Received: 18 April 2024 | Revised: 30 May 2024 | Accepted: 3 June 2024 | Published online: 16 June 2024

DOI: 10.1002/ijgo.15738

CLINICAL ARTICLE

Obstetrics

External cephalic version following prior cesarean delivery: A comparative cohort analysis

Javier Sánchez-Romero[1,2] | Rosa María Gallego-Pozuelo[1,2] | Hajar Dahmouni-Dahmouni[2] | José Eliseo Blanco-Carnero[1,2] | Fernando Araico-Rodríguez[1] | Javier Herrera-Giménez[1] | Alberto Rafael Guijarro-Campillo[1] | Aníbal Nieto-Díaz[1,2] | Katy de Paco[1,2]

[1]Department of Obstetrics and Gynecology, Clinic University Hospital "Virgen de la Arrixaca", Murcia, Spain

[2]Department of Obstetrics, Gynecology, Surgery and Pediatrics, University of Murcia, Murcia, Spain

Correspondence
Aníbal Nieto-Díaz, Department of Obstetrics and Gynecology, "Virgen de la Arrixaca" University Hospital, Crtra. Cartagena-Madrid s/n, 30120 El Palmar, Murcia, Spain.
Email: anibal.nieto@um.es

Funding information
Universidad de Murcia

Abstract

Objective: To analyze the success rate of external cephalic version (ECV) in pregnant women with a history of previous cesarean section, as well as to describe the rate of complications associated with the procedure.

Methods: A retrospective cohort study of women who were offered an ECV at "Virgen de la Arrixaca" Clinic University Hospital (Murcia, Spain) between January 2014 and December 2023. We collected data for previous cesarean delivery, obstetric history, fetal presentation, amniotic fluid volume, ECV success rate, complications related to ECV, mode of delivery, and neonatal outcomes. The study confidently performed ECV under sedation with propofol and tocolysis with ritodrine. Univariate and multivariate analyses were conducted to compare the success rate of ECV, ECV complications, and mode of delivery between women with and without previous cesarean sections.

Results: Of 1116 pregnant women who were offered ECV, 911 were included in the study, with 42 having a previous cesarean section. The success rate of ECV in pregnant women with a previous cesarean section was 78.6% (adjusted odds ratio 1.18; 95% confidence interval 0.49–2.86; $P = 0.708$), with a low complication rate of 9.5%, such as non-reassuring fetal heart rate (7.1%) or major vaginal bleeding (2.4%). Of the women who attempted a vaginal delivery after ECV, 80.8% were successful.

Conclusions: These findings support that ECV is a safe and effective option for women with a previous cesarean section, with success rates comparable to those in women without a previous cesarean section.

KEYWORDS

breech presentation, cesarean section, external cephalic version, trial of labor after cesarean section, vaginal birth after cesarean section

1 | INTRODUCTION

Non-cephalic presentation occurs in 3% of pregnancies at term.[1] Pregnant women affected can be offered an elective cesarean section (CS), vaginal breech delivery, or external cephalic version (ECV).[2] The Term Breech Trial (TBT) published in 2000 played an important role in the management of breech presentation. However, the TBT initially reported an increase in perinatal mortality with vaginal breech delivery,[3] but subsequent follow up at 2 years did not consistently support these results.[4] The publication of TBT resulted in a worldwide increase in CS rates.[5] However, the World Health Organization has expressed concern about this increase and recommended ECV as a means of reducing it.[6]

The American College of Obstetricians and Gynecologists,[7] Royal College of Obstetricians and Gynecologists,[8] and Spanish Society of Gynecologists and Obstetricians[9] all recommend vaginal birth after cesarean section (VBAC). CS increases morbidity, maternal mortality, and the risk of placenta accreta spectrum in subsequent pregnancies.[10]

A previous CS can significantly impact a woman's reproductive future, with a second cesarean delivery notably increasing the risk of uterine rupture in subsequent pregnancies.[11] To achieve safer VBAC, it is crucial to avoid a second CS.[11] ECV is the safest option for offering vaginal delivery to pregnant women with a history of CS and non-cephalic presentation.

Previous CS is a common condition in pregnant women who undergo ECV. Nevertheless, the available data are insufficient to confidently conclude that the risk is not increased.[2,12] Although propofol is a widely used agent in obstetric anesthetic management,[13] to the best of our knowledge, there is no previous publication comparing ECV results using sedation with propofol between pregnant women with and without previous CS. Further studies are needed to analyze the ECV results in pregnant women with previous CS when propofol is used as a sedative agent.

We hypothesized that there are no differences in the effectiveness and safety of ECV between pregnant women with and without a previous CS. Our study aims to analyze the success rate of ECV in pregnant women with a previous CS, as well as to describe the rate of complications associated with the procedure.

2 | MATERIALS AND METHODS

This is a cohort study conducted at the Clinic University Hospital "Virgen de la Arrixaca" (Murcia, Spain) from January 1, 2014, to December 31, 2023. Patient data were collected retrospectively from 2014 to 2020 and prospectively recruited from 2020 to 2023. Informed written consent was obtained from all prospectively recruited patients, and patient information was kept confidential. The Clinical Research Committee of the "Virgen de la Arrixaca" Clinic University Hospital (2020-5-6-HCUVA) approved this study, which adheres to the 2013 Helsinki World Medical Association Declaration.

