



National-survey for evaluation of the best screening method of late fetal growth restriction in low risk pregnancy: A prospective study



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ARTICLE INFO

Article history:

Received 13 May 2019

Received in revised form 2 July 2019

Accepted 8 July 2019

Keywords:

Fetal growth restriction
Ultrasound screening
Third trimester
Low risk pregnancies
Opinion of physicians

ABSTRACT

Objective: To compare knowledge and practices surrounding third trimester screening of fetal growth restriction (FGR) in low risk pregnancies among Portuguese Gynecologists/Obstetricians (GOs) and General Practitioners (GPs). Primary outcome was to compare the proportion of GOs that consider the need of a third trimester ultrasound (estimation of fetal weight) for screening of FGR in low risk pregnancies and the best time to perform it with the corresponding proportion of GPs.

Study design: We have conducted a prospective, observational cohort study based on application of surveys to GOs and GPs. Questionnaires were sent by e-mail to physicians and they filled them online. A second reminder e-mail was sent 7 days later. Recruitment was also done personally at scientific meetings. A total of 573 surveys were available for analysis, 298 corresponded to GOs and 275 to GPs. We used χ^2 test to compare dichotomous variables and Kruskal-Wallis test for the comparison of ordinal variables. *P* values <0.05 were considered statistically significant.

Results: The vast majority of GOs and GPs (93%) considered that third trimester ultrasound is useful and needed for surveillance of low risk pregnancy. A higher proportion of GOs (38%) selected 35th–37th weeks as the best time to perform the ultrasound compared to GPs (10%) ($p < 0.001$). GOs (51%) consider that symphysis-fundus distance is a measurement with moderate accuracy for screening of FGR while GPs (61%) attribute a low accuracy ($p < 0.001$). Fifty percent (50%) of GOs consider that performing a third trimester ultrasound will have no impact on cesarean delivery rate for fetal distress, while 41% of GPs consider that routine ultrasound will contribute to increase this rate ($p < 0.001$). The majority of GPs (52%) consider that routine ultrasound will contribute to diminish the admission rate to neonatal intensive care unit while GOs revealed a dichotomy with 43% of respondents reporting that it will diminish the rate and 40% that it will have no impact.

Conclusion: Varied opinions among the clinicians included in our sample reflect the controversy that remains on the best screening of FGR in low risk pregnancies.

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1 Introduction

Death of a growth-restricted fetus is the second most common etiology of stillbirth [1,2]. Fetal growth restriction (FGR) without prenatal diagnosis is associated with higher risk of adverse neonatal outcomes compared with FGR whose diagnosis was made antepartum. Moreover, a significant proportion of term stillbirths correspond to undiagnosed FGR [3,4]. The most commonly used clinical screening tool in this population is the serial measurement of symphysis-fundus distance, which is a method of variable and low sensitivity [5,6]. Sonographic fetal

weight estimation (EFW) at the last weeks of third trimester in low-risk pregnancies is an effective method for diagnosis of FGR permitting close surveillance and timely delivery [7]. Evidence from meta-analysis has failed to demonstrate any real benefit from routine third-trimester screening for FGR in low risk pregnancies [8]. It may be argued that the results of these studies have limited contemporary validity as they have used outdated surrogates of fetal growth or protocols in which FGR diagnosis elicited no change in management. The main argument against a routine third trimester ultrasound is the possibility that it could induce over diagnosis of FGR since a significant proportion of these fetuses are constitutively small for gestational age (SGA). These are not pathological fetuses but it is very difficult to distinguish them and they would be put at risk of unnecessary obstetric intervention, iatrogenic preterm deliveries, labor induction and eventually more

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cesarean deliveries. On the other hand, in the absence of third trimester ultrasound, undetected FGR may not have enough placental respiratory reserve to withstand pregnancy up to 41 weeks and the demands of labor at that gestational age which would result in higher cesarean deliveries and potentially more admissions to neonatal intensive care unit (NICU).

In Portugal, in accordance with guidelines of *Direcção Geral de Saúde (DGS)* from 2015, FGR screening in low risk pregnancies is performed with an ultrasound for EFW at 30th–33rd weeks [9]. Nonetheless, recent data from *ROUTE study*, an open-label parallel randomized trial, showed that FGR detection rate was superior at 36 vs 32 weeks' gestation (sensitivity, 38.8% vs 22.5%; $p = 0.006$) [10].

