

Original Research

# Effect of Super-Specialization in External Cephalic Version: A Comparative Study

Javier Sánchez-Romero<sup>1,2,\*</sup>, Fernando Araico-Rodríguez<sup>1</sup>, Javier Herrera-Giménez<sup>1</sup>, José Eliseo Blanco-Carnero<sup>1,2</sup>, Rosa María Gallego-Pozuelo<sup>1</sup>, Aníbal Nieto-Díaz<sup>1,2</sup>, María Luisa Sánchez-Ferrer<sup>1,2</sup>

<sup>1</sup>Department of Obstetrics and Gynecology, 'Virgen de la Arrixaca' University Clinical Hospital, 30120 Murcia, Spain

<sup>2</sup>Department of Surgery, Obstetrics and Gynecology and Pediatrics of University of Murcia, 30120 Murcia, Spain

\*Correspondence: [javier.sanchez14@um.es](mailto:javier.sanchez14@um.es) (Javier Sánchez-Romero)

Academic Editor: Ugo Indraccolo

Submitted: 2 July 2022 Revised: 24 August 2022 Accepted: 26 August 2022 Published: 16 November 2022

## Abstract

**Background:** The introduction of an experienced dedicated team is not a completely studied fact. Several studies reported a high external cephalic version (ECV) success rate when the procedure is executed by a single operator or a dedicated team. This study aims to compare the effectiveness and safety of the ECV when the procedure is performed by senior experienced obstetricians or by super-specialized professionals who composed a dedicated team. **Methods:** Longitudinal retrospective analysis of ECV performed in a tertiary hospital. From 1 January 2018 to 1 October 2019, ECV were performed by two senior experienced obstetricians who composed the dedicated team for ECV, designed as Group A. From 1 October 2019 to 31 December 2019, ECV was performed by two seniors obstetricians, designed as Group B. Ritodrine was administered during 30 minutes just before the procedure. Propofol was used for sedation. **Results:** 186 pregnant women were recruited (150 patients in group A and 36 patients in group B). ECV success rate increased from 47.2% (31.7–63.2) in Group B to 74.0% (66.6–80.5) in Group A ( $p = 0.002$ ). The greatest increase in the success rate of ECV was seen in nulliparae, from 38.5% (21.8–57.6) in group B to 69.1% (59.4–77.6) ( $p = 0.004$ ). Complications rate decreased from 22.2% (11.1–37.6) in Group B to 9.3% (5.5–14.8) in Group A ( $p = 0.032$ ). **Conclusions:** The introduction of an experienced dedicated team improves ECV success rate, especially in primiparas, and it also reduces ECV complications rate.

**Keywords:** sedation; experience; ECV; breech presentation

## 1. Introduction

A breech presentation occurs in 3–4% of all pregnant women at term [1]. Since the publication of the Term Breech Trial in 2000 [2] which reported an excess neonatal mortality as a consequence of breech vaginal delivery, cesarean delivery rates have risen alarmingly [3].

External cephalic version is an effective procedure for modifying the fetal position and achieving a cephalic presentation. The purpose of the ECV is to offer a chance for cephalic delivery which is safer than breech delivery or cesarean section. The use of ECF in breech presentation, according to World Health Organization [4], reduces the incidence of cesarean section, which is interesting in those units where vaginal breech delivery is not a common practice.

ECV is commonly performed before the active labor period begins. Many factors are associated with a higher ECV success [5–7] such as black race, multiparity, posterior placenta, amniotic fluid index higher than 10 cm, or a transverse lie.

Certain interventions facilitate ECV [8] such as analgesia, tocolysis, empty bladder [9], or the introduction of a dedicated experienced team [10]. Although ritodrine is considered the safest tocolytic drug and the agent that im-

proves the most ECV success rate [8,11], other tocolytics have been also compared in ECV are atosiban [8], nifedipine [8], others beta-agonist [12] or nitroglycerine [12].

Other analgesic agents have been analyzed such as systemic opioids or spinal anesthesia. Spinal anesthesia techniques improve the ECV success rate and pain after the procedure [13–16]. No differences are reported in the ECV success rate when systemic opioids or spinal anesthesia are compared [13].

