Clinical and Experimental Obstetrics & Gynecology

Clin. Exp. Obstet. Gynecol. **2023**; 50(3): 63
https://doi.org/10.31083/j.ceog5003063

Original Research

Success Rate and Clinical Outcomes of External Cephalic Version with or without Anesthesia for Breech Presentation at Term in China

Jing Yang[1,†], Zhaie Lu[1,†], Tiantian Liu[2], Aner Chen[1], Qiaona Dai[1], Tingting Sun[1], Hongjun Ying[1], Qin Wang[1], Xiaobo He[1,*]

[1]Department of Obstetrics, Ningbo Women and Children's Hospital, 315012 Ningbo, Zhejiang, China
[2]Department of Anesthesiology, Ningbo Women and Children's Hospital, 315012 Ningbo, Zhejiang, China
*Correspondence: hexiaobotj@163.com (Xiaobo He)
[†]These authors contributed equally.
Academic Editor: Ferdinando Antonio Gulino
Submitted: 5 December 2022 Revised: 10 January 2023 Accepted: 16 January 2023 Published: 13 March 2023

Abstract

Background: To determine whether neuraxial anesthesia (NA) can improve the success rate of external cephalic version (ECV), and evaluate the clinical outcomes. **Methods**: This study included 201 consecutive participants who had a breech presentation at term and received ECV between 2014 and 2022. Participants who received ECV without NA were included in Group 1, while participants with NA were included in Group 2. Outcomes assessed were the success rate of ECV and clinical outcomes. **Results**: In total, 201 participants who had a breech presentation at term and received ECV met the inclusion criteria. Totally, 134 participants performed ECV without NA were included in Group 1, while 67 participants performed the ECV with NA were included in Group 2. The success rate of ECV among the participants was 66.2% (133/201). The rate of placental abruption during or after ECV and neonatal intensive care unit (NICU) admission in Group 2 was statistically significant higher than in the Group 1 ($p < 0.05$). **Conclusions**: This study suggested that the use of NA did not increase ECV success rates after 37 weeks of gestation. The recommendation of NA for the ECV may be not suitable for all pregnancies unless the participants request. A large and high-quality study should be conducted to verify the role of NA in ECV, if any.

Keywords: external cephalic version; breech presentation; neuraxial anesthesia; cesarean delivery

1. Introduction

The incidence of noncephalic presentation is 3–4% in full-term pregnancies, and the external cephalic version (ECV) is a method of correcting the breech position and is a good method in reducing noncephalic presentation [1]. A high-quality meta-analysis study observed the success rate of procedure ECV was quite different range from 16% to 100% [2]. The huge difference might be due to the participants' pain and tension which has been theorized to increase abdominal tone and guarding [3]. With restricting the obstetrician's ability to rotate the fetus, the operators had used many ancillary methods (Moxibustion, Amnioinfusion, terbutaline, Calcium Channel Blockers, Analgesia) to relax the maternal uterus and abdominal wall muscles to make the participants feel comfort or painlessness of the procedure [4–7].

Several previous randomized controlled trials (RCT) reported that ECV with neuraxial anesthetic (NA) blockade either the intrathecal or epidural route leads to a higher success rate because of reducing the pain, although the best practice has not been clarified [8,9]. Meanwhile, some publications found a significant difference for pain levels from the surgery between the two groups, but the same success rate [10,11]. However, evidence about the efficacy of analgesia to improve the success of ECV is insufficient and lack of systematic empirical investigation at present, especially in China [12]. We have been performing ECV procedure since the last decade in our hospital, we aimed to determine whether ECV with or without NA affects the success rate of ECV and clinical outcomes.

2. Methods

2.1 Patient Identification

This is a retrospective study followed the Declaration of Helsinki and approved by the Ethics Committee of Ningbo participants and Children's Hospital (approval number: EC2022-041). Participants who met the inclusion criteria were included in the study, from December 1st 2014 to December 31st 2022.

