



Practice patterns of obstetric care in twin gestations: the value of MFM consultation

Abdallah Adra, Dalia Khalife, Ihab M. Usta, Elie Hobeika, Fadi Mirza, Labib Ghulmiyyah & Anwar H. Nassar

To cite this article: Abdallah Adra, Dalia Khalife, Ihab M. Usta, Elie Hobeika, Fadi Mirza, Labib Ghulmiyyah & Anwar H. Nassar (2022) Practice patterns of obstetric care in twin gestations: the value of MFM consultation, The Journal of Maternal-Fetal & Neonatal Medicine, 35:18, 3453-3459, DOI: [10.1080/14767058.2020.1821640](https://doi.org/10.1080/14767058.2020.1821640)

To link to this article: <https://doi.org/10.1080/14767058.2020.1821640>



Published online: 20 Sep 2020.



Submit your article to this journal [↗](#)



Article views: 125




View related articles [↗](#)



View Crossmark data [↗](#)

Practice patterns of obstetric care in twin gestations: the value of MFM consultation

Abdallah Adra^a, Dalia Khalife^{b*} , Ihab M. Usta^a, Elie Hobeika^b, Fadi Mirza^a, Labib Ghulmiyyah^a and Anwar H. Nassar^a

^aDepartment of Obstetrics and Gynecology, Division of Maternal Fetal Medicine, American University of Beirut Medical Center, Beirut, Lebanon; ^bDepartment of Obstetrics and Gynecology, American University of Beirut Medical Center, Beirut, Lebanon

ABSTRACT

Objectives: To evaluate the practice patterns among Lebanese obstetricians regarding obstetric care of twins and to compare selected practice patterns between general obstetricians and maternal fetal medicine physicians.

Methods: Questionnaires distributed during the annual meeting of the Lebanese Society of Obstetrics and Gynecology.

Results: Questionnaires were returned by 69.2% of the 296 physicians approached. Ten percent had fellowship training in Maternal Fetal Medicine (MFM). Thirty-nine percent perform cervical length measurement at 20–24 weeks of gestation and 34% recommend vaginal progesterone in case of a short cervix. When comparing selected practice patterns between MFM & general obstetricians, MFM specialists were less likely to perform cervical cerclage in the first trimester (5.9% versus 49%, $p = .001$), more likely to offer prenatal screening for aneuploidy (66.6% vs 46.4%, $p = .03$), less likely to use vaginal progesterone in the second trimester in the case of a short cervix (42.1% vs 61.8%, $p = .04$), less likely to perform serial ultrasound exam in the third trimester to assess fetal growth (50% vs 78%, $p = .005$) and more likely to deliver monoamniotic twins at 32–34 weeks of gestation (55% vs 37%, $p = .05$).

Conclusion: Because of the different background of the Lebanese physicians, MFM specialists are more likely to follow obstetric care guidelines in twin gestation.

ARTICLE HISTORY

Received 13 June 2019

Accepted 7 September 2020

KEYWORDS

Twin gestation; perinatal care; obstetricians; maternal fetal medicine



1. Introduction

The incidence of twin gestations has dramatically increased due to trends of delaying conception and the increased use of assisted reproduction [1]. Multifetal gestations are associated with an increased risk of fetal & neonatal morbidity and mortality [1]. There are several problems that are unique to twins which may contribute to this increased perinatal morbidity; these include twin-to-twin transfusion syndrome, selective intrauterine growth restriction, single in-utero demise, and the increased incidence of fetal malformations [1,2]. Perinatal research has focused on potential modalities to screen for preterm birth (PTB), with transvaginal cervical length (CL) measurement seeming to be the most reliable modality [3]. Interventions regarding secondary prevention of preterm birth have yielded conflicting (prophylactic oral tocolytics and the use of cervical pessaries) [4,5], disappointing (progesterone supplementation) [6,7], and

negative (placement of cervical cerclage) results [8]. There is so much heterogeneity among health care providers when it comes to obstetric care of twin gestations. Guidelines endorsed by different professional societies do not always agree on the specific issues regarding prenatal care and management of complicated twin gestations. The objectives of this study were to study the practice patterns of Lebanese obstetricians regarding prenatal care in twin gestations and to compare selected practices between Maternal Fetal Medicine (MFM) physicians and general obstetricians.

