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CASE STUDY

Surgical video of septum cavum colloid cyst

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Cavum septum pellucidum (CSP) cysts are rare midline intracranial cysts, typically asymptomatic but capable of causing neurological symptoms when enlarged. With an incidence of approximately 0.04%, symptomatic cases are even rarer and may present with headaches, ataxia, seizures, visual disturbances, or cerebrospinal fluid (CSF) obstruction leading to hydrocephalus. These cysts are characterized by lateral bowing of the septal walls and a width of at least 10 mm. We present an operative video of a 41-year-old gentleman who presented with imbalance while walking, lower limb weakness, and memory impairment. His radiological evaluation was suggestive of a CSP cyst extending into the third ventricle with gross ventriculomegaly. Surgical excision of the cyst was performed via a transcallosal approach, leading to significant improvement in symptom complexity. This manuscript highlights the importance of considering CSP cysts in unexplained neurological conditions and the potential benefits of timely surgical intervention.

Keywords: septum cavum colloid cyst, midline intracranial cysts, operative video, transcallosal approach, symptomatic CSP cysts

Introduction

Cavum septum pellucidum (CSP) cyst, cavum vergae, and cavum velum interpositum represent different types of benign midline anterior intracranial cysts. These cysts become clinically significant only when they cause symptoms, which typically depend on their size. CSP cysts are rare, with an incidence of approximately 0.04%. Even more uncommon are symptomatic CSP cysts, with only a handful of cases documented in the literature. The symptomatology of these cases varies widely from headache to focal neurological deficits (1). The symptom complex includes ataxia, seizures, papilledema, visual disturbances, and sensorimotor impairments. In some cases, gradually enlarging cysts may also lead to behavioral, visual, or autonomic dysfunctions. Most CSP cysts are incidental findings and often remain asymptomatic, even when they exert a mass effect.

A dilated cavum or a CSP cyst is significantly rarer than a simple CSP. According to Shaw and Alvord, a cavity within the septum pellucidum is referred to as a cavum, which is usually considered a normal anatomical variant without clinical relevance (2). When this cavity enlarges beyond its usual size, it may be termed a cyst, a congenital cerebral cyst of the cavum, or a dilated cavum. Sarwar further characterized a CSP cyst as a fluid-filled structure located between the lateral ventricles, distinguished by a lateral bowing of its walls rather than a parallel alignment, with a separation of 10 mm or more (3). These cysts have been associated with various neuropsychiatric conditions, including acute hydrocephalus, loss of consciousness, autonomic dysfunction, and seizure disorders. Current hypotheses suggest that the symptoms arise when an enlarged cyst obstructs the interventricular foramen, leading to impaired cerebrospinal fluid (CSF) flow (4). Some patients with these cysts have been observed to develop intermittent hydrocephalus.

Case summary

A 41-year-old right-handed gentleman presented with a 6-month history of gait imbalance and weakness in both lower limbs with memory impairment. He had no history

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of headaches, vomiting, visual disturbances, sleep changes, seizures, unsteadiness, or episodes of falls. On neurological examination, his higher mental functions were intact except for recent memory impairment. The cranial nerve assessment was normal. In the motor examination, the power in both lower limbs at the ankle joint was noted as 4/5. An MRI of the brain with contrast revealed a cavum septum pellucidum cyst and cavum vergae. The cyst, measuring 1.5 × 2 × 1.7 cm, was in the lower part of the septum cavum, extending into the third ventricle. It appeared hyperintense on T1 and T2 sequences without contrast enhancement. There was mild enlargement of the lateral ventricles bilaterally. Although no definite communication between the cyst and the right lateral or third ventricle was observed, a minimal connection to the left lateral ventricle was noted. Partial luminal obstruction at the level of the bilateral foramina of Monro was identified, leading to mild hydrocephalus.

Surgical intervention (Video 1)

The patient underwent a right medial frontoparietal craniotomy via an interhemispheric transventricular approach for excision of the cyst. The details of the operative steps are as follows:

