgical intervention "as soon as possible after the diagnosis of hydrocephalus and the exclusion of contraindications". The pathophysiological mechanisms that have been proposed for the formation of the traumatic subdural hygroma involve the arachnoid tearing which acts as a one-way valve between the subarachnoid and the subdural space and is usually caused by mild or moderate trauma [8]. There is also a theory that serum fluid leaks from fenestrations of small vessels on subdural neomembranes and concomitant enlargement of the subdural hygromas [10]. In patients with SDEH after a severe head injury or intracranial aneurysm clipping, the placement of a V-P shunt may be sufficient to treat both the subdural effusion and the hydrocephalus and subsequently improve the clinical symptoms. The V-P shunt placement drains the hydrocephalus which is the cause of this entity, and as a result it prevents the CSF diversion to the subdural space. Apart from the radiological evaluation, clinical tests including measurement of the subdural pressure are recommended providing that there is a suspicion of an SDEH. Although our patients responded to V-P shunt placement, in persistent cases, there might be an indication to proceed to an S-P shunt either in parallel or connected to the valve of the V-P shunt.

CONCLUSION

SDEH is a rare complication of Traumatic brain injury. Accurate diagnosis of SDEH and differentiation from other subdural collections are crucial. Burr-hole drainage and SPS can only temporarily improve the symptoms of patients with SDEH, while a VP Shunt might ultimately be necessary in patients with SDEH. VP Shunt is a safe and effective surgical method to treat SDEH under the condition of the SDE with no mass effect. Once the diagnosis of SDEH is established, and the SDE has no mass effect, a VP Shunt may need to be implanted quickly to avoid multiple surgical procedures. In the future, more cases and studies need to explore whether VP Shunt or SP Shunt plus VP Shunt can be reasonably performed during the first surgery to avoid a second surgery when treating patients with SDEH, especially when the SDE has a mass effect

Financial Support And Sponsorship- Nil
Conflict of Interest- There is no conflict of interest

REFERENCES

[1] L. R. Ment, C. C. Duncan, and R. Geehr, "Benign enlargement of the subarachnoid spaces in the infant," Journal of Neurosurgery, vol. 54, no. 4, pp. 504–508, 1981.
[2] W. C. Robertson and M. R. Gomez, "External hydrocephalus. Early finding in congenital communicating hydrocephalus," Archives of Neurology, vol. 35, no. 8, pp. 541–544, 1978. [3] E. R. Cardoso and R. Schubert, "External hydrocephalus in adults: report of three cases," Journal of Neurosurgery, vol. 85, no. 6, pp. 1143–1147, 1996.
[4] M. Escosa-Bage and R. G. Sola, "Physiopathology of adult-onset external hydrocephalus," Revista de Neurologia, vol. 35, no. 2, pp. 141–144, 2002.
[5] C. Kilincer, O. Simsek, M. K. Hamamcioglu, T. Hicdonmez, and S. Cobanoglu, "Contralateral subdural effusion after aneurysm surgery and decompressive craniectomy: case report and review of the literature," Clinical Neurology and Neurosurgery, vol. 107, no. 5, pp. 412–416, 2005.
[6] Y. Yoshimoto, S. Wakai, and M. Hamano, "External hydrocephalus after aneurysm surgery: paradoxical response to ventricular shunting," Journal of Neurosurgery, vol. 88, no. 3, pp. 485–489, 1998.
[7] P. W. Huh, DO. S. Yoo, K. S. Cho et al., "Diagnostic method for differentiating external hydrocephalus from simple subdural hygroma," Journal of Neurosurgery, vol. 105, no. 1, pp. 65–70, 2006.
[8] T. Kawaguchi, S. Fujita, K. Hosoda, Y. Shibata, H. Komatsu, and N. Tamaki, "Treatment of subdural effusion with hydrocephalus after ruptured intracranial aneurysm clipping," Neurosurgery, vol. 43, no. 5, pp. 1033–1038, 1998.
[9] K. Mori and H. Handa, "Subdural haematoma (effusion) and internal hydrocephalus," Neurochirurgia, vol. 20, no. 5, pp. 154–161, 1977.
[10] M. Hasegawa, T. Yamashima, J. Yamashita et al., "Traumatic subdural hygroma: pathology and meningeal enhancement on magnetic resonance imaging," Neurosurgery, vol. 31, no. 3, pp. 580–585, 1992.
[11] B. N. French, C. A. Cobb, G. Corkill, and J. R. Youmans, "Delayed evolution of posttraumatic subdural hygroma," Surgical Neurology, vol. 9, no. 3, pp. 145–148, 1978.
[12] B. Aarabi, D. Chesler, C. Maulucci, T. Blacklock, and M. Alexander, "Dynamics of subdural hygroma following decompressive craniectomy: a comparative study," Neurosurgical Focus, vol. 26, no. 6, p. E8, 2009.
[13] C. Kilincer and M. K. Hamamcioglu, "Surgical complications of decompressive craniectomy for head trauma," Acta Neurochirurgica, vol. 152, no. 3, pp. 557–558, 2010.
[14] S. I. Stiver, "Complications of decompressive craniectomy for traumatic brain injury," Neurosurgical focus, vol. 26, no. 6, p. E7, 2009.
[15] X. F. Yang, X. F. Wen, F. Shen et al., "Surgical complications secondary to decompressive craniectomy in patients with a head injury: a series of 108 consecutive cases," Acta Neurochirurgica, vol. 150, no. 12, pp. 1241–1248, 2008.
[16] X. F. Yang, L. Wen, J. B. Gong, and R. Y. Zhan, "Subdural effusion secondary to decompressive craniectomy in patients with severe traumatic brain injury," Acta Neurochirurgica, vol. 152, no. 3, pp. 555–556, 2010.
[17] A. Waziri, D. Fusco, S. A. Mayer, G. M. McKhann, and E. S. Connolly, "Postoperative hydrocephalus in patients undergoing decompressive hemicraniectomy for ischemic or hemorrhagic stroke," Neurosurgery, vol. 61, no. 3, pp. 489–493, 2007.