

Ultrasound Markers for the Prediction of Poor Perinatal Outcomes in Antenatally Diagnosed Gastroschisis

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Introduction:

Gastroschisis is a full thickness defect in the para-umbilical abdominal wall of a fetus leading to extravasation of the abdominal contents into the amniotic sac. It affects 3-4/10,000.

Potential sequelae include:

- Bowel complications such as malrotation, stenosis, necrosis, volvulus and perforation. These are thought to result from oedema, inflammation and ischaemia of the bowel wall.
- Non-bowel complications such as growth restriction, polyhydramnios/oligohydramnios, preterm birth and fetal demise

Gastroschisis is effectively diagnosed by fetal ultrasonography with the expectation that 100% will be diagnosed antenatally. Ultrasound is also an effective tool to assess severity. Antenatally diagnosed complications such as intra or extra-abdominal gut dilatation, or polyhydramnios are associated with poorer neonatal outcomes. In these cases, ultrasound monitoring can assist in counselling and planning. Ultrasound can also monitor for growth restriction, which has been shown to significantly increase the risk of prolonged hospital stay in gastroschisis affected neonates .



Image 1: Gastroschisis in a newborn¹. Image 2: Ultrasound example of gastroschisis². Image 3: Intra and extra-abdominal bowel dilatation³.

Literature review demonstrated significant variation in rates of preterm birth (20-40%), growth restriction (4-60%) and intrauterine fetal demise (0.3-5%) between publications. A large systematic review by Bhat et. al showed a significant association between intra-abdominal bowel dilatation and polyhydramnios with bowel atresia, and gastric dilatation with fetal demise. They did not find any association between extra abdominal bowel dilatation and poor neonatal outcome.

Aims:

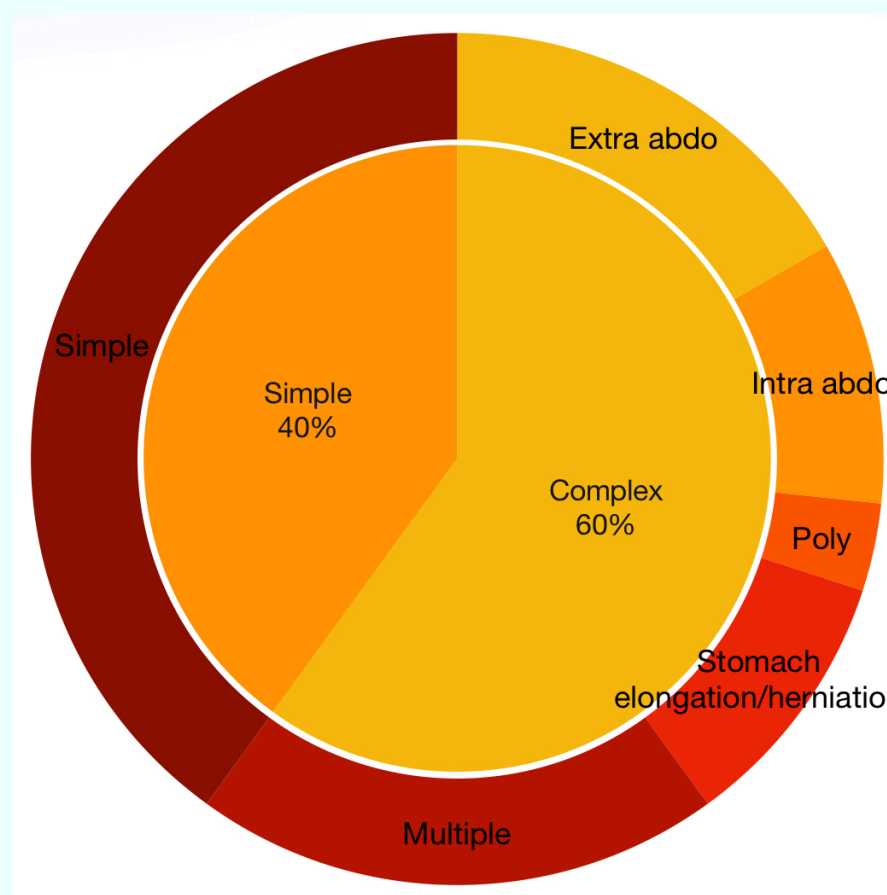
We correlated antenatal ultrasound findings with perinatal outcomes in gastroschisis affected fetus' with the aim to see which outcomes could be predicted by features found on ultrasound.