2. Materials and methods

Questionnaires were distributed to physicians during the annual meeting of the Lebanese Society of Obstetricians and Gynecologists (LSOG) after the Institutional Review Board approval. All participants gave verbal informed consent before filling the

CONTACT Anwar H. Nassar  an21@aub.edu.lb  Maternal Fetal Medicine, Department of Obstetrics and Gynecology, American University of Beirut Medical Center, P.O. Box: 1136044/B36, Beirut, Lebanon

*Equal contribution to first author.

questionnaire. Questionnaires were collected in a drop box placed on the way out of the conference room and were then picked up by the co-investigators at the end of the meeting and audited.

The questionnaire was composed of five sections. The first section collected data about the socio-demographic of respondents. The second section addressed the issues of management of twin pregnancies. It queried about the number of twin gestations managed yearly and the reasons for referral to an MFM specialist. The third section assessed the issues of prenatal care of twins in the first trimester namely, multifetal pregnancy reduction in higher order multiple gestations, prenatal screening for aneuploidy, indications for progesterone supplementation and cervical cerclage. The fourth section addressed second trimester obstetric care including cervical CL measurement, the gestational age at which a cerclage is performed, and interventions used in the event of a short cervix. The last section addressed third trimester and intrapartum obstetric care.

2.1. Sample size

Assuming that 50% of registered Lebanese obstetricians ($n = 1000$) will attend the annual LSOG meeting, a minimal sample size of 176 was calculated to achieve a power of 90% at a significance level of $\alpha = 0.05$. To account for an expected 60% response rate, a total of 296 gynecologists were randomly approached to participate in the study using a computer-generated table of random numbers corresponding to their registration numbers.

2.2. Statistical analysis

All statistical analyses were conducted using the Statistical Package for Social Sciences software (SPSS) for windows XP, version 11.0. We used χ^2 test to compare categorical data when sample size supports the approximation. A p -value $< .05$ was considered statistically significant.

3. Results

Of the 296 questionnaires distributed, 205 responses were collected (response rate = 69.2%). Eighty two percent of the physicians were less than 55 years of age and 59% were males. Ninety percent were general obstetricians/gynecologists, 10% ($n = 20$) had subspecialty training in MFM. With respect to the type of practice, 33% of respondents were in private practice,

50% had over 17 years of experience, with a minimum of one year and a maximum of 45 years.

Only 48% of respondents manage ≥ 5 twin gestations yearly. Ninety-six percent consider twins as a high-risk pregnancy. Regarding the indications for referral to an MFM specialist, 71.3% would refer for more than one reason. When asked about multifetal pregnancy reduction (MFPR) in the case of higher order gestations, 73% replied that they would discuss with their patients MFPR from triplets to twins. Out of the remaining who don't, 12.3% were concerned about legal issues and others believe that there is not enough evidence that this practice will reduce maternal morbidity or improve perinatal outcome. Regarding obstetric care during the first trimester, 70.9% of the respondents offer prenatal screening for aneuploidy with 44.3% offering nuchal translucency (NT) as a single test. Chorionicity is routinely determined in 94% of the cases. Thirty two percent of obstetricians would measure the cervical length in the first trimester, and the majority (64.9%) would give progesterone supplementation for more than one indication, including but not limited to every twin pregnancy, those conceived through *in vitro* fertilization, twins with first trimester bleeding and in patients with history of PTB (Table 1). 85.1% of the physicians would perform a cerclage in the first trimester for several indications, and mainly for twins with short cervix on transvaginal ultrasound or patients with a known uterine malformation.

Regarding the second trimester, 54.4% of obstetricians would routinely measure the CL, with 58.5% of them doing the measurement beyond 21 weeks; 86.3% would measure it trans-vaginally. In the event of a short cervix, 34% elect to give vaginal progesterone, 1.5% would perform a prophylactic cervical cerclage, while the majority would individualize the intervention and manage with a combination of interventions. Forty nine percent of the responders offer prenatal screening, with 41.6% of them relying on anomaly scan as a single modality for reassurance (Table 1).

