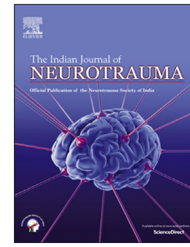
THE INDIAN JOURNAL OF NEUROTRAUMA 11 (2014) 97–102

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/ijnt




Original Article

# Subdural effusion with ventriculomegaly after decompressive craniectomy for traumatic brain injury: A challenging entity

*Deepak Agrawal**, *Nityanand Pandey, Sumit Sinha, Deepak Gupta, G.D. Satyarthee, P.K. Singh*

*Department of Neurosurgery, JPNA Trauma Centre, All India Institute of Medical Sciences, New Delhi 110029, India*

ARTICLE INFO

*Article history:*
Received 27 July 2014
Accepted 4 November 2014
Available online 20 November 2014

*Keywords:*
Traumatic brain injury
Ventriculomegaly
Subdural effusion
Interhemispheric hygroma

ABSTRACT

*Problems considered:* Subdural effusion with concomitant ventriculomegaly (SEV) is not infrequently seen in patients with traumatic brain injury (TBI) after decompressive craniectomy (DC). The management of this entity remains very challenging. The aim of this study was to determine the incidence of SEV in patients who required DC.
*Methods:* This retrospective study was done over 8 months (March 2011–October 2011). All Patients with severe head injury (GCS $\leq$8) who developed subdural collection with associated ventriculomegaly in the postoperative period following DC were included in the study. Criteria for ventriculomegaly included modified frontal horn index greater than 0.3 and/or presence of periventricular lucencies.
*Results:* 270 patients underwent DC during the study period. SEV was seen in 80 (26.6%) patients. The mean age was 29.8 years with predominance of males (83%). Incidence of SEV was highest (59%) in the third week (day 14–21) after DC. 90% of SEV were ipsilateral to the side of craniectomy, and 81.25% ($n = 65$) were more than 10 mm in thickness. 47.5% ($n = 38$) of patients with SEV had IHH with mean thickness of 8.71 mm (range 3.5–23). 14 patients needed treatment in the form of various shunts. Of these the majority (86%) had concomitant IHH.
*Conclusions:* Contrary to common perception, SEV has a very high incidence (26.6% in our study) in patients who required DC following TBI. Our study shows that IHH is an important prognostic marker for the need of CSF diversion in these patients.


## 1. Introduction

Decompressive craniectomy (DC) is widely carried out in patients with raised intracranial pressure due to trauma or infarction. The procedure is not entirely free from complications. The incidence of subdural effusion after decompressive craniectomy is between 21 and 50%.[1] Subdural effusions are fluid collections which are usually asymptomatic, and the course follows spontaneous resolution. Nevertheless, they

*Abbreviations:* SEV, subdural effusion with concomitant ventriculomegaly; TBI, traumatic brain injury; DC, decompressive craniectomy; IHH, interhemispheric hygroma.

* *Corresponding author*. Tel.: +91 9868398242.
E-mail address: drdeepak@gmail.com (D. Agrawal).
http://dx.doi.org/10.1016/j.ijnt.2014.11.001

occasionally become symptomatic due to associated ventriculomegaly and/or mass effect. Traumatic subdural effusion with ventriculomegaly (SEV) has been described in multiple case reports but its incidence and management has not been properly dealt with.[2–4] The term subdural effusion with ventriculomegaly (SEV) describes more accurately the nature and the severity of this condition, thereby differentiating it from the benign subdural collections of infancy and subdural hygromas.

External hydrocephalus is a well-established entity in infants which is benign and usually resolves without shunting.[5,6] 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.[4,7–10] However, the fact that this form of hydrocephalus may not have a benign course and needs in many cases surgical management demonstrates the need for a different term other than "external hydrocephalus."

The aim of this study was to determine the incidence of subdural effusion with ventriculomegaly in patients who required DC for traumatic brain injury and survived more than 3 days. A secondary objective was to study the role of interhemispheric hygroma (IHH) as a marker of impending hydrocephalus in these patients.

## 2. Material and methods

The retrospective study was conducted at Jai Prakash Narayan Apex Trauma Centre, All India Institute of Medical Sciences, New Delhi over a period of 8 months (March 2012–October 2012). All Patients with severe head injury (GCS $\leq$8) who developed subdural collection with associated ventriculomegaly in the postoperative period following DC were included in the study. Indications for surgery included the presence of CT-documented mass effect with or without the presence of intracranial haematoma, evidence of raised ICP on monitoring and/or deteriorating neurological status. Exclusion criteria included patients who died within 3 days after the surgery as we believe that in this period there is not enough time to develop hydrocephalus.

All patients were admitted and managed in the neurosurgical intensive care unit (NSICU) and received standard medical management of cerebral oedema. Serial CT scans of the head were acquired in all patients. Epidemiological data such as age, sex, mode and time of injury, admission GCS score, date, time and type of surgeries and post-surgical outcome and history were obtained from the Computerised Patient Record System.

CT head was reviewed to see for any ventriculomegaly and/or subdural effusion. Ventriculomegaly was defined as the presence on CT scans (in the postoperative period) of *both* of the following criteria: 1) modified Frontal Horn Index score greater than 33% (the greatest width of the frontal horns divided by the bicortical distance in the same plane), and 2) distended appearance of the anterior horns of the lateral ventricles and the enlargement of the temporal horns and third ventricle in the presence of normal or absent sulci and/or presence of periventricular lucency. Subdural effusions were classified as ipsilateral, contralateral, bilateral and interhemispheric depending on the site of craniectomy. Scans revealing ventriculomegaly were serially followed in order to assess the evolution of the hydrocephalus vis-à-vis subdural effusion and/or midline shift. Individual lesions identified on CT scans, such as diffuse brain oedema, cerebral contusions, traumatic SAH, IVH, or intra/extra-axial haemorrhagic collections, were also recorded. Data from subsequent scans were also recorded. In-hospital mortality was assessed for all patients.

## 3. Results

A total of 270 patients had undergone decompressive craniectomy in the study period. Of these 80 (26.6%) patients developed subdural effusion (Figs. 1 and 2). Males constituted 83% of these patients with the mean age of 30 years. Majority of the patients (35%) were in the 20–30 year group. The most common cause of trauma was road traffic accidents (92%) followed by falls (6%). Sixty percent patients had acute subdural haematoma followed by contusions (31.25%), diffuse brain oedema (6.25%) and bullet injury (2.5%). The admission GCS was $\leq$8 in 72.5% patients, rest being moderate head injuries (GCS $9 \leq 13$).

The presence of SEV was 26.62%. SEV manifested earliest in 3 days but majority of patients (52%) developed SEV in the 3rd postoperative week with a mean of 10 days. Most common site of the SEV was ipsilateral to the site of craniectomy (70%) followed by interhemispheric (47.5%) and bilateral (22.5%). The average thickness of the SEV was 14.67 mm (57.5%). It was more than 20 mm in 23.75% patients with the maximum of 39 mm in 2 patients.


**Fig. 1 – CT scan brain showing left frontotemporoparietal acute subdural haematoma with mass effect.**