The introduction of an experienced dedicated team is not a completely studied fact. Several studies reported a high ECV success rate when the procedure is executed by a single operator [17,18] or a dedicated team [5,10,19,20]. Just one study has compared a dedicated team with non-experienced gynecologists, midwives, and residents [10].

The main objective of this study is to compare ECV results when the procedure is performed by an experienced dedicated team or by senior obstetricians who are not involved in a dedicated team. As a secondary objective, predictor factors of ECV success are analyzed in both groups. We hypothesized that an experienced dedicated team could have a higher ECV success rate and lower complication rate.



## 2. Materials and Methods

A longitudinal retrospective analysis of ECV performed in ‘Virgen de la Arrixaca’ University Clinical Hospital in Murcia (Spain) between the 1 January 2018 and the 31 December 2019 was performed. Informed written consent was obtained from all the patients under study. The confidentiality of any information about the patients was assured. No obligation on the patients to participate in the study. This study was approved by the Clinical Research Committee of the ‘Virgen de la Arrixaca’ University Clinical Hospital (2020-5-6-HCUVA). This study conforms with the 2013 Helsinki World Medical Association Declaration.

The procedure were performed by two of the four senior experienced obstetricians who composed the dedicated team for ECV in the Maternal-Fetal Unit from 1 January 2018 to 31 September 2019. In this study, this group is designed as ‘Group A’. The dedicated team for ECV in Maternal-Fetal Unit has more than 7 years of experience in ECV. More than seven hundred procedures have been carried out by this team during this period. However, the members of the dedicated team for ECV were absent between 1 October 2019 and 31 December 2019, and they were performed by two seniors obstetricians specialized in obstetrical care with 15 years of experience in delivery room. These seniors’ colleagues were not involved in the dedicated team for ECV. In this study, this group is designed as ‘Group B’.

Patients were offered the ECV during the third-trimester evaluation at 36 weeks gestation. Recruitment criteria were the same for Group A and Group B and there was no changes in ECV offering criteria during this period. ECV was proposed for every pregnant with non-cephalic presentation and no contraindication for vaginal delivery. Women were deemed ineligible in cases of severe preeclampsia, confirmed rupture of membranes, recent vaginal bleeding, and when an absolute indication for cesarean section was identified (e.g., placenta previa).

Obstetric anamnesis and ultrasound scan for assuring fetal position, biometry, placental location, and amniotic fluid were carried out in the consult.

If the patient was considered eligible and informed consent was obtained, ECV is performed at 37 weeks gestation. All patients were asked to fast at least eight hours before the procedure.

### 2.1 Procedure

ECV was performed following the same protocol in both groups [21,22]. Our group published a previous study describing the procedure [21] and analyzing the role of sedation with propofol [22]. The procedure was carried out in the operating room in the presence of a midwife and an anesthesiologist. Before ECV was performed, pregnant women were valued by the anesthesiologist. Just before the ECV, 0.2 mg/min of ritodrine was administered for 30 minutes.

In the operating room, vital signs were monitored

(Temperature, noninvasive blood pressure, heart rate, Electrocardiogram (EKG), and oxygen saturation). The patient was positioned in Trendelenburg (15°) and administered 1–1.5 mg/kg of propofol [22]. Paracetamol was used as analgesic agent. Two ECV attempts were performed by two obstetricians following the forward-roll technique. Immediately after the procedure, the fetal position was reassured with an ultrasound scan and fetal well-being was assessed with a continuous cardiotocograph register during the following 4 hours. Anti-D was given to rhesus-negative women. 24 hours after the procedure, a continuous monitoring for one hour and fetal position was reassured.

If any complication occurred during or immediately after the procedure, an urgent cesarean section was performed.

### 2.2 Outcome Variables

The procedure is considered successful when a cephalic presentation is achieved. Intraversion cesarean is considered as any cesarean carried out during the ECV or the first 24 hours after the procedure due to any complication secondary to it (i.e., fetal compromise, cord prolapse, vaginal bleeding, ...).

### 2.3 Statistical Analysis

Data were recorded retrospectively on all referrals. Continuous variables were assessed for normality with the Shapiro–Wilk test.

