Temporary Subdural-Peritoneal Shunts in The Treatment of Paediatric Subdural Collections

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Abstract : Subdural collections are frequently seen during infancy but there is no agreement on their management . The results of 58 consecutive patients in which a subdural-peritoneal shunt was inserted for the treatment of subdural collection are presented. Subdural collection was diagnosed with computed tomography in all cases, unilateral in 12 and bilateral in 46. Macrocrania, bulging fontanelle, seizure and anaemia the predominant symptoms and signs related to subdural collection improved in all patients, except two cases with brain tumour whose clinical status persisted. There was no operative mortality. S-P shunts were removed in 38 cases. Unilateral S-P shunt is effective in bilateral subdural collections and it seems that S-P shunt is an effective method in the management of this condition in infants and children.

Key Words : Subdural haematoma, Computed tomography, Subdural-peritoneal shunt

INTRODUCTION

Subdural collections are frequently seen during infancy. However, there is no consensus on their management. Subdural tapping (1,7), craniotomy and removal of membranes (6), and shunting of subdural space (1-4,8,9, 11,12) have been used in the treatment of infantile chronic subdural hematomas. Shunting of the subdural space seems to be effective and less invasive than other methods such as tapping and craniotomy. We started using the temporary subdural-peritoneal (S-P) shunts in the management of subdural collections in infants and children in 1983. We reviewed the cases in which a S-P shunt was used for subdural collections in this paper.

MATERIALS AND METHODS

S-P shunting was performed for subdural collection in 58 patients from January 1983 through August 1992 at the Division of Paediatric Neurosurgery, Ege University Medical School. There were 39 boys (67%) and 19 girls (33%), aged from 2 months to 14 years (mean 11.9 months). 95% of the cases were 1 year old or younger. The diagnosis of subdural collection was made by computed tomography (CT). S-P shunt was a primary mode of treatment or secondary to other treatment such as subdural tap, burr-hole evacuation and external drainage. Low pressure unishunt or peritoneal catheter was used in S-P shunting.

Each patient was evaluated in terms of presenting symptoms and signs, aetiology and complications. We aimed to follow up all patients in terms of clinical findings, radiological investigation and electroencephalography (EEG). Shunt removal was advised and performed in patients in which resolution of the subdural collection was detected on the CT scan.

RESULTS

Symptoms and signs at the time of admission are shown in Table I. Macrocrania, bulging fontanelle, seizure and anaemia were predominant. Infection was the most frequent cause of the subdural collection (Table II). Twelve patients (22%) had unilateral subdural collection and it was bilateral in 46 patients (78%). A S-P shunt was primarily used in 26 cases, followed subdural tapping in 23, burr-hole evacuation in 7 and external subdural drainage in 2 patients.

Table I : Symptoms and Signs on Admission	
Symptoms and Signs	**No. of Cases**
Macrocrania	32
Seizure	28
Bulging fontalle	27
Anaemia	24
İrritability	13
Altered state of consciousness	10
Psychomotor retardation	9
Hemiparesis	8
Abducens paralysis	3

Table II : Etiology of Subdural Collections		
Cause of Subdural Collection	**No. of Cases**	**(%)**
Infection	25	43
Trauma	18	31
Post-shunting	6	10
Postoperative	3	5
Haemorrhagic diathesis	1	2
Unkown	5	9

Table III : Types of The Shunts Used in S-P Shunting		
Type of the Shunt	**No. of Cases**	**(%)**
Unishunt with reservoir, low pressure	28	48
Unishunt, low pressure	13	22.5
Peritoneal catheter, low pressure	17	29.5

The types of shunt used are shown in Table III. Postoperative CT scans were obtained in 46 patients. Resolution of the subdural collection was demonstrated in 38 cases, whereas the CT scans of 8 patients displayed a reduction in the volume. S-P shunts were removed in 38 cases; the interval between shunt insertion and removal ranged between 1 and 36 months (mean 9.3 months). Postoperative EEG performed on 27 patients was normal in 14 cases, whereas epileptic discharges were present in 13. There was no operative mortality but two deaths occurred due to brain tumour 6 months and 21/2 years after S-P shunt surgery. The symptoms and signs related to the subdural collection improved in all patients, except the two with brain tumour whose clinical status persisted. Complications of S-P shunt are; obstruction, migration, infection and wound dehiscence (Fig.2).

