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ACUTE EPIDURAL HEMATOMA FORMATION AFTER VENTRICULO-PERITONEAL SHUNT PLACEMENT

Background: *Acute epidural hematoma is a common finding of the traumatic brain injury patients. However there are only a few cases of acute epidural hematoma formation after insertion of ventriculo-peritoneal shunt.*

Case report: *We present a rare case of acute epidural hematoma formation after insertion of ventriculo-peritoneal shunt.*

A 28-year old man presenting with one year history of headache, dizziness, difficulties finding words, lower limbs weakness and urinary incontinence was admitted for CSF diversion. MRI investigation revealed excessive dilatation of the all four ventricles. Intracranial pressure measured in recumbent position pre-operatively revealed an ICP of 6mm Hg. The patient was operated and Strata programmable valve was used for the CSF diversion. CT scan on the sixth post-operative day showed an acute epidural hematoma that was evacuated urgently. The postoperative period went uneventfully. Patient was discharged with significant improvement.

Conclusion: *Although the formation of subdural hematomas is not rare conditions resulting from the overdrainage of the VPS in the shunted patients with chronic longstanding ventriculomegaly, the acute epidural hematoma formation after VPS insertion is a rare entity. Our case however shows that it could be also expected as a complication among the over drained chronic hydrocephalus patients*

Introduction

Subdural hematoma formation is a well known complication of the overdrained chronic longstanding hydrocephalus patients [1, 2]. The reason for that is the long standing ventriculomegaly that dramatically reduces the brain compliance [3]. However there are only a few cases reported of acute epidural hematoma formation after insertion of ventriculo-peritoneal shunt [4, 5].

Purpose: We present a rare case of acute epidural hematoma formation after insertion of ventriculo-peritoneal shunt, in order to prove the possibility of acute epidural hematoma formation due to overdrainage in the long standing chronic hydrocephalus patients.

Methods: The case is presented together with its clinical course, the diagnostic techniques, the surgical findings, and the treatment outcome.

Case report

A 28-year old man presented with one year history of headache, dizziness, difficulties finding words, lower limbs weakness and urinary incontinence. The conversation with his relatives revealed learning difficulties and mental retardation during the childhood. MRI investigation revealed excessive dilatation of the all four ventricles. (Figure 1) Intracranial pressure measured in recumbent position pre-operatively revealed an ICP of 6mm Hg. After clinical discussion it was decided the hydrocephalus to be treated with Strata Adjustable Valve. The valve was intra-operatively set at 1.0. CT scan on the sixth post-operative day showed an acute epidural hematoma (Figure 2) that was

evacuated urgently (Figure 3). The valve was set intra-operatively to 2.0. The postoperative period went uneventfully. Patient was discharged with significant improvement – no headaches and dizziness, improved word finding, improved gait and urinary control, which remained unchanged on the sixth month follow up visit.

Results

After the surgical treatment the patient's complaints were alleviated and no complaints were registered, during the next 6 months follow-up.

Discussion

A multitude of underlying etiological reasons can cause hydrocephalus (HC). Its classification and terminology is still controversial and a widely accepted consensus is still due to be achieved [2, 6, 7, 8].

The pathophysiology of hydrocephalus (HC) first started in the beginning of the previous century with the work of Dandy and Blackfan [9]. In 1913 they had first introduced the term "Internal Hydrocephalus" and also described the main features of the so called Communicating and Non-communicating Hydrocephalus. By 1919 Dandy [10] had developed an experimental animal model in order to study and develop treatment for HC. Since that first classification, there are numerous attempts at HC classifications, reflecting different aspects of the problem, but 100 years after the Dandy's and Blackfan's work, despite the many major achievements led to many classifications covering

different aspects of HC, the ideal comprehensive classification covering all the aspects remains elusive. Hence the term hydrocephalus generally represents a complex pathophysiological entity with one main characteristic - disturbed cerebrospinal fluid (CSF) turnover, with complex, not well understood and on many occasions intuitive treatment.