> The patient was positioned supine with the head fixed in a Sugita head fixator frame with neck flexion. All pressure points were well padded, and the coronal suture was identified and marked using a marker pen. A right frontoparietal horseshoe scalp incision was marked, and a right parasagittal craniotomy was performed using a high-speed electric drill. During craniotomy, care was taken to separate the dura adequately from the undersurface of bone to avoid inadvertent injury to the cortical veins. The craniotomy was extended across the midline to get easy access to the interhemispheric fissure. The dura was carefully opened and reflected over the superior sagittal sinus. Care must be taken to avoid inadvertent injury to any parasagittal cortical vein draining towards the superior sagittal sinus. In case a cortical vein is found to adhere densely with the overlying dura, a cuff of dura must be cut around the cortical vein and reflected with the dural flap. Gentle retraction of the medial right frontal lobe allowed access to the interhemispheric fissure. The cingulate gyrus is identified as the gyrus immediately below the callosomarginal artery and should not be mistaken for the corpus callosum. The two pericallosal arteries were identified, and the area between them was exposed by separating these arteries apart. The pearly white appearance of the corpus callosum was recognized, and the two DACAs were kept apart by keeping small cottonoids at both ends of the exposure. A 1.5 cm length of the corpus callosum was coagulated and incised to access the right lateral ventricle. The laterality of the ventricle was identified by the anatomy of the thalamostriate vein, being lateral to the ipsilateral septal vein. The choroid plexus was identified in the medial wall of the right lateral ventricle, which was heading towards the foramen of Monro. The cyst, which was bulging into the right lateral ventricle, was identified as a bluish cystic lesion. The lateral wall of the cyst was meticulously coagulated at a lower bipolar current. The cyst content was mucinous, and multiple specs of calcification were noticed. The lateral wall of the cyst, which was bulging into the left lateral ventricle, was adhered to the left septal vein, which was dissected out using micro neurosurgical principles. While dissecting the cyst wall, care was taken not to damage the column of the fornix in the posteroinferior aspect of the lesion. The operative cavity was thoroughly washed out with antibiotic-mixed saline. The brain was lax at the end of the surgical resection of the cyst. The cottonoids applied underneath the brain retractor were gently removed. Hemostasis was achieved, and the dura was closed watertight. The bone flap was fixed with a miniplate and titanium screws. The wound was closed in layers, and an aseptic dressing was performed.

VIDEO 1 | 0:33-Head fixed in Sugita clamp. Incision marked; 0:43-Durotomy; 1:02-Interhemispheric approach; 1:26-Corpus callosum coagulated and incised; 1:32-Right lateral ventricle opened; 2:30-colloid cyst visualised; 3:01-cyst opened.
https://youtu.be/P7D99zk7uf0

Postoperative course

The patient recovered well postoperatively without any new neurological deficits. The CT brain scan on postoperative day one confirmed complete cyst excision with pneumocephalus. He was discharged on postoperative day five. Histopathology confirmed the diagnosis of a colloid cyst. On follow-up, the patient showed significant improvement in memory function.

Discussion

The septum pellucidum (SP) is a thin, triangular, double-layered membrane that separates the frontal horns of the right and left lateral ventricles. Its apex is positioned at the foramen of Monro, and its base extends towards the quadrigeminal cistern. The CSP is a potential space between the two layers of the SP. A CSP cyst is a fluid-filled lesion

located in this potential space measuring a minimum of 10 mm in width or causing the adjacent ventricular walls to bow laterally. Although historically misunderstood as a functionless neural structure, the septum pellucidum plays a role in the limbic system. It serves as a relay between the hippocampus and the hypothalamic nuclei. SP abnormalities are characterized by cognitive impairments such as learning disabilities and mental retardation.

Anatomically, the borders of the SP are as follows. The inferior surface of the corpus callosum forms the superior border; the superior surface of the genu of the corpus callosum forms the antero-inferior border; the medial walls of the frontal horns of the lateral ventricles form the lateral border; and the potential space between the opposing CSP forms the medial border. If the CSP extends posteriorly, it is referred to as the cavum vergae. In most cases (over 85%), the CSP naturally fuses in the first 3–6 months of life. The caudal part starts fusing first at 38 weeks of gestation. The rostral part fuses later, driven by the growth of the corpus callosum and the hippocampal alvei and the fusion of the cerebral hemispheres. The prevalence of CSP declines after birth; with 85% in the first month, 45% in the second month, and 15% by the third to sixth month (5). The cavum vergae is found in approximately 30% of newborns but persists in only 1% of adults. SP and CSP were previously referred to as the fifth and sixth ventricles, respectively, but since they are not continuous with the ventricular system and lack a choroid plexus, this terminology is obsolete. CSP cysts are categorized based on their connection to the ventricular system. They can be classified as communicating or non-communicating, with secondary connections potentially forming due to trauma, surgery, or spontaneous rupture. Another system differentiates between asymptomatic (incidental) cysts and symptomatic (noncommunicating cysts that increase intra-cystic pressure). CSP cysts are rare, but they are a significant cause of positional headaches, which can be treated effectively. The differential diagnoses for anterior midline intracranial cysts include asymmetrically enlarged ventricle cysts with an intact bowed septum pellucidum, vein of Galen aneurysms, cavum septum arachnoid cysts, interhemispheric cysts linked to corpus callosum agenesis, and cavum velum interpositum cysts.

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