

Traumatic Subdural Hygroma: Nuances of Management

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Abstract

Background: Traumatic subdural hygroma (TSHg) is a collection of cerebrospinal fluid (CSF) in the subdural space following head injury. Despite being rather common, its onset and progression are unclear. The pathogenesis of TSHg is still uncertain.

Aim of Study: This study attempts to discuss management based on the possible pathogenesis.

Patients and Methods: Twenty patients with TSHg were studied clinically and by serial CT scans. TSHg was defined on CT as hypodense subdural fluid, without contrast enhancement or neomembrane formation, with at least 3mm between the skull and brain. Ventricle size was measured and quantified by the bicaudate index (BCI).

Results: Twenty patients were collected prospectively during the period of the study. Ages ranged from 4 and 65 years with male predominance (16 patients).

The main trauma mechanism was Road Traffic accidents in 11 patients, fall from height in 5 patients and 4 patients suffered from direct blow to the head.

The period to develop the subdural hygroma ranged between 3 weeks to 2 months in our cohort. Ten of our patients were discovered accidentally by the routine follow-up images, the other half of patients developed clinical signs of neurological affection.

Sixteen patients were subjected to surgical intervention. 12 patients had burr hole evacuation. 7 of them did not need further procedure whereas the other 5 had recollection and they needed shunt insertion. In 4 patients, the subdural collection was accompanied by ventriculomegaly for which they had a ventriculoperitoneal shunt from the beginning.

Conclusions: Management of TSHg should be guided by the possible pathologies affecting the CSF pathway. The three groups probably represent a spectrum of CSF circulation impairment.

Group 1 represents what is considered by most a simple hygroma, with no effect on CSF absorption. Group 2 represent the external hydrocephalus form, and group 3 were the cases presenting marked mass effect. With proper interpretation of clinical and CT findings, one can define the best treatment option.

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Introduction

HEAD injuries can result from numerous types of accidents, it may be caused by Road Traffic Accident (RTA), Fall from Height (FFH) or even a direct blow to the head.

No matter what was the cause, head injuries can have a drasting outcome either immediately by causing direct cerebral impact or later affections such as CSF disturbances and subdural hygroma formation [1].

The resultant conditions are troublesome to all the health care workers who are involved in emergency departments all over the world, yet the medical team personnel are always looking for answers from the neurosurgeons about the resultant debatable conditions like post-traumatic subdural hygroma.

Having multiple theories of development, post traumatic subdural hygroma management is controversial, urging the need to plot a road map helping the neurosurgeons to make appropriate decisions that meet the patient's need in every phase of the disease.

In this study we tried to reach an algorithm for managing the patients who develop post traumatic subdural hygroma, opening the way for better care to treat the sequelae of Head injuries and to avoid the devastating outcomes that may affect those patients.

Patients and Methods

This prospective study was performed in Cairo University Hospitals in the period between March 2018 and March 2019. The study design was tailored to do at least two CT examinations for each case included in this study.

We defined the TSHg as a subdural collection on CT scan that appears as hypodense fluid, without contrast enhancement or neomembrane formation, the size should be at least 3mm between the skull and brain.

The ventricular size was also measured and quantified by the bicaudate index (BCI). We included all the patients with moderate to severe traumatic brain injury with GCS 10/15 or less from all ages and both genders who had been hospitalized for more than 3 weeks. Neither Patients who had surgery for intracranial hematoma nor patients with mild traumatic brain injury (GCS 12:14/15) were included in this study.

All patients were monitored in ICU for conscious level with serial follow-up CT every 10 days and patients who developed hygroma on follow-up CT were observed for changes in conscious level, size of hygroma, ventriculomegaly, and were subjected to fundus examination to monitor ICP and if not conclusive we had to proceed for LP if fourth ventricle is wide or burr hole manometry if not.

In cases with elevated pressure (more than 20cm/H₂O) then management was carried out via burr hole evacuation of hygroma and follow-up.

If recollection was encountered in the follow-up images, then a shunt was inserted either subduroperitoneal or ventriculoperitoneal according to which compartment was more convenient and safer for the procedure.

Results

20 patients were collected prospectively during the period of the study. Ages of the patients ranged from 4 and 65 years with male predominance (16 patients).

The main trauma mechanism was Road Traffic accidents in 11 patients, fall from height in 5 patients and 4 patients suffered from direct blow to the head.