CSF circulation and turnover is a complex process and is described by many variables and is dependent on a multitude of factors which complicates attempts at a unifying classification system. Based on the systematic review of almost 10000 publications from the period of 1950 – 2008 in the HC area, and also based on his own experimental and clinical work, in 2010 Oi proposed "Multi-categorical Hydrocephalus classification, attempting to cover all the aspects of the HC [7]. Each HC case according to this classification is confronted to ten categories with multiple subcategories, with a final count of 54 HC subtypes listed. Hence if one would wish to cover all the possible combinations in this classification, there would be theoretically 72,576,000 patterns of hydrocephalus classified.

As classification dealing with specific forms of HC Oi points the Normal pressure hydrocephalus (NPH) [11], Longstanding overt ventriculomegaly in adult (LOVA) [12, 13], The syndrome of hydrocephalus in young and middle-aged adults (SHYMA) [14, 15], etc.

Longstanding overt ventriculomegaly in adult (LOVA) is a specific form of non-communicating hydrocephalus that often causes hydrocephalic dementia [16]. It is a unique category of hydrocephalus first presented by Oi in the mid-1990's. Before this new category was proposed, patients with LOVA might have been considered within the spectrum of normal pressure hydrocephalus (NPH) [15 17].

But descriptions of LOVA presentation in young and middle-aged adults have largely been restricted to obstructive hydrocephalus due to aqueductal stenosis. Because adults in this age range have been included in cohorts of predominately elderly patients with NPH [17, 18, 19] the clinical presentation of young adults has not been differentiated until Cowan et al. [14] described in 2005 a new subgroup of HC patients - hydrocephalus in young and middle-aged adults. They proposed the recognition of a single, clinically distinct syndrome of hydrocephalus in young and middle-aged adults (SHYMA), which is associated with ventriculomegaly and signs and symptoms that are age related and mostly similar, regardless of the aetiology of the hydrocephalus. So according to the authors, LOVA patient group – those with obstructive hydrocephalus due to aqueductal stenosis, appear to be a subset of SHYMA patient group, which comprise chronic HC patients not only with decompensated HC due to aqueductal stenosis, but HC due to obstruction elsewhere but

aqueduct, also non obstructive HC forms and also idiopathic HC.

SHYMA also adopts in a large scale the chronological concept [12] of the hydrocephalus dynamics that Oi accepts to explain the pathophysiology of LOVA, namely that the cause for the distorted CSF dynamics could be sought not necessarily in the immediate prior to diagnose period and also that the CSF dynamics varies with time. [12, 20, 21, 22].

The presented case demonstrates the typical feature of the longstanding chronic HC (SHYMA).

A Typical feature for the all chronic hydrocephaly cases is chronically enlarged ventricles and thinning of the brain mantel. [19] Because of longstanding severe ventriculomegaly, the involved brain parenchyma has lost its compliance. [3] That is the reason why these patients are susceptible to and usually form chronic subdural hematoma formation when over drained. Our case presented shows, that the reduced compliance could contribute also for acute epidural hematoma formation.

In a published series of patients with LOVA hydrocephalus, Oi reports on chronic subdural hematoma formation in all the patients treated with differential pressure valves and concludes that for the treatment of this subgroup of patients with hydrocephalus, the treatment options that should be considered should be or Endoscopic Third Ventriculostomy (ETV), or Programmable Pressure Valve (PPV) for flow diversion [13, 1, 23].

The choice to treat the patient reported with PPV was based mainly on the freedom that the programmable valves give to the treating physician to adjust the pressure settings of the valve according to the needs of the specific patient with a specific CSF dynamics. The protocol that we normally use when using PPV is to preoperatively set the valve to high pressure, usually 2.0 or 2.5 and then slowly reduce the pressure in the postoperative period until the symptoms of the patient settle down. Like this we try to assure slow decrease of the ICP until the patient becomes ideally free of symptoms (or at least to decrease significantly the severity of the symptoms) and in the same time to prevent overdrainage and hematoma formation.

In the case that we report we have a breach of the above mentioned protocol that resulted in epidural hematoma formation that had to be evacuated.

Conclusion

Although the formation of subdural hematomas is not rare conditions resulting from the overdrainage of the VPS in the shunted patients with chronic longstanding ventriculomegaly, the acute epidural hematoma formation after VPS insertion is a rare entity. Our case however shows that it could be also expected as a complication among the overdrained chronic hydrocephalus patients.