Gynecologists/Obstetricians (GOs) and General Practitioners (GPs) are in a unique position to screen for FGR. Given the adverse outcomes associated with missed FGR and the importance to optimize screening, our aim was to investigate knowledge and practices surrounding screening of FGR in low risk pregnancies among Portuguese GOs and GPs.

2 Materials and methods

We have conducted a prospective cohort study based on application of surveys to GOs and GPs. Questionnaires were sent by e-mail to physicians and they filled them online. A second reminder e-mail was sent 7 days later. We had the approval of National Scientific Societies in order to distribute the questionnaires. When physicians register on scientific societies with their e-mails, they give permission to receive e-mails and no ethics committee or informed consent was required for this study. Questionnaires were announced by social media such as medical groups on facebook. Recruitment was also done personally at scientific meetings. The questionnaires were completely anonymous.

In accordance to National Statistics, there are 1772 GOs and 7149 GPs registered in Portugal as of 2018. All that have access to e-mail and/or attend scientific meetings were eligible to fill the survey.

The survey included questions about physician demographics, training and practice characteristics. Responses were therefore assumed to refer to a respondent's self-reported current practices about the screening of FGR, offering a cross-sectional view.

Primary outcome was to compare the proportion of GOs that consider the need of a third trimester ultrasound (EFW) for FGR screening in low risk pregnancies and the best time to perform it with the corresponding proportion of GPs.

Secondary outcomes included: to compare the opinion of GOs and GPs regarding accuracy of symphysis-fundus distance for screening of FGR in low risk pregnancies and also about the impact of a routine third trimester ultrasound on cesarean delivery rate for fetal distress and on admission of newborns to NICU.

We did subgroup analysis of the endpoints described above based on current weekly activity (surveillance of low risk pregnancy and/or performing obstetric ultrasound). With this analysis, we expected to evaluate if there were differences in the knowledge of physicians who deal regularly with the diagnosis, management and consequences of FGR in low risk pregnancies compared with those that do not have this current practice. All this data was included in preliminary questions at the beginning of the survey. It was made in multiple-choice format and took less than 5 min to complete.

Statistical analysis was performed with STATA 14.2. χ^2 test was used to compare categorical variables. Comparison of ordinal variables was performed with Kruskal-Wallis test. For these variables, we considered the following hypotheses: null (0%), low (<10%), moderate (10–90%), high (>90%). P values <0.05 were considered statistically significant.

As far as we know there is no study comparing the opinion of physicians regarding FGR screening. Since we had no data to base on our expected difference between groups in order to estimate sample size, we decided to use the total of physicians included in this study that were registered at National Medical Council. We may hypothesize that physicians are used to national guidelines and that around 75% of GPs will consider that 30th–33rd weeks is the best time to perform it, leaving about 25% who would select 35th–37th weeks. Recent evidence has been highly debated in scientific meetings of GOs and we may consider that these physicians might be more aware of this with a higher proportion selecting 35th–37th weeks.

In our baseline population, we have a ratio of GPs/GOs of 4.03 (7149/1772). Considering a response rate of 20%, we would include 1430 GPs ($N1 = 7149 \times 0.20$) and 354 GOs ($N2 = 1772 \times 0.20$), with $N1/N2 = 4.03$. Given that around 25% of GPs would choose 35th–37th weeks, for a total sample size of 1784 ($N1 + N2$), with a significance α level of 0.05 and 80% power, we would expect to be able to detect a difference of 8% between the proportions of GPs and GOs that would select 35th–37th weeks as the best time to perform the ultrasound.

3 Results

A total of 573 surveys were available for analysis, 298 corresponded to GOs and 275 to GPs, with a response rate of 17% and 4%, respectively. Demographic characteristics are described in Table 1. Respondents had been in practice for a median of 6 years (IQR 2;15).

