External cephalic version for singleton breech presentation: proposal of a practical check-list for obstetricians

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Abstract. – OBJECTIVE: External cephalic version (ECV) for breech presentation is not routinely performed by obstetricians in many clinical settings. The aim of this work is to assess to what extent the factors involved in performing ECV are relevant for the success and safety of ECV, in order to propose a practical check-list for assessing the feasibility of ECV.

METHODS: Review of 214 references. Factors involved in the success and risks of ECV (feasibility of ECV) were extracted and were scored in a semi-quantitative way according to textual information, type of publication, year of publication, number of cases. Simple conjoint analysis was used to describe the relevance found for each factor.

RESULTS: Parity has the pivotal role in ECV feasibility (relevance 16.6%), followed by tocolysis (10.8%), gestational age (10.6%), amniotic fluid volume (4.7%), breech variety (1.9%), and placenta location (1.7%). Other factors with estimated relevance around 0 (regional anesthesia, station, estimated fetal weight, fetal position, obesity/BMI, fetal birth weight, duration of manoeuvre/number of attempts) have some role in the feasibility of ECV. Yet other factors, with negative values of estimated relevance, have even less importance.

CONCLUSIONS: From a logical interpretation of the relevance of each factor assessed, ECV should be proposed with utmost prudence if a stringent check-list is followed. Such a check-list should take into account: parity, tocolytic therapy, gestational age, amniotic fluid volume, breech variety, placenta location, regional anesthesia, breech engagement, fetal well-being, uterine relaxation, fetal size, fetal position, fetal head grasping capability and fetal turning capability.

Key Words:

External cephalic version, Breech, Delivery, Cesarean section.

Introduction

External cephalic version (ECV) is still recognized as a useful method for reducing the rate of cesarean sections in healthy singleton breech pregnancies¹⁻⁵. However, despite what is reported in practice guidelines¹⁻⁵, this obstetrical manoeuvre is not routinely performed by obstetricians in many clinical settings. The policy to not perform ECV may be linked to factors involved in the feasibility of ECV, meaning that the obstetrician should be able to turn the breech fetus towards cephalic presentation with a subsequent successful vaginal delivery (success of ECV) without risk for either mother or fetus (safety of ECV). Such obstetrician knowledge would be built from both literature evidence and personal experience, substantiating an "a priori" knowledge strongly conditioning the obstetrician's choice in managing breech presentation in healthy singleton breech pregnancies.

The aim of the following semi-quantitative review is to assess to what extent the factors involved in performing ECV are relevant for the success and safety of ECV, in order to propose a check-list for performing ECV.

Methods

A literature review was made on 19 June 2013 using the Scopus search engine, with "external" "cephalic" "version" as key words. More references were added using Google Scholar. References concerning ECV in singleton breech pregnancy were retained, excluding case reports, reviews and letters to the editor. A few case reports within a single citation was considered as a small series. A total of 214 references were reviewed⁶⁻²¹⁹.

Factors involved in the success, failure and risks of ECV (feasibility of ECV) were collected by reading the full text article and, if the full texts were unavailable, by reading the abstracts. The textual information was scored in a semiquantitative way. A score of 1 was assigned if the factor was not mentioned. A score of 2 was assigned if the factor was marginally discussed. A score of 3 was assigned if the factor was widely discussed. A score of 4 was assigned if the factor was considered as pivotal.

To quantify the importance of the reference, an additional score based on the type of reference was assigned: (a) type of study (retrospective studies = 1; prospective observational studies = 2; randomized trials = 3; metanalyses = 4); (b) year of publication (before or during 1980 = 1; between 1981 and 1989 = 2; between 1990 and 1999 = 3; between 2000 and 2009 = 4; during 2010 and after 2010 = 5); (c) Number of cases in the study (< 100 cases = 1; 100-499 = 2; 500-999 = 3; \geq 1000 = 4). The sum of a+b+c was multiplied by the score assigned to factors extracted from textual information, correcting the scores for importance of reference.

Factors arising from textual information were arranged into six categories: (1) maternal factors (maternal age, parity, obesity/BMI, weight gain, miometrial thickness); (2) factors related to pregnancy and labour (gestational age, cervical dilatation, breech station, uterine contraction or uterine relaxation); (3) fetal factors (estimated fetal weight, fetal position, breech variety, fetal birth weight); (4) factors related to fetal adnexa (placenta location, amniotic fluid index/amniotic fluid volume, cord rounds); (5) therapies (tocolytic agents, regional anesthesia, general anesthesia); (6) factors related to the manoeuvre (skill of the operator, duration of manoeuvre/number of attempts).

Statistical Analysis

Simple conjoint analysis was used to quantify the relevance of each factor within categories and overall. To check the difference in estimated relevance, the Friedman test or the Mann-Whitney test for unpaired data was performed. Alpha value for significance was set at 0.01.

