

## ORIGINAL ARTICLE

## PREDICTION MODEL FOR DETERMINING IMPORTANT FACTORS OF SUCCESS OF EXTERNAL CEPHALIC VERSION

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**Background:** The External cephalic version (ECV) is a skill as well as an art that could be easily acquired. It has become a valuable option in the management of breech foetus at term. Aims of this study were to determine those factors that were significantly associated with success of external cephalic version (ECV) procedure. **Method:** This prospective interventional study was conducted at Department of Obstetrics and Gynaecology, Unit-III, Services Hospital, Lahore, Pakistan from July 2007 to December 2009. Total of 56 patients who had undergone ECV was analysed descriptively and analytically. Univariate and multivariate data analysis was performed. Pre-procedural factors (gravidity, gestational age, amniotic fluid index, placental location, type of breech, maternal obesity, foetal weight), and factors associated with the procedure itself (abdominal wall musculature tone, uterine tone, maternal anxiety, maternal threshold for pain, engagement of breech, number of attempts) were assessed. **Results:** Thirty-three patients were successfully converted to vertex presentation. In multivariate analysis, placenta, type of breech, station of breech and number of attempts ( $\leq 2$  times) were significantly associated factors with ECV procedure. **Conclusion:** ECV is most likely to succeed when the patient has already one pregnancy and child birth, the breech is not engaged, and is flexed. Procedure is usually successful within one or two attempts, whereas ongoing attempts lead to increased maternal anxiety, lesser cooperation and ending in failure.

**Keywords:** External cephalic version (ECV), breech

## INTRODUCTION

External Cephalic Version (ECV) has been practiced since the time of Aristotle (384–322 BC). However, external version eventually fell out of favour as a result of several concerns: firstly, its high rate of spontaneous reversion if performed before 36 weeks of gestation, secondly, possible foetal complications, and thirdly, the assumption that an external version converts only those foetuses to vertex that would have converted spontaneously anyway. By the 1960s, breech foetuses were delivered by vaginally. By the 1970s, studies suggested vaginal breech delivery is more hazardous for the baby both in terms of morbidity and mortality.<sup>1</sup>

Those apprehensions in an intensified medico-legal atmosphere led to a strong trend away from the teaching and use of breech vaginal delivery. A 1988 survey of the society of perinatal obstetricians found that 14% thought there was 'adequate scientific documentation demonstrating that caesarean section (CS) is the preferred mode of delivery'.<sup>2</sup>

Multicenter randomised trials are needed to establish the optimal mode of delivery. Critics however suggested that such studies would be difficult. The overall result has been a dramatic increase in the caesarean section rate for breech presentation. This further increased with the publication of term breech trial.<sup>3</sup> Thus measures to reduce the incidence of breech presentation have become more important in form of external cephalic version. The ECV not only reduces the number of breech presentation at term but also reduces

the rate of CS for the same indication. Reduced primary rate of CS will decrease the number of women undergoing repeat caesarean delivery thus additive effect on overall CS rate reduction. Effects of such measures are reduced maternal morbidity and mortality from surgery. All women do not present with equal chances of a successful procedure. Thus subject selection would increase success rate. The present study is done to assess the significantly associated factors for predicting successful external cephalic version. Along with subject selection gentle approach should be emphasised rather than forceful movement.<sup>4</sup> One of the modern pioneers in the technique, states, and one should approach the gentle art of external cephalic version with a flexible attitude. The brain, nerves, muscles and fingers of the obstetrician should be sensitively elastic. This is no place for a hasty or domineering approach, which is futile, and possibly dangerous.

Aims of this study were to determine those factors that were significantly associated with success of external cephalic version (ECV) procedure.

