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Current practice for gastroschisis prenatal surveillance among society for maternal fetal medicine (SMFM) members

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Abstract

Background: Gastroschisis is an abdominal wall defect with potential devastating outcomes, including short bowel syndrome (SBS). The objective of this study is to define current practices in prenatal gastroschisis surveillance.

Methods: An online survey was circulated to the Society for Maternal Fetal Medicine (SMFM) providers. Questions focused on timing, type, and frequency of surveillance, proposed interventions, and the impact of gastroschisis defect diameter on plan of care.

Results: Responses were obtained from 150/1104 (14%) SMFM providers. The majority of respondents worked in practices in an academic setting (61%) and more than half (58%) had been in maternal fetal medicine (MFM) practice for > 10 years. Antenatal testing began at 32 weeks for 78% of MFM providers. Surveillance was unanimously uniformly performed with ultrasound. About 40% of the providers would consider all abnormalities in the measured parameters to change their surveillance frequency. In non-complicated gastroschisis, 44% of the providers would recommend delivery at 37 weeks of gestational age, with the vast majority of them (96%) recommending vaginal delivery. Among the 23% who expressed their thoughts, 70% agreed that a smaller defect size correlated with the higher risk for development of SBS. Nevertheless, only 2% declared an absolute cutoff point (< 8 mm–3 cm) at which they would recommend delivery. Only one-fifth of the participants (21%) noted that the abdominal wall defect size has an impact on development of SBS. A higher percentage of SMFM providers (89%) with ≤ 10 years of experience started the antenatal testing at week 32 weeks compared to 66% of senior providers. Senior providers were more inclined (50%) to induce labor at 37 weeks compared to SMFM providers with > 10 years of experience (38%).

Conclusions: Gastroschisis management does not differ dramatically among SMFM providers, though noticeable differences in surveillance and timing of induction were identified based on years of experience as providers. The impact of gastroschisis defect dimensions on development of SBS may be under appreciated.

Keywords: Gastroschisis, Abdominal wall defect dimensions, Vanishing gastroschisis, Short bowel syndrome, Antenatal surveillance

Background

Gastroschisis is a congenital defect in the anterior abdominal wall that leads to prolapse of the intestine into the amniotic cavity; the prolonged exposure to the amniotic fluid can cause inflammatory changes in the intestine. Of more concern is the patency of the mesenteric blood supply, threatened by a tight defect, potentially leading to intestinal atresia and short bowel syndrome (SBS); this complication may be seen in up to 13% of cases (Escobar and Caty 2016). Moreover, complicated gastroschisis fetuses have a higher risk of intrauterine fetal death compared to non-complicated

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gastroschisis fetuses. Of note, non-complicated gastroschisis babies have low mortality, with a survival rate > 95% (South et al. 2013). Ultrasound (US) is utilized to diagnose and monitor these patients (Friedman et al. 2016; Jones et al. 2016; Nelson et al. 2015). Current practice for many maternal fetal medicine (MFM) providers on identified gastroschisis patients is to implement monthly fetal monitoring until 30 or 32 weeks of gestation, then biweekly or weekly until the delivery time (Bauseler et al. 2016; Barseghyan et al. 2012; Kuleva et al. 2012; Mousty et al. 2012). Loss of small intestine and development of SBS may happen due to vascular compromise of the protruded bowel ("vanishing" gastroschisis); ischemia of the intestine which leads to atresia can significantly shorten/compromise the intestinal length (Wood et al. 2014). It is worth noting that a closing abdominal defect with a protruded bowel can self-resolve gastroschisis in utero, though this can lead to infarction or sloughing of the exterior bowel contents secondary to strangulation by the abdominal wall defect which can manifest as SBS (Barsoom et al. 2000).