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ТҮЙІНДЕМЕ

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ВЕНТРИКУЛО-ПЕРИТОНЕАЛЬДЫ ШУНТТЫ ОРНАТҚАННАН КЕЙІНГІ ЖІТІ ЭПИДУРАЛЬДЫ ГЕМАТОМАНЫҢ ПАЙДА БОЛУЫ

Кіріспе. Жіті эпидуральды гематома мидың жарақатында жиі кездесетін жағдай болып табылады. Алайда, вентрикуло-перитонеальды шунтты орнатқаннан кейінгі жіті эпидуральды гематоманың пайда болуының бірнеше жағдайлары кездесті.

Клиникалық жағдайы. Біз вентрикуло-перитонеальды шунтты орнатқаннан кейінгі жіті эпидуральды гематоманың пайда болуының сирек кездесетін жағдайын ұсынамыз. Бір жыл бойы басы ауруы болған, басы айналуы, сөйлеуде қиналыстары бар, аяқтарының қозғалысы әлсіз,



кіші дәреті ұстамайтын 28 жасар ер кісі ОМҚ-мен келіп түсті. МРТ зерттеуі барлық төрт қарыншаның шамадан тыс дилатациясын көрсетті. Операцияға дейінгі бассүйекшілік қысымды өлшеу БІҚ 6 мм рт айқындады. Пациентке операция жасалынды және Strat бағдарламалы клапаны ОМҚ үшін пайдаланылды. Операциядан кейінгі алтыншы күні жасалған КТ жіті эпидуральды гематоманы көрсетті, тез арада алынып тасталынды. Операциядан кейінгі кезең ешқандай асқынуларсыз өтті пациент айтарлықтай жақсы нәтижемен ауруханадан шығарылды.

Қорытынды: шунт қойылған, созылмалы көп жылдық вентрикуломегалиялы науқастарда ВПШ артық дренажи әсерінен орын алатын субдуральды гематомалар аса сирек нәтиже болып саналмағанмен, вентрикуло-перитонеальды шунтты орнатқаннан кейінгі жіті эпидуральды гематоманың пайда болуы сирек кездесетін жағдай болып табылады. Алайда, біздің жағдай бұл созылмалы гидроцефалияның артық дренаждалған пациенттер арасындағы асқынулар ретінде қарастырылуы мүмкін екендігін көрсетті.

РЕЗЮМЕ

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ОСТРОЕ ЭПИДУРАЛЬНОЕ ОБРАЗОВАНИЕ ГЕМАТОМЫ ПОСЛЕ ВЕНТРИКУЛО-ПЕРИТОНЕАЛЬНОМ ШУНТИРОВАННОМ РАЗМЕЩЕНИИ

Введение. Острая эпидуральная гематома является частым случаем пациентов с травматическим повреждением мозга. Однако, есть только несколько случаев острого эпидурального образования гематомы после введения вентрикуло-перитонеального шунта.

Клинический случай. Мы представляем редкий случай острого эпидурального образования гематомы после введения вентрикуло-перитонеального шунта.

28-летний мужчина, представленный с годовой историей головной боли, головокружением, с трудностью речи, со слабостью нижних конечностей и недержанием мочи поступил для отведения СМЖ. Исследование МРТ показало, чрезмерную дилатацию всех четырех желудочков. Измерение внутричерепного давления в лежачем положении до операции выявило

6 мм рт ВЧД. Пациент был прооперирован и программируемый клапан Strata был использован для отвода СМЖ. КТ скан на шестой послеоперационный день показал острую эпидуральную гематому, которая была срочно эвакуирована. Послеоперационный период прошел без происшествий. Пациент был выписан со значительным улучшением.

Заключение. Хотя образование субдуральных гематом не редкий результат вытекающий из избыточного дренажа, ВПШ у шунтированных больных с хронической многолетней вентрикуломегалией, образование острой эпидуральной гематомы после введения ВПШ является редким явлением. Однако, наш случай показывает, что это может быть рассмотрено как осложнение среди пациентов с дренированным избытком хронической гидроцефалии.