## MATERIAL AND METHODS

This prospective interventional study was conducted in Obstetrics and Gynaecology Department, Services Hospital, Lahore from July 2007 to December 2009. Women attending the antenatal clinic were recruited and 56 were selected for ECV. For the analysis of predictors of success, some factors were assessed prior to the procedure which included gravidity, parity, gestational

age, abdominal wall obesity (thick or thin), condition of abdominal wall musculature (tense or relaxed), ultrasonologically assessed amniotic fluid index, placental site location (anterior, cornual, posterior) and type of breech. During the procedure certain factors were assessed by the practitioner and included maternal anxiety, maternal pain experienced during the procedure, uterine tone (uterine contractions or irritability), station of breech (engaged or free floating), number of attempts at ECV. Exclusion criteria included placenta previa or history of vaginal bleeding especially in the 3<sup>rd</sup> trimester, AFI <8 Cm, foetal weight restriction, previous uterine scar, good size foetus or if patient not willing despite thorough counselling. Informed consent was obtained after explaining each patient about the diagnosis, risks of malpresentation, the nature and risks of ECV, timing of ECV, success of the procedure and alternative options if ECV failed. Each procedure was performed or supervised by the personnel involved in the study.

Data were analysed using SPSS-12. Count and percentages were calculated for qualitative variables. For univariate analysis, Chi-square test of independence was used at 5% level of significance while at multivariate analysis logistic regression technique was applied to establish a relationship between outcome and predictors. Odds ratios with 95% confidence interval were calculated to find the estimated risk of significant predictors associated with success of ECV.

**RESULTS**

From Table-1 multiple logistic regression analysis showed that Placenta (Posterior-Lateral), Type of breech (Flexed breech) and attempts ( $\leq 2$  times) were found significantly associated factors with the outcome dependent variable (ECV Procedure) ( $p < 0.05$ ). Forward likelihood ratio test criterion was applied for variable selection. Odds ratios with 95% CI were found as placenta (OR=0.019,  $p=0.019$ , CI: 0.019–0.703), Type of breech (OR=12.995,  $p=0.008$ , CI: 1.956–86.346), Attempts (OR=4.675,  $p=0.010$ , CI: 1.454–15.033) respectively. Nagelkerke  $R^2$  value as found 0.561 at the last step that indicate about 56% of variation can be explained through this regression model.

Similarly, in univariate analysis placenta, type of breech, attempts ( $\leq 2$  times) were also found significant in the case of multivariate analysis. An additional factor, i.e., Breech Station was also significant in univariate analysis (Table-2).

**Table-1: Logistic Regression analyses, Coefficients, Odds Ratios and 95% CI**

Predictor	Beta	p	OR	95% CI
Placenta	-2.165	0.019	0.115	0.019–0.703
Types of Breech	2.565	0.008	12.995	1.956–86.346
Attempts	1.542	0.010	4.675	1.454–15.033

**Table-2: Univariate analysis showing association of ECV with different predictors**

Predictor	Failure ECV (n=21)	Successful ECV (n=35)	p
<b>Gravidity:</b>			
Primary	9	11	0.688
2-4	9	18	
$\geq 5$	3	6	
<b>Gestational age (Weeks):</b>			
37	11	20	0.899
38-39	9	14	
40-41	1	1	
<b>AFI:</b>			
7-8	5	5	0.487
9-10	12	19	
11-13	4	11	
<b>Placenta:</b>			
Anterior Cornual	14	8	0.002
Posterior Lateral	7	27	
<b>Type of Breech:</b>			
Flexed	7	25	0.011
Extended Breech	14	10	
<b>Maternal obesity</b>			
Thin	11	23	0.401
Thick	10	12	
<b>Breech station:</b>			
Unengaged	8	24	0.050
Engaged	13	11	
<b>Foetal weight (Kg):</b>			
2-2.5	5	15	0.263
2.6-3.5	13	18	
$\geq 3.6$	3	2	
<b>Maternal mental condition:</b>			
Relaxed	12	23	0.577
Anxious	9	12	
<b>Maternal pain:</b>			
Mild	10	25	0.125
Moderated	8	9	
Severe	3	1	
<b>Uterine tone:</b>			
Relaxed	12	28	0.125
Contracting	9	7	
<b>Attempts:</b>			
1	2	12	0.000
2	5	19	
3	14	4	