Pregnant women with non-cephalic presentation and no contraindication for vaginal delivery were offered the ECV during week 36 of their pregnancy. Women with the following exclusion criteria were considered ineligible for the procedure: severe pre-eclampsia, confirmed rupture of membranes, recent vaginal bleeding, or an absolute indication for CS (e.g. placenta previa).

Obstetrical history and ultrasound scans were performed during the consultation to confirm fetal position, biometry, placental location, and amniotic fluid. If the patient was deemed eligible and provided informed consent, ECV was performed at 37 weeks of pregnancy.

2.1 | Procedure

The procedure was performed according to a previously published protocol.[14] All patients were instructed to fast for at least 8 h before the procedure. The procedure was performed by two senior obstetricians from the Maternal-Fetal Unit's dedicated ECV team, with over 8 years of experience in ECV and having performed more than 800 procedures during this period.[15]

The ECV procedure was performed in the operating room with the assistance of a skilled midwife and an anesthesiologist. Before the procedure, the anesthesiologist thoroughly evaluated the pregnant woman. A dose of 0.2 mg/min of ritodrine was administered for 30 min just before the ECV.

Throughout the procedure, the patient's vital signs were closely monitored, including temperature, noninvasive blood pressure, heart rate, electrocardiogram, and oxygen saturation.

The patient was placed in the Trendelenburg position (15°). Patients were given either 1–1.5 mg/kg of propofol or spinal anesthesia with 5 mg of bupivacaine and 20 μg of intrathecal fentanyl. Two obstetricians performed two ECV attempts using the forward-roll technique.[14] Subsequently, fetal position was confirmed with an ultrasound scan and fetal well-being was continuously monitored with a cardiotocograph register for the next 4 h. Anti-D was administered to Rhesus-negative women. Continuous cardiotocographic monitoring was conducted for 1 h they day after the procedure to ensure fetal well-being.

2.2 | Outcomes

The procedure was considered successful when a cephalic presentation was achieved. Any complications that arose during the first 24 h after the procedure were registered.

2.3 | Statistical analysis

Normality and homogeneity of variance of all variables were assessed using the Kolmogorov–Smirnoff and Levene tests, respectively. To compare the groups (previous CS and non-CS), unpaired

Student *t* and Mann–Whitney *U* tests were conducted for samples that followed normality and those that did not, respectively. The data are presented as mean ± standard deviation (SD). A Chi-squared test was used to compare categorical variables.

The success of ECV was the primary outcome variable, while the incidence of ECV-related complications was the secondary outcome variable. Obstetric history, anthropometric measurements, estimated fetal weight in the third trimester, placental location, and fetal presentation were compared using either Student's *t* test or Pearson's Chi-squared test to analyze the characteristics of each group.

We used a multivariable analysis logistic regression model for both groups, considering all primary and secondary outcome variables that had a *P* value less than 0.2 in bivariate analysis. The results reported include odds ratios or estimates, along with their corresponding 95% confidence intervals (CI) and *P* values. All tests were two-tailed, and the level of statistical significance was set at 0.05. The data analysis was conducted using Stata/BE 18.0 (StataCorp. College Station, TX, USA).

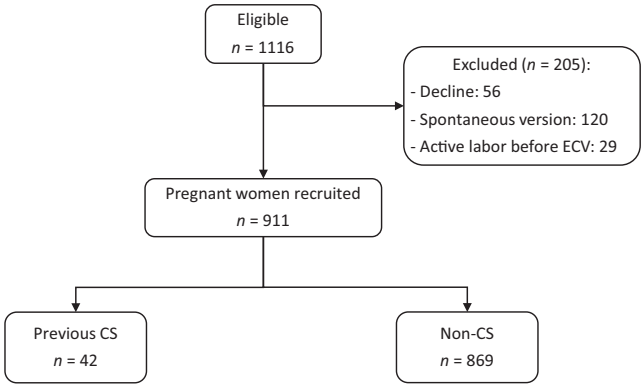

FIGURE 1 Flowchart of pregnant women included in the analysis.

3 | RESULTS

3.1 | Maternal-neonatal characteristics and clinical outcomes

During the study period, ECV was offered to 1116 pregnant women, but the procedure was declined by 56 (5.0%) of them. A spontaneous cephalic presentation before the ECV was reported in 120 (10.8%), and 29 (2.6%) pregnant women began active labour before the ECV. Ultimately, 911 (81.6%) pregnant women were included in the analysis (Figure 1). It is worth noting that only 42 (4.6%) pregnant women had undergone a previous CS, as shown in Table 1.

TABLE 1 Baseline characteristics.[a]