Regarding the third trimester, 8.5% of practitioners would give prophylactic oral tocolysis to all twin gestations. 68% of obstetricians prescribe progesterone routinely, while 19.2% would prescribe progesterone for more than one indication. Twenty percent of physicians recommend serial ultrasounds every 3 weeks to assess fetal growth. As for the timing of delivery, 25% would deliver dichorionic diamniotic twins at 38 weeks, 5.5% would deliver monochorionic diamniotic twins between 34 and 37 weeks and only 2% of

Table 1. Issues of prenatal care of twin pregnancies during the three trimesters.

Questions	Frequency (percentage)
<i>Issues in the first trimester (up to 14 weeks)</i>	
Discussing MFPR in case of HOG	107 (54)
Discussing reducing triplets to twins	121 (73.5)
Prenatal screening for aneuploidy	
NT measurement at 11–14 weeks	74 (44.3)
Serum markers PAPP-A, beta hCG 11–13 weeks	2 (1.2)
Combined first trimester screening: NT and serum markers	10 (6)
NIPT starting 10 weeks	4 (2.4)
More than one test	77 (46.1)
Progesterone supplementation	
Routinely, in every twin pregnancy	32 (15.8)
Twin pregnancy conceived through IVF/ICSI	13 (6.4)
Twin pregnancy with first trimester bleeding	4 (2)
Twin pregnancy with history of pregnancy loss or preterm birth	19 (9.4)
More than one indication	132 (64.9)
<i>Issues in the second trimester (15–28 weeks)</i>	
GA for starting CL measurement in twins	
16–17 weeks	18 (14)
18–19 weeks	6 (4.7)
20–21 weeks	(22.5)
>21 weeks	76 (58.8)
Interventions for CL ≤ 25 mm in asymptomatic patients	
Vaginal progesterone	66 (34)
Cervical cerclage	3 (1.5)
Bed rest and/or hospitalization	2 (1)
Oral tocolysis	2 (1)
Tests offered for prenatal screening	
Triple serum screen	21 (15.3)
Quadruple serum screen	1 (.7)
NIPT	8 (5.8)
Targeted fetal ultrasound	57 (41.6)
<i>Issues in the third trimester and intrapartum</i>	
Progesterone supplementation	
Routinely	120 (68.6)
Twins conceived through IVF/ICSI	6 (3.4)
Short cervix detected on ultrasound	29 (16.6)
History of spontaneous preterm birth	20 (11.4)
Route of delivery in uncomplicated twins	
Cesarean delivery always	34 (16.9)
Allow vaginal delivery if both fetuses are Vx/Vx	75 (37.3)
Allow vaginal delivery if twin A is Vx	47 (23.4)
Other	45 (22.4)

HOG: Higher Order Gestation; HR: High Risk; AFV: Amniotic Fluid Volume; MFM: Maternal Fetal Medicine; MFPR: Multifetal Pregnancy Reduction; NT: Nuchal Translucency; NIPT: Noninvasive prenatal testing; CL: cervical length; TVUS: transvaginal ultrasound; IVF/ICSI: *In Vitro* Fertilization/Intra-cytoplasmic sperm Injection; GA: Gestational Age; Vx: Vertex.

obstetricians would deliver monoamniotic twins between 32 and 34 weeks of gestation.

Regarding the route of delivery, 23.4% of the obstetricians allow a trial of labor and vaginal birth if the first twin is in a cephalic presentation irrespective of twin B (Table 1). MFM specialists are more likely to be males (80% vs 51%, $p = .05$), and consider higher order gestation as a high-risk pregnancy ($p = .022$) (16 out of 20). When comparing practices between MFM specialists and other obstetricians, MFM specialists rely on the NT measurement for prenatal screening during the first trimester, and all MFM specialists will determine chorionicity. Twenty percent of MFM specialists would measure CL during the first trimester ($p = .025$), and 37.5% would provide progesterone supplementation routinely ($p = .142$). On the other hand, MFM specialists were less likely to perform cervical cerclage in the first trimester, in the event of a short cervix or a