Results

Table I reports the results of simple conjoint analysis. According to textual information from the literature, the most important factors involved in ECV for breech presentation are the maternal ones (relative relevance 33.3%), followed by therapies during the manoeuvre (relative importance 21.5%), factors related to pregnancy and labour (relative relevance 21.3%), factors related to fetal adnexa (relative relevance 14.6%), fetal factors (relative relevance 8.8%), factors related to the manoeuvre (relative relevance 1.1%).

Among maternal factors, parity seems to be pivotal for ECV (relative relevance 49.9%, p <0.001), with a positive association with the feasibility of ECV. Among the therapies during the manoeuvre, tocolysis seems to have the pivotal role in ECV feasibility (relative relevances 50%, p < 0.001), with a positive association. Among factors related with pregnancy and labour, gestational age seems to have the greatest relevance for the feasibility of ECV (49.7%, p < 0.001), with a positive association. Among factors related to fetal adnexa, both amniotic fluid (relevance 34.2%) and placental location (relevance 15.8%) have a role in the feasibility of ECV with a positive association (p < 0.001). Among fetal factors, breech variety has a pivotal relevance (49.9%, p < 0.001) for the feasibility of ECV. Among factors related to the manoeuvre, the pivotal role in the feasibility of the manoeuvre seems to be played by how easy it is to perform the manoeuvre (number of attempts and/or duration of manoeuvre, relevance 46.7%), but statistical significance was not found.

Table I also reports the relative relevance of each factor overall, independently of categories. Figure 1 depicts those overall relevances as bars. The most important factors involved in the feasibility of ECV are reported as a positive relevance, while the less important factors are reported as a negative relevance. By analyzing the overall data, it appears that a large portion of literature agrees in attributing to parity the pivotal role in ECV feasibility (relevance 16.6%), followed by tocolysis (10.8%), gestational age (10.6%), amniotic fluid volume (4.7%), breech variety (1.9%), and placenta location (1.7%). The other factors with estimated relevance around 0 (regional anesthesia, station, estimated fetal weight, fetal position, obesity/BMI, fetal birth weight, duration of manoeuvre/number of at-

Factor groups		Estimated importance in the group		Estimated importance overall	
Maternal factors (relevance: 33.3%)	Maternal age Parity Obesity/BMI Weight gain Miometrial thickness	-14% 49.9% -2.3% -16.5% -17.2%	<i>p</i> < 0.001	-3.8% 27% -0.4% -5% -5.3%	<i>p</i> < 0.001
Factors related with pregnancy and labour (relevance: 21.3%)	Gestational age Cervical dilation Station Uterine contraction/ relaxation	49.7% -26.2% 0 -24%	<i>p</i> < 0.001	12.1% -3.8% 0 -1.1%	
Fetal factors (relevance: 8.3%)	Estimated fetal weight Fetal position Breech variety Fetal birth weight	-13.2% -14.7% 49.9% -22.1%	<i>p</i> < 0.001	-0.1% 1.9% -0.4%	
Factors related with fetal adnexa (relevance: 14.6%)	Placenta location Amniotic fluid index, amniotic fluid volume Cord rounds	15.8% 34.2% -50%	<i>p</i> < 0.001	1.7% 4.7%	
Therapies (relevance: 21.5%)	Tocolytic agents Regional anesthesia General anesthesia	50% -5.4% -44.5%	<i>p</i> < 0.001	21% 0.3% -5%	
Factors related to the manoeuvre (relevance: 1.1%)	Skill of operator Duration of manoeuvre/ number of attempts	-55.6% 46.7%	n.s.	-1.7% -0.8%	

Table I. Results of conjoint analysis. The more significant relevances are highlighted in bold.

tempts) appear to have some role in the feasibility of the ECV manoeuvre. Conversely, the factors with negative bar values appear to have a less established relevance.

Discussion

The semi-quantitative review aims to provide a score of relevance for many common factors investigated in the overall body of literature concerning the topic "external cephalic version for breech presentation". This kind of semi-quantitative review is able to provide "a priori" knowledge about this topic from several points of view, encompassing and summarizing all the levels of evidence. The same kind of work can be produced using a traditional review, in a more subjective way. Therefore, readers should not be confused by a semi-quantitative review that objectifies textual information. A similar approach was previously used by the Authors to investigate the pathogenesis of endometrial polyps²²⁰.