Variable	Total	Previous CS	Non-CS	*P* value
Age, years	33 ± 5.4	34.5 ± 5.1	32.9 ± 5.4	0.070
Nulliparity	504 (55.3%)	19 (45.2%)	485 (55.8%)	0.177
Previous CS	42 (4.6%)	42 (100%)	0 (0%)	
BMI	26.5 ± 4.9	27.2 ± 5.8	26.4 ± 4.9	0.494
Gestation at ECV, weeks	37.5 ± 0.6	37.6 ± 0.7	37.5 ± 0.6	0.267
Estimated fetal weight, g	2745 ± 383.4	2863.4 ± 330.7	2739.3 ± 385	0.046
Placental location				0.586
Anterior	528 (58%)	28 (66.7%)	500 (57.5%)	
Posterior	319 (35%)	12 (28.6%)	307 (35.3%)	
Fundal	17 (5.2%)	0 (0%)	17 (2.0%)	
Lateral wall	47 (5.2%)	2 (4.8%)	45 (5.2%)	
AF pocket, mm	50.2 ± 16.8	55.5 ± 17.3	49.9 ± 16.7	0.075
Fetal position				<0.001
Breech	837 (91.9%)	31 (73.8%)	806 (92.8%)	
Transverse lie	74 (8.1%)	11 (26.2%)	63 (7.3%)	
Analgesia				0.395
No	13 (1.4%)	1 (2.4%)	12 (1.4%)	
Deep sedation with propofol	866 (95%)	41 (97.6%)	825 (94.9%)	
Spinal anesthesia	32 (3.5%)	0 (0%)	32 (3.7%)	
ECV success rate	661 (72.6%)	33 (78.6%)	628 (72.3%)	0.371

Abbreviations: AF, amniotic fluid; BMI, body mass index (calculated as weight in kilograms divided by the square of height in meters); CS, cesarean section; ECV, external cephalic version; GDM, gestational diabetes mellitus; *n*, absolute frequency.

[a]Data are presented as mean ± standard deviation or as number (percentage).

Both groups were comparable except for the estimated fetal weight before the ECV and the fetal position. The mean ± SD age in the group with previous CS was 34.5 ± 5.1 years and it was 32.9 ± 5.4 years in the non-CS group ($P = 0.070$). The mean ± SD amniotic fluid pocket was 55.5 ± 17.3 mm in the previous CS group and 49.9 ± 16.7 mm in the non-CS group ($P = 0.075$). The estimated fetal weight before ECV was 2863 ± 330.7 g in the previous CS group and 2739 ± 385 g in the non-CS group ($P = 0.046$). Transverse lie was reported in 11 (26.2%) women in the previous CS group and in 74 (8.1%) women in the non-CS group ($P < 0.001$).

Maternal comorbidities were present in 4 out of 42 patients (9.5%) with previous CS, compared with 57 out of 864 pregnant women (6.6%) with no previous CS ($P = 0.557$). Gestational diabetes mellitus was observed in 3 (7.1%) pregnant women with previous CS and in 44 (4.8%) without CS. One case (2.4%) of gestational hypertension was reported in a woman with previous CS. Two cases (0.2%) of cholestasis, four (0.4%) of gestational hypertension, and five (0.7%) of pre-eclampsia were observed in pregnant women without previous cesarean delivery. Among the comorbidities observed, Chagas disease, maternal HIV infection with undetectable viral load, maternal hepatitis B, maternal Arnold-Chiari type 2 syndrome, and mitochondrial myopathy were reported in five women.

3.2 | External cephalic version success rate

Success rates of ECV were 78.6% in the CS group and 72.3% in the non-CS group ($P = 0.371$). In the multivariate analysis (Figure 2), the presence of a previous CS showed a non-significant adjusted odds ratio (aOR) of 1.18 (95% CI 0.49–2.86; $P = 0.708$) after adjusting for multiparity, placental location, amniotic fluid pocket, fetal position, and estimated fetal weight.

The multivariate analysis demonstrated significant differences in the following variables: multiparity (aOR 1.99; 95% CI 1.41–2.80; $P < 0.001$), amniotic fluid pocket (aOR 1.02; 95% CI 1.01–1.03; $P < 0.001$), and transverse lie (aOR 3.86; 95% CI 1.50–9.99; $P = 0.005$).

3.3 | External cephalic version complication rate

The observed period revealed that the CS group had four complications (9.5%), while the non-CS-group had 90 pregnant women (10.4%) reporting complications. The rates of ECV complications between the two groups did not show any statistically significant differences($P = 0.857$). It is worth noting that all complications were reported within 24 h following the procedure. All the complications reported are shown in Table 2. The study reported