The inclusion criteria included: (a) singleton pregnancy; (b) a noncephalic presentation at 36–38 weeks gestation and scheduled for ECV.

The exclusion criteria included: (a) cesarean delivery (CD) cannot be avoided, diagnosed with placenta previa or twin pregnancy; (b) contraindications were early labor, oligohydramnios or rupture of membranes, severe fetal growth restriction, uterine malformation, prior abruption and prior cesarean delivery; (c) incomplete history and surgery records were available; and participants requested repeat CD during delivery. Fig. 1 showed the flowchart of

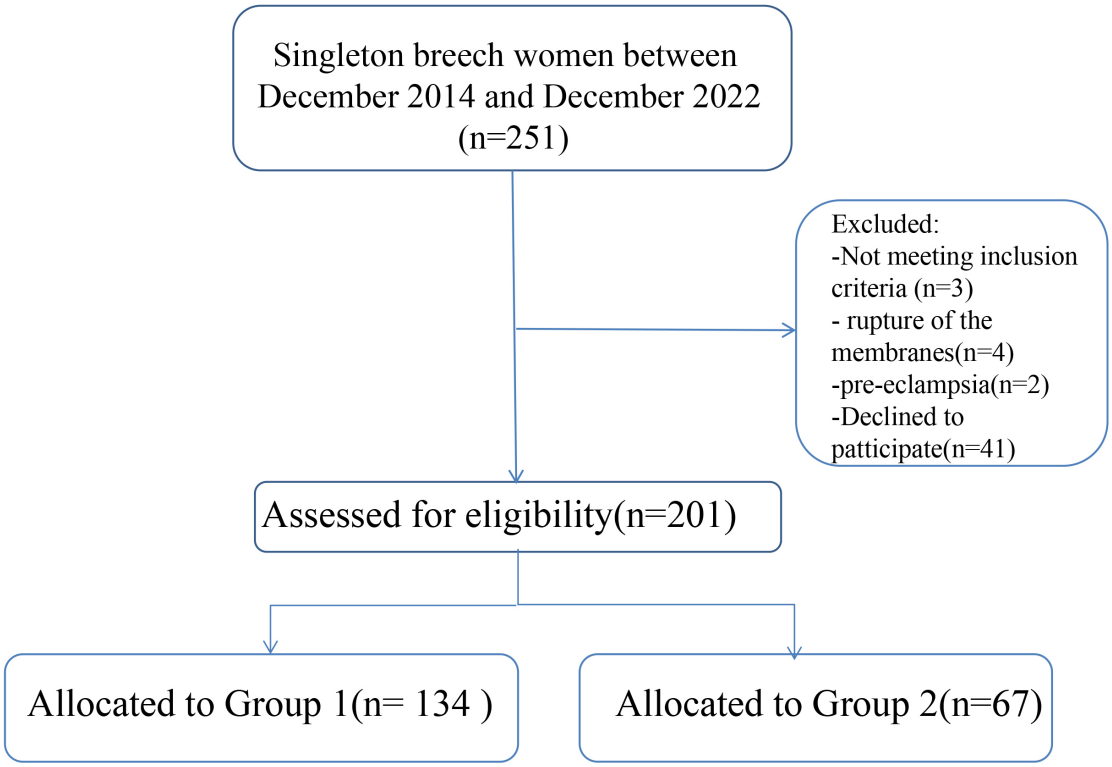

Fig. 1. Flow chart of patient selection.

this study.

