REVIEW ARTICLE

Chronic Subdural Fluid Collection in Children

Raj Kumar

Introduction

In the pediatric population, chronic subdural fluid collection is group of related condition termed as extracerebral (or extra-axial) fluid collection (1). Chronic subdural fluid collection can present as chronic subdural hematoma or subdural effusion (2). The term subdural hygroma, subdural hydroma, chronic subdural hematoma and beningn extracerebral fluid collection etc have been used very loosely in past to describe the same entity. While the condition of benign external hydrocephalus (benign extra cerebral fluid collection) has been recognized as different entity from above described entities, as it is a self limiting disease of infancy (3). Modern neuroimaging techniques, however have greatly advanced our understanding of these conditions. Surprisingly not much literature exists on the subject, and publications before the advent of modern computed tomography (CT) and magnetic resonance imaging-MRI (1). It is an entity of common interest to pediatricians, physicians and neurosurgeons. The author highlights his experience of subdural fluid collection in small children of less than 2 year age, the role of conservative treatment is emphasized.

Pathophysiology and Terminology

Excessive fluid within the subarachnoid space occurs with communicating hydrocephalus and in a self-limited condition known by various terms, including benign expansion of the subarachnoid spaces and benign external hydrocephalus (1). According to other theory, the benign external hydrocephalus is thought to occur because of the atersia of arachnoid villi leading to failed CSF absorption and it's (CSF) consequent accumulation in subarachnoid space (4). Hence this entity is different from other subdural fluid collections i.e. effusion, haematoma or hygroma. Chronic accumulation of fluid within the subdural space may occur as the results of one or more of three distinct processes. The most straight forward of these occurs when liquefication of an acute subdural hematoma results in chronic subdural hematoma (CSH) formation. It has been postulated that the thick viscous fluid, increases in volume because of gradients in oncotic pressure. Although this may occur as early as blood and proteins degrade, most investigators believe that rebleeding is the main agent causing persistence of the subdural hematoma (1).

The second type of subdural fluid collection occurs after an opening in the arachnoid, which allows CSF to enter the subdural space. The CSF mixes with varying amounts of blood, resulting in a thin xanthochromic fluid, sometimes termed a subdural hygroma (1).

The third type of subdural fluid accumulation is purulent. Subdural empyemas may result from direct extension of sinusitis or otitis media into the epidural space and then the subdural space. Purulent subdural collections are also occasionally seen after episodes of bacterial meningitis, especially due to haemophilus influenza (1).

Causes

The most common cause of subdural fluid collection in children is meningitis in about 42% cases (2) (Fig.1).

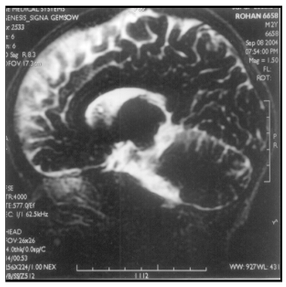

Fig.1. MRI saggittal view showing subdural fluid collection, which occurred following meningitis.

From The Department of Neurosurgery, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, U.P. (India).
Correspondece to: Dr. Raj Kumar, Associate Professor, Deptt. of Neurosurgery Sanjay Gandhi PGIMS Lucknow - 226014, U.P (India).

The second common cause is head injury in about 24% cases (2) (Table 1).

Table. 1 Etiologies of subdural fluid collection.

Sl.No.	Etiology	Percentage (%)
1.	Meningiti	42
2.	Head Injury	24
3.	Unknown	15
4.	Postoperative	14
5.	Child Abuse	3
6.	Hemorrhagic diathesis	2

Certain underlying conditions may however, predispose to subdural bleeding with relatively minor trauma. Frequently, the traumatic episode passes without medical attention. Traumatic causes may be either accidental or nonaccidental (i.e., child abuse). Nonaccidental trauma is the most common cause of subdural hematoma in children less than 2 years of age (1). Occasionally, the diagnosis of a bleeding diathesis is made after intracranial hemorrhage in the absence of identifiable trauma (2). An intracranial anomaly that may predispose to subdural bleeding is represented by arachnoid cysts of the middle fossa (2).