Some restrictions of the textual information and of the simple conjoint analysis complicate interpre-

tation of the results. Textual information is extracted from full texts and from abstracts of work built for demonstrating a specific topic in relationship with ECV. Reading only the abstracts instead of the entire articles could have prevented a more indepth assessment of certain factors rather than others. Moreover, conjoint analysis is unable to assess the reasons why a factor has been considered of relevance for the feasibility of ECV for breech presentation. Another restriction is that simple conjoint analysis requires all factors to be considered reciprocally independent. However, the independence of each factor may not be established if the factor is not assessed from a causative view. Finally, some other factors relevant for ECV could have not been collected by reading the texts or the abstracts, because they could be unknown. These restrictions lead to the need for discussing the results in the following section. Said discussion aims to interpret the relevance of each factor from a causative point of view, evaluating the presumptive interdependence of each factor. In turn, the objective is to obtain a logical synthesis of the current "a priori" knowledge about the feasibility of ECV, in order to establish a practical check-list.



Figure 1. Relevances of each factor overall. More positive bars suggest higher relevance for the feasibility of ECV.

Parity

Among maternal factors involved in the feasibility of ECV, parity is the most relevant. In literature, multiparity is widely considered the most important factor for the success of ECV (overall relevance 27%). The reasons for observing a more feasible ECV in multiparas may be related to factors involving the uterine wall²³ and uterine tone. Such a hypothesis has lead multiparity to be considered as related to other factors involving uterine relaxation, but the literature does not seems to assess specifically why multiparity favours a more feasible ECV.

Tocolytic Agents

Agreement in the literature was found regarding the need to use a tocolytic agent during ECV attempts (overall relevance 21%). Nifedipine²¹¹, ritodrine²⁸, salbutamol²⁰⁷, terbutaline¹³⁷, atosiban²⁸, nitroglycerin^{24,25} have been used with the aim of facilitating ECV and many studies assessing many aspects of ECV had enrolled patients under tocolysis. This finding proves that the "a priori" knowledge agrees in considering uterine relaxation as pivotal for attempting ECV.

Gestational Age

The feasibility of ECV strongly relates with gestational age (relevance 12.1%). It has been reported that spontaneous version of breech pre-

sentation is rather more common before 37 weeks than after 37 weeks^{221,222}. Therefore, the feasibility of ECV relates with gestational age because, while versions may be easier before 37 weeks, they may also be vain before 37 weeks because of possible spontaneous breech reversion^{89,95}. Moreover, ECV before 37 weeks may lead to some risks for the pregnancy (such as preterm rupture of membranes or preterm labour)^{89,95} or can cause complications (placental abruption, CTG abnormalities, feto-maternal transfusion²²³, which must be managed preterm. Therefore, some practice guidelines suggest offering ECV at term or near term^{2,5}.

In summary, an obstetrician considering attempting ECV must take gestational age into account, both for the likelihood of success and for the need to manage possible complications.

Amniotic Fluid Index – Amniotic Fluid Volume

Some guidelines²²⁴ state that ECV should be avoided in case of oligohydramnios. However, it as been reported that ECV may be performed even in case of rupture of membranes with potential risks or needing to plan an amnioinfusion^{195,225,226}. Therefore, amniotic fluid greatly affects the feasibility of ECV because more amniotic fluid facilitates the success of the manoeuvre with less harm. Moreover, a normal amount of amniotic fluid should suggest fetal well being. However, the number of articles considering amniotic fluid of relevance for ECV are not as numerous as the ones that assess the factors listed above. This leads to a relevance score of 4.7%.

Breech Variety – Fetal Position

Breech variety impacts the feasibility of ECV (relevance 1.9%), while the relevance of fetal position for the feasibility of ECV seems to be poor, with a relevance score of -0.2%. It has been reported by Burgos et al²⁷ that incomplete breech presentations are less likely to be verted, but that double footling are more likely to be verted than complete breech. Moreover, it has been reported that a non-frank breech position (transverse position)⁷² or back position^{68,125} are more likely to be turned. Taken together, this information leads us to consider that fetal position and footling breech favour version more often, because the manoeuvre would be more straightforward for the obstetrician and less harmful for the mother and fetus. However, few articles have been matched to or have discussed the topic, explaining the poor relevance found for breech variety and for fetal position

Placenta Location

Placenta location impacts on the feasibility of ECV (relevance 1.7%). For example, it has been reported by Burgos et al³¹ and by Kok et al¹¹² that anterior placenta was unfavourable for version of the fetus. It may be speculated that an anterior placenta may affect the ability of the obstetrician to grasp and turn the fetus, leading to a more difficult and more potentially dangerous manoeuvre.

Regional Anesthesia – General Anesthesia

Preston et al²²⁷ have recently reviewed the topic of the usefulness of regional anesthesia for facilitating ECV. The Authors conclude that regional anesthesia (spinal, epidural, neuraxial) may favour ECV independently from tocolysis and without significant additional risks for both mother and fetus. This opinion seems to consider pain level as a significant factor for the feasibility of ECV, even if the Authors²²⁷ do not relate pain with the success of ECV. Therefore, in the present review, regional and general anesthesia have been assessed among factors involved in ECV, with the result that regional anesthesia has some relevance in ECV (0.3%) simply because many studies have assessed the topic; however, the majority have not done so.

