ORIGINAL ARTICLE

Introducing external cephalic version in a Malaysian setting

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Objective To assess the outcome of external cephalic version for routine management of malpresenting foetuses at term.

Design Prospective observational study.

Setting Tertiary teaching hospital, Malaysia.

Patients From September 2003 to June 2004, a study involving 41 pregnant women with malpresentation at term was undertaken. An external cephalic version protocol was implemented. Data were collected for identifying characteristics associated with success or failure of external cephalic version.

Main outcome measures Maternal and foetal outcome measures including success rate of external cephalic version, maternal and foetal complications, and characteristics associated with success or failure; engagement of presenting part, placental location, direction of version, attempts at version, use of intravenous tocolytic agent, eventual mode of delivery, Apgar scores, birth weights, and maternal satisfaction with the procedure.

Results Data were available for 38 women. External cephalic version was successful in 63% of patients; the majority (75%) of whom achieved a vaginal delivery. Multiparity (odds ratio=34.0; 95% confidence interval, 0.67-1730) and high amniotic fluid index (4.9; 1.3-18.2) were associated with successful external cephalic version. Engagement of presenting part (odds ratio=0.0001; 95% confidence interval, 0.00001-0.001) and a need to resort to backward somersault (0.02; 0.00001-0.916) were associated with poor success rates. Emergency caesarean section rate for foetal distress directly resulting from external cephalic version was 8%, but there was no perinatal or maternal adverse outcome. The majority (74%) of women were satisfied with external cephalic version.

Conclusions External cephalic version has acceptable success rates. Multiparity, liquor volume, engagement of presenting part, and the need for backward somersault were strong predictors of outcome. External cephalic version is relatively safe, simple to learn and perform, and associated with maternal satisfaction. Modern obstetric units should routinely offer the procedure.

Introduction

Breech presentation and, less commonly, oblique and transverse lie occur in 3 to 4% of pregnancies at term.[1-3] Planned caesarean section is safer for the baby than planned vaginal breech delivery for term breech foetuses in extended or flexed presentations.[4] Compared to vaginal breech delivery, caesarean section reduced perinatal mortality, late neonatal mortality, and serious neonatal morbidity by two thirds.[4] Hence, caesarean section is the preferred and more commonly used mode of delivery for otherwise uncomplicated breech presentations at term. However, caesarean section is associated with higher maternal morbidity and mortality as well as financial costs and long-term complications than vaginal delivery per se.[5]

External cephalic version (ECV) is another option for foetuses with breech presentation at term. A meta-analysis of six randomised controlled trials has found it effective in reducing the number of vaginal breech deliveries by 87% and caesarean sections by 64%.[2] No significant increase in foetal or maternal mortality or morbidity following ECV has been found, though numbers may have been too small to reliably detect changes in perinatal morbidity or mortality.[6] The American College of Obstetricians and Gynecologists[7] and Royal College of Obstetricians

Key words
Breech presentation; Obstetric surgical procedures; Patient satisfaction; Pregnancy outcome; Version, fetal

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and Gynaecologists[1] recommend that ECV be offered to all suitable women at term with breech presentation.

Despite these recommendations, recent surveys of pregnant women having foetuses with breech presentation at term were not offered ECV or were not made aware of this option by their obstetric carers.[8-10] This was also noted in our hospital before this study was carried out, with some consultants performing ECV occasionally. In our setting most junior staff were not familiar with the technique and had never performed it, which was similar to findings from a recent survey in England.[11]

This study aimed to assess the effectiveness and safety of ECV for the routine management of malpresentations (mainly breech) at term and assess factors that influence success as well as women's views about the procedure in general. This study was also designed to enable junior staff to learn how to perform ECV.

在馬來西亞推展體外迴轉術

目的 評估體外迴轉術作為足月異位分娩胎兒的常規治療程序的效果。

設計 前瞻性觀察研究。

安排 馬來西亞大專教學醫院。

患者 研究由2003年9月至2004年6月進行，期間診治了41名出現足月異位分娩的孕婦。她們接受體外迴轉術治療方案，並收集數據以確定各項治療成敗的相關因素。

主要結果測量 孕婦及嬰兒雙方的結果測量，包括體外迴轉術成功率、雙方出現的併發症、成敗相關的特點；分娩位置的固定、胎盤位置、迴轉方向、迴轉的嘗試、使用靜脈注射產科藥物、最終分娩方式、阿普加嬰兒評分、出生重量和孕婦對過程的滿意程度。