**DISCUSSION**

Various maternal and foetal factors leading to successful external cephalic version procedure have been assessed in previous studies.<sup>5-9</sup> Present study was carried out to assess certain factors associated with such success. We found that flexed, non-engaged presenting breech and posterolateral placental localisation were important factors leading to successful version along with one or two attempts. Maternal obesity causing thick abdominal wall, uterine tone during the procedure, and maternal anxiety were significantly less likely to have successful ECV procedure. Flexed, non-engaged presenting breech emerged as significant pre-procedural predictor of ECV in our study. Prior studies that included this variable (non-engagement of breech)<sup>10-13</sup> were associated with good success rate. ECV at 35-36 weeks when the breech is not engaged and foetal weight is less has 80% success rate.<sup>14</sup> Concomitantly, the spontaneous reversion rate is approximately 16%. Reason being the

pre-term foetus with relatively small size has more room to be turned and can revert on its own. At term the success rate falls to 63% but the reversion rate improves to 6–7%.<sup>15</sup> The early ECV2 currently in progress, will test hypothesis that ECV earlier in pregnancy will result in good success rate because of decreased likelihood of breech engagement and thus reducing caesarean section rate.<sup>16</sup>

We performed the procedure at 37 weeks or beyond considering that most spontaneous versions will already have occurred, other pregnancy problems such as pre-eclampsia will be apparent, in the event of complications, the rapid delivery of a mature foetus can be undertaken, and iatrogenic preterm complications of ECV (rupture of membranes, preterm labour, vaginal bleeding) can be avoided.

Among the engaged breeches, 10 women had successful version. These were manually disengaged abdominally by gentle pressure on both sides of presenting breech. Moreover 10–20 degree Trendelenberg position also facilitated cephalad displacement of breech. Vaginal elevation of the presenting breech was not recommended as part of our study protocol, though it was used in other studies<sup>17,18</sup> and may be successful for enhancing success when the breech is engaged. Contrary to Lau *et al*<sup>19</sup> which showed that position of legs in breech foetus whether extended or flexed made less difference in the success of ECV, present study showed significant relationship of flexed breech with ECV procedure. The study results also depict that ECV is more likely to succeed with  $\leq 2$  attempts, whereas failure increased with further attempts. Reason behind 3 attempts in our study was to increase the probability of ECV success. Such attempts were not acceptable to our patients. Protracted and aggressive attempts lead to maternal discomfort, lesser cooperation, and high pain scores which is reported as 5% in some studies.<sup>20,21</sup> Contrary to our findings, parity and amniotic fluid index were also the major determinants of success in another study.<sup>22</sup>

Anxious women, obese/thick abdominal wall, tense irritable uterus, and anterior cornual placental location were associated with higher failure. All these factors contributed to difficulty in palpating, repositioning and guiding the foetal poles. Ultrasound helped to overcome many difficulties during the procedure in obese women. Besides the factors included in our study, many other factors may also contribute to ECV success. A recent meta-analysis examining sixteen studies determined that epidural analgesia and tocolysis significantly improved ECV success rates when compared to controls.<sup>23</sup> However there is no definitive evidence of a benefit from the use of spinal analgesia, vibroacoustic stimulation or transabdominal amnioinfusion.<sup>24</sup> Despite current knowledge of factors influencing probability of successful ECV<sup>23</sup> no single

scoring system has been developed that accurately predicts ECV success.<sup>25</sup>

Careful evaluation of individual predictors can optimise patient selection and success rate. During the procedure relaxed uterus allows the version to proceed with less physical effort and less patient discomfort. Relaxed uterus can also be achieved by administration of tocolytics. Here in our study protocol we did not use tocolytics.

## CONCLUSION

Flexed, non-engaged breech, and posterolateral placental location were the significant predictors of success of ECV. Procedure was also significantly successful with one or two attempts. However successive attempts at ECV lead to failure. Careful evaluation of the factors that influence success make this simple procedure safer.

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