On the other hand, older articles^{10,118,134,135} have reported ECV cases under general anesthesia, but these studies do not assess the effect of the anesthesia in the success and/or danger of ECV.

In summary, one should acknowledge the hypothesis that pain control with anesthesia may be useful for the feasibility of ECV, without increasing potential harm for both mother and fetus.

However, according to the role of uterine tone for the feasibility of ECV, it may be speculated that anesthesia may also favour uterine relaxation, allowing a more feasible ECV. This hypothesis may be supported indirectly by the literature²²⁸, because studies have reported the need for uterotonic agents in labour under epidural anesthesia and because Suen et al¹⁹² have reported that the force applied for verting a fetus is reduced when ECV is performed under spinal analgesia.

Station – Cervical Dilation

Some reports^{145,214} have considered breech station and cervical dilatations in multivariable models predicting the success of ECV. Fetal version is not possible with engaged breech, but uterine relaxation is also necessary for obtaining fetal version²¹⁴, and Authors should know that ECV should not be attempted in labouring women. This knowledge leads us to imagine that many Authors in literature may have versed fetuses with unengaged breech, without discussing the topic in their works. Therefore, the relevance found in the current review concerning cervical dilatation and breech station is poor, even if breech station is a relevant factor for the feasibility of ECV.

Other Factors

The other factors considered in the present review are poorly related with the feasibility of ECV compared to the ones discussed above. Few studies specifically discuss those factors or attribute to them a pivotal role in the feasibility of ECV, even if they have a logical role. Factors such as uterine contraction/relaxation, miometrial thickness, obesity/BMI and weight gain could cause difficulty in grasping the fetal head and turning the fetus. Estimated fetal weight and fetal birth weight involve both fetal well being³³ and the capability to turn the fetus^{49,58}. Fetuses weighting more than 3000 g are more likely to be verted⁴⁹. The skill of the operator, the number of attempts and the time for completing the manoeuvre are less related to the feasibility of ECV, because obstetricians should be able to perform ECV and should not try an ECV for an extended time period or for more than three attempts. If ECV is unsuccessful after a few attempts and a certain length of time, obstetricians should consider it harmful. Interestingly, Kuppens et al¹¹⁷ have suggested that the cord characteristic found in breech position may condition the success of ECV. Additionally, cord rounds may obstacle ECV^{99,134} and may be harmful for fetal well-being during the manoeuvre.

Conclusions

In a clinical setting and under the need for maximum caution, an obstetrician performing ECV for breech presentation is likely to consider many factors involved in the feasibility of ECV in a healthy woman. He/she should prefer to perform ECV in the case of multiparity and near term, as well as following a stringent check-list: estimate fetal weight, assess amniotic fluid volume, exclude cord rounds, assess fetal well-being, evaluate uterine relaxation, breech engagement, fetal position and breech variety for grasping the fetal head. Finally, he/she should try the version for a limited number of attempts and for short durations. If the version is successful, he/she should check fetal well-being and manage any complications caused by the manoeuvre.

Readers may feel that in clinical settings, many presumptive contraindications for the feasibility of ECV are to be found. For example: is the 3000 g estimated fetal weight so pivotal for the feasibility of ECV? Are all cord rounds detectable? What should the amniotic fluid volume be to safely perform ECV? How many attempts must be made before considering ECV unfeasible? For how long should ECV be attempted? This uncertainty may discourage the obstetrician from attempting ECV, even if practice guidelines¹⁻⁵ suggest doing it. Moreover, we can imagine that some mothers may not agree to undergoing ECV, regional anesthesia, or tocolytic treatment, preferring a planned cesare-an section for breech presentation at term.

In conclusion, in almost all cases in healthy breech pregnancies, obstetricians are unable to predict ECV feasibility. In agreement with the "a priori" knowledge drawn from the current review, it may be highlighted that a prudent checklist for attempting ECV in a healthy singleton breech pregnancy should consider: multiparity, tocolytic therapy, gestational age, amniotic fluid volume, breech variety, placenta location, regional anesthesia, breech engagement (Figure 1) and, from a logical interpretation of results, fetal wellbeing, uterine relaxation, fetal size, fetal position and fetal head-grasping and turning capability. In Italy, this check-list would be useful for demonstrating the best prudence in case of litigations.

Realistically, however, the number of cesareans prevented by performing ECV are very few.

Conflict of interest

The Authors declare that they have no conflict of interests.

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