The primary outcome variable was the ECV success. The secondary outcome variable was the incidence of intraversion cesarean section. Obstetric history, anthropometric measurements, estimated fetal weight at 3rd trimester, placental location, and fetal presentation underwent bivariate analysis using Student’s *T*-test or Pearson’s chi-squared test to compare the characteristics of each group. Subsequently, the primary and secondary outcome variables were compared between both groups.

Afterward, taking primary and secondary outcome variables for each group: all variables above mentioned with *p*-value < 0.2 in bivariate analysis were considered using a multivariable analysis logistic regression model for both groups.

All tests were two-tailed and the level of statistical significance was set at 0.05. Data analysis was assisted with SPSS version 25.0 (SPSS Inc., Chicago, IL, USA), R version 3.6.2 (<https://www.r-project.org/>). Accessed 29 February 2022. R Core Team, Auckland, US), and RStudio version 1.2.5033: Integrated Development for R (RStudio, Inc., Boston, MA, USA).

## 3. Results

During this period, 203 pregnant women were offered an ECV. A spontaneous cephalic presentation before the procedure was showed in 15 pregnant and preterm labor began in two patients. Finally, 186 pregnant women un-

derwent an ECV attempt. Of these, 150 (80.6%) were performed by Group A, and 36 (19.4%) were carried out by Group B (Fig. 1). 123 women were nulliparas (66.1%) and 63 (33.9%) women were multiparas. Baseline characteristics are depicted in Table 1. Baseline characteristics were comparable for Group A and Group B.

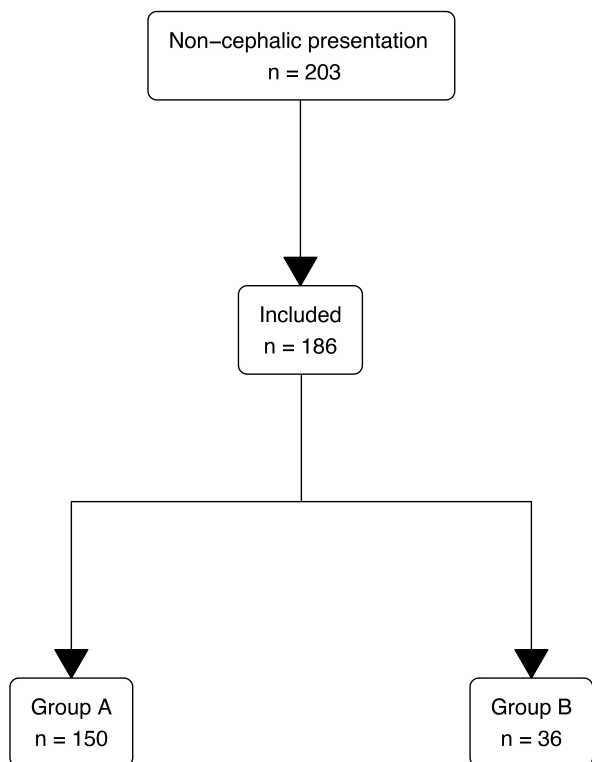


Fig. 1. Flowchart diagram of study population.

The overall ECV success rate was 68.8% (95% confidence interval (CI) 61.9–75.1). ECV outcomes and obstetric outcomes by Group are shown in Table 2.

The success rate of ECV increased from 47.2% (95% CI 31.7–63.2) in Group B to 74.0% (95% CI 66.6–80.5) in Group A (odds ratio (OR) = 3.18; 95% CI 1.40–7.20;  $p = 0.002$ ) (Fig. 2). The greatest increase in the success rate of ECV was seen in nulliparas, from 38.5% (95% CI 21.8–57.6) in group B to 69.1% (95% CI 59.4–77.6) (OR = 3.57; 95% CI 1.33–9.83;  $p = 0.004$ ) (Fig. 2).