known uterine malformation ($p = .001$). If the CL measures ≤ 25 mm on transvaginal ultrasound during the second trimester, MFM specialists would tailor the treatment depending on each case and were less likely to use vaginal progesterone ($p = .04$) or perform cervical cerclage ($p = .05$). As for the prenatal screening, they would offer a targeted ultrasound in most of the cases. None of the MFM specialists would prescribe prophylactic oral tocolysis ($p = .658$), or they were less likely to prescribe progesterone supplementation routinely during the third trimester ($p = .05$). As for the timing of delivery, they were more likely to deliver monoamniotic twins at 32–34 weeks of gestation (55% versus 37.1%, $p = .05$) (Table 2).

4. Discussion

Our survey attempted at reviewing practices of Lebanese obstetricians during the three trimesters of

Table 2. Comparisons of practices during the three trimesters between Maternal Fetal Medicine specialists and general obstetricians.

	General Obstetricians N = 185	Maternal Fetal Medicine specialists N = 20	p Value
Consider twin or HOG a HR pregnancy	156 (84.3)	16 (80)	.022
Issues during the first trimester			
Discussing reducing triplets to twins	106/148 (71.62)	13/16 (81.25)	.41
Tests offered for prenatal screening for aneuploidy			
NT measurement at 11-14 weeks	130/146 (89)	16/19 (84.2)	.53
Determine chorionicity	166 (93.2)	20 (100)	.325
Routine measurement of CL	60 (33.9)	4 (20)	.025
Routine Progesterone supplementation in every twin pregnancy	29 (40.8)	3 (37.5)	.142
Performing cerclage			
Routinely in every twin	2/163 (1.22)	0/17 (0)	.64
Twin conceived through IVF	18/163 (11.1)	0/17 (0)	.15
Twin with history of preterm birth or pregnancy loss	53/163 (32.5)	4/17 (23.5)	.45
Twin with short cervix on TVUS	80/163 (49)	1/17 (5.89)	.001
Twin pregnancy with known uterine malformation	67/163 (41.1)	0/17 (0)	.001
Issues during the second trimester			
Routine measurement of CL	128/182 (70.3)	15/20 (75)	.66
Type of ultrasound used to measure CL			
Transvaginal	110 (85.9)	15 (93.7)	.521
Offer prenatal screening for aneuploidy			
Yes	78 (46.4)	12 (66.6)	.033
Use of vaginal progesterone in case of short cervix on TVUS	107/173 (61.8)	8/19 (42.1)	.04
Performing cerclage in case of short cervix on TVUS	20/173 (11.6)	0/19 (0)	.05
Issues during the third trimester			
Routine progesterone for all twins	33/171 (19.3)	1/20 (5)	.05
Follow-up obstetrical care			
Serial ultrasound examinations every 3 weeks to assess fetal growth, AFV and well-being	142/182 (78)	10/20 (50)	.005
Weekly NST starting 34–36 weeks in uncomplicated twin pregnancies	61/182 (33.5)	7/20 (35)	.89
Antenatal corticosteroids at 32–34 weeks	58/182 (31.9)	10/20 (50)	.11
Timing of delivery			
38 weeks-dichorionic twins	145/178 (81.5)	17/20 (85)	.69
34–37 weeks-monochorionic twins	115/178 (64.6)	12/20 (60)	.68
32–34 weeks-monoamniotic twins	66/178 (37.1)	11/20 (55)	.05

HOG: Higher Order Gestation; HR: High Risk; AFV: Amniotic Fluid Volume; MFM: Maternal Fetal Medicine; MFPR: Multifetal Pregnancy Reduction; NT: Nuchal Translucency; NIPT: Noninvasive prenatal testing; CL: cervical length; TVUS: transvaginal ultrasound; IVF/ICSI: *In Vitro* Fertilization/Intra-cytoplasmic sperm Injection; GA: Gestational Age; NST: non-stress test; Vx: Vertex.

