20th World Congress in Fetal Medicine

Arachnoid cysts: does the location predicts postnatal outcomes?

Mohan V, Prabhu A, Gupta R, Chhikara U, Kaul A
Apollo Center for Fetal Medicine, Indraprastha Apollo Hospital, New Delhi, India

Objective

To assess the correlation between the cyst location (supratentorial vs infratentorial) and characteristics (size at diagnosis, the cistern of origin, natural course) and the need for surgical intervention postnatally.

Methods

This was a prospective descriptive study on retrospectively & prospectively collected data on a cohort of fetuses with prenatal diagnosis of arachnoid cysts on ultrasound from January 2012 to February 2023. These were categorized based on their location into supratentorial (STA) vs infratentorial (ITA) arachnoid cysts. We excluded CVI cysts, interhemispheric cysts & communicating 4th ventricle. The confirmed arachnoid cysts were reviewed for the initial gestation at diagnosis, cistern of origin, initial size at time of diagnosis, pressure signs, antenatal progression, association with other anomalies, and outcomes.

Results

Twelve cases of arachnoid cysts were included – 7 infratentorial (58%) and 5 supratentorial (41.6%). The mean gestation at diagnosis was comparable between the two groups (28.7 weeks in ITA and 27.6 weeks in STA). The cyst size at diagnosis was similar in both the groups. MRI was done for 8 patients. According to the cistern of origin, retro-cerebellar CSF space was the most common(n=6). The others were superior cerebellar cistern(n=1), left sylvian cistern(n=2), left anterior temporal lobe CSF space(n=2), right anterior temporal lobe CSF space(n=1). There was no significant correlation between the cistern of origin and need for surgical intervention. In terms of associated anomalies, infratentorial cysts were more commonly associated with other CNS & extra CNS anomalies 57% (4/7)- 1 had severe FGR with persistent Hyaloid artery (neonatal death) and 3 were Syndromic (2 Termination of pregnancy, 1 ongoing pregnancy). On the contrary, only 1/5 (20%) supratentorial cyst had an associated finding (frontoethmoidal encephalocele – this one had a favorable postsurgical outcome). On assessing the pressure signs, we looked at ventriculomegaly which was seen only in STA cysts (40%, 2/5) and there was no associated Corpus Callosal abnormality in isolated arachnoid cysts in either group. Vermian abnormality secondary to pressure effects, was only seen in ITA (14%, 1/7). Evaluation of change in size suggested that 60% of the STA cysts and 50 % of the ITA cysts progressed in size through the antenatal course. There was no significant correlation with initial size at diagnosis and postnatal outcomes. There were 7 live births (4 STA, 3 ITA). On postnatal follow-up, only the supratentorial cysts progressed (3/4, 75%) and went on to require surgical intervention (3/4, 75%- one cyst excision, one cystoperitoneal shunt insertion, one failed fenestration followed by shunt insertion). The infratentorial cysts remained stable or regressed in size after birth and none needed surgical intervention. Our results were in concordance with existing literature- isolated arachnoid cysts had a favorable outcome (71%) in our study (66% infratentorial, 50% supratentorial cysts). MRI was useful in giving extra information about the cistern of origin and pressure signs.

Conclusion

Although this is a small case series, we found that the supratentorial arachnoid cysts are mostly isolated and tend to progress in size postnatally. These are more likely to require surgical intervention and an effort should be made for close monitoring. Infratentorial cysts are likely to be associated with other CNS & extra CNS anomalies however, isolated ITA cysts tend to regress or remain stable in size post birth. Overall, Isolated Arachnoid cysts have a favorable prognosis. MRI is a useful tool for excluding damage to the surrounding brain structures and identifying the cistern/ origin of the cysts however, it was not helpful in predicting postnatal surgical outcomes in our study.