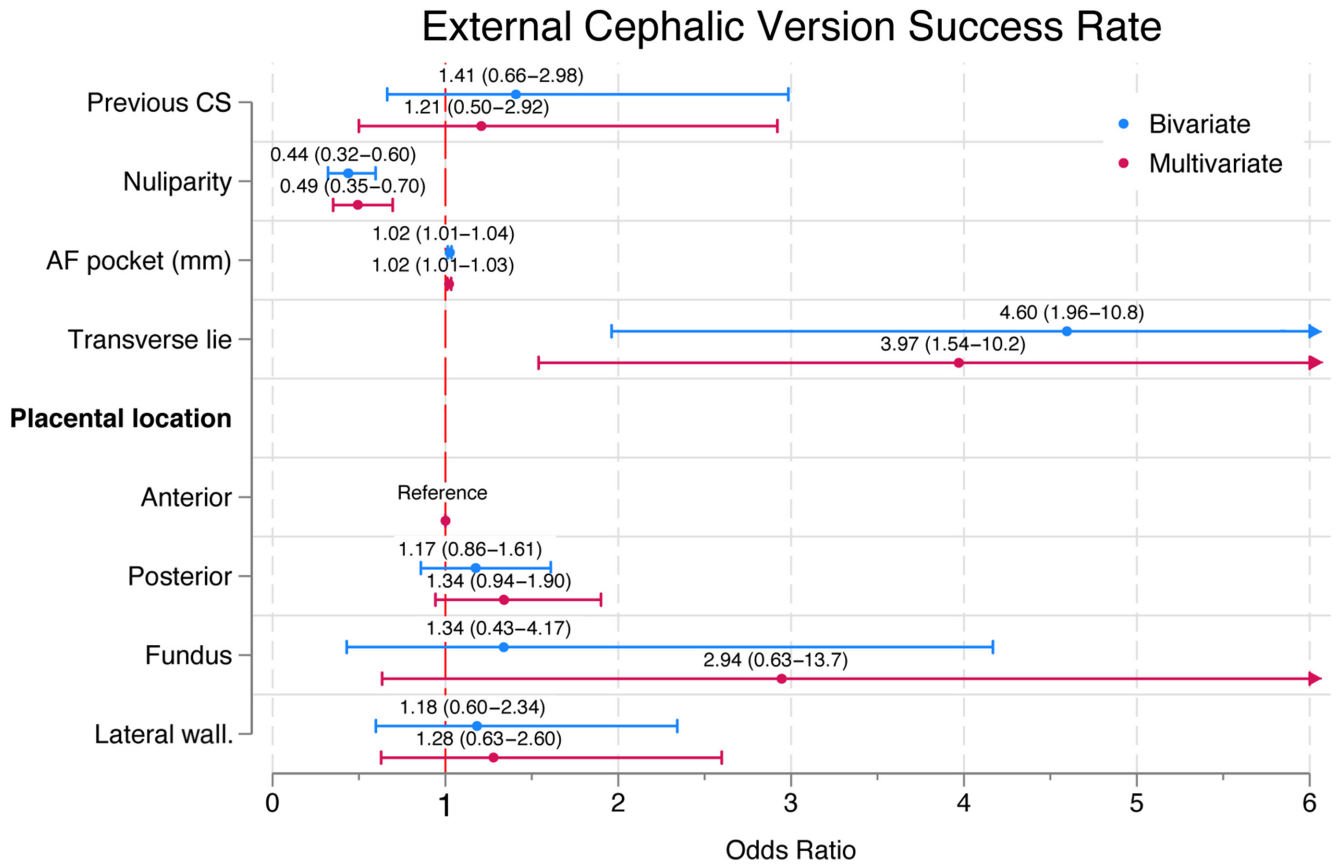

FIGURE 2 Multivariate analysis of external cephalic version success rate in pregnant women with previous cesarean section. Adjusted by previous cesarean section, multiparity, placental location, amniotic fluid pocket, and fetal position.

TABLE 2 ECV complications rate.[a]

Variable	Total	Previous CS	Non-CS	*P* value
ECV complication rate	94 (10.4%)	4 (9.5%)	90 (10.4%)	0.857
Non-reassuring FHR	37 (4.1%)	3 (7.1%)	34 (3.9%)	0.806
Major vaginal bleeding	20 (2.2%)	1 (2.4%)	19 (2.2%)	
Minor vaginal bleeding	17 (1.9%)	0 (0%)	17 (2.0%)	
Uterine contractions	11 (1.2%)	0 (0%)	11 (1.3%)	
PROM	5 (0.5%)	0 (0%)	5 (0.6%)	
Bronchoaspiration	1 (0.1%)	0 (0%)	1 (0.1%)	
Others	3 (0.3%)	0 (0%)	3 (0.3%)	

Abbreviations: CS, cesarean section; FHR, fetal heart rate; *n*, absolute frequency; PROM, premature rupture of membranes.
[a]Data are presented as number (percentage).