twin pregnancy. In this survey, 85.7% of obstetricians rightfully consider twin gestation as a high-risk pregnancy. It is well known that chorionicity has a significant impact on obstetric management and risks for complications in twin gestation [1]. In this respect, 94% of physicians attempted to determine chorionicity in the first trimester. On the other hand, there are several practices that differ from proposed guidelines and they include measurement of CL by trans-vaginal ultrasound for prediction of PTB and placement of cerclage if the cervix is short. A recently published retrospective matched case-control study, assessing pregnancy outcomes among 82 women with twins who underwent first trimester history-indicated cerclage compared to expectant management, concluded that the procedure had an overall positive effect on maternal and neonatal outcomes, with a need for adequate randomized trials on cerclage placement [9]. Progesterone supplementation during the first trimester is prescribed by 77.8% of Lebanese obstetricians, mostly in patients with twins conceived through IVF or in case of vaginal bleeding, despite the fact that progesterone treatment does not reduce the incidence

of spontaneous PTB and is therefore not recommended [10,11]. On the other hand, as in singleton pregnancies, NT is important for the risk assessment of aneuploidy and anomalies in twins. Screening for aneuploidy in the first trimester was offered as per proposed guidelines [12], using the NT as the single modality by 44.3% of obstetricians. As the detection rate of noninvasive prenatal testing (NIPT) is lower in case of twin gestations conceived through assisted reproduction [13], 2.4% of the obstetricians surveyed offer the NIPT starting 10 weeks of gestation. Other obstetricians offer combined screening, since they believe that the detection rate for Down syndrome in twins can be increased by combining maternal age and NT with serum levels of free beta HCG & PAPP-A [14]. Only 14.9% of physicians would not perform routinely a cerclage on every twin pregnancy in the first trimester and go by guidelines [15].

In a recent meta-analysis, the pooled rates of birth before 37, 34 and 32 weeks for twins, independent of chorionicity, were 41%, 13% and 7%, respectively [2,16]. Perinatal research has focused over the last decade on prediction and prevention of PTB in high risk

populations, namely in patients with history of PTB, short CL and twin gestation. A study from a single MFM practice evaluating CL measurement in six hundred eleven asymptomatic women with twin pregnancies found that the risk of spontaneous PTB before 35 weeks of gestation increased with a decreasing CL [17]. An awareness of CL tends to impact patient counseling and obstetric care. Even though universal screening for PTB in twin gestation, using CL measurement by transvaginal ultrasound, is controversial, 54.4% of Lebanese obstetricians caring for twin pregnancy measure CL in the second trimester whereas routine ultrasound assessment of CL screening has not been shown to be associated with improved outcomes, when incorporated into the standard management of low-risk twin pregnancies [18]. In case of a short cervix, 34% would administer vaginal progesterone and the rest would individualize the management. A meta-analysis by Romero concluded that administration of vaginal progesterone to asymptomatic women with a twin gestation and a short cervix in the mid-trimester reduces the risk of PTB occurring at less than 30–35 weeks' gestation [19]. A Cochrane meta-analysis of seven prospective studies examining prophylactic tocolysis in twins showed no consistent effect on PTB, birthweight or neonatal mortality [5]. Accordingly, only 8.5% of obstetricians in our survey prescribe routinely prophylactic oral tocolysis in twin gestation during the third trimester.

As for the follow-up obstetric care in the third trimester, and because the assessment of fetal growth is of critical importance when managing twins, serial sonographic evaluation of fetal biometry is recommended to detect early growth restriction or discordance. In our survey, only 19.1% of the Lebanese obstetricians follow the guidelines and recommend serial ultrasounds every 3 weeks to assess fetal growth.

As for the timing and the mode of delivery, challenging decisions exist regarding the ideal route of delivery when the presenting fetal part is in a non-vertex position [20]. When the presenting twin is in a cephalic position, 23.4% of the Lebanese obstetricians allow a trial of vaginal birth despite controversies. Most recent data showed no difference in newborn outcome in selected vertex/non-vertex pregnancies delivered vaginally compared to cesarean deliveries, and clinical guidelines are in support of safety trial of labor for pregnancies with a vertex-presenting twin [21]. As for the non-presenting twin, limited data in the literature has examined the impact of its position on successful vaginal delivery [20]. Physician years of practice and experience are one of the strong

determinants for selection and delivery planning. Based on these findings, consensus guidelines from the American Congress of Obstetricians and Gynecologists suggest counseling patients with cephalic-presenting twins for an attempt at vaginal birth [1].