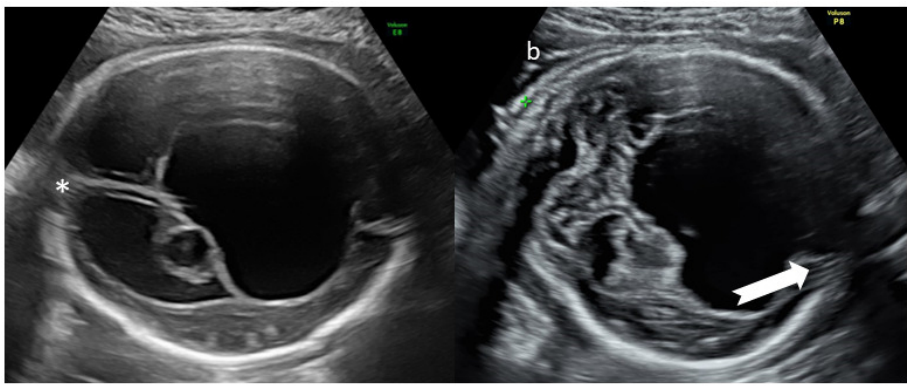
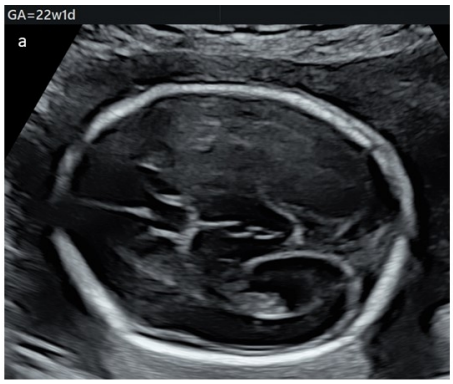


Figure 1: Case 4 of STA cysts- Cyst 1(^) seen crossing the midline, Cyst 2(*) wedged between the posterior horn of the right lateral ventricle and cyst 1(image a). Mass effect on the adjacent brain parenchyma (solid arrow, image b)



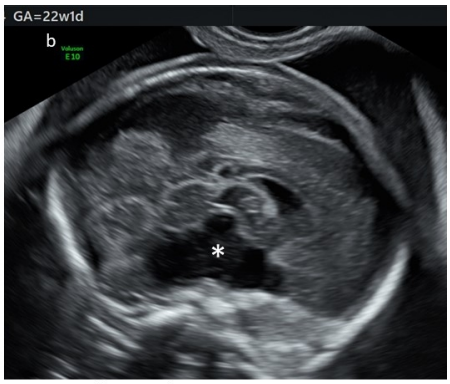


Figure 2. Case 5 of STA cysts- Normal appearing transthalamic plane (image a), Midsagittal view showing a suprasellar arachnoid cyst (*), with mass effect on the masa intermedia, 3rd ventricle (image b).

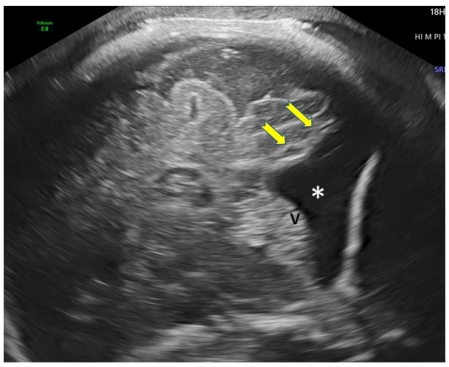


Figure 3: Case 7 of ITA cysts- Sagittal plane showing an ITA cyst(*) arising from the Retro-cerebellar CSF space. It is seen to cause tentorial elevation (solid arrows), slight flattening of the posterior surface of the vermis due to mass effect (V)

Table 1. Characteristics and outcomes of Supratentorial Arachnoid cysts (STA)