The criteria for selecting the participants for NA: participants who were informed of the benefits and disadvantages of ECV under NA, and agreed the anaesthesia. Participants gave consented to before the procedure of ECV and were fasted for 6 hours or more. The position, weight of the fetus and the amniotic fluid index was confirmed by the ultrasonography before ECV. In labor and delivery room, the real-time ultrasound guidance, continuous electronic fetal heart rate monitoring and facilities for emergency cesarean delivery were all immediately available during the procedure of ECV. First, all participants were open intravenous access. After injection of 0.25 mg subcutaneous terbutaline, subarachnoid analgesia was performed via a 26-gauge Gertie Marx Neuraxial needle inserted at the L3-4 interspace with 7.5 mg of intrathecal ropivacaine in the left side lying position. Loss of sensation to pinprick to at least the T10 level was verified success functioning of the Neuraxial opioid. All ECV attempts were performed by the same experienced operators (Dr. Ying or Dr. Chen) who had been working for 20 years. Each obstetrician made no more than five ECV attempts. After the procedure, the participants had continuous electronic fetal heart rate monitoring to assess the fetal heart rate at least for 30 min and remained on the labor and delivery room for at least 2 hours. Participants were allocated to Group 1-ECV without NA and only offered 0.25 mg subcutaneous terbutaline approximately 20 min before the start of ECV. Participants were allocated to Group 2-ECV with NA.

2.2 Data Collection

The prenatal characteristics including maternal age, pregnancy body mass index (BMI), education background, parity (primiparous), gestational age at ECV, estimated birth weight (EFW), anterior placental implantation, amniotic fluid index (AFI), loops of nuchal cord, gestational diabetes mellitus (GDM), and surgeon (Dr. Chen) were collected in the current study. The clinical outcomes collected included successful ECV, vertex presentation at delivery, emergency CD (EmCD), concerning fetal heart rate after ECV, placental abruption after ECV, gestational age at delivery, postpartum hemorrhage (PPH), neonatal weight, Apgar score (5 min, $\leq$7), and neonatal intensive care unit (NICU) admission. Estimated fetal weight (EFW) was evaluated by the Hadlock formula.

The primary outcome, in this study, included the success rate of ECV and cesarean delivery rates; the secondary outcome included clinical outcomes, such as placenta abruption, cord prolapse, hemorrhage and Apgar score.

2.3 Statistical Analysis

The Mann–Whitney U test was conducted to analyze the differences for continuous variables, and Fisher's exact test or the Chi-squared test was performed to analyze the differences for categorical variables. Continuous variables were showed as the means $\pm$ standard deviation (SD), and categorical variables were showed as the median and

Table 1. Demographic and clinical characteristics of the participants in the two groups.

Clinical parameters	Group 1 (n = 134)	Group 2 (n = 67)	*p*
Maternal age (years),	31.22 ± 4.18	30.04 ± 4.22	0.090
Prepregnancy BMI (kg/m^2)	20.80 ± 2.66	21.55 ± 2.34	0.445
education background (≥graduate), n (%)	95 (70.9%)	54 (80.6%)	0.193
Parity (times)	1 (0–3)	1 (0–3)	0.813
Primiparous, n (%)	50 (37.3%)	26 (38.1%)	
Gestational age at ECV (weeks)	$37^{0/7}$ ($37^{0/7}$–$39^{6/7}$)	$38^{4/7}$ ($37^{0/7}$–$39^{5/7}$)	0.006
Estimated birth weight (kg)	3.08 ± 0.30	3.10 ± 0.39	0.741
Anterior placental implantation, n (%)	56 (41.8%)	24 (35.8%)	0.262
AFI (mm)	122 ± 35	115 ± 30	0.236
Loops of nuchal cord(yes), n (%)	88 (65.7%)	46 (68.6%)	0.705
GDM, n (%)	114 (85.1%)	52 (77.6%)	0.282
Surgeon (Dr. Chen), n (%)	60 (44.8%)	46 (68.6%)	0.336

Data in the table are presented as n (%), mean ± SD, and median [interquartile range]. ECV, External cephalic version; BMI, body mass index; GDM, gestational diabetes mellitus; AFI, amniotic fluid index.

Table 2. Clinical outcomes of the participants.