The period to develop the subdural hygroma ranged between 3 weeks to 2 months in our cohort. 10 of our patients were discovered accidentally by the routine follow-up images.

Whereas the other half of patients developed clinical signs of neurological affection. Conscious level was worsened in 6 patients and 4 patients developed contralateral hemiparesis.

Fundus examination was conclusive in 12 patients showing multiple stages of papill edema,

but it did not show any signs for increased tension in 8 patients for whom we carried out a lumbar manometry.

4 patients had high pressures with values more than 20cm/H₂O (38,35,32 and 29) the other 4 patients had normal opening pressure during the procedure so a conservative management was carried out especially those patients has no clinical problems and the hygroma was accidentally discovered.

16 patients were subjected to surgical intervention. 12 patients had burr hole evacuation. 7 of them did not need further procedure whereas the other 5 had recollection and they needed shunt insertion.

In 4 patients, the subdural collection was accompanied by ventriculomegaly for which they had a ventriculoperitoneal shunt from the beginning recollection and they were shunted.

All the 4 patients with the motor weakness improved after the intervention but only 2 patients out of the 6 patients with conscious level deterioration improved after the surgery.

Case presentation:

6-year-old boy with history of road traffic accident one month ago, GCS was 7/15. The initial CT brain showed no detectable hygromas or hydrocephalic changes (Fig. 1).

Follow-up CT showed the development of a hygroma on the right side with ventriculomegaly (Fig. 2).

Patient showed no lateralizing signs. The fundus examination revealed pale disc with no definite signs of increased tension or papilledema.

So that a lumbar puncture was carried out as the 4th ventricular size was the relatively bigger than the initial CT.

The opening pressure was 38cm/H₂O so that a ventriculol-peritoneal shunt was inserted.

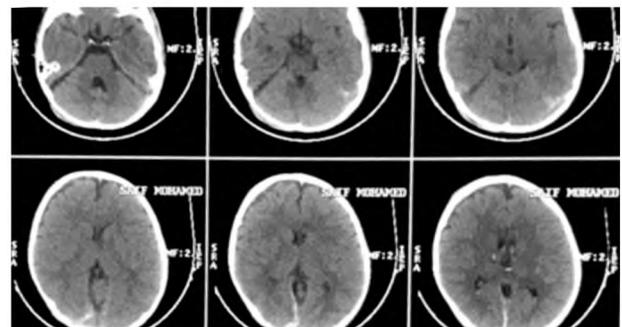


Fig. (1): Initial CT brain with no ventriculomegaly or subdural collection.

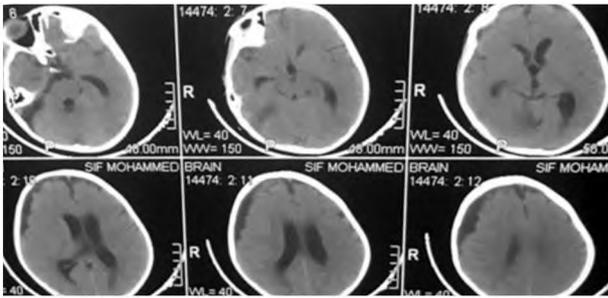


Fig. (2): Follow-up CT brain shows development of right frontal subdural hygroma with ventriculomegaly.

Discussion

Management of any medical problem necessitates understanding the pathogenesis of this condition.

A Lot of theories emerged to explain the mechanism of formation of the subdural hygroma.

It was suggested that there is a possibility of dural separation from the arachnoid after trauma which in turn would create a space at which the fluid of the hygroma collects.

Thus the condition may occur more in extremes of ages due to high compliance of the cerebral hemispheres in the infants and due to the decrease in the brain mantle in the elderly [1].

It is unusual for the subdural hygroma to cause midline shift, so some schools opted that it is a filling collection rather than a real lesion with mass effect [2]. Mostly, subdural hygroma is composed of cerebrospinal fluid (CSF).

However, this may be converted into chronic hematoma and can be distinguished by the increased density in the follow-up neuroimaging [3].

