Post-traumatic intradiploic leptomeningeal cyst of the posterior fossa in an adult

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A B S T R A C T

Intradiploic cysts in the posterior fossa are rare. We report a post-traumatic intradiploic leptomeningeal cyst in an adult and review the diagnosis and pathogenesis of this lesion.

A 28-year-old woman presented with a headache and a hard mass in the occipital region. She had a history of head injury as she had fallen from a height at the age of 18 months. CT scans and MRI revealed an expanding intradiploic cyst with the density of cerebrospinal fluid (CSF) and thinning of the inner and outer tables. A bony defect of the inner table connecting to the cisterna magna was also visualized. At surgery, we detected free communication of the CSF between the cystic cavity and the subarachnoid space of the posterior fossa via a defect in the dura and inner table. The dural defect was sutured primarily and covered with the autogenous outer table.

An intradiploic cyst of the occipital bone can be detected in adults and might be caused by remote head injuries during childhood. Prompt surgical repair of the dural and bony defect in an adult patient has an excellent prognosis.

1. Introduction

Intradiploic leptomeningeal cysts in the posterior fossa are rare with only several reported cases. Most of these cysts are due to blunt head trauma in childhood prior to the age of three. A dural tear and fracture of the inner table are probably important factors, causing pulsation of the brain through the torn dura. The arachnoid bulges through the defect as a result of pulsating cerebrospinal fluid (CSF) and the cyst develops over several years. In a few cases with no evidence or history of head injury, these cysts are referred to as intradiploic arachnoid cysts or intradiploic CSF fistulas. We report a large suboccipital intradiploic leptomeningeal cyst in an adult.

2. Case report

A 28-year-old woman was admitted to our hospital with complaints of occipital headache and an occipital mass. The patient was questioned for previous head injury and mentioned a severe head injury after falling to the ground from a motorcycle at the age of 18 months, which was followed by vomiting and occipital head injury after falling to the ground from a motorcycle at the age of 18 months. CT scans and MRI revealed an expanding intradiploic cyst with the density of cerebrospinal fluid (CSF) and thinning of the inner and outer tables. In the density of CSF (Fig. 3).

A midline scalp incision was made to expose the suboccipital mass. Immediately after a small perforation was made in the outer wall, clear colorless CSF gushed out. The thin outer table was removed, and the large intradiploic space was lined by a thin membrane. The inner table had a small round defect surrounded by a sclerotic and everted bony margin like a crater. There was free communication between the intradiploic cyst and the subarachnoid space of the posterior fossa. The inner wall of the cavity was removed until intact dural edges came into view. The dural defect was sutured primarily and the skull reconstructed with the outer table. Postoperative CSF leakage was Prevented by lumbar drainage. After 12 months of follow-up the patient remains asymptomatic with a good cosmetic result.
3. Discussion

The characteristic findings of intradiploic cyst are an intact outer table, a CSF-filled cyst and a defect in the inner table and dura. The clinical presentation is not only a palpable mass but also compression of the occipital lobe and/or cerebellum.

Although the mechanism of intradiploic cyst development is controversial, it might start with trauma to the calvaria in childhood, when the skull deformation does not result in a complete break but causes a fracture of the inner table and a dural tear. This, in turn, leads to bulging of the arachnoid membrane through the bony fissure caused by pulsating CSF. Some factors associated with the outward pressure, such as the normal pulsation of a growing brain, hydrocephalus, or edema, might accelerate growth of the cyst. We assume that the continuous pulsations of the CSF had eroded the edges of the fractured inner table through the defect, and had led, after many years, to the small round defect in the inner table becoming surrounded by a sclerotic and everted bony margin. These findings suggest that the water hammer effect, through the dural defect, might separate the bony fracture and lead to the subsequent development of an arachnoid pouch, while the slow circulation through the diploe of the occipital bone leads to the intradiploic cavity. The cyst within the diploe then elevates the outer table and flattens the inner table.

In this patient we detected free communication of CSF between the cystic cavity and the cisterna magna via a small defect in the dura and inner table. Our patient had not developed hydrocephalus. However, there was a possible initiating event in the developing brain when the child was 2 years of age. Although there was no apparent arachnoid membrane encapsulating the cyst, a persistent cystic communication of CSF with progressive loss of bone and dura at the site of a previous fracture in our patient was consistent with the development of a leptomeningeal cyst.