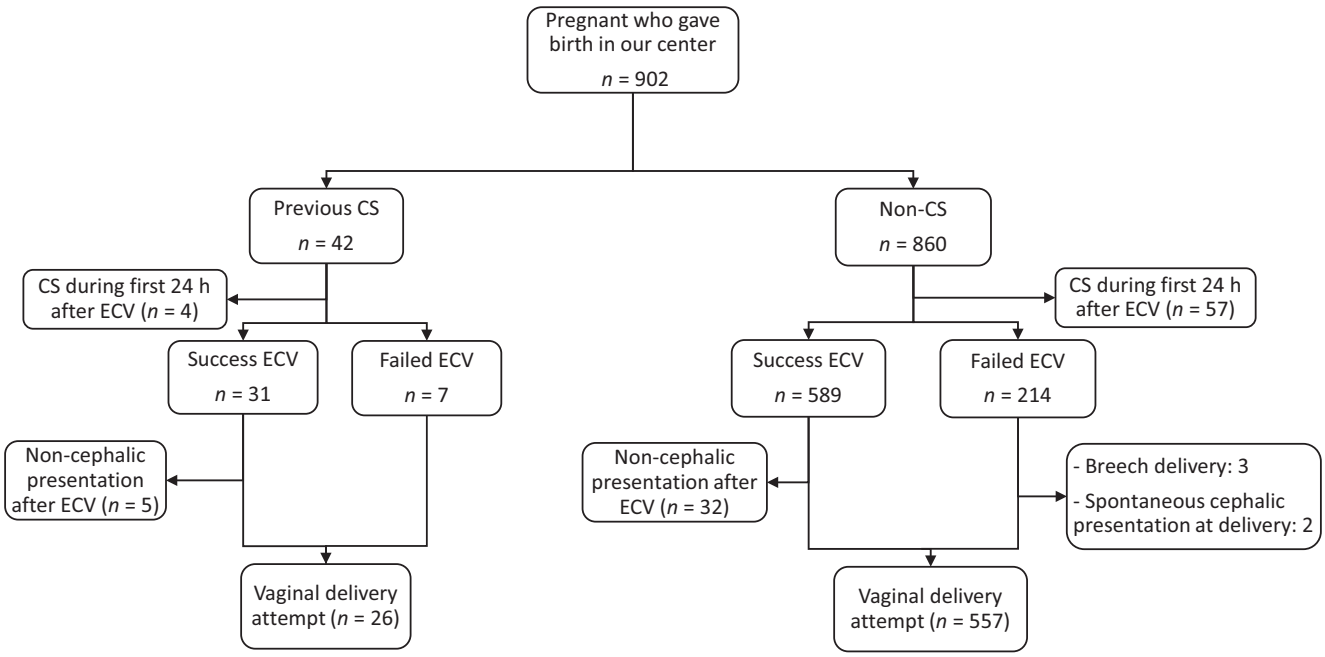

FIGURE 3 Flowchart of external cephalic version results and mode of delivery.

several severe complications, including maternal bronchoaspiration (0.10%), major vaginal bleeding (2.20%), non-reassuring fetal heart rate patterns (4.06%), and cord prolapse (0.33%).

Previous CS did not show a statistically significant association with the ECV complication rate in univariate analysis (OR 0.91; 95% CI 0.32 2.60; $P=0.857$). When it was adjusted for multiparity, estimated fetal weight, amniotic fluid pocket, and fetal position, it did not reach statistical significance (aOR 1.13; 95% CI 0.33–3.92; $P=0.847$). The only variable related to ECV complication rate was amniotic fluid pocket (aOR 0.96; 95% CI 0.94–0.98; $P<0.001$).

One woman experienced bronchoaspiration immediately after ending the ECV. She was admitted to the maternal care unit and was given antibiotics. Although cephalic presentation was achieved, a CS was performed because of the bronchoaspiration after 7 days of treatment. The female neonate had an APGAR score of 9/10 and an umbilical vein pH of 7.32. Both the woman and her newborn were discharged without any sequelae.

3.4 | Obstetrical and neonatal outcomes after ECV

During the follow-up period, only nine pregnant women (0.99%) gave birth at other centers. At our center, out of the total number of pregnant women who gave birth ($n=902$), four pregnant women with previous CS (9.5%) and 57 without previous CS (6.6%) underwent a CS within the first 24 h after the procedure (Figure 3).

Of the 249 patients who underwent ECV in our center and gave birth, only two (0.8%) had a spontaneous cephalic presentation, and three (1.2%) had a breech delivery. It is worth noting that none of these patients had a previous CS. Finally, 583 pregnant women (64.6%) attempted a vaginal delivery after ECV. Onset of labor and mode of delivery of women who attempted a vaginal delivery after ECV and neonatal outcomes are shown in Table 3. No statistically significant differences were found between the two groups.

TABLE 3 Labor onset, type of delivery, and neonatal outcomes in those pregnant women who attempted a vaginal delivery.[a]

Variable	Total	Previous CS	Non-CS	*P* value
Labor onset				0.866
Spontaneous	327 (56.1%)	15 (57.7%)	312 (56.0%)	
Induced	256 (43.9%)	11 (42.3%)	245 (44.0%)	
Type of delivery				0.840
Vaginal	473 (81.1%)	21 (80.8%)	452 (81.1%)	
Spontaneous	342 (58.7%)	14 (53.8%)	328 (58.9%)	
Operative	131 (22.5%)	7 (26.9%)	124 (22.2%)	
Urgent CS	110 (18.9%)	5 (19.2%)	105 (18.9%)	
Gestation at delivery, weeks	39.9 ± 1.2	39.5 ± 1.2	39.9 ± 1.2	0.101
Newborn weight, g	3285.8 (456.0)	3170.6 (374.3)	3291.2 (459.0)	0.188
Arterial cord pH at delivery	7.273 (0.07)	7.279 (0.08)	7.272 (0.08)	0.499
Arterial cord pH <7	0.7% (3)	0% (0)	0.7% (3)	0.709
1-min APGAR score	8.8 (0.6)	8.9 (0.4)	8.9 (0.6)	0.911
1-min APGAR score <7	3.6% (21)	3.9% (1)	3.6% (20)	0.950
5-min APGAR score	9.9 (0.5)	9.8 (0.5)	9.9 (0.5)	0.497
5-min APGAR score <7	0.7% (4)	0% (0)	0.7% (4)	0.664
Neonatal unit care admission	2.2% (13)	7.7% (2)	2.0% (11)	0.054
NICU admission	1.0% (6)	3.9% (1)	0.9% (5)	0.146

Abbreviations: CS, cesarean section; *n*, absolute frequency; NICU, neonatal intensive care unit.

[a]Data are presented as mean ± standard deviation or as number (percentage).

During the follow up, one newborn had Loucks-Innes syndrome, which resulted in neonatal death. Despite the successful ECV and spontaneous delivery, the newborn had tetralogy of and vermis agenesis, requiring admission to the neonatal intensive care unit. Despite the best efforts of the medical team, a hemodynamic collapse occurred during the admission, ultimately resulting in neonatal death. However, all the other neonates were normal at discharge.