A previous survey among North American Fetal Therapy Network (NAFT-Net) showed no agreement among the MFM providers about the antenatal care for gastroschisis patients (Amin et al. 2019). Moreover, previous surveys have not asked about possible associations between defect dimension and the development of gastrointestinal complications. This study targeted the members of the Society for Maternal-Fetal Medicine (SMFM). SMFM is a large MFM community that was established in 1977 and is a non-profit organization of more than 1100 members. This society aims to improve maternal, fetal, and perinatal health. The survey's introductory email aimed to evaluate the current practice of the MFM providers who are taking care of women pregnant with gastroschisis fetuses. Based on the nature of the SMFM membership categories, we expected the responses from the Regular Members. These are Board certified in MFM or Board certified in Ob/Gyn with certification in areas related to MFM and they account for 37% of the SMFM total members (408 members).

There is currently no agreed upon protocol for optimal fetal surveillance nor for timing of delivery of fetuses with gastroschisis. The correlation between abdominal wall defect dimension and its effect on the development of SBS have been the subject of a number of previous studies (Wood et al. 2014; Barsoom et al. 2000). Their main conclusions was: as the defect gets tighter, the risk of SBS increases. However, the awareness of MFM providers and their practical interventions never been explored. Currently there are no standardized guidelines for either fetal monitoring or timing of delivery in gastroschisis patients in order to avoid SBS related to gastroschisis.

The aim of this survey was to explore the antenatal care plan/regimen of MFM providers with gastroschisis patients. We were also interested in learning how they manage these patients and if they see a correlation between abdominal wall defect diameter and its impact on development of SBS. It is worth noting that SMFM is a US-based society, which may not follow the same practice guidelines as other regions.

Methods

A twelve question online survey was circulated to the SMFM providers. It is worth mentioning that the term "provider" can be used to include non-physician professionals such as nurse practitioners and physician assistants who take care of pregnant women. However, as a subspecialty of OB/GYN, MFM members are dominantly doctors/physicians. After completing the survey, we aimed to gain insight on the providers' years of experience treating this population and how it affects their practice. We also collected data regarding the providers' clinical affiliation (academic, private, or other). Most of the questions focused on time, type, and frequency of surveillance, proposed interventions, and the impact of gastroschisis defect diameter on plan of care. We were looking to see if there were any patterns in current practices that identified a set of criteria or umbilical ring dimension measurement that would prompt early delivery, or altered the timing and route of delivery. Two questions were devoted to examine the participants' opinions about abdominal wall defect dimensions, and their impact on development of SBS. The survey was partially adopted from a previous survey used by Amin et al. (2019).

The survey was distributed via RedCap to all SMFM members, and responses were obtained over a 6-month period. Comparisons were made between the SMFM providers with > 10 years of experience to those with ≤ 10 years of practice experience after the survey was completed (post hoc analysis). Chi-square and univariate analysis statistics were used and P-value of < 0.05 was considered statistically significant. This study was approved by the University at Buffalo Institutional Review Board.

Ethical approval

The study was approved by the institutional review board of University at Buffalo, Buffalo, NY, USA (STUDY00003021, 8 March 2019).

Results

Responses were obtained from 150/1104 (14%) SMFM providers. The majority of respondents worked in an academic setting (61%) and more than half (58%) had been in MFM practice for > 10 years.

The majority of the providers (76%, 113/150/144) began the antenatal testing at 32 weeks. Surveillance was unanimously performed via US, while biophysical profile (BPP) and non-stress test (NST) were also utilized (76%). A majority of the respondents stated the defect diameter was measured every 4 weeks (60%), fetal weight (FW) was estimated every 4 weeks (56%), and amniotic fluid index (AFI) analyzed weekly (50%). Slightly less than half of the respondents measured fetal growth (FG) and fetal growth lag (FGL) every 4 weeks (48%), the mesenteric and umbilical artery flows were measured weekly (43%), and 37% of respondents measured bowel thickening every 4 weeks.

