

## Original Article

## Clinical score for the outcome of external cephalic version: A two-phase prospective study

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**Aim:** To design a score based on clinical parameters to predict the outcome of external cephalic versions (ECVs) at term.

**Materials and Methods:** A two-phase study was conducted (analysis/design and prospective validation) regarding 1000 versions performed between March 2002 and November 2010. The variables considered in the score were selected based on the results of multiple logistic regression models and multiple correspondence analyses published by our group. The predictive capacity was estimated through the area under the ROC curve.

**Results:** The success rates for ECV in phases 1 and 2 were 52.2 and 51.2%, respectively, making the overall success rate 51.7%. The score was designed with the variables parity, placental location, breech variety and amount of amniotic fluid giving a value for each one. A clinical recommendation, based on the result of the score, was the estimated success rate with the 95% confidence interval. The predictive capacity of the score for the outcome of ECV at term was 70.1% (95% CI 66.9–73.4).

**Conclusions:** A score composed of four easily measurable variables enabled us to predict the outcome of ECV at term.

**Key words:** breech presentation, predictive value of test, pregnancy complications, version fetal.

## Introduction

External cephalic version (ECV) is a procedure used to rotate the fetal presenting part from breech to cephalic presentation. This procedure, which has been known for centuries now, has received much attention in recent times as a result of the publication of the 'Term Breech Trial'<sup>1</sup> results, on the one hand, and of the predominant use of caesarean section as preferred mode of delivery in breech presentations, on the other. Although both the Cochrane Collaboration<sup>2</sup> and the major scientific societies<sup>3–5</sup> recommend its use and inclusion in care protocols, its implementation in medical centres is discreet and its degree of acceptance among patients remains low.

The aim of this study is to define and validate a score that is based on clinical parameters and that can help to predict the success of ECV in breech presentations at term.

## Material and Methods

The study was performed in Cruces University Hospital, Spain. The centre is a reference for obstetric pathology and deliveries. The management of the breech presentation in the hospital includes ECV, and two obstetricians with experience perform the technique. A two-phase study was designed. In the first phase, the score was developed following a prospective analysis of the factors associated with the success rate of ECV for breech presentation at term in 500 women by our group.<sup>6</sup> According to multiple regression logistic analysis, the variables associated with success were parity, placental location, amount of amniotic fluid and type of breech. Variables not significantly associated with success were maternal age, weight, BMI and previous caesarean delivery. The second phase of the study was a prospective internal validation of the score. This phase was developed with 500 ECV from 1 April 2008 to 30 November 2010. Finally, we analysed the total 1000 ECV (first phase + second phase) to ascertain the predictive ability. Statistical analysis was carried out using SPSS v.19 statistical software (IBM, Armonk, NY, USA). The predictive capacity of the score was calculated with the area under the ROC curve. The 95% confidence interval (CI) of the success prediction was calculated by Fisher's test. The study's design was approved by our Hospital's Research Ethics Committee (CEIC E06/28 Code).

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## Results

In the first phase, the score was designed with the variables parity, placental location, amount of amniotic fluid and type of breech following the results of our group.<sup>6</sup> According to the multiple logistic regression analysis of this study (Table 1), a value was assigned to each variable based on the value of the coefficient of regression. The index score was obtained by adding the values of all four variables. Table 2 shows the design of the score for the outcome of ECV. Table 3 shows the success rates associated with the scores obtained by the 500 ECV. The area under the ROC curve indicated that predictability was 73.8% (95% CI, 69.5–78.2). The success rate of ECV in the first phase was 52.2%.

In the second phase, the data regarding the following 500 ECV procedures were collected prospectively to carry out a prospective validation of the score. Table 3 showed a similar distribution in the prediction by scores. The area under the ROC curve showed that the predictability remained at 66.9% (95% CI, 62.2–71.6). The success rate of ECV in the

**Table 1** Multiple logistic regression analysis of external cephalic version at term<sup>6</sup>

|                          | Adjusted OR | 95% CI     |
|--------------------------|-------------|------------|
| Parity                   |             |            |
| Primiparous              | 1           |            |
| Biparous                 | 3.74        | 2.37–5.90  |
| Triparous or more        | 4.82        | 1.69–13.73 |
| Placental location       |             |            |
| Anterior                 | 1           |            |
| Fundal lateral           | 1.35        | 0.69–2.62  |
| Posterior                | 2.85        | 1.87–4.36  |
| Type of breech           |             |            |
| Frank                    | 1           |            |
| Complete                 | 1.83        | 1.14–2.93  |
| Incomplete               | 0.96        | 0.49–1.89  |
| Double footling          | 2.77        | 1.16–6.62  |
| Amount of amniotic fluid |             |            |
| Low                      | 1           |            |
| Normal                   | 2.30        | 0.99–5.31  |
| Abundant                 | 7.44        | 1.55–35.65 |

**Table 2** Predictive index for the outcome of external cephalic version at term

|                          | 1                | 2              | 3               | 4                 |
|--------------------------|------------------|----------------|-----------------|-------------------|
| Parity                   | Primiparous      |                | Biparous        | Triparous or more |
| Placental location       | Anterior         | Fundal lateral | Posterior       |                   |
| Type of breech           | Frank incomplete | Complete       | Double footling |                   |
| Amount of amniotic fluid | Low              | Normal         |                 | Abundant          |

second phase was 51.2%. The statistical analysis with 1000 ECV procedures showed that the predictability was 70.1% (CI 95%, 66.9–73.4). The global success rate for ECV was 51.7%.