結果 共收集38名孕婦的數據。63%患者成功進行體外迴轉術，當中大部分（75%）透過陰道分娩。再分娩（比數比=34.0；95%置信區間，0.67-1730）和高羊水指數（4.9；1.3-18.2）與成功的體外迴轉術相關；分娩位置的固定（比數比=0.0001；95%置信區間，0.00001-0.001）和最終需要反向迴轉（0.02；0.00001-0.916）的情況則顯示甚低的成功率。8%孕婦因體外迴轉術直接導致胎兒情況不穩而須緊急剖腹分娩，但這對圍產期或孕婦沒有壞影響。大部分孕婦（74%）對體外迴轉術表示滿意。

結論 體外迴轉術的成功率可以接受。醫生可以從多項因素如孕婦是否再分娩、羊水量、分娩位置的固定和是否要反向迴轉等情況，推測體外迴轉術的結果。體外迴轉術是相對安全、容易學習和使用的療法，孕婦亦對效果表示滿意。現代產科部門應常規進行此程序。

Methods

Study design

This was a prospective observational study conducted over the period September 2003 and June 2004 inclusive. Patients attending the antenatal clinic at the Tenku Ampuan Afzan Hospital, Kuantan, Pahang, Malaysia were recruited. External cephalic version was performed at or after 37 weeks. The Research Centre of the International Islamic University of Malaysia including its Ethics Committee approved and funded the study. An ECV protocol was created and implemented, based on the author's prior experience in other units and from published protocols and guidelines.[7]

All suitable patients with uncomplicated malpresenting foetuses at term were offered ECV. Malpresentation included all forms of breech, oblique, and/or transverse lie. Standard exclusion criteria were as proposed by the American College of Obstetricians and Gynecologists[7] and Myerscough.[12]

A detailed ultrasound scan helped confirm malpresentation and exclude contra-indications to ECV. Informed consent was obtained after counselling each patient about the diagnosis and risks of malpresentation, the nature and risks of ECV, its timing, predicted success rate (50%), and alternative options (elective caesarean section or assisted vaginal breech delivery) if ECV failed. The patient was admitted after fasting overnight, intravenous access was secured, blood was typed and screened, and operating theatre personnel were placed on standby. A cardiotocogram (CTG) and an ultrasound were performed, and if findings from these tests were non-reassuring or revealed contra-indications to ECV, the procedure was abandoned in favour of caesarean section. If not, tocolysis using intravenous terbutaline (250 μg diluted in 5 mL of normal saline infused over 30 seconds) was given selectively to patients with a tense uterus. Blood pressure and pulse were checked before and after ECV.

The technique of ECV was as described by Myerscough.[12] Forward somersault was tried first and then backward somersault if version was difficult. If the version did not occur within 15 minutes, the procedure was abandoned. Ultrasound was used selectively for cases requiring a pause during the version to check on foetal heart rate. Otherwise ECV was completed in one continuous torque without loss of momentum. The procedure was also abandoned if ECV was: (i) causing unbearable pain to the patient, (ii) could not be achieved easily, or (iii) foetal bradycardia was noted.

Anti-D immunoglobulin was given to Rhesus-negative individuals after ECV. Patients with a successful version were discharged if they had a satisfactory CTG to await natural labour or were offered a stabilising induction (if they had an unstable lie). Failed ECV patients were offered either an emergency caesarean section or a trial of assisted vaginal breech delivery (not chosen by any patient). An emergency section was also performed for any foetal or maternal complications resulting from ECV.

Analysis of data and outcome measures

Non-parametric tests were used for statistical analysis

TABLE 1. Characteristics of patients in whom external cephalic version was successful or failed

	External cephalic version		P value*
	Successful Median (IQR†)	Failed Median (IQR)	
Maternal age (years)	29 (27-33)	27 (24-30)	0.118
Birth weight (kg)	3 (2.9-3.4)	2.9 (2.8-3.3)	0.513
Amniotic fluid index (cm)	12 (11-13)	10.3 (10-10.8)	0.002

* Mann-Whitney *U* test
† IQR denotes interquartile range

TABLE 2. Factors associated with the success of external cephalic version

Factor	Success rate No. (%)	P value
Parity		0.035*
Primipara	5/13 (38)	
Multipara	19/25 (76)	
Engagement		0.004†
No	24/33 (73)	
Yes	0/5 (0)	
Placentation		0.002*
Anterior upper segment placenta	5/15 (33)	
Fundal or posterior upper segment placenta	19/23 (83)	
Somersault direction		0.002*
Forward only	19/23 (83)	
Backward and forward	5/15 (33)	
Intravenous tocolytic		0.014†
Used	15/29 (52)	
Not used	9/9 (100)	
Type of malpresentation		0.410*
Extended breech	12/20 (60)	
Others	14/18 (78)	
Pushing attempts		0.216†
Once	7/8 (88)	
>Once	17/30 (57)	
Maternal satisfaction		0.0001†
Yes	23/28 (82)	
No	1/10 (10)	

