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ORIGINAL ARTICLE

Outcome of Fetuses with Cavum Velum Interpositi Cyst—Experience of a Tertiary Centre

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Abstract Cavum velum interpositi is the space between the layers of the tela choroidea of the third ventricle. This space occasionally appears as an anechoic lesion in routine mid-trimester targeted scans because of the presence of fluid inside. This is then called a cavum velum interpositi (CVI) cyst. CVI cyst is a rare finding with varied outcomes. Councellings management are consequently confusing. This study was aimed at assessing the outcome of CVI cysts to guide the treating clinician and address apprehensions of the expecting couple. Genetic evaluation and MRI to prove the inncocuous nature of CVI cysts is expensive and needs to be offered in an appropriate perspective. A fetal Neurosonogram was conducted in all the targeted scans and the brain was visualized in coronal, axial, sagittal and oblique saggital planes. The fetuses with a CVI cyst were followed antenatally and up to 6 months post delivery. The study concluded that CVI cysts appear to be an innocuous finding as neurological outcome of all four cases who continued pregnancy was normal. One patient terminated the pregnancy for an extra Central Nervous System anomaly.

Keywords CVI cyst · Cavum velum interpositi cyst · Midline cysts brain · Anechoic intracranial cyst

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Introduction

Cavum- (hollow in latin) Velum- (veil/curtain) Interpositum [1] as the name suggests represents a potential space between the columns of the fornices and the choroid forming the roof of the third ventricle. It is a space bound laterally by the fornices in the superior aspect & thalami in the inferior aspect, superiorly by the hippocampus, postero superiorly by the splenium of the corpus callosum, inferiorly by the choroid of the third ventricle and anteriorly by the pineal body but it may extend up to the foramen of Monro. In the midsagittal view it can be visualized below the splenium of the corpus callosum separate from the cavum septum pellucidum and cavum vergae.

Embryologically, the CVI is a true cistern [2] originating from the roof plate of the diencephalon by an extension of the pia mater, which protrudes into the primitive neural tube at about the third month of gestation.

The prenatal diagnosis of a CVI cyst is feasible by ultrasound examination [3] of the fetal brain. In the axial view of the brain, it is seen as a well-defined anechoic inter-hemispheric lesion that is located posterior to the thalami. In the midsagittal view the cyst is located antero-inferior to the splenium of the corpus callosum, superior

and posterior to the thalami; the columns of the fornix form the superior-lateral wall of the cyst and separate it from the cavum vergae and the cavum septi pellucidi. The most anterior extension of the CVI is at the foramen of Monro. The internal cerebral veins are displaced inferiorly and laterally by a CVI cyst.

The differential diagnosis includes [4]: dilated cavum septi pellucidi and cavum vergae and arachnoid cysts of the quadrigeminal cistern. The midsagittal view is crucial in the differential diagnosis. The dilated cavum septi pellucidi and cavum vergae are located below the body of the corpus callosum and are superior and anterior to the columns of the fornix; Arachnoid cysts of the quadrigeminal cistern are located below the internal cerebral veins. The pineal gland is normally surrounded by the echogenic non-distended quadrigeminal cistern, a sonolucent structure seen in this region may raise concerns about the presence of an arachnoid cyst or pineal gland cyst.

Methods

This is a retrospective study of five fetuses diagnosed with CVI cyst in the period from October 2016 and January 2018. All the five cases were second referrals for either borderline ventriculomegaly ($n = 2$) or midline intracranial cyst ($n = 3$).

The gestational age at the time of our first examination ranged from 18.6 to 35 weeks. The ultrasound examination was performed by a single fetal medicine expert (FMF certified) using Voluson E10, BT 17 ultrasound machine equipped with RAB6-D transabdominal and RIC6-12-D vaginal probe. Three dimensional evaluation was also done in all cases. Examination of the fetal brain was done in axial, sagittal and coronal planes to evaluate the shape, size and anatomical relationship of the cyst. A detailed anatomical survey of the fetus was done to rule out associated anomalies. Serial scans were performed in order to monitor ventriculomegaly, the size of the cyst and appearance of any other finding.

Amniocentesis for fetal karyotyping was advised in one case with bilateral ventriculomegaly and single umbilical artery. One patient terminated pregnancy due to the associated presence of left small deformed ear.

Delivery and postnatal details were gathered for all the pregnancies. All the neonates underwent a transfontanellor scan after birth. Postnatal MRI was done in one case of CVI cyst with associated ventriculomegaly. All babies were followed up to 12–18 months of age.

Results

In all five cases, the midsagittal view allowed visualization of the cyst below the splenium of the corpus callosum and posterior to the cavum septi pellucidi and cavum vergae (Fig. 1).

Results are summarized in Table 1.

The mean diameter of the CVI cyst ranged between 9 and 20 mm.

In one case isolated CVI cyst disappeared in the third trimester scan at 29 weeks.

In the second case, the midline cystic brain lesion was a dilated CSP and the neonate was asymptomatic.