Clinical outcomes	Group 1 (n = 134)	Group 2 (n = 67)	*p*
Successful ECV, n (%)	90 (67.2%)	44 (65.6%)	0.833
Vertex presentation at delivery, n (%)	90 (67.2%)	43 (64.2%)	0.675
Total CD, n (%)	47 (35.1%)	29 (43.3%)	0.260
EmCD, n (%)	6 (4.5%)	8 (11.9%)	0.050
Concerning fetal heart rate during ECV, n (%)	6 (4.5%)	7 (10.4%)	0.075
Placental abruption after ECV, n (%)	0 (0%)	3 (4.5%)	0.013
Gestational age at delivery (weeks)	$39^{0/7}$ ($38^{4/7}$–$39^{6/7}$)	$39^{3/7}$ ($38^{6/7}$–$40^{2/7}$)	0.982
PPH, n (%)	4 (3.0%)	6 (9.0%)	0.067
Neonatal weight, g	3.36 ± 0.33	3.25 ± 0.38	0.055
Apgar score (5 min, ≤7), n (%)	0 (0%)	1 (1.5%)	0.539
NICU admission, n (%)	3 (2.2%)	6 (9.0%)	0.030

Data showed as n (%), or mean ± SD, or median [interquartile range], which appropriately. NICU, neonatal intensive care unit.

interquartile range (IQR). All statistical analyses were conducted by SAS 9.4 (SAS Institute, Cary, NC, USA).

3. Results

In total, 251 participants who received ECV were included in this study, from December 1st 2014 to December 31st 2022. 54 participants did not meet the inclusion criteria because they received repeat CD at their request. 134 of 201 participants were allocated to Group 1, while 67 participant were allocated to Group 2. We observed overall success rate was 66.2% (133/201) in this study (Fig. 1). Table 1 showed the demographic and clinical characteristics of all participants. No statistically significant differences were observed in age, prepregnancy body mass index, education background, parity, estimated birth weight, anterior placenta, AFI, Loops of nuchal cord, GDM or Surgeon in each group. Gestational age at ECV in Group 2 was higher than in Group 1 ($p < 0.01$).

Table 2 showed the clinical outcomes of each group. There were no significant differences in successful ECV, vertex presentation at delivery, CD, EmCD, concerning fetal heart rate after ECV, gestational age at delivery, PPH, neonatal weight, or Apgar score between the two groups. The rate of placental abruption during or after ECV and NICU admission was significantly higher in Group 2 than in Group 1 ($p < 0.05$).

The mode of delivery in the 201 participants is shown in Table 3. In Group 1, 90/134 was successful and all were vertex presentations at delivery. Three participants chose elective CD (ElCD) even if the ECV procedure was successful. In Group 2, 44/67 was successful, 43 were all vertex presentations at delivery. Only one patient was found to have premature rupture of membranes (PROM) and umbilical cord prolapse still with breech presentation even if the ECV procedure was successful. Three participants chose elective CD even if the ECV procedure was successful. Three participants had an EmCD; one was found to have vaginal bleeding combined with placental abruption after ECV, and the other was found to have a concerning fetal heart rate combined with placental abruption after ECV. We found a significantly higher rate of EmCD after successful ECV in Group 2 than in Group 1 ($p < 0.05$).

Table 3. Mode of delivery in the participants.

Clinical outcomes	Group 1 (n = 134)	Group 2 (n = 67)	*p*
Success ECV, n (%)	90 (67.2%)	44 (65.6%)	0.833
ElCD, n (%)	3 (3.33%)	3 (6.82%)	0.363
EmCD, n (%)	0 (0%)	3 (6.82%)	0.012
Failed ECV, n (%)	44 (32.8%)	23 (34.3%)	0.403
ElCD, n (%)	38 (86.4%)	18 (78.3%)	
EmCD, n (%)	6 (13.6%)	5 (21.7%)	

ElCD, elective cesarean delivery; EmCD, emergency cesarean delivery.