The abnormalities that would lead to change surveillance frequency were mesenteric and umbilical artery flow (2%), bowel status or appearance (5%), FG (8%), FGL (13%), estimated fetal weight (EFW) (15%), AFI (18%), and about 40% consider all the above-mentioned measurements. In non-complicated gastroschisis, 44% of the providers would recommend the delivery at 37 gestational weeks, and the vast majority (95%) would recommend vaginal delivery.

About one-third (36%) of the providers measure the diameter of the gastroschisis defect as part of their routine evaluation. Among the 23% who expressed their thoughts, 70% agreed that the smaller the defect size the higher the risk for development of SBS. Nevertheless, only 2% declared an absolute cutoff point (< 8 mm–3 cm) at which they would recommend delivery. Moreover, 96% stated that the abdominal wall defect diameter would not affect their treatment plan/ delivery timing. Only one-fifth of the participants (21%) think the abdominal wall defect size (dimensions) have an impact on development of SBS. Table 1 presents the details.

We then looked to see if there were differences in treatment plans relating to years of experience in practice. We have 2 groups, MFM providers with > 10 years (Group 1 the senior group) and compared the responses to MFM providers with ≤ 10 years of practice experience, (Group 2, the junior group); a number of statistically significant discrepancies were revealed. Group 1, requested Doppler US more often (59% vs. 35%, $p = 0.003$), and were more inclined to start the antenatal testing at week 32 weeks (66% vs. 89%, $p = 0.02$). About 51% of Group 2 would like to induce labor at 37 weeks compared to 40% of group 1 ($p = 0.01$), Table 2 presents the details. Approximately, 17% of Group 1 would like to check the mesenteric and umbilical artery every 2 weeks compared with only 5% of Group 2 ($p = 0.2$), and 23% Group 2 check the amniotic fluid index every 2 weeks compared to only 11% of Group 1 ($p = 0.04$).

When it came to changing the plan of care, 45% of Group 1 would like to see changes in all parameters (bowel status or appearance, mesenteric and umbilical artery, EFW, FG, FGL, and AFI) in order to modify the course of treatment as opposed to only 33% of Group 2 ($p = 0.002$).

The key message is that SMFM providers adopt similar approach to manage gastroschisis fetuses. However, the impact of gastroschisis defect dimensions on SBS development is a controversial practice. SMFM providers with less experience start antenatal care earlier and recommend delivery at early term.

Discussion

In concordance with a similar prior survey, there is inconsistency regarding antenatal surveillance practice and timing of delivery for gastroschisis fetuses (Amin et al. 2019). These findings demonstrate the need for standardizing the surveillance protocol to improve the mortality and morbidity for gastroschisis patients. Perry et al.'s (2017) study found that by implementing a standard antenatal surveillance protocol for gastroschisis fetuses, the intrauterine death rates dropped 58%, from 5.5 to 2.2%. In our study, though all providers used US to monitor their patients, 76% of them initiated monitoring at 32 weeks of gestation, which is consistent with previous studies (Bauseler et al. 2016; Barseghyan et al. 2012; Kuleva et al. 2012; Mousty et al. 2012); however, the parameters that we are interested in are widely different. Though parameters were consistent with the recommended approach, the significance of each test is debatable. For instance, the NST (76%) and BPP (76%) were reported to be performed more in this survey than previously reported (50%) (Barseghyan et al. 2012; Amin et al. 2019; Wilson et al. 2012; Baud et al. 2013). Ultrasound for EFW was performed every 4 weeks by 56% of providers, which correlates with the claim of two previous studies of inability of EFW to precisely predict the outcomes (Overcash et al. 2014; Page et al. 2014). However, a similar survey conducted among the NAFT-Net members found that 79% of the providers monitor EFW weekly (Amin et al. 2019).

In concordance with a recent study, FG and FGL were found not to be the best tool to monitor gastroschisis fetuses by this survey cohort, as they were measured monthly by less than the half of the providers, and only 13% of the respondents would change their care plan based on FG and FGL changes (Overcash et al. 2014).