The vast majority of GOs and GPs (93%) considered that third trimester ultrasound is useful and needed for surveillance of low risk pregnancy (Table 2). GPs are very consistent regarding the best time to perform third trimester ultrasound, with 90% defending 30th–33rd weeks. Among GOs, 38% consider that the best time to perform third trimester screening is 35th–37th weeks ($p < 0.001$).

Table 1
Demographic characteristics of GOs and GPs respondents.

Variables	Gynecologists/Obstetricians (n = 298)	General Practitioners (n = 275)	p value
Age (years) [median (IQR)]	34 (30;45)	32 (29;36)	<0.001
Sex (n [%])			0.98
Female	257 (86.2)	237 (86.2)	
Male	41 (13.8)	38 (13.8)	
Position (n [%])			0.97
Resident	124 (41.6)	114 (41.5)	
Consultant	174 (58.4)	161 (58.5)	
Performs weekly surveillance of low risk pregnancy (n [%])	220 (73.8)	251 (91.3)	<0.001
Performs weekly obstetric ultrasound (n [%])	154 (51.7)	18 (6.5)	<0.001

GOs - Gynecologists/Obstetricians; GPs - General Practitioners; IQR - interquartile range.

Table 2

Opinion of GOs and GPs regarding FGR screening during third trimester in low risk pregnancies.

Variables	Gynecologists/Obstetricians (n = 298)	General Practitioners (n = 275)	p value
Accuracy of symphysis-fundus distance in detection of FGR			<0.001
Null (0%)	20 (6.7)	11 (4.0)	
Low (<10%)	119 (39.9)	167 (60.7)	
Moderate (10–90%)	151 (50.7)	92 (33.5)	
High (>90%)	8 (2.7)	5 (1.8)	
Considers that routine third trimester ultrasound is needed	276 (92.6)	256 (93.1)	0.83
Best time to perform third trimester ultrasound			< 0.001
30 th -33 rd weeks	172 (62.3)	230 (89.8)	
35 th -37 th weeks	104 (37.7)	26 (10.2)	
Impact of third trimester ultrasound on cesarean deliveries			<0.001
Decrease	51 (17.1)	92 (33.5)	
Null	149 (50.0)	71 (25.8)	
Increase	98 (32.9)	112 (40.7)	
Impact of third trimester ultrasound on NICU admissions			0.04
Decrease	127 (42.6)	143 (52.0)	
Null	118 (39.6)	80 (29.1)	
Increase	53 (17.8)	52 (18.9)	

GOs - Gynecologists/Obstetricians; GPs - General Practitioners; FGR - fetal growth restriction; NICU - neonatal intensive care unit.

Regarding clinical screening of FGR with symphysis-fundus distance, GOs and GPs have different opinions (Table 2). GOs (51%) consider that symphysis-fundus distance is a measurement with moderate accuracy for screening of FGR while GPs (61%) attribute a low accuracy ($p < 0.001$). Less than 5% of all physicians consider that symphysis-fundus distance is a measurement of high accuracy.

GOs and GPs also have different opinions about the impact of routine third trimester ultrasound on cesarean delivery rate for fetal distress. Fifty percent (50%) of GOs consider it will have no impact on cesarean delivery rate for fetal distress, while 41% of GPs consider that it will contribute to increase this rate ($p < 0.001$). Opinions also diverge regarding the impact on admissions of newborns to NICU ($p = 0.04$). The majority of GPs (52%) consider that it will contribute to diminish admissions to NICU while GOs revealed a dichotomy with 43% of respondents reporting that it will diminish the rate and 40% that it will have no impact.

Responses to questions regarding third trimester FGR screening were stratified based on current clinical activity. Eighty-two percent 82% (471/573) of physicians performed weekly surveillance of low risk pregnancies and 30% (172/573) performed weekly obstetric ultrasound.

Symphysis-fundus distance was a measurement with low to moderate accuracy for screening of FGR for both groups of physicians that perform weekly surveillance of low risk pregnancies ($n = 471$) and the ones that do not have this activity ($n = 102$). Most of physicians in both groups acknowledge the usefulness of routine third trimester ultrasound. There was no statistically significant difference between groups regarding the best time to perform the ultrasound, the impact of routine third trimester ultrasound on the rate of cesarean deliveries and admissions to NICU (Table 3).