4. Discussion

The primary result of our study is that the success rate of ECV was 66.2% in a Chinese population. In the two groups, no difference was found in the success rate of ECV, but participants in Group 1 had a lower placental abruption and NICU admission after ECV compared to Group 2. Generally, participants without NA are more likely to experience successful ECV, which is safe and feasible for participants and lowers poor outcomes.

Our success rate of ECV without NA was 67.2%, similar to the results in Manal's report (68.1%, 145/213) [13]. The findings also show that NA cannot improve the rate of successful conversion to cephalic presentation. Dugoff and Birnbach's studies both showed that the surgery ECV with or without NA did not show a difference in success rate for conversion to cephalic presentation [14,15]. However, many researchers found that participants with NA had a higher success rate due to less maternal pain [16,17]. A few potential explanations for these differences between our results and those of findings are as follows. Our study was not a randomized control trial (RCT). Factors such as surgeon and operating room (OR) procedures may influence the success rate. If we could try an ECV with NA for a second attempt after a failed ECV attempt, the success rate and a reduction of Cesarean delivery could be calculated again. In a study performed by Cobec *et al*. [18], the CD rate among participant with successful ECV was 19.4%, while in ours was 6.72%. So, we may attempt to conduct this trial.

One of the serious complication of ECV is placental abruption [19]. The incidence of placental abruption complication among 201 participants who received ECV in the present study was 1.45% (3/201), which was similar with other studies that the rate of placental abruption was from 1.0 to 4.2% [20,21]. Details of these three cases occurred with placental abruption are as follows. The first case was performed successful ECV in a patient with NA. However, after 8 hours of ECV, the patient was diagnosed with PROM and umbilical cord prolapsed. Emergency cesarean section was operated and confirmed Breech presentation. Apgar score at 5 min of the neonate was well (nine points), the same as the umbilical cord artery pH (7.260). The placenta was adherent with a 4-cm clot in cesarean section during the delivery of the placenta. The other two cases occurred during the surgery of ECV found 3 min of fetal bradycardia with NA tested by the continuous electronic fetal heart rate monitoring. Emergency cesarean section was performed due to recurrent late deceleration. Apgar score at 5 min was good (nine points) and umbilical cord artery pH was normal. A 5-cm clot adherent to the placenta was detected. No case of death or severe neonatal morbidity was found.

A univariate analysis in our study revealed that the gestational age at ECV in Group 2 was significantly higher than in Group 1. The gestational age of ECV is typically performed near term in most institutions based on recommendation by obstetricians for fetal lung maturity and neonatal asphyxia resuscitation [22]. Early ECV can have more fetuses in noncephalic presentation at delivery than late ECV; interestingly the rate of cesarean delivery with early ECV was not significantly reduced compared to late ECV [23,24]. Meanwhile, in our study and some cohort studies, greater gestational age at procedure was associated with an increased likelihood of failed ECV [25]. The optimum block (epidural or Neuraxial) and drug dose are yet to be researched. A first attempt could be performed with low-dose NA at a greater gestational age. ECV combined Neuraxial technique could enable prompt Cesarean delivery if needed. In this study, some patients might choose anesthesia, when they with older gestational age require external inversion, because the pregnancy could be terminated by cesarean section without re-anesthesia, if the external inversion is not successful. Meanwhile if general anaesthetic technique is quick enough, NA is not always needed. However, to draw the most appropriate gestational age at ECV, high-quality randomized clinical trials or more prospective cohort studies with large sample sizes can be conducted in our hospital.

Certainly, several limitations were notable in this study. First of all, it is noteworthy that no poor outcome was found, with regard to participants with ECV success. As this is a retrospective study involving only a small number of cases in one center, the results recorded in the surgical records may be lacking. Second, prospective randomization arrangements regarding NA can be recommended to eliminate the selection bias. Finally, we had no authority to acquire data on several confounding factors, such as psychological factors, family support, and socioeconomic conditions, which might result in deviation from the successful ECV rate, including over- or under-evaluation. Accordingly, caution should be noticed when interpreting the finding due to a number of limitations.