The significance of measuring bowel status (thickening and diameter) and its relationship to outcomes was a

Table 1 Demographic and responses of the entire cohort

Variables	Total number (percentage)
Affiliation	
Academic practice	90 (62.5%)
Private practice	41 (28.5%)
Other	13 (9.0%)
Years of experience as MFM provider	
0–3 years	21 (14.6%)
4–6 years	22 (15.3%)
7–10 years	18 (12.5%)
> 10 years	83 (57.6%)
Diagnostic and monitoring tool for a fetus with gastroschisis	
Ultrasound	144 (100.0%)
Doppler ultrasound	73 (50.7%)
Biophysical profile (BPP)	110 (76.4%)
Non-stress test (NST)	111, (77.1%)
MRI	5 (3.5%)
Age of starting antenatal testing	
≤ 24 weeks	3 (2.1%)
28 weeks	19 (13.4%)
32 weeks	108 (76.1%)
33 weeks	0, (0.0%)
34 weeks	12 (8.5%)
Frequency of bowel wall thickness/bowel dilation measurement	
Every week	36 (30.8%)
Every two weeks	29 (24.8%)
Every three weeks	10 (8.5%)
Every four weeks	43 (36.8%)
Frequency of mesenteric and umbilical artery monitoring	
Every week	23 (41.8%)
Every two weeks	18 (32.7%)
Every three weeks	4 (7.3%)
Every four weeks	11 (20.0%)
Frequency of estimated fetal weight measurement	
Every week	0 (0.0%)
Every two weeks	29 (20.6%)
Every three weeks	41 (29.1%)
Every four weeks	76 (53.9%)
Frequency of fetal growth and fetal growth lag (FGL) measurement	
Every week	(0, 0.0%)
Every two weeks	31 (27.0%)
Every three weeks	36 (31.3%)
Every four weeks	54 (47.0%)
Frequency of amniotic fluid index (AFI) measurement	
Every week	68 (49.3%)
Every two weeks	27 (19.6%)
Every three weeks	13 (9.4%)
Every four weeks	34 (24.6%)
Frequency of umbilical ring size measurement	
Every week	3 (10.3%)
Every two weeks	6 (20.7%)
Every three weeks	2 (6.9%)
Every four weeks	18 (62.1%)
Abnormalities would change surveillance frequency	
Bowel status or appearance	7 (4.9%)
Mesenteric and umbilical artery by Doppler US	3 (2.1%)
Estimated fetal weight	21 (14.7%)
Fetal growth	12 (8.4%)
Fetal growth lag (FGL)	17 (11.9%)
Amniotic fluid index (AFI)	25 (17.5%)
All apply	58 (40.6%)
Elective premature delivery in case of any abnormal findings	
Yes	96 (69.1%)
No	43 (30.9%)
Time for delivery in non-complicated gastroschisis	
Prior to 36 weeks	0 (0.0%)
At 36 weeks	6 (4.2%)
At 37 weeks	62 (43.1%)
At 38 weeks	28 (19.4%)
At 39 weeks	39 (27.1%)
Spontaneous	9 (6.3%)
Mode of delivery in case of the presence of fetal gastroschisis	
Vaginal	134 (95.0%)
Cesarean	7 (5.0%)
Do you measure the diameter of the gastroschisis defect?	
Yes	52 (36.4%)
No	87 (60.8%)
I would like to but it is not feasible	4 (2.8%)
Impact of abdominal wall defect diameter on treatment plan	
Yes	8 (5.6%)
No	135 (94.4%)
Abdominal wall defect size impact on short bowel syndrome	
Yes	28 (20.1%)
No	35 (25.2%)
I don't know	76 (54.7%)

controversial issue raised by some studies (Vegunta et al. 2005; Long et al. 2011), which may reflect the response of our participants where less than a third of them check these measurements on a weekly basis. Of note, a number of studies found a direct correlation between the bowel status and outcomes (Bauseler et al. 2016; Heinig et al. 2008; Nick et al. 2006; Lato et al. 2013). Contrary to a previous survey among NAFT-Net members where EFW (77%) was the main indication for changing the management approach (Amin et al. 2019), in our cohort only 15% would change their management based on FW changes. The majority of our participants considered all the parameters before changing their management