Case no.	Gestation at diagnosis (weeks)	Cistern of origin	Cyst Size at diagnosis	Other CNS / extra CNS abnormalities	Pressure signs on USG	Progression in cyst size during pregnancy	Extra findings on fetal MRI	Outcome and Postnatal progression in size of cyst	Neuro-developmental Outcomes
1	28+3	left sylvian cistern	4.3 x 3.8 x 3.4 cm	Fronto-ethmoidocele (2.2 x 1.7 x 1.5cm)	-Midline shift to right side -mass effect on adjacent parenchyma	No	Underlying temporal lobe showed paucity of volume	-Live birth -CS at 38 weeks, 4200gm, male -asymptomatic after birth -No progression in size -cyst excision done during the ethmoidocele repair at 6 months	ND Normal
2	21	Left anterior temporal lobe CSF space	4 x 2.8 x 2.8cm	No	-ventriculomegaly -Midline shift -mass effect on adjacent brain	Yes	-done at 34 +4 weeks -cyst crossing the midline & causing. Indentation on Brain stem, Basal Ganglia, Thalamus	-Live birth - CS @37 weeks, 2619gm, female -cyst size progressed after 6 months of age -Cyst fenestration @ 9 months followed by Ventriculoperitoneal shunting due to cyst Recurrence	-ND Normal - Strabismus @ 1 yr of age
3	31+4	Cyst 1- left anterior temporal lobe CSF space Cyst 2- continuation of cyst 1 across midline	Cyst 1-4.9 x 3.5 x 4.9cm Cyst2- 2.1 x 1 x 0.9cm	No	-mass effect on adjacent brain parenchyma on the left side -left ventricle compressed & displaced -no midline shift	Yes Developed hydrocephalus at 36 weeks	-Superior elevation of a hypoplastic left temporal lobe -the cyst on the right occupied right peri-mesecephalic cistern & seemed to be an extension of the larger left cyst across the midline	-Live birth -CS @ 39+3 weeks, 3000gm, male -progressively increased in size post birth -endoscopic fenestration done at 1.5 mo of age followed by recurrence of cyst	Died at 3.5mo of age
4	30+6	Cyst 1- left sylvian Cyst 2- wedged between cyst 1 and post horn of right ventricle	Cyst 1- 6.1 x 4.9 x 4.5cm Cyst 2- 1.76 x 1.6 x 1.4cm	No	-bilateral ventriculomegaly -both lateral ventricles displaced laterally -thinned out Corpus Callosum -CSP disrupted -splaying of Midbrain, Thalamus -Midline shift	No	USG findings confirmed on MRI	-Live birth -Full term CS -progression in size post birth -hydrocephalus noted clinically @ 3 mo of age	ND Normal till 3 mo of age
5	22+1	Suprasellar cistern	3.3 x 1.9 x 1.4cm	No	-masa intermedia, 3rd ventricle, pons, midbrain pushed upward -flattened pons belly	No	USG findings confirmed on MRI	Ongoing pregnancy	-

Table 2. Characteristics and Outcomes of Infratentorial arachnoid cysts (ITA)

Case no	Gestation at diagnosis (weeks)	Cistern of origin	Size of cyst at diagnosis	Other CNS / extra CNS associated abnormalities	Pressure signs on USG	Progression in cyst size during pregnancy	Extra findings on fetal MRI	Outcome & Postnatal progression in cyst size	Neuro-developmental Outcomes
1	32+5	Retro-cerebellar CSF space	3.8 x 2.6 x 2.1cm	No	Tentorial elevation	yes	Scalloping of occipital bone	-Live birth -CS @39 weeks, 3300gm, male -Regressed in size post birth	Normal till 4 Mo of age
2	30	Retro-cerebellar CSF space	Diagnosed as megacisterna magna (12.7mm)	No	No	yes	-tentorial elevation -scalloping of occipital bone	-Live birth -CS@38 weeks, 3150gm, male -Regressed in size post birth	Normal till 1.5 yrs of age
3	27 Twin1 of DCDA twins	Superior cerebellar cistern	2.2 x 1.6 x 1.9cm	Severe FGR, Global brain asymmetry, ballooned out frontal horns, periventricular pseudocysts, ?Tubulinopathy	No	-	-scalloping of occipital bone -confirmation of USG findings	-IUFD of Twin 1 at 31 weeks - Exome sequencing of twin 1- VUS Mutation in ZNF148 (AD) a/w- global developmental delay, ACC/PACC, dysmorphic facies	-
4	36	Retro-cerebellar CSF space	5.8x2.9x2.8cm	-Severe Late onset FGR -Pre-terminal Dopplers -Persistent Hyaloid artery	Tentorial elevation	-	NA	-Emergency CS @ 36weeks, 1610gm, male -on Ventilatory support till 3 mo -cyst size remained stable	Died at 3 mo of sepsis
5	19+3	Retro-cerebellar CSF space	1.6x1.6x1.8cm	No	Mass effect on cerebellum and posterior surface of vermis	-	-Tentorial elevation -scalloping of occipital bone -Torcula shifted to left side	Termination of Pregnancy	-
6	24	Retro-cerebellar CSF space	2.8 x 2.4 x 2.2cm	Right CDH, Heterotaxy syndrome, enlarged kidneys, post axial polydactyly in all 4 limbs, delayed sulcations, asymmetrical & downslanting cerebellar hemispheres, thinned out pons belly, vermian hypoplasia	No	-	NA	Ongoing pregnancy	-
7	32+2	Retro-cerebellar CSF space	3.1 x 3 x 2.6cm		-Mass effect on posterior surface of vermis -tentorial elevation	-	NA	Ongoing pregnancy	-