4 | DISCUSSION

In the present study we found that the ECV success and complication rates when propofol was used as sedative agent and with tocolysis among pregnant women with a history of CS were similar to those in women without a previous CS. Therefore, the presence of a previous CS should not deter the offer of ECV to women who have a breech presentation at term.

This is the first publication that compares ECV results when propofol is used as sedative agent between pregnant women with and without previous CS. Pregnant women with previous CS seem to have the same ECV outcomes in terms of efficacy and safety.[16,17] We compared the ECV outcomes, ECV complications, mode of delivery, and perinatal outcomes between pregnant women with and without CS. The results of ECV with spinal analgesia in pregnant women with previous CS compared with the use of tocolysis have been reported previously (Table 4).[16–24] However, this is the first published study comparing ECV outcomes in patients with previous CS using tocolysis and mainly propofol as the sedative agent. Spinal anesthesia was used in only 32 (3.7%) pregnant women without previous CS.

There was no difference in ECV success rate in pregnant women with previous CS (78.6% vs 72.3%; $P=0.371$). We reported a higher ECV success rate in both groups (previous CS and non-CS) than other research groups (50%[17] and 67.1%, respectively). This difference could be explained by the fact that we used tocolysis with ritodrine and propofol as sedation, whereas these studies did not use analgesia or sedation in ECV.[16,17,25]

Some clinical characteristics were reported to be associated with a higher ECV success rate: multiparity, amniotic fluid pocket, and transverse lie. Previous CS did not reach a statistically significant relationship with ECV success rate (aOR 1.18; 95% CI 0.49–2.86; $P=0.708$). Burgos et al.[16] reported similar results (aOR 0.93; 95% CI 0.52–1.68; $P=0.820$). However, Impey et al.[17] reported a statistically significant decrease in ECV success rate (OR 0.55; 95% CI 0.36–0.84; $P=0.005$). These differences could be explained by the fact that both the present study and Burgos et al.[16] created a multivariate regression model adjusting for potential cofounders such as multiparity, fetal position, or amniotic fluid, whereas Impey et al.[17] reported a crude association.

We found some statistically significant relationships with ECV success rate: multiparity (aOR 1.99; 95% CI 1.41–2.80; $P<0.001$), amniotic fluid pocket (aOR 1.02; 95% CI 1.01–1.03; $P<0.001$), and transverse lie (aOR 3.86; 95% CI 1.50–9.99; $P=0.005$). These relationships are consistent with the results reported by Burgos et al.[16]

TABLE 4 Studies about external cephalic version in previous cesarean section.[a]

Author	Year	*n*	Tocolysis	Analgesia	Success	ECV complications	Uterine rupture	Vaginal delivery
Levin[19]	2019	37	Yes; nifedipine vs ritodrine	No	27 (73.0%)	NR	0	NR
McLaren[28]	2018	715	NR	NR	576 (80.6%)	NR	0	74.9%
Impey[17]	2018	100	Just in a second attempt; salbutamol	No	50 (50.0%)	1 (1.00%)	0	60.0%
Weill[18]>	2017	117	Yes; ritodrine	No	105 (89.7%)	0	0	89.7%
Keepanasseril[20]	2017	38	Not all, when required: terbutaline	No	32 (84.2%)	0	0	59.4%
Burgos[16]	2014	70	Yes; ritodrine	No	47 (67.1%)	0	0	52.8%
Sela[21]	2009	42	Yes; ritodrine or nifedipine.	No	31 (73.8%)	1	0	83.9%
de Meesus[22]	1998	38	Yes; ritodrine	No	25 (65.8%)	1	0	76.0%
Schachter[23]	1994	11	Yes; ritodrine	No	11 (100.0%)	1	0	54.5%
Flamm[24]	1991	56	Not all, when required terbutaline or ritodrine	No	46 (82.1%)	1	0	65.2%

Abbreviation: NR, not reported.

[a]Data are presented as number, percentage, or number (percentage).

We reported four complications (9.5%) in the previous CS group. Urgent CS was performed in these cases, and the follow up of these infants was normal. Although the complication rate of ECV reported by other groups was lower than ours, they did not use analgesia in ECV.[19,26] Other studies that used analgesia and tocolysis simultaneously in ECV reported a rate similar to ours.[27] In addition, McLaren et al.[28] reported an increased risk of maternal transfusion, unplanned hysterectomy, and low 5-min Apgar scores in pregnant women with previous CS after ECV. No uterine rupture was reported in our study, or in previously published studies.[16,17,26] A recent study analyzing patient characteristics associated with ECV complications reported no uterine rupture and no association with previous CS.[29]

Although maternal bronchoaspiration was reported, it should be emphasized that this was the only serious adverse event that occurred during the 9 years for which we have ECV records (more than 900 procedures). Although fasting for at least 8 h before the procedure is recommended, delayed gastric emptying may occur during pregnancy.[30] This case reinforces the need for rigorous preanesthesia counseling.

To our knowledge, the present study is the first to analyze the outcomes of ECV in patients with a previous CS who were sedated with propofol. Furthermore, it is one of the largest studies to compare ECV results in pregnant women with previous CS. The results demonstrate that ECV is both effective and safe in pregnant women with previous CS.

The present study supports the successful and low-risk nature of ECV in women with a previous CS. The results of this study suggest that ECV in women with a previous CS is a successful and low-risk procedure, with rates comparable to those in women without a previous CS.