Table 2 MFM providers' response based on years of experience

Variable	> 10 years of experience 82 (%)	≤ 10 years of experience 62 (%)	*p* Value
Antenatal workup			
US	82 (100%)	62 (100%)	0.09
Doppler	51 (62.2%)	22 (35.5%)	0.002
Biophysical profile	61 (74.4%)	49 (79.0%)	0.52
Non-stress test	66 (80.5%)	45 (72.6%)	0.26
MRI	5 (6.15)	0 (0%)	0.05
Time of start testing			0.02
≤ 24 weeks	2 (2.5%)	1 (1.6%)	
28 weeks	16 (20%)	3 (4.8%)	
32 weeks	53 (66.3%)	55 (88.7%)	
33 weeks	0 (0%)	0 (0%)	
34 weeks	9 (11.3%)	3 (4.8%)	
Frequency of bowel wall thickness/bowel dilation			
Weekly	20 (24.4%)	16 (25.8%)	0.85
Every 2 weeks	18 (22%)	11 (17.7%)	0.53
Every 3 weeks	4 (4.9%)	6 (9.7%)	0.26
Every 4 weeks	23 (28%)	20 (32.3%)	0.59
Mesenteric and umbilical artery by Doppler US			
Weekly	11 (13.4%)	12 (19.4%)	0.34
Every 2 weeks	15 (18.3%)	3 (4.8%)	0.02
Every 3 weeks	1 (1.2%)	3 (4.8%)	0.19
Every 4 weeks	8 (9.8%)	3 (4.8%)	0.27
Estimated fetal weight			
Weekly	82 (100%)	62 (100%)	1
Every 2 weeks	21 (25.6%)	8 (12.9%)	0.06
Every 3 weeks	21 (25.6%)	20 (32.3%)	0.38
Every 4 weeks	41 (50%)	35 (56.5%)	0.44
Fetal growth and fetal growth lag			
Weekly	82 (100%)	62 (100%)	1
Every 2 weeks	22 (26.8%)	9 (14.5%)	0.08
Every 3 weeks	19 (23.2%)	17 (27.4%)	0.56
Every 4 weeks	32 (39%)	22 (35.5%)	0.66
Amniotic fluid index			
Weekly	36 (43.9%)	32 (51.6%)	0.36
Every 2 weeks	20 (24.4%)	7 (11.3%)	0.05
Every 3 weeks	5 (6.1%)	8 (12.9%)	0.16
Every 4 weeks	18 (22%)	16 (25.8%)	0.59
Umbilical ring size			
Weekly	2 (2.4%)	1 (1.6%)	0.73
Every 2 weeks	4 (4.9%)	2 (3.2%)	0.62
Every 3 weeks	2 (2.4%)	0 (0%)	0.22
Every 4 weeks	8 (9.8%)	10 (16.1%)	0.25

Table 2 (continued)