When compared to obstetricians in general, the MFM specialists are more likely to respect the consensus guidelines when it comes to timing of delivery of mono-amniotic twins [1,22]. In the absence of large randomized trials that demonstrate an optimal time for delivery, Lebanese physicians seem to reasonably follow the recommendations for timing of delivery, namely awaiting till 37–38 weeks of gestation in case of uncomplicated dichorionic, diamniotic twins, and at 34–37 weeks in case of uncomplicated monochorionic, diamniotic twins [1].

This is the second survey looking at attitudes & practices of obstetricians regarding pregnancy care in twin gestation and comparing them to established or proposed guidelines. Our survey was unique in comparing practice patterns and attitudes regarding prenatal care in twin gestation between general obstetricians and MFM-trained physicians.

Clery-Goldman et al assessed knowledge and practice patterns pertaining to the management of multiple pregnancy. They found that more than 60% of respondents rated their training regarding management of multiples as adequate and 62% of general obstetricians managed twins without input from an MFM specialist. This survey identified knowledge gaps, specifically in chorionicity, indicating the need to develop educational strategies addressing these insufficiencies [23].

However, our study has several limitations. First, apart from its purely descriptive nature, it is limited by the sample size, since it is not large enough to estimate differences between the practices. Second, the obstetricians attending the LSOG meeting were our selected population, however this meeting is not always representative of the Lebanese physicians, since many physicians from the Arab and the Gulf countries attend it too, so generalization of our findings to the whole Lebanese population may not be valid. Third, this study is also susceptible to recall bias, when self-reported information obtained may be inaccurate or incomplete.

In view of the small sample size, this study might not be generalized to the whole population as the findings might be unique to the few people included in the research study. Nevertheless, the study has several points of strength and more importantly the non-

response rate which is usually a particular problem affecting cross-sectional studies is only 30% in our case.

In conclusion, our survey was the first to compare attitudes and practices of general obstetricians and MFM-trained physicians regarding pregnancy care in twin gestations. Because of the heterogeneity in the Lebanese population and the different background of training, guidelines are not abided uniformly when it comes to their practice pattern in the three trimesters. For those established guidelines, MFM specialists are more likely to follow guidelines than the other general obstetricians, hence the value of obtaining a consultation from an MFM specialist, especially in high-risk twin pregnancies. Controversial issues and heterogeneity seen in obstetric care in twins, regarding screening and prevention of PTB were also observed among Lebanese obstetricians.

Disclosure statement

No potential conflict of interest was reported by the author(s).