5. Conclusions

In our study, ECV with NA did not increase ECV success rates at term. The recommendation of NA for the ECV may be not suitable for all pregnancies unless the participants request. Large and high-quality cohort or RCT studies should be conducted to confirm our findings.

Availability of Data and Materials

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

Author Contributions

JY and ZEL—Data Collection, Manuscript Writing; TTL and AEC, QND and TTS—Data Collection; HJY and QW—Data Analysis; XBH—Project Development, Manuscript Editing. All the authors reviewed and approved the final version of the manuscript.

Ethics Approval and Consent to Participate

The Institutional Review Board of Ningbo Women and Children's approved this study. The need for informed consent was waived by the Institutional Review Board of Ningbo Women and Children's because of retrospective nature of this study (approval number: EC2022-041). Research was conducted according to the ethical standard of Helsinki declaration and that data of patients were stored anonymized in a dedicated database. All methods were carried out in accordance with relevant guidelines and regulations.

Acknowledgment

We would like to express my gratitude to all those who helped me during the writing of this manuscript. We thank all the peer reviewers for their opinions and suggestions.

Funding

This study was supported by the Medical Science and Technology Project of Zhejiang Province, China (2021KY1057) and funded by the project of NINGBO Leading Medical & Health Discipline (2010-S04).

Conflict of Interest

The authors declare no conflict of interest.

References

[1] External Cephalic Version: ACOG Practice Bulletin, Number 221. Obstetrics and Gynecology. 2020; 135: e203–e212.

[2] Melo P, Georgiou EX, Hedditch A, Ellaway P, Impey L. External cephalic version at term: a cohort study of 18 years' experience. BJOG: An International Journal of Obstetrics and Gynaecology. 2019; 126: 493–499.

[3] Lim S, Lucero J. Obstetric and Anesthetic Approaches to External Cephalic Version. Anesthesiology Clinics. 2017; 35: 81–94.

[4] Vas J, Aranda JM, Barón M, Perea-Milla E, Méndez C, Ramírez C, *et al*. Correcting non cephalic presentation with moxibustion: study protocol for a multi-centre randomised controlled trial in general practice. BMC Complementary and Alternative Medicine. 2008; 8: 22.

[5] Cluver C, Gyte GML, Sinclair M, Dowswell T, Hofmeyr GJ. Interventions for helping to turn term breech babies to head first presentation when using external cephalic version. The Cochrane Database of Systematic Reviews. 2015; CD000184.

[6] Katz D, Riley K, Kim E, Beilin Y. Comparison of Nitroglycerin and Terbutaline for External Cephalic Version in Women Who Received Neuraxial Anesthesia: A Retrospective Analysis. Anesthesia and Analgesia. 2020; 130: e58–e62.

[7] Hao Q, Hu Y, Zhang L, Ross J, Robishaw S, Noble C, *et al*. A Systematic Review and Meta-analysis of Clinical Trials of Neuraxial, Intravenous, and Inhalational Anesthesia for External Cephalic Version. Anesthesia and Analgesia. 2020; 131: 1800–1811.

[8] Massalha M, Izhaki I, Iskander R, Salim R. Effect of nitrous oxide use on external cephalic version success rate; a systematic review and meta-analysis. Journal of Maternal-Fetal and Neonatal Medicine. 2022; 35: 9702–9708.

[9] Hakem E, Lindow SW, O'Connell MP, von Bünau G. External cephalic version - A 10-year review of practice. European Journal of Obstetrics, Gynecology, and Reproductive Biology. 2021; 258: 414–417.

[10] Sullivan JT, Grobman WA, Bauchat JR, Scavone BM, Grouper S, McCarthy RJ, *et al*. A randomized controlled trial of the effect of combined spinal-epidural analgesia on the success of external cephalic version for breech presentation. International Journal of Obstetric Anesthesia. 2009; 18: 328–334.