Variable	> 10 years of experience 82 (%)	≤ 10 years of experience 62 (%)	*p* Value
Abnormalities would lead you to change surveillance			0.001
Bowel status or appearance	1 (1.2%)	6 (9.7%)	
Mesenteric and umbilical artery	1 (1.2%)	2 (3.2%)	
Estimated fetal weight	5 (6.2%)	16 (25.8%)	
Fetal growth	6 (7.4%)	6 (9.7%)	
Fetal growth lag	13 (16%)	4 (6.5%)	
Amniotic fluid index	18 (22.2%)	7 (11.3%)	
All Apply	37 (45.7%)	21 (33.9%)	
Do you recommend elective premature delivery in case of any abnormalities			0.68
Yes	55 (70.5%)	41 (67.2%)	
No	23 (29.5%)	20 (32.8%)	
In non-complicated gastroschisis, time of the delivery			0.01
36 weeks	6 (7.3%)	0 (0%)	
37 weeks	31 (37.8%)	31 (50%)	
38 weeks	19 (23.2%)	9 (14.5%)	
39 weeks	18 (22%)	21 (33.9%)	
Spontaneous	8 (9.8%)	1 (0.7%)	
Mode of delivery			0.11
Vaginal	74 (92.5%)	60 (98.4%)	
Caesarean Section	6 (7.5%)	1 (1.6%)	
Do you measure the diameter of the gastroschisis defect			0.64
Yes	27 (33.3%)	25 (40.3%)	
No	52 (64.2%)	35 (56.5%)	
I would like to, but not feasible	2 (2.5%)	2 (3.2%)	
Does or would the abdominal wall defect diameter affect your treatment plan?			0.49
Yes	4 (4.9%)	4 (6.5%)	
No	77 (95.1%)	58 (93.5%)	
Impact of the abdominal wall defect dimensions on SBS			0.25
Yes	14 (17.7%)	14 (10.1%)	
No	24 (30.4%)	11 (18.3%)	
I don't know	41 (51.9%)	35 (58.3%)	

plan. This discrepancy has been noticed in the literature (Overcash et al. 2014; Adair et al. 1996).

Similar to a previous survey result (Amin et al. 2019), the vast majority of MFM providers (95%) recommend vaginal delivery as delivery mode of choice; this approach is supported by a meta-analysis that found the mode of delivery was not associated with postnatal outcomes for gastroschisis patients (Adair et al. 1996).

Even though there is no absolute consensus on the timing of delivery, of respondents from our cohort and from a previous survey, about 44% of the providers would recommend the delivery at 37 gestational weeks, while 28% delivered at 39 weeks (Amin et al. 2019). This approach is supported by a number of studies that found preterm delivery increased the morbidity, prolonged length of stay, higher incidence of sepsis, and increased time on total parenteral nutrition, as well as, an increased length of hospital stay without any clinical benefit (Yang et al. 2014; Nasr et al. 2013; Al-Kaff et al. 2015; Cain et al. 2014). Studies that encourage delivery of gastroschisis fetuses at 37 weeks of gestation to reduce the incidence of mortality, sepsis, and bowel damage compared with fetuses born beyond 37 weeks (Baud et al. 2013; Sparks et al. 2017) are consistent with the practice of about half of this study's participants. On the other hand, a few studies which demonstrated delivery at 35–36.9 weeks showed no increase in morbidity and mortality, showed better surgical outcomes (Moir et al. 2004; Burgos et al.

2015) and actually decreased the length of hospital stay and length of time on full enteral feeds (Logghe et al. 2005). This may account for the small portion (4%) of our respondents noting that they deliver the fetuses at 36 weeks.