In the third and fourth case, CVI cyst was associated with ventriculomegaly, the cyst size and ventriculomegaly increased progressively in one and the neonate underwent postnatal ventriculo-peritoneal shunting. In the other case,

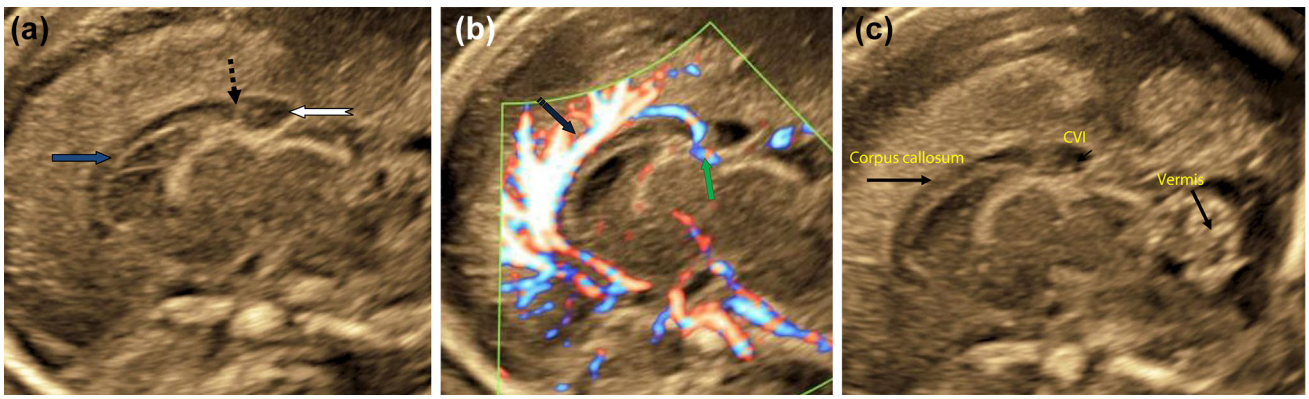

Fig. 1 **a** The midsagittal plane (2D-imaging). Blue arrow—intact corpus callosum, black arrow—column of the fornices, forming concave surface of the anechoic lesion with a characteristic comma shape which is a CVI cyst (white arrow). **b** Midsagittal plane (3D-imaging + Color Doppler). Green solid arrow -The internal cerebral veins are visualized as parts of the inferolateral boundaries of the cavum velum interpositum, but are not anatomically within it. The pericallosal artery is seen (black striped arrow). 2D and Doppler images show the internal cerebral vein located beneath the CVI. **c** 2D sagittal, axial and coronal images of the fetal head showing the cavum veli interpositi. Noted the characteristic triangular shape in the axial plane

Table 1 Prenatal findings and postnatal outcome of five cases of cavum veli interpositi (CVI) cyst

Case	MA-years	GA weeks	CVI-c mean diameter (mm)		Asso anomalies	KT	Final diag	Follow up age at outcome final report
			Initial	Final				
1	25	20	8.5	–	–	–	Stable	17 months
2	24	23	7.8	9	SUA, Mild ventriculomegaly	Normal	Regressed	18 months
3	35	24	11	18	Ventriculomegaly Mod-severe	–	Increased	V-P shunt done, 18 months
4	25	22	12	–	Unilateral deformed small ear	–	–	Opted for termination
5	36	35			–	–	Stable	14 months

GA gestational age, *MA* maternal age, *SUA* single umbilical artery, *KT* karyotype, *V-P* ventriculo-peritoneal

a single umbilical artery was demonstrated with bilateral ventriculomegaly. Amniocentesis was done for fetal karyotype which turned to be normal. Stable ventriculomegaly was noted till 30 weeks followed by a normal postnatal neurosonogram.

In the last case, the patient terminated the pregnancy due to an associated finding of a left small deformed ear (microtia).

Gestational age at delivery in the other four cases ranged from 36 to 40 weeks.

Cesarean section was performed in two cases (Cases 3 and 4) for indications not associated with the prenatal diagnosis (previous Cesarean section, twin pregnancy). Birth weight ranged from 2800 to 3450 g. None of the neonates required admission to intensive care.

Duration of neonatal follow-up ranged from 14 to 48 months; neonatal neurosonography confirmed the presence of CVI cyst in all four cases who went to term and a CVI cyst was confirmed in the abortus of the couple who had decided for termination of pregnancy. The cyst regressed in one case (Case 4) within 1 month after delivery. In others, it remained stable in size during the follow-up period.

References

1. D'Addario V, Pinto V, Rossi AC, Pintucci A, Di Cagno L. Cavum veli interpositi cyst: prenatal diagnosis and postnatal outcome. ISUOG. 2009. https://doi.org/10.1002/uog.6419.
2. Tubbs RS, et al. Cavum velum interpositum, cavum septum pellucidum, and cavum vergae: a review. Childs Nerv Syst. 2011;27(11):1927–30.
3. Chen CY, et al. Sonographic characteristics of the cavum velum interpositum. AJNR Am J Neuroradiol. 1998;19:1631–5.
4. Tsikhanenka I, Chukanov A, Grishchenya V. Polost ppromezutochnogo parusa—klinicheskoe znachenie i differentialnaya diagnostica. Medicina. 2016;4:28–34.