Comparing the group of physicians that perform weekly obstetric ultrasound ($n = 172$) with the ones that do not perform scans ($n = 401$), both consider that symphysis-fundus distance is a measurement with low to moderate accuracy for FGR screening. A higher proportion of physicians that perform obstetric ultrasound consider that the best time to perform the ultrasound is 35th-37th weeks, compared with physicians that do not perform obstetric ultrasound (39% vs 19%, $p < 0.001$). Forty-five percent (45%) of physicians that perform obstetric ultrasound consider that third trimester scan will have no impact on cesarean delivery rate for fetal distress while 39% of the ones that do not perform scans

Table 3

Opinion of physicians regarding FGR screening during third trimester in low risk pregnancies according to clinical activity.

Variables	Surveillance of low risk pregnancies		p value	Perform obstetric ultrasound		p value
	Yes (471)	No (102)		Yes (172)	No (401)	
Accuracy of symphysis-fundus distance in detection of FGR			0.94			0.67
Null (0%)	24 (5.1)	7 (6.9)		14 (8.1)	17 (4.2)	
Low (<10%)	238 (50.5)	48 (47.1)		75 (43.6)	211 (52.6)	
Moderate (10–90%)	198 (42.0)	45 (44.1)		80 (46.5)	163 (40.7)	
High (>90%)	11 (2.4)	2 (1.9)		3 (1.8)	10 (2.5)	
Considers that routine third trimester ultrasound is needed	440 (93.4)	92 (90.2)	0.25	158 (91.9)	374 (93.3)	0.55
Best time to perform third trimester ultrasound			0.09			<0.001
30 th -33 rd weeks	337 (76.6)	63 (68.5)		97 (61.4)	303 (81.0)	
35 th -37 th weeks	103 (23.4)	29 (31.5)		61 (38.6)	71 (19.0)	
Impact of third trimester ultrasound on cesarean deliveries			0.37			0.03
Decrease	129 (27.4)	14 (13.7)		39 (22.7)	104 (25.9)	
Null	171 (36.3)	48 (47.1)		78 (45.3)	141 (35.2)	
Increase	171 (36.3)	40 (39.2)		55 (32.0)	156 (38.9)	
Impact of third trimester ultrasound on NICU admissions			0.26			0.13
Decrease	235 (49.9)	35 (34.3)		82 (47.7)	188 (46.9)	
Null	153 (32.5)	45 (44.1)		65 (37.8)	133 (33.2)	
Increase	83 (17.6)	22 (21.6)		25 (14.5)	80 (19.9)	

GOs - Gynecologists/Obstetricians; GPs - General Practitioners; FGR - fetal growth restriction; NICU - neonatal intensive care unit.

consider that it will contribute to decrease this rate ($p = 0.03$). Both groups have similar proportions regarding the potential impact of third trimester ultrasound to decrease the rate admissions to NICU (Table 3).

4 Comment

The best screening of late FGR in low risk pregnancies has received emphasis over time and still remains to be defined. Nearly 93% of respondents consider that routine third trimester ultrasound is needed. This high percentage is probably due to the fact that national guidelines recommend third trimester ultrasound. Although meta-analysis has failed to demonstrate any real benefit from routine third-trimester ultrasound, the World Health Organization has recently recommended that it might be useful when performed as an antenatal screening to detect fetal compromise and predict complications in apparently healthy pregnancies [11].

Few respondents (less than 5%) consider that symphysis-fundus distance is a measurement with high accuracy. The different opinion of GOs and GPs is consistent with literature that attributes a variable sensitivity to this type of screening, probably because the measurement is not always properly performed and there are limitations associated with maternal characteristics [5,6]. A prospective outcome study indicated that universal third trimester ultrasound almost tripled the detection of SGA babies compared with clinically indicated sonography with serial measurement of symphysis-fundus distance (57% vs. 20%) [12].

Results from this survey reinforce that, where there are unclear or conflicting recommendations, there are varied and conflicting practices among clinicians. Regarding the best time to perform third trimester ultrasound, a higher proportion of GOs (38%) selected 35th–37th weeks the best time to perform the ultrasound compared to GPs (10%). This difference may be due to the fact that GOs discuss more frequently this topic at scientific meetings and may be more familiar with recent studies that suggest that an ultrasound after 35 weeks has a higher detection rate of FGR compared with an earlier ultrasound during third trimester [10,13].