Even though previous studies demonstrated that SBS could be attributed to a narrow/tight abdominal defect, potentially leading to infarction and sloughing of the protruding bowel (Barsoom et al. 2000) about one-third (36%) of the providers measure the diameter of the gastroschisis defect as part of their routine evaluation. Among the 23% who expressed their thoughts, 70% agreed that the smaller the defect size the higher the risk for development of SBS. Accurate measurement of abdominal wall defect dimensions using US or MRI may be instrumental in determining if critical dimensions may predict a higher chance of developing ischemia or amputation of the protruded bowels. One study using the US to evaluate gastroschisis fetuses demonstrated that a small abdominal wall defect diameter (< 9.2 mm at T2 and < 12.5 mm at T3) was predictive of complex gastroschisis (Geslin et al. 2017). The study also showed vanishing gastroschisis cases displayed earlier intra-abdominal bowel dilation associated with no extra-abdominal dilation and a smaller wall defect (11.0 +/− 7.7 mm) (Geslin et al. 2017). Nevertheless, only 2.3% of our cohort declared an absolute cutoff point (< 8 mm–3 cm) at which they would recommend delivery. The fact that the cutoffs vary dramatically by almost fourfold, comparing the lowest defect (8 mm) to the highest (30 mm), reflects the significant discrepancy in SMFM members' knowledge. It should prompt an appropriate intervention, whether via conducting more robust studies to prove this concept or to make MFM providers aware about the safe practice and need for family counseling. Moreover, 94% stated that the abdominal wall defect diameter would not affect their treatment plan/delivery timing. Only one-fifth of the participants think the abdominal wall defect size (dimensions) have an impact on development of SBS.

Despite the minimal difference between the practice of the MFM providers with > 10 years of experience and those with less experience in this survey, a meta-analysis study found that medical providers with less experience are more likely to abide by the guidelines (Choudhry et al. 2005). The authors included 19 studies and examined the impact of providers' age and years of clinical experience in regards to adherence to guidelines. Of these 74% concluded a negative correlation between physician age and adherence to guidelines of appropriate management (Choudhry et al. 2005).

Our study had several limitations. While the required number of responses to reveal statistically significant results was attained, the response rate was low. It is acknowledged that such a low response rate might affect the generalizability of the study's findings. Selection bias is a potential limitation of this survey, though the percentage of respondents with academic affiliation (61%) was close to the national average (69%). The strengths of this study were exploring the largest SMFM, having tapped into this unique niche, the results may be a more representative sample of this specialty, with regard to affiliation and years of experience. This study has a significant emphasis on the areas of agreement and the controversial aspects of antenatal care for gastroschisis fetuses, which corresponds with the inconsistency in literature and the need for high-level evidence studies. As a novel finding, this study substantiated the major difference among the providers who take care of gastroschisis fetuses and the need for a well-designed study to examine the impact abdominal-defect diameter has on SBS in gastroschisis patients. Future work should include prospective studies to ascertain the impact of gastroschisis defect dimensions on the gastroschisis outcomes, especially for SBS.

In conclusion, gastroschisis management does not differ dramatically among SMFM providers, though noticeable differences in surveillance and timing of induction were identified based on years of experience as providers. The impact of gastroschisis defect's dimensions on the development of SBS remains a controversial issue that is worth further studying.

Conclusions

Gastroschisis management does not differ dramatically among SMFM providers. The impact of gastroschisis defect dimensions on development of SBS is a controversial point of practice. Among the respondents, SMFM providers with less experience are likely to start the antenatal care earlier with delivery recommended at 37 gestational weeks.

Abbreviations

SMFM: Society for Maternal Fetal Medicine; MFM: Maternal-Fetal Medicine; SBS: Short bowel syndrome; NAFT-Net: North American Fetal Therapy Network; US: Ultrasound; BPP: Biophysical profile; NST: Non-stress test; FW: Fetal weight; AFI: Amniotic fluid index; FG: Fetal growth; FGL: Fetal growth lag; EFW: Estimated fetal weight.

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Author contributions

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Availability of data and materials
The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
The study was approved by the institutional review board of University at Buffalo, Buffalo, NY, USA (STUDY00003021, 8 March 2019). The consent from study participants was verbal/implicit, because this was an electronic survey and the participants who agreed to participate clicked voluntarily on the link to complete the survey. This was approved by the ethics committee.

Consent for publication
The study was approved for publication by the institutional review board of University at Buffalo, Buffalo, NY, USA (STUDY00003021, 8 March 2019). No identifying images or other personal or clinical details of participants are presented that compromise anonymity.

Consent to publish from the patients/participants
Not applicable.

Competing interests
The author declares that he has no competing interests.

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