(Wait or Operate) is the Dilemma, the decision for management of this post traumatic subdural hygroma is really tough and hard. After viewing the radiology of a patient with this condition, one wonders what to do, the surgical intervention might be unnecessary and carries the usual risks of such operations especially that many studies reported spontaneous resolution of the subdural hygromas [2,4,5].

whereas other studies voted strongly for surgical intervention, they claimed that a surgery will alleviate the high intracranial pressure and it will decompress the crammed neural structures that may cause sensorium changes. Moreover, the conservative treatment might facilitate further deteri-

oration or at least pauses the recovery of the patient [6-9].

Categorization of the subdural collection according to its mass effect and the presence of ventriculomegaly may be helpful to decide which management is suitable for a specific case.

Zanini et al., [1] divided the patients with subdural hygromas into 3 groups.

In their first group, patients had simple hygromas with no mass effect or ventriculomegaly who were managed conservatively.

They proposed that the absorption of CSF might be impaired, and some patients may develop a sort of external hydrocephalus which would evolve later to internal hydrocephalus and they attributed those patients in their second group who were managed by CSF diversion.

A third group was proposed by them with patients in which the hygroma attained a large size that was enough to produce mass effect which in turn necessitated drainage of fluid plus or minus Shunt insertion [1].

Even though, a lot of query cases do exist. Fundus examination might help, however an increased ICP can be confirmed via burrhole manometry.

Easier solution for ICP detection may be attained via performance of a Lumbar Puncture (LP) manometry which may offer some help especially with wide 4th ventricle when the LP can really reflect the ICP 2,10 and hence the decision can be made more confidently.

The situation becomes more tricky when the condition is associated with ventriculomegaly as the trauma may cause an arachnoid tear with concomitant disturbance of CSF circulation and those patient may need a form of CSF diversion weather from the subdural space or from the ventricles directly [11].

In our study, we stuck to an intracranial pressure-based management. We feel that this method is more accurate than the neuroimaging driven categorization of the patients with this extremely variable condition.

Although this approach may be criticized for being more invasive, yet we feel that the application of all safety precautions together with proper selection of the procedure that is relevant to each patient can lead to proper diagnosis of the patient

condition and hence can be a guide for a satisfactory management plan.

Conclusion:

Post traumatic subdural hygroma is a query condition that necessitates a proper diagnosis and proper follow-up. Due to presence of various theories for the pathophysiology of such condition, we proposed an ICP based algorithm of management which can be helpful in application of proper strategies of management that can be tailored for each case on an individual basis.

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الفروق الدقيقة في علاج ورم خبيث تحت آلام الجافية

يعد تجمع السوائل تحت آلام الجافية بعد حالات إصابات الرأس ما هي إلا تجمعات السائل الشوكي.

أن حدوث هذه التجمعات غالباً ما يكون في المرضى نوى درجة الوعي المنخفضة بعد إصابات الرأس كما أنها تحدث بصورة مزمنة لهؤلاء المرضى.

على الرغم من أن عدد هذه الحالات ليس بالقليل، إلا أن بدايتها وظهور أعراضها غالباً ما يكون بالتدريج ويتم إكتشافه بالمصادفة عند عمل أشعة مقطعية بصورة روتينية لمتابعة المرضى في الرعاية المركزة أن سبب وتفسير حدوث مثل هذه الحالة غير واضح وغير مفهوم حتى الآن في هذه الدراسة نحاول أن نتوصل إلى طريقة للتعامل مع هذه التجمعات للسائل النخاعي تحت آلام الجافية.

في هذه الدراسة تم متابعة ٢٠ مريض ما بعد إصابات الرأس وتبين وجود هذه التجمعات والتي تتصف بأنها داكنة ولا تصطبغ في فحوصات الأشعة ولا يوجد لديها غشاء داخلي وسمكها ٣م من تحت سطح عظام الجمجمة.

تم دراسة ومتابعة هؤلاء المرضى عن طريق سلسلة من الأشعات والفحوصات مثل فحص قاع العين وقياس ضغط المخ عن طريق فتحة في القحف أو عن طريق بزل للسائل الشوكي وذلك لمعرفة ما أن كانت هذه السوائل تحت ضغط عالي من عدمه.

وعليه يتم التعامل معها بالمتابعة فقط أو تفريغها أو تركيب صمام مخى بريتنوني وفي النهاية هناك ثلاثة أنواع، الأول وهو النوع البسيط الغير متسبب في أى ضرر والنوع المصاحب باستسقاء في المخ والنوع الأخير وهو الذى يكون متسبب في ضغط على المخ ويحتاج تفريغ.