The pathogenesis of intradiploic cysts suggests a distinct clinical entity separate from growing skull fractures. The main difference between the two lesions is that the outer table is intact in the intradiploic cyst. Both a complete skull fracture and a dural tear are necessary for the development of a bony defect in a growing skull fracture. Therefore, to lead to an intradiploic cyst the initial blunt trauma is likely to be severe enough to break the inner table.

Fig. 1. Lateral skull radiograph showing a multilobulated radiolucent lesion in the occipital bone.

Fig. 2. Cranial axial CT scan showing an expanding intradiploic cyst with thinning of the inner and outer table of the occipital bone.

Fig. 3. Sagittal T1-weighted MRI showing the cerebrospinal fluid characteristics of the cyst content.
but not severe enough to break the outer table. In addition, the CSF pulsates through the dural tear, without disturbing the outer table, and eventually leads to the development of an intradiploic cyst. The mechanism involved in the arachnoid bulging outward and subsequent enlargement of the cyst is thought to be similar to that of a growing skull fracture. Growing skull fractures occur more frequently in young children and 90% occur in children under 3 years of age. However, intradiploic cysts have been diagnosed more frequently in adults, where the time interval between the initial head injury and the diagnosis of the cyst is significantly longer compared to growing skull fractures. The patient may have forgotten the injury because the trauma may be in the distant past.

The predominant location in the occipital bone suggests that the thick occipital muscles and the greater thickness of the occipital bone near the midline are related to the development of an intradiploic cyst. The thick musculature behind the inferior portion of the posterior fossa might cushion the force of the head injury without breaking the outer table. Nonetheless, although the cyst does not expand, it could grow to a considerable size due to the supporting force of the thick occipital muscles. Another possible explanation for the predisposition for intradiploic cysts to develop in the occipital region is the large subarachnoid space, the cisterna magna, between the skull and the brain in the posterior fossa. This might reduce the pulsating pressure effects on the bony tissue in this region in contrast to a supratentorial lesion, which is compressed almost directly by the pulsating brain.

The diagnostic work-up includes plain radiographs that show an eggshell appearance around a multilobulated radiolucent lesion. The thin outer wall protrudes outward, but is not destroyed. The CT scan contributes to the visualization of both the cranial defect and subsequent enlargement of the cyst is thought to be similar to that of a growing skull fracture. Growing skull fractures occur more frequently in young children and 90% occur in children under 3 years of age. However, intradiploic cysts have been diagnosed more frequently in adults, where the time interval between the initial head injury and the diagnosis of the cyst is significantly longer compared to growing skull fractures. The patient may have forgotten the injury because the trauma may be in the distant past.

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The surgical treatment is simple and usually successful. The principle approach is to close the defect in the dura. A craniectomy with careful exposure of the intact dural edges and duroplasty is the standard technique used. Cranioplasty with either autogenous bone or acrylic material is generally followed by good results.

A CSF diversion procedure might be necessary in patients with communicating hydrocephalus.

References


Giant intradural extramedullary arachnoid cyst of the thoracic spine

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ABSTRACT

Spinal intradural arachnoid cysts (ACs) are found frequently in the thoracic region, and often extend over four or five vertebral levels. We present a 28-year-old patient who had a giant thoracic congenital intradural extramedullary AC (T1–T12) with a 10-month history of pain, paresthesia, paraparesis and gait ataxia. A T3 to T6 laminectomy was performed. After durotomy, the posterior wall of the AC was visualized compressing the spinal cord. We resected the cyst wall as widely as possible and connected the cyst to the subarachnoid space using a catheter. There were no postoperative complications. At 1-year follow-up, the patient presented with no motor deficits or pain, and had experienced progressive resolution of the gait ataxia. The treatment of giant intradural extramedullary ACs, especially for those that cannot be totally excised, should include generous fenestration and the insertion of a cyst–subarachnoid shunt.

1. Introduction

Arachnoid cysts (ACs) within the spinal canal may mimic many neurological and non-neurological disorders and therefore delay