* Chi squared test
† Fisher's exact test

including the Mann-Whitney *U* test for descriptive data, Pearson's Chi squared and Fisher's exact tests for univariate analyses, and logistic regression for multivariate analysis of factors associated with successful ECV. All statistical analyses were performed using the Statistical Package for the Social Sciences (Windows version 13; SPSS Inc, Chicago [IL], US).

Maternal and foetal outcome measures included success rate of ECV, maternal and foetal complications, and characteristics associated with success or failure including maternal age, parity, amniotic fluid index (AFI), engagement of presenting part, placental location, direction of version, attempts at version, use of intravenous tocolytic agent, eventual mode of delivery, Apgar scores, birth weights, and maternal satisfaction with the procedure.

Results

There were 6570 deliveries during the study period. Among these, 228 (3.5%) patients had malpresentations, of which 41 (18%) consented to undergo ECV, but three were excluded from the analysis due to irretrievable data. Details regarding the numbers of women with malpresentation who were offered ECV, trial of vaginal breech delivery, or elective caesarean section were unavailable. Of the 228 women, 177 (78%) delivered by caesarean section, 33 (14%) had breech vaginal deliveries, and 18 (8%) had cephalic vaginal deliveries due to successful ECV. Initially all ECVs were performed by the author; subsequently 60% cases of ECV were done by junior trainees who had mastered the technique after witnessing or being supervised on about six cases. There was no overall difference in success rates between the author and the trainees once the latter had mastered the technique. All trainees regarded ECV as relatively easy to learn and practise.

Patient and antenatal characteristics

The median maternal age was 29 (interquartile range [IQR], 25-33) years and median parity was 1 (IQR, 0-3). Approximately two thirds of our patients were multipara. All were beyond 37 weeks' gestation with one post-dates at 41 weeks and 3 days. The majority (92%) had breech presentations including 20 that were extended, 14 flexed, and one footling. Two (5%) were oblique breech lies and one (3%) had a transverse lie. The majority of patients had an unremarkable antenatal course. Two patients had a history of bronchial asthma (in remission), and three had gestational diabetes mellitus controlled by diet. One patient had mild pregnancy-induced hypertension and another had mild nutritional anaemia. All patients were Rhesus blood group positive.

There were no significant differences between maternal age or birth weights in women with a successful or failed attempt at ECV. For patients who failed ECV, their AFI ranged from 8.3 to 13.7 cm; for patients who successfully underwent ECV, their AFI ranged from 9.1 to 14.6 cm. Thus, those in whom it succeeded had a higher median value than those in whom it failed (Table 1), though all 38 patients had normal AFIs (reference range of AFI at term: 6.8-19.6 cm[13]) with a median of 11. Multiparity, non-engagement of the presenting part, a fundal or posterior upper segment placenta, and need for forward somersault alone were all significantly associated with success of ECV. Conversely, the type of malpresentation and number of ECV attempts were not significant factors (Table 2).

TABLE 3. Factors predictive of success or failure of external cephalic version*

Predictive factors	Coefficient	OR	95% CI
Amniotic fluid index	1.588	4.9	1.31-18.23
Parity	3.527	34.0	0.67-1730
Engagement	-12.45	0.0001	0.00001-0.001
Backward somersault	-3.89	0.02	0.00001-0.916

* Based on logistic regression analysis

Effect of tocolysis

The number of women who received tocolysis was 29; they included 12/13 nullipara of which four (33%) achieved successful ECV and 17/25 multipara of which 11 (65%) achieved success. Among the remaining nullipara and multipara who did not receive tocolysis, all nine (100%) achieved successful ECV. Thus, use of tocolysis was significantly associated with failure (P=0.014, Table 2).

Multivariate logistic regression analyses of the statistically significant variables further singled out the most significant factors to high AFI and multiparity, which strongly predicted successful ECV. In contrast, engagement of presenting part and need for backward somersault strongly predicted failure (Table 3). Resort to a backward in addition to a forward somersault was associated with a 40% lower success rate. Nor did the addition of tocolysis to this procedure have any obvious impact. Backward somersault was not performed for some patients for whom the forward manoeuvre failed, because the operator felt it was not feasible or the patient was unwilling to tolerate further pain due to version.