This investigation is the first to explore the outcomes of ECV in patients with a history of CS who were sedated with propofol. It also ranks among the most comprehensive studies to examine ECV outcomes in pregnant women with previous CS. Although, the evidence indicates that ECV is both effective and safe for pregnant women who have undergone a CS, more prospective studies are required to reaffirm this.

This is a retrospective study, with the inherent limitations of this type of research: limited external validity, temporal ambiguity, selection bias, and the potential influence of confounders. Several strengths should be highlighted. The study recruited a large number of pregnant women. All ECV procedures were performed by the same obstetricians, anesthesiologists, and midwives who make up the ECV Working Group, with more than 7 years of experience in ECV. All procedures were performed in the operating room, where an urgent CS could quickly be performed. All the professionals who make up the ECV Working Group have been trained to manage any complications that may arise. The results were confirmed after adjusting for potential cofounders. Despite these strengths, all these results should be confirmed in further prospective research.

However, there are several limitations to the present study. An important limitation is the nature of the study design. Although this is a large study, the main weakness of this research is the limited number of pregnant women with previous CS recruited ($n=42$). Nevertheless, previous studies have reported similar numbers of patients recruited (between 11 and 158).[19,23] Another limitation is that maternal weight was measured at 12 weeks of pregnancy when the first-trimester scan was performed. Weight changes during pregnancy were not taken into account for the analysis.

In conclusion, complications of ECV in women with previous CS are uncommon. The success rate of ECV in women with previous CS was comparable to that in women without previous CS. We believe that the uterine scar should not be considered a contraindication to ECV; for this reason, ECV should be offered to women with a

previous CS with breech presentation at term. Further prospective studies are needed to confirm our findings and to develop a consensus on ECV in women with previous CS.

AUTHOR CONTRIBUTIONS

Data compilation was conducted by HD-D, RMG-P, and JS-R. JEB-C, JH-G, and FA-R funded the ECV super-specialized team in our center. Statistical analysis was executed by JS-R and KP. Technical and academic guidance were generously provided by JEB-C, AN-D, ARG-C, and KP. All the authors participated in drafting and redaction of the manuscript and approved the final version.

ACKNOWLEDGMENTS

We would like to express our appreciation for the support from the University of Murcia in covering the costs of open access publication, as well as the use of ChatGPT AI for English grammar review. During the preparation of this work the authors used ChatGPT 3.5 in order to review grammar.

FUNDING INFORMATION

The University of Murcia has reached commercial agreements with Wiley to cover the publication costs in journals from this publisher.

CONFLICT OF INTEREST STATEMENT

JS-R, JEB-C, AN-D, and KP are affiliated with the University of Murcia. This institution has covered the expenses for open access publication.

DATA AVAILABILITY STATEMENT

Data available on request due to privacy/ethical restrictions.

ORCID

Javier Sánchez-Romero https://orcid.org/0000-0002-4253-3556
José Eliseo Blanco-Carnero https://orcid.org/0000-0003-0511-3533
Alberto Rafael Guijarro-Campillo https://orcid.org/0000-0002-2831-9975
Aníbal Nieto-Díaz https://orcid.org/0000-0003-0792-7119
Katy de Paco https://orcid.org/0000-0002-0117-6388