ORCID

Dalia Khalife  <http://orcid.org/0000-0003-0354-7311>

References

- [1] The American College of Obstetricians and Gynecologists, Multifetal Gestations: Twin, Triplet, and Higher-Order Multifetal Pregnancies, Practice Bulletin Number 144, May 2014.
- [2] Gezer A, Rashidova M, Güralp O, et al. Perinatal mortality and morbidity in twin pregnancies: the relation between chorionicity and gestational age at birth. *Arch Gynecol Obstet.* 2012;285(2):353–360.
- [3] Conde-Agudelo A, Romero R, Hassan SS, et al. Transvaginal sonographic cervical length for the prediction of spontaneous preterm birth in twin pregnancies: a systematic review and metaanalysis. *Am J Obstet Gynecol.* 2010;203(2):128.e1–128.e12.
- [4] Nicolaides KH, Syngelaki A, Poon LC, et al. Cervical pessary placement for prevention of preterm birth in unselected twin pregnancies: a randomized controlled trial. *Am J Obstet Gynecol.* 2016;214(1):3.e1–3.e9.
- [5] Yamasmit W, Chaithong Wong Watthana S, Tolosa JE, et al. Prophylactic oral betamimetics for reducing preterm birth in women with a twin pregnancy. *Cochrane Database Syst Rev.* 2012;12:9.
- [6] O'Brien JM, Lewis DF. Prevention of preterm birth with vaginal progesterone or 17-alpha-hydroxyprogesterone caproate: a critical examination of efficacy and safety. *Am J Obstet Gynecol.* 2016;214(1):45–56.
- [7] Klein K, Rode L, Nicolaides KH, et al. Vaginal micronized progesterone and risk of preterm delivery in high-risk twin pregnancies: secondary analysis of a placebo-controlled randomized trial and meta-analysis. *Ultrasound Obstet Gynecol.* 2011;38(3):281–287.
- [8] Saccone G, Rust O, Althuisius S, et al. Cerclage for short cervix in twin pregnancies: systematic review and meta-analysis of randomized trials using individual patient-level data. *Acta Obstet Gynecol Scand.* 2015;94(4):352–358.
- [9] Rottenstreich A, Levin G, Kleinstern G, et al. History-indicated cervical cerclage in the management of twin pregnancy. *Ultrasound Obstet Gynecol.* 2019;54(4):517–523.
- [10] Norman JE, Mackenzie F, Owen P, et al. Progesterone for the prevention of preterm birth in twin pregnancy (STOPPIT): a randomised, double-blind, placebo-controlled study and meta-analysis. *Lancet.* 2009;373(9680):2034–2040.
- [11] Serra V, Perales A, Meseguer J, et al. Increased doses of vaginal progesterone for the prevention of preterm birth in twin pregnancies: a randomised controlled double-blind multicentre trial. *BJOG.* 2013;120(1):50–57.
- [12] Sepulveda W, Wong AE, Casasbuenas A. Nuchal translucency and nasal bone in first-trimester ultrasound screening for aneuploidy in multiple pregnancies. *Ultrasound Obstet Gynecol.* 2009;33(2):152–156.
- [13] Gil MM, Quezada MS, Revello R, et al. Analysis of cell-free DNA in maternal blood in screening for fetal aneuploidies: updated meta-analysis. *Ultrasound Obstet Gynecol.* 2015;45(3):249–266.
- [14] Spencer K. Screening for trisomy 21 in twin pregnancies in the first trimester using free β -hCG and PAPP-A, combined with fetal nuchal translucency thickness. *Prenat Diagn.* 2000;20(2):91–95.
- [15] Roman AS, Saltzman DH, Fox N, et al. Prophylactic cerclage in the management of twin pregnancies. *Amer J Perinatol.* 2013;30(09):751–754.
- [16] Carter EB, Bishop KC, Goetzinger KR, et al. The impact of chorionicity on maternal pregnancy outcomes. *Am J Obstet Gynecol.* 2015; 213(3):390.e1–390.e7.
- [17] Fox NS, Saltzman DH, Fishman A, et al. Gestational age at cervical length and fetal fibronectin assessment and the incidence of spontaneous preterm birth in twins. *J Ultrasound Med.* 2015;34(6):977–984.
- [18] Gordon MC, McKenna DS, Stewart TL, et al. Transvaginal cervical length scans to prevent prematurity in twins: a randomized controlled trial. *Am J Obstet Gynecol.* 2016;214(2):277.e1–277.e7.
- [19] Romero R, Conde-Agudelo A, El Refaie W, et al. Vaginal progesterone decreases preterm birth and neonatal morbidity and mortality in women with a twin gestation and a short cervix: an updated meta-analysis of individual patient data. *Ultrasound Obstet Gynecol.* 2017;49(3):303–314.
- [20] Easter SR, Lieberman E, Carusi D. Fetal presentation and successful twin vaginal delivery. *Am J Obstet Gynecol.* 2016;214(1):116.e1–116.e10.

- [21] Barrett JF, Hannah ME, Hutton EK, et al. A randomized trial of planned cesarean or vaginal delivery for twin pregnancy. *N Engl J Med.* 2013;369(14):1295–1305.
- [22] Ezra Y, Shveiky D, Ophir E, et al. Intensive management and early delivery reduce antenatal mortality in monoamniotic twin pregnancies. *Acta Obstet Gynecol Scand.* 2005;84(5):432–435.
- [23] Cleary-Goldman J, Morgan M, Robinson J, et al. Multiple pregnancy: knowledge and practice patterns of obstetricians and gynecologists. *Obstet Gynecol.* 2004;104(2):232–237.