Maternal and foetal outcomes of external cephalic version

Twenty-four (63%) of the 38 patients achieved successful ECV, with lower success rates in nulliparas than multiparas (38 vs 76%). The overall caesarean section rate was 53% (20/38). Of those with successful version, 75% (18/24) achieved a vaginal delivery. The remaining six cases underwent caesarean section due to: failure of labour to progress (n=2), cord prolapse (n=1), and foetal distress (n=3; two with foetal bradycardia lasting >5 minutes immediately after ECV and one with intrapartum bradycardia). None of the patients in whom ECV failed elected to undergo assisted vaginal breech delivery though one (2.6%) actually achieved a vaginal delivery following spontaneous cephalic version. There was no reversion to malpresentation after a successful ECV. Indications for caesarean section in those in whom ECV failed were: persistent malpresentation (n=12) and foetal distress (n=1) manifesting as foetal bradycardia immediately after the procedure.

One patient had spontaneous rupture of membranes after a successful ECV which led to labour and vaginal delivery. Seven patients complained of pain during the procedure, leading to abandonment in one. There was no maternal or perinatal mortality. The numbers of male and female infants were equal. All babies had normal Apgar scores of >7 at 5 minutes. One infant was admitted to the neonatal intensive care unit for suspected meconium aspiration but was subsequently discharged uneventfully.

Maternal satisfaction

Twenty-eight (74%) women were satisfied with the attempt at ECV and would choose it again in the future if needed; in 24 the procedure succeeded. Two thirds of the women who were satisfied with ECV went on to achieve vaginal delivery. On the contrary, in nine of the 10 women dissatisfied with the ECV procedure, it had failed and so they underwent caesarean section (Table 2). The remaining patient was dissatisfied despite successful ECV, she underwent emergency caesarean section for foetal distress immediately after the procedure.

Discussion

This small study was undertaken in a tertiary hospital in Malaysia, to assess the feasibility and outcome of ECV as part of the routine management of malpresenting foetuses at term. The majority of our patients were of low socio-economic status, of high parity (highest was para 7), of Malay ethnicity, and considered to have relatively high pain thresholds. In our hospital, assisted vaginal breech delivery was still considered a reasonable mode of delivery and offered as a management option for breech presentation at term. Increasingly however, patients were advised to undergo planned elective caesareans in view of the term breech trial. Prior to this study, ECV was seldom performed by senior staff and most of our trainees had no experience with it. Initial recruitment of patients was therefore suboptimal; only 18% of women with malpresentation participated. However as preliminary results were good, the procedure was gradually accepted and increasingly offered to suitable women. Overseas research has found that women's uptake rate of ECV can be improved by education of staff.[14] Most of the results from this study were consistent with experience in ECV for term breech presentations obtained elsewhere in South-East Asia and overseas.[6,15-17]

Our ECV success rate of 63% is similar to those reported by others; quoted at approximately 50% with a range of 35 to 86%.[1,7,15-17] In keeping with others,[2,14,18] multiparity, AFI, and non-engagement of the presenting part were strongly associated with successful ECV. A placenta in the anterior upper segment was associated with a higher chance of failure than if it was in the posterior upper segment or fundally, because in the former situation the head is directly beneath it and therefore less accessible for version.[19] The favourable ECV success rate we achieved could be attributed to the fact that most patients were multiparous. It may also reflect the importance of adhering to strict patient

selection criteria for the procedure. The use of ultrasound facilitated ECV and is highly recommended.[1]

In contrast to other reports,[1,6,20] in our study selective use of tocolysis was significantly associated with failure. In a few of our patients with tense uteri, administering a tocolytic agent immediately converted impending failed ECV to a successful version, but the proportion in whom this occurred was small (52%). In contrast, all succeeded in those who did not receive tocolysis (100%), the difference being statistically significant. This apparently paradoxical finding was probably due to a sampling bias, as tocolysis was used selectively in women with tense uteri, the majority of whom were nullipara. As mentioned, nulliparity strongly predicts failure of ECV in our study. Thus, using multiple logistic regression, it was clear that tocolysis per se was not a significant independent predictor of ECV success or failure.

If a forward somersault failed, a backward somersault could be tried.[7,12] The low success rate of a backward somersault after a failed forward attempt is understandable, as the need to resort to a backward flip means that ECV was quite difficult to begin with. In other words, easy ECV usually succeeds with the first (forward) somersault, and this was also reflected in our logistic regression analysis.