REFERENCES

1. Hughey MJ. Fetal position during pregnancy. *Am J Obstet Gynecol*. 1985;153:885-886. doi:10.1016/S0002-9378(85)80276-3
2. Baxi L. External cephalic version: ACOG practice bulletin number 221. *Obstet Gynecol*. 2020;136:634. doi:10.1097/AOG.0000000000004076
3. Hannah ME, Hannah WJ, Hewson SA, Hodnett ED, Saigal S, Willan AR. Planned caesarean section versus planned vaginal birth for breech presentation at term: a randomised multicentre trial. *Lancet*. 2000;356:1375-1383. doi:10.1016/S0140-6736(00)02840-3
4. Whyte H, Hannah ME, Saigal S, et al. Outcomes of children at 2 years after planned cesarean birth versus planned vaginal birth for breech presentation at term: the International Randomized Term Breech Trial. *Am J Obstet Gynecol*. 2004;191:864-871. doi:10.1016/j.ajog.2004.06.056
5. Rietberg CCT, Elferink-Stinkens PM, Visser GHA. The effect of the Term Breech Trial on medical intervention behaviour and neonatal outcome in The Netherlands: an analysis of 35,453 term breech infants. *BJOG*. 2005;112:205-209. doi:10.1111/j.1471-0528.2004.00317.x
6. World Health Organization. *WHO Recommendations Non-clinical Interventions to Reduce Unnecessary Caesarean Sections*. World Health Organization; 2018.
7. ACOG Practice Bulletin No. 205. Vaginal birth after cesarean delivery. *Obstet Gynecol*. 2019;133:e110-e127. doi:10.1097/AOG.0000000000003078
8. Gupta J, Smith G, Chodankar R, Royal College of Obstetricians and Gynaecologists. *Birth After Previous Caesarean Birth*. Royal College of Obstetricians and Gynaecologists; 2015.
9. Sociedad Española de Ginecología y Obstetricia. *Parto vaginal tras cesárea*. SEGO; 2010.
10. Clark EAS, Silver RM. Long-term maternal morbidity associated with repeat cesarean delivery. *Am J Obstet Gynecol*. 2011;205:S2-S10. doi:10.1016/j.ajog.2011.09.028
11. Tahseen S, Griffiths M. Vaginal birth after two caesarean sections (VBAC-2)—a systematic review with meta-analysis of success rate and adverse outcomes of VBAC-2 versus VBAC-1 and repeat (third) caesarean sections. *BJOG*. 2010;117:5-19. doi:10.1111/j.1471-0528.2009.02351.x
12. Impey LW, Murphy DJ, Griffiths M, et al. External cephalic version and reducing the incidence of term breech presentation: green-top guideline No. 20a. *BJOG*. 2017;124:E179-E192. doi:10.1111/1471-0528.14466
13. Odor PM, Bampoe S, Moonesinghe SR, et al. General anaesthetic and airway management practice for obstetric surgery in England: a prospective, multicentre observational study. *Anaesthesia*. 2021;76:460-471. doi:10.1111/anae.15250
14. Sánchez-Romero J, García-Soria V, Araico-Rodríguez F, et al. External cephalic version: is it an effective and safe procedure? *JoVE*. 2020;160:60636. doi:10.3791/60636
15. Sánchez-Romero J, Araico-Rodríguez F, Herrera-Giménez J, et al. Effect of super-specialization in external cephalic version: a comparative study. *Clin Exp Obstet Gynecol*. 2022;49:257. doi:10.31083/j.ceog4911257
16. Burgos J, Cobos P, Rodríguez L, et al. Is external cephalic version at term contraindicated in previous caesarean section? A prospective comparative cohort study. *BJOG*. 2014;121:230-235. doi:10.1111/1471-0528.12487
17. Impey ORE, Greenwood CEL, Impey LWM. External cephalic version after previous cesarean section: a cohort study of 100 consecutive attempts. *Eur J Obstet Gynecol Reprod Biol*. 2018;231:210-213. doi:10.1016/j.ejogrb.2018.10.036
18. Weill Y, Pollack RN. The efficacy and safety of external cephalic version after a previous caesarean delivery. *Aust NZ J Obst Gynaecol*. 2017;57:323-326. doi:10.1111/ajo.12527
19. Levin G, Ezra Y, Weill Y, Kabiri D, Pollack RN, Rottenstreich A. Nifedipine versus ritodrine during external cephalic version procedure: a case control study. *J Matern Fetal Neonatal Med*. 2019;34:1-6. doi:10.1080/14767058.2019.1677589
20. Keepanasseril A, Anand K, Soundara RS. Matched cohort study of external cephalic version in women with previous cesarean delivery. *Int J Gynecol Obstet*. 2017;138:79-83. doi:10.1002/ijgo.12169
21. Sela HY, Fiegenberg T, Ben-Meir A, Elchalal U, Ezra Y. Safety and efficacy of external cephalic version for women with a previous cesarean delivery. *Eur J Obstet Gynecol Reprod Biol*. 2009;142:111-114. doi:10.1016/j.ejogrb.2008.08.012
22. de Meeus JB, Ellia F, Magnin G. External cephalic version after previous cesarean section: a series of 38 cases. *Eur J Obstet Gynecol Reprod Biol*. 1998;81:65-68. doi:10.1016/S0301-2115(98)00149-3

23. Schachter M, Kogan S, Blickstein I. External cephalic version after previous cesarean section—a clinical dilemma. *Int J Gynecol Obstet*. 1994;45:17-20. doi:10.1016/0020-7292(94)90760-9
24. Flamm BL, Fried MW, Lonky NM, Giles WS. External cephalic version after previous cesarean section. *Am J Obstet Gynecol*. 1991;165:370-372. doi:10.1016/0002-9378(91)90095-9
25. Hakem E, Lindow SW, O'Connell MP, Von Bünau G. External cephalic version—a 10-year review of practice. *Eur J Obstet Gynecol Reprod Biol*. 2021;258:414-417. doi:10.1016/j.ejogrb.2021.01.044
26. Zhang N, Ward H. Safety and efficacy of external cephalic version after a previous caesarean delivery: a systematic review. *Aust NZ J Obst Gynaeco*. 2021;61:650-657. doi:10.1111/ajo.13399
27. Unno S, Ogawa K, Nukariya A, Umehara N, Sago H. Predictive factors for successful external cephalic version with regional anesthesia. *J Obstet Gynaecol*. 2023;49:1335-1340. doi:10.1111/jog.15615
28. McLaren R, Atallah F, Fisher N, Minkoff H. Maternal and neonatal outcomes after attempted external cephalic version among women with one previous cesarean delivery. *AJP Rep*. 2018;8:e349-e354. doi:10.1055/s-0038-1676297
29. Dahl CM, Zhang Y, Ong JX, et al. Patient characteristics associated with complications of external cephalic version. *Am J Obstet Gynecol MFM*. 2021;3:100411. doi:10.1016/j.ajogmf.2021.100411
30. Simpson KH, Stakes AF, Miller M. Pregnancy delays paracetamol absorption and gastric emptying in patients undergoing surgery. *Br J Anaesth*. 1988;60:24-27. doi:10.1093/bja/60.1.24

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Sánchez-Romero J, Gallego-Pozuelo RM, Dahmouni-Dahmouni H, et al. External cephalic version following prior cesarean delivery: A comparative cohort analysis. *Int J Gynecol Obstet*. 2024;167:1066-1074. doi:10.1002/ijgo.15738