The other documented causes include subdural collection following surgery for intraventricular tumors (Fig.2) (5), subdural effusion following ventriculoperitoneal shunts or third ventriculostomy and subarachnoid fluid collection in cases of cerebral atrophy (3).

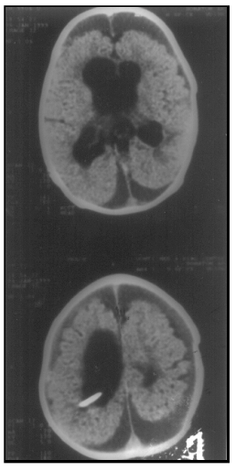

Fig. 2. CT head depicting subdural fluid collection following right ventriculoperitoneal shunt in an hydrocephalic child. Choroid plexus papilloma from lateral ventricle had been excised before shunt in this child.

Out of our 21 children (of subdural fluid collection) studied by us over a period of 9 years, subclinical or clinical meningitis was responsible for it in 4, head trauma in 5, following surgery in 6 and secondary to acute lymphoblastic leukemia in 1, The cause of effusion could not be established in rest 5.

Clinical Features

Ninety three percent of patients are under 2 years of age (2) and we also had children of below two years with mean age of 10 months (ranging from 3 months 2 years). Seizure is the most common presenting symptoms followed in frequency by irritability and letharginess, head enlargement and bulging fontanel (Table–2). Occasionally hemiparesis and 6th nerve paresis may also occur (1).

However the children with benign extracereebral fluid collection (external hydrocephalus), may remain asymptomatic (3).

Table. 2 Symptoms and signs in the patients with subdural fluid collection

Sl No.	Symptoms and Signs	Percentage (%)
1.	Seizure	45.3
2.	Macrocrania	37.1
3.	Bulging fontanel	22.6
4.	Irritability	15.4
5.	Anemia	15.4
6.	Psychomotor retardation	12.3
7.	Lethargy	10.3
8.	Cranial nerve involvement (II,III, & VI)	10.3
9.	Hemiparesis	7.2

Diagnosis

Plain CT scan head with or without contrast is diagnostic. Subdural fluid collection is mostly bilateral in nearly 77% cases. The thickness of subdural fluid collection may range from few mm (4mm) to 42mm. MRI has been found to be helpful in differentiating subdural fluid collections from benign subarachnoid dilation or benign external hydrocephalus, which does not require surgical intervention in most of cases (6). Diffusion wt. images of MRI can demonstrate the pressure effect of subdural collection over the adjacent cortex.

Treatment and Outcome

Various modalities of treatment are described, which include evacuation and irrigation of subdural space through burrhole, subdural taps, continuous subdural drainage and subduroperitoneal shunt. Subduroperitoneal shunt has been adovated by many authors, but the complications of shunt are troublesome, these include obstruction, migration, infection, unilateral drainage and bowel performation etc (2). We performed evacuation of subdural collection in only 6 of 21 children. Four of these six were operated cases of intraventricular choroids plexus papillomas, who deteriorated in postoperative period and required evacuation of fluid and air, as they had pneumocepahlus also along with sudural fluid collection. A similar experience is documented by others (5). Drainage of chronic subdural hematoma was required in another child of acute lymphoblastic leukemia, where chronic subdural collection caused deterioration in sensorium while on chemotherapy. Other child of post traumatic effusion also required evacuation on account of a thick collection causing compression of cortex (Fig. 3). Rest 15 children were managed by 4-6 week treatment of acetazolamide therapy and antiepileptic drugs. All cases showed significant improvement at an average follow-up of 1.4 month (ranging from 1 month to 7 months) in nonsurgical cases and upto 2.3 year in surgical cases.

Acknowledgement

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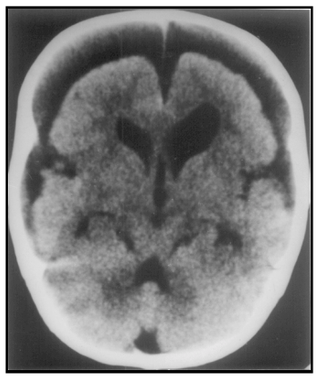

Fig. 3. CT head showing bihemispheric subdural fluid collection following head trauma which required evaluation. He had no recurrence in follow up.

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