[11] Ainsworth A, Sviggum HP, Tolcher MC, Weaver AL, Holman MA, Arendt KW. Lessons learned from a single institution's retrospective analysis of emergent cesarean delivery following external cephalic version with and without neuraxial anesthesia. International Journal of Obstetric Anesthesia. 2017; 31: 57–62.

[12] Zhi Z, Xi L. Clinical analysis of 40 cases of external cephalic version without anesthesia. The Journal of International Medical Research. 2021; 49: 300060520986699.

[13] Massalha M, Garmi G, Zafran N, Carmeli J, Gimburg G, Salim R. Clinical outcomes after external cephalic version with spinal anesthesia after failure of a first attempt without anesthesia. International Journal of Gynaecology and Obstetrics. 2017; 139: 324–328.

[14] Dugoff L, Stamm CA, Jones OW, Mohling SI, Hawkins JL. The effect of spinal anesthesia on the success rate of external cephalic version: a randomized trial. Obstetrics and Gynecology. 1999; 93: 345–349.

[15] Birnbach DJ, Matut J, Stein DJ, Campagnuolo J, Drimbarean C, Grunebaum A, *et al*. The effect of intrathecal analgesia on the success of external cephalic version. Anesthesia and Analgesia. 2001; 93: 410–413.

[16] Khaw KS, Lee SWY, Ngan Kee WD, Law LW, Lau TK, Ng FF, *et al*. Randomized trial of anaesthetic interventions in external cephalic version for breech presentation. British Journal of Anaesthesia. 2015; 114: 944–950.

[17] Lauterbach R, Bachar G, Ben-David C, Matanes E, Ginsberg Y, Beloosesky R, *et al*. Association of Persistent Breech Presentation With External Cephalic Version Success. Obstetrics and Gynecology. 2021; 137: 258–262.

[18] Cobec IM, Varzaru VB, Kövendy T, Kuban L, Eftenoiu A, Moatar AE, *et al*. External Cephalic Version-A Chance for Vaginal Delivery at Breech Presentation. Medicina. 2022; 58: 1619.

[19] Matsui H, Ogawa K, Okamoto A, Sago H. Risk factors and outcomes of abnormal bleeding after external cephalic version. Journal of Perinatal Medicine. 2021; 49: 733–739.

[20] Dahl CM, Zhang Y, Ong JX, Yeh C, Son M, Miller ES, *et al*. Patient characteristics associated with complications of external cephalic version. American Journal of Obstetrics & Gynecology MFM. 2021; 3: 100411.

[21] Collaris RJ, Oei SG. External cephalic version: a safe procedure? A systematic review of version-related risks. Acta Obstetricia Et Gynecologica Scandinavica. 2004; 83: 511–518.

[22] De Castro H, Ciobanu A, Formuso C, Akolekar R, Nicolaides KH. Value of routine ultrasound examination at 35–37 weeks'

gestation in diagnosis of non-cephalic presentation. Ultrasound in Obstetrics & Gynecology. 2020; 55: 248–256.

[23] Hutton EK, Hannah ME, Ross SJ, Delisle M, Carson GD, Windrim R, *et al*. The Early External Cephalic Version (ECV) 2 Trial: an international multicentre randomised controlled trial of timing of ECV for breech pregnancies. BJOG: An International Journal of Obstetrics and Gynaecology. 2011; 118: 564–577.

[24] Hutton EK, Kaufman K, Hodnett E, Amankwah K, Hewson SA, McKay D, *et al*. External cephalic version beginning at 34 weeks' gestation versus 37 weeks' gestation: a randomized multicenter trial. American Journal of Obstetrics and Gynecology. 2003; 189: 245–254.

[25] Ducarme G. Breech Presentation: CNGOF Guidelines for Clinical Practice - External Cephalic Version and other Interventions to turn Breech Babies to Cephalic Presentation. Gynecologie Obstetrique Fertilite et Senologie. 2020; 48: 81–94. (In French)