GOs mainly considered that third trimester ultrasound will have no impact on cesarean delivery rate for fetal distress, probably because they think that detection of FGR will include two groups of fetuses: a group of FGR that will be timely delivered and probably will avoid later emergent cesarean sections and another proportion of constitutionally small fetuses that could induce iatrogenic obstetric intervention. Similarly, 40% of GOs consider that third trimester ultrasound will have no impact on admissions to NICU, while 43% considered that it could reduce this rate. This last group may suggest that the ultrasound could help selecting more appropriate surveillance and timely delivery for detected FGR with lower morbidity.

In a prior retrospective study, our group analyzed 1429 term low risk pregnancies and concluded that SGA term babies (EFW < 10th percentile) had a statistically significant higher rate of cesarean deliveries for intrapartum fetal distress than appropriate for gestational age (18/151 vs. 8/1202, $p < 0.001$) as well as a higher rate of admissions to NICU (16/151 vs. 18/1202, $p < 0.001$) [14]. Antepartum detection of SGA neonates showed a statistically lower rate of operative deliveries for nonreassuring fetal status than undetected group (3/31 versus 39/120, $p = .01$) [14]. In our sample, 30th–33rd weeks ultrasound only detected 36% of SGA neonates and antepartum detection of FGR was associated with better outcome. Other groups have found that among uncomplicated term pregnancies, small- compared to appropriate-for-gestational-age newborns have a significantly higher likelihood of adverse outcomes [15–17].

GPs mainly considered that a routine third trimester ultrasound will contribute to increase cesarean rate for fetal distress and will decrease the admissions to NICU. Although we did not ask physicians the reasons that justify these choices, we can hypothesize that GPs may have the idea that in case of ultrasound detected FGR, these fetuses may need to be delivered by cesarean section and this would be protective of adverse outcome. Nonetheless, evidence has demonstrated that planned cesarean deliveries are associated with more NICU admissions compared to planned vaginal deliveries [18].

In our subgroup analysis, physicians that perform obstetric ultrasound more frequently selected 35th–37th weeks as the best time to perform the ultrasound compared to physicians that do not perform obstetric ultrasound. Physicians that perform ultrasound may be more updated in terms of recent literature that has attributed a higher detection rate of FGR to a later ultrasound during third trimester [10,13,19].

We are conducting a prospective randomized clinical trial that will try to evaluate if a 35th–37th weeks ultrasound in low risk pregnancies is effective in reducing cesarean deliveries for intrapartum fetal distress and admissions to NICU. In parallel with this trial we consider that this observational study would reflect the experience of physicians and could contribute to update the guidelines of surveillance of low risk pregnancy.

The main limitation of our study was the low response rate, particularly the low response rate for GPs compared to GOs, probably because the first are less motivated with this subject since GOs deal more directly with the consequences of missing FGR. Despite the low response rate of GPs, we decided to analyse the data and stopped attempts to include more GPs since we identified important differences among the physicians included.

We may have lost some participants that may have changed e-mail without updating personal information at the registries of scientific societies. A selection bias could be associated with recruitment of physicians that have e-mail as well as physicians that attend scientific meetings that may be more motivated to be updated. Implementation of two modalities of recruitment may have minimized these biases.

Although we did not ask practitioners whether they are aware of guidelines for third trimester FGR screening in low risk pregnancies, practice and knowledge variation is apparent and suggests that providers may have controversial ideas about the screening of FGR. These instances indicate the need for further research, both to gain a better understanding of FGR optimal screening and to improve outcomes and optimize guidelines.

Acknowledgements

The authors would like to thank Dr John Groarke and Dr Alexandre Valentim-Lourenço, mentors of the program Portugal Clinical Scholars Research Training of Harvard Medical School for the careful revision and correction of the text.

This work was supported by a Research Grant from Fundação para a Ciência e Tecnologia (FCT) - SFRH/SINTD/92997/2013. The sponsor had no participation in the collection, analysis and interpretation of the data and in the writing of the manuscript.

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