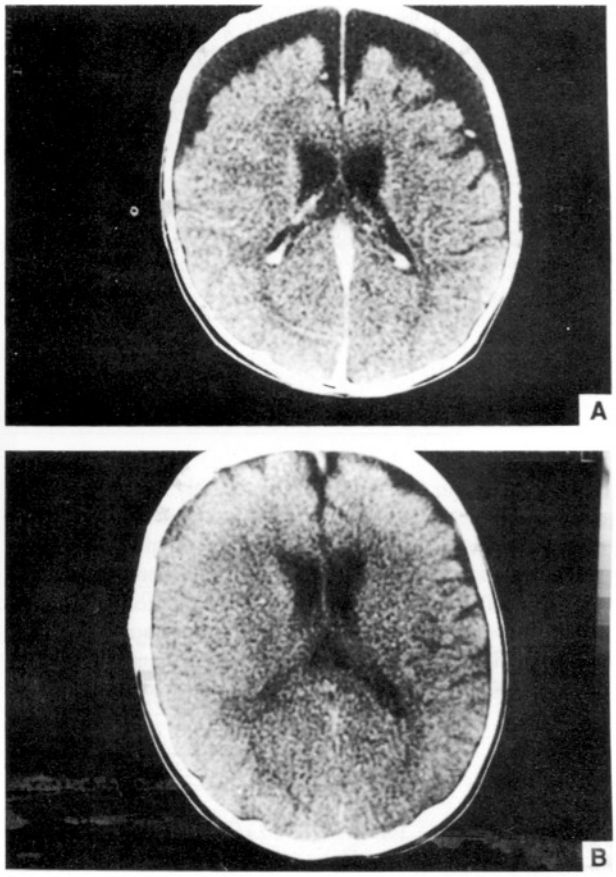

Fig. 1 : (a) CT of a 6-month old by showing bilateral subdural collection. (b) note the resolution of subdural collection 2 months after S-P shunting.

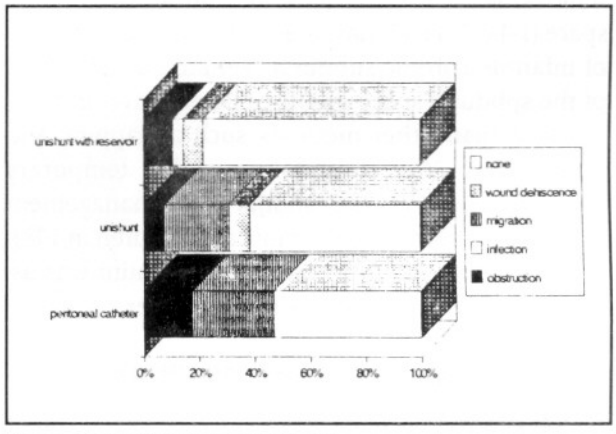

Fig. 2 : Complications of S-P shunt.