Prediction of success based on ECV score was obtained by grouping the results in three categories (Table 4). The estimated success rate and the confidence interval were given for each category.

## Discussion

Since the beginning, our goal was to design a score that could be a useful tool for clinical practice. For this reason, the variables considered are those that could be easily obtained and are part of routine clinical practice in pregnancy. The four variables included in the score are obtained from the third trimester pregnancy ultrasound and patient parity. Once the variables are obtained, calculating the score is simple, because it does not require complex calculations and its interpretation is simple.

The variables included, maternal parity, placental location, amount of amniotic fluid and breech variety, were selected based on a prospective multiple regression analysis of the factors associated with the success rate of ECV for breech presentation at term. With this analysis, we obtained the adjusted odds ratio for each variable introduced in the model

**Table 3** Index prediction by scores obtained in different phases of the study

| First phase |                           | Second phase |                           | 1000 ECV (first phase + second phase) |                           |
|-------------|---------------------------|--------------|---------------------------|---------------------------------------|---------------------------|
| Score       | Success (%)               | <i>n</i>     | Success (%)               | <i>n</i>                              | Success (%)               |
| 4           | 9.1                       | 11           | 37.5                      | 8                                     | 21.1                      |
| 5           | 29.8                      | 84           | 32.5                      | 117                                   | 31.3                      |
| 6           | 24.2                      | 62           | 39.1                      | 64                                    | 31.7                      |
| 7           | 51.4                      | 175          | 54.9                      | 162                                   | 53.1                      |
| 8           | 71.2                      | 66           | 60.4                      | 48                                    | 66.7                      |
| 9           | 76.3                      | 59           | 66.7                      | 60                                    | 71.4                      |
| 10          | 92.3                      | 26           | 82.9                      | 35                                    | 86.9                      |
| 11          | 84.6                      | 13           | 67.7                      | 6                                     | 78.9                      |
| 12          | 75.0                      | 4            | –                         | –                                     | 75.0                      |
| ROC area    | 73.8% (95% CI, 69.5–78.2) |              | 66.9% (95% CI, 62.2–71.6) |                                       | 70.1% (95% CI, 66.9–73.4) |

ECV, external cephalic version.

**Table 4** Prediction of success based on score of external cephalic version (ECV) index

| Score of ECV Index | <i>n</i> = 1000 (%) | Success rate (%) | Fisher's 95% CI |
|--------------------|---------------------|------------------|-----------------|
| 4–6                | 346 (34.6)          | 30.9             | 26.1–36.1       |
| 7–8                | 451 (45.1)          | 56.5             | 51.8–61.2       |
| 9–14               | 203 (20.3)          | 76.8             | 70.4–82.5       |

of the multiple regression analysis. This study was made by our group with 500 ECV and published previously.<sup>6</sup>

There are other factors that can affect the ECV success rate, but they are more difficult to measure, such as the height of fetal presentation, fetal pole palpation, degree of fetal engagement and uterine tone on palpation. These variables were studied by Lau *et al.*,<sup>7</sup> who concluded that they were associated with ECV success, together with Wong,<sup>8</sup> who included them in his predictive score. Because of these factors' characteristics and to the lack of homogeneous criteria for their measurement, it is difficult to estimate their influence on the success rate and almost impossible to include them in a score that can be used by obstetricians who are not experts in this procedure.

We recommend ECV for breech presentation at term. In spite of the clear advantages of ECV and our recommendation, some women are reluctant to undergo this procedure because of the lack of prior information regarding the procedure, because of its low success rate or because of the false belief that caesarean birth does not cause complications. In this subgroup of women this score can be a useful tool in decision-making, given that it individualises success probabilities. If the score of ECV index is 7 or 8, the success rate prediction is 56.5%, and if it is 9 or more, the success is 76.8%. On the other hand, if the score is 6 or less, the success rate is 30.9%. We speculate that the individualised success rates could assist decision making in women who are reluctant to consider ECV as an option.

There are several authors<sup>7–11</sup> who have developed statistical studies of greater or lower complexity to predict ECV success rate. Most base their studies on logistic regression analysis, but do not design a predictive score. A clinical score was developed by Newman,<sup>12</sup> and it includes the following variables: parity, estimated fetal weight, placental location, cervical dilatation and height of presentation. The inclusion of the 'estimated fetal weight' variable by this author was carried out by categories, although the discriminatory points are not explained in his study. Our group conducted study to investigate the relation between the fetal estimated weight and the success of ECV.<sup>13</sup> Based on the results of this study, the fetal estimated weight was not associated with the success of ECV, and so this variable was not included in the prediction score of ECV success. We believe that other variables included in Newman's score as cervical dilatation and presentation height should not be part of the score, given that their measurement is subjective, and that they entail an examination that is not routinely performed at that week of gestation.

Our study develops a predictive score for the outcome of ECV at term that can be used by obstetricians as a simple tool in clinical decision-making. We found that parity, placental location, breech variety and amount of amniotic fluid are variables associated with ECV success.

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