Methods:

An ethics exception was in place prior to commencement. We reviewed gastroschisis cases monitored in our MFM unit between May 2014 and March 2022. We collected data on surveillance, ultrasound markers, delivery and neonatal outcomes, including a composite outcome of bowel necrotising enterocolitis, obstruction, early and late neonatal sepsis. We classified high risk ultrasound features of intra or extra abdominal bowel and gastric dilatation and polyhydramnios as "complex", and those without these features as "simple". Stata was used to perform statistical analysis.

Table 1: Results of antenatal monitoring

Maternal age	26.1		
		Nullip	Multipl
Parity	17	13	
Gest age at birth	35+1		
Gest age at first scan	16+4		
#scans >24w (term births)	8.4		
Av AC% last USS	13.9		
Av EFW% last USS	13.7		
Complex gastroschisis	18/30		
Simple gastroschisis	12/30		



Graph 1: Simple and Complex gastroschisis cases.

Once excluding fetal demise, loss to follow up and ongoing pregnancy, 30 cases were left to analyse. Results of antenatal monitoring can be found in table 1. 18/30 (73%) had complex gastroschisis, 12/30 (27%) were simple. Average birth gestation was 35+1, 15/30 (50%) delivered by cesarean, 12 emergency and 3 elective, 14/30 (46.7%) had spontaneous vertex birth, 1/30 (0.3%) required a vacuum. Comparative results between complex gastroschisis versus simple gastroschisis can be found in table 2. Though there was a trend towards longer length of stay for complex compared with simple gastroschisis (31.94 cf. 26.3 days), this was not statistically significant. The only significant finding was an increased rate of composite neonatal outcome for complex gastroschisis compared with simple (66.7% cf. 25%, p = 0.03).

Complex vs Simple Gastroschisis				
	Complex	Simple	Z/T score	P Value
Birth details				
IUGR at last USS (%)	22.2	41.7		0.43
CS (%)	44.4	58.3		0.46
Vaginal birth (%)	55.6	41.7		0.46
GA at birth (weeks)	36 (SD 1week,3days)	36+3 (SD 1week,1day)	z=1.23	0.22
Birth weight (centile)	38.4 (SD 33.1)	41 (SD 36.8)	z=0.11	0.92
Closure				
Silo (N)	15.0	10.0		1.0
Primary (N)	3.0	2.0		1.0
Neonatal morbidity outcomes				
Time to closure (days)	5.1 (SD 3.2)	4.2 (SD 2.8)	t(28) = 0.79	0.44
Time to cease TPN (days)	22.6 (SD 17.0)	23.33 (SD 15.7)	z=0.24	0.81
Length of stay (days)	31.94 (SD 23.0)	26.3 (SD 16.0)	z= 0.84	0.40
Composite outcome (%)	66.7	25.0		0.03

Discussion

Our study confirmed that fetus' with ultrasonographic features of complex gastroschisis increased the likelihood for the neonate having complications such as bowel obstruction, volvulus, necrotising enterocolitis and sepsis. When looking at systematic reviews, there is debate as to the usefulness of extra-abdominal bowel dilatation as a feature of complex gastroschisis. We included this feature in our study, however it would be interesting to exclude it and see if results remain similar. We did not perform a post hoc analysis on this due to restrictive sample size.

There was no difference between complex and simple gastroschisis with regard to mode of delivery, gestation at birth or type of closure. This negative finding is still extremely valuable when counselling families on expected outcomes in the peripartum and neonatal period.

A shortcoming of this study was the small sample size, despite collecting nearly 8 years of data. One of the reasons for this was that until 2016 many of our gastroschisis cases were being transferred to other tertiary sites for delivery and were therefore lost to follow up. This was due to a lack of paediatric surgical service at our site. After 2016, a paediatric surgical service was commenced and less cases were transferred out. It would be worth repeating this study in a few years when the loss to follow up rate is less likely to make an impact.

References:

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