DISCUSSION

Subdural collections comprise chronic subdural hematomas and subdural effusions which consist of bloody and xanthochromic fluid. They are fre-

quently seen in infants and there is a male preponderance (1,4,8,12). 94% of the cases were under one year old and 66% were male. In terms of aetiology infection and head injury comprised 46% and 31% of patients respectively. . In the series of Aoki (1) and Moyes et al. (8), head injury was most frequent cause of the subdural collections. Aoki and Masuzawa (3) reported subdural haematomas in abused children. Bilateral localization of chronic infantile subdural haematomas has been frequently reported by many authors (1,2,4,8,10). Seventy-eight of our patients had bilateral subdural collections, more than half of the cases had macrocrania, and bulging fontanelle and convulsions were present in 48% of the patients. Although the symptoms and signs of the patients in the series of Shulman and Ransohoff (12) were similar to those of our patients, tense fontanelle, psychomotor retardation and macrocrania were the most common symptoms or signs in Aoki's series (1). There is no agreement on the treatment of subdural hematomas or effusions. Subdural taps through the anterior fontanelle is a method only possible in infants (1,7). Ingraham and Matson (6) advocated emptying the haematoma and excision of the membranes by a large craniotomy. However, Collins and Pucci (4) reported that serial biopsies of the subdural membranes showed marked regression in membrane thickness, cellularity and vascularity in shunted patients, provided drainage was adequate. They also observed the disappearance of the subdural membrane in one case when a S-P shunt was used. Shulman and Ransohoff (12) stated that it does not seem reasonable that a thin vascularized membrane could significantly prevent the growth of the brain and advocated the removal of heavy, inelastic inner subdural membranes producing signs or symptoms of increased intracranial pressure or focal cerebral dysfunction.

Operative methods regarding the problem of craniocerebral disproportion such as a reduction, restoration of the normal angle of junction of the cerebral bridging veins and superior sagittal sinus have not been widely accepted (5,10). Internal drainage of the subdural fluid into a body cavity such as the pleura or the peritoneum has improved the treatment possibilities in infants and small children (1-4,8,9,11,12). Ransohoff (11) used subdural-pleural shunts in infants with chronic subdural haematomas. Collins and Pucci (4) reported good results with S-P drainage. Perret and Graf (9) proposed the subgaleal shunt for subdural drainage which necessitated the tapping of subdural space postoperatively. Other studies regarding the use of S-P shunt in subdural collections have been published (1-4,8).

In four cases with bilateral subdural collections, we connected both subdural spaces with a silastic tube and the subdural space on one side was shunted. Later we started shunting of the subdural space in one side in bilateral collections. Unilateral S-P shunt was effective and resulted in resolution. Although Moyes et al (8) advocated bilateral shunts, Aoki and Masuzawa (2) reported that unilateral S-P shunts in cases of bilateral subdural hematomas resulted in resolution of the bilateral hematomas. In those cases, the communication between bilateral subdural hematoma cavities was not demonstrated by metrizamide computed tomography subdurography. We used three different shunt systems, i.e., unishunt with reservoir, unishunt and peritoneal catheter. Obstruction, migration and infection in addition to wound dehiscence were, seen in our cases. Migration was most frequent in patients in whom a peritoneal catheter was used. Whereas, wound dehiscence was the most common complication of unishunt with reservoir. Infection, migration and obstruction have been reported as the complications of S-P shunts (4,8).

Removal of the shunt after 4 to 8 weeks has been advocated (1,4,8). We removed them, once the resolution of subdural collection was demonstrated on CT scan. As it was not always possible to CT scan patients at given intervals, the interval between surgery and removal of the shunt is longer than in the literature.

Subdural shunting eliminates the considerable loss of protein which accompanies external drainage and therefore reduces the tendency to malnutrition and anaemia. The subdural membrane if not very thick probably becomes absorbed (4,8). Unilateral shunt has advantages, including shorter operation time and less invasiveness as well as a lower incidence of infection, making shunt surgery safer and more reliable (1,2).

In conclusion, S-P shunt is less invasive than other treatment modalities such as subdural tapping and resection of membranes, and shortens the hospitalization period. Morbidity and mortality are relatively low. Unilateral S-P shunt is effective in

bilateral subdural collections. Unishunt with reservoir seems to be advantageous, since other shunt systems have a higher incidence of migration. Our belief is that S-P shunt is an effective method in the management of subdural collections in infants and children.

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