Whereas 75% of patients having successful ECV subsequently achieved vaginal delivery, 25% were delivered by caesarean, which was higher than the 18% annual baseline caesarean section rate for our hospital. Our results were similar to those of another study in Hong Kong which reported vaginal delivery in 83% of women having a successful ECV, and recourse to emergency caesarean section in 17% of patients.[16] Caesareans were resorted to mainly for non-reassuring CTG findings or poor progress, which was 2.25 fold higher than the baseline rate.[16] The higher rate of caesarean section after a successful ECV is a recognised but unexplained phenomenon, very likely related to foetal and maternal factors.[16,21]

Regarding patients who failed ECV, all except one were delivered by caesarean section. Repeating ECV again at a later date after a failed first attempt, increases the overall success rate by another 17%.[14] However, this was not feasible in our setting because many of our patients were from distant villages, such that repeated travel to and from hospital would have been unaffordable. Hence, if ECV failed they were offered an emergency caesarean section or allowed to await spontaneous labour and assisted vaginal breech delivery, though none actually took up the latter option.

There were three (8%) instances of ECV-related foetal distress, which is higher than the 0.37 to 1% rates reported by others,[16,22] but eventually all had favourable neonatal outcomes. Two systematic reviews recently found that the most frequently reported foetal complication of ECV was a transiently abnormal CTG pattern (ranging from 1-47% with a mean incidence of 5.7%).[16,22] Transient foetal bradycardias usually last 5 minutes but can be as long as 1 hour.[17] Arguably, if our three foetuses in distress had been observed for longer than 5 minutes, their heart rates may have recovered and the need for caesarean section precluded.

No case of cord prolapse after an ECV was reported in a recent review.[17] However, we encountered one such patient, which nevertheless resulted in a good neonatal outcome following an emergency caesarean section. In our series there were no significant perinatal or maternal complications. Uncommon complications reported in the literature are very rare and include: foetomaternal haemorrhage (3.7%), vaginal bleeding (0.5%), persisting pathological CTG readings (0.4%), and placental abruption (0.1-0.4%).[16,22] Therefore ECV can be considered a safe procedure.[1,2,7,14,16,17,22]

The majority (74%) of our patients were satisfied with ECV and would have it again if needed. In most of these women (86%) the procedure had succeeded, but some in whom it had failed also held this view. In 90% of those who were dissatisfied, the procedure had failed. Thus, patient satisfaction with the procedure appeared linked to having a good chance of achieving vaginal delivery and avoiding caesarean section. In addition, the opportunity to take an active part in management decisions provided a sense of control and satisfaction, even if ECV failed (as in four of our patients). Consistent with our experience, a review of the literature on maternal perception of ECV suggests that women would likely be satisfied with it, so long as it was tolerable, safe, efficacious, and associated with a reasonably good chance of vaginal delivery.[9,23,24]

Major limitations of our study were the small sample size and missing records. Also, racial factors have been shown to influence ECV success rates,[14,18] which inevitably limits the generalisability of our findings to other populations. Unlike other published reports,[2] this study did not demonstrate a significant reduction in caesarean section rates after ECV. This could be partially due to the low (18%) recruitment rate, whether due to women with malpresentations being undiagnosed, uninformed, unsuitable, or unwilling. The other reason may have been the perceived availability of vaginal breech delivery in our unit. We estimated that vaginal breech delivery alone would reduce the caesarean section rate by 15%, which is greater than the 8% reduction associated with ECV alone. Hence, any benefits of ECV in terms of reduced caesarean section rates were more than offset by vaginal breech deliveries. However, no data are available regarding the outcome of neonates resulting from vaginal breech delivery. Hence, a second clinical audit is to be conducted to compare corresponding outcomes to allow the full impact of a universal ECV policy to be evaluated.

Unlike for breech presentation, there are no randomised trials on the management for transverse or oblique lie.[6] These latter cases were included in our study because we assumed that ECV can be applied

to all suitable malpresentations. We encountered only three such patients, all of whom had successful ECV, but no conclusions can be drawn regarding this issue owing to the very small numbers.

Conclusions

External cephalic version was successfully introduced in a Malaysian hospital; its efficacy was comparable to that in other countries. Multiparity and high AFI were strong predictors of a success, whereas engagement of the presenting part and the need for backward somersault were strong predictors of a failure. It is a relatively safe procedure, simple to learn and perform, and it is associated with a high maternal satisfaction rate. All modern obstetric units should offer ECV to suitable women at term with malpresentation.

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