Four pregnant women gave birth in a different institution. The total vaginal delivery rate after ECV increased from 41.2% (95% CI 25.9–57.9) in Group B to 56.1% (95% CI 48.9–63.9) in Group A. Overall, the rate of planned cesarean after ECV decreased from 33.3% (95% CI 19.7–49.5) in Group B to 22.0% (95% CI 15.9–29.1) in Group A. After successful ECV, four pregnant women (2.2%) showed breech presentation at birth and they were planned cesarean section. These four procedures were performed by Group A. Moreover, after a failed ECV, eight pregnant (4.3%) showed a cephalic presentation at birth and had a vaginal delivery (seven spontaneous and an operative de-

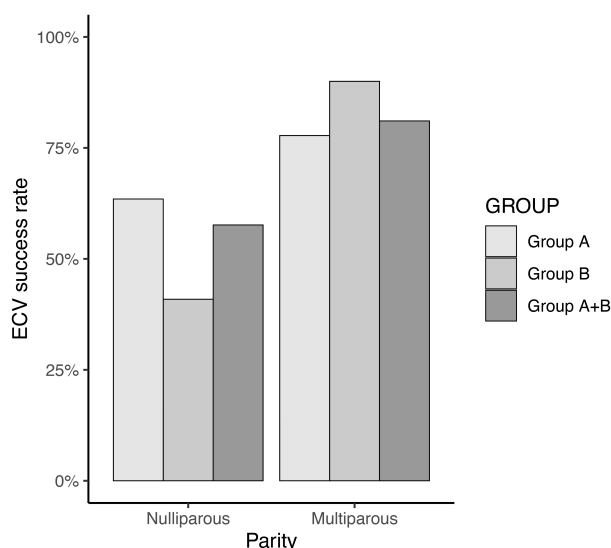


Fig. 2. ECV Success rate for nulliparas, multiparas, and total women.

livery). The spontaneous reversion to cephalic rate after a failed ECV was 15.4% for Group A and 10.6% for Group B.

Multivariable logistic regression analysis showed that the amniotic fluid pocket (OR 1.08, CI 95% 1.04–1.12,  $p < 0.001$ ) was associated with the success of ECV. ECV super-specialization (OR 3.40, 95% CI 1.23–9.42,  $p < 0.05$ ), previous cesarean section (OR 2.23, 95% CI 0.73–6.79,  $p < 0.05$ ) and lower maternal body mass index (BMI) (OR 0.86, 95% CI 0.80–0.98,  $p < 0.02$ ) were associated with the success of ECV (Table 3).

Over this period, 22 (11.8%) complications occurred, all during the 24 h following the procedure. Complications rate decreased from 22.2% (95% CI 11.1–37.6) in Group B to 9.3% (95% CI 5.5–14.8) in Group A (OR = 0.36; 95% CI 0.14–0.91;  $p = 0.032$ ). 13 minor vaginal bleeding, five non-reassuring fetal heart rate pattern, two preterm rupture of membranes, two chord prolapse and a maternal bronchoaspiration during the procedure were reported.

One newborn was admitted to neonatal unit care due to minor respiratory distress. This was a patient with a successful ECV, and afterward, intrauterine growth restriction was diagnosed. Labor was induced with dinoprostone and it was a spontaneous delivery with a cord blood pH = 7.28 and APGAR score at 1st minute of life = 8 and APGAR at 5 minutes of life = 9. The newborn was discharged after two days with no consequences.

One newborn was admitted to neonatal intensive unit care due to major respiratory distress. This was a planned cesarean section two weeks after an unsuccessful ECV. It was an extremely difficult fetal extraction during the cesarean section that needed a J-shaped incision for achieving it. Arterial cord blood pH was 6.97, venous cord blood pH was 7.00, APGAR score at 1st minute of life = 1, and

**Table 1. Characteristics of pregnant women who underwent external cephalic version (ECV).**

Characteristics	Total (186)	95% CI	Group A (150)	95% CI	Group B (36)	95% CI
Age, years	32.3	31.5–33.0	33.5	31.8–35.2	33.5	31.8–37.2
GA at ECV, weeks	37.5	37.4–37.5	37.4	37.2–37.5	37.4	37.2–37.5
Gravida	1.9	1.7–2.1	2.0	1.6–2.4	2.0	1.6–2.4
Nulliparous, % (n)	66.1% (123)	59.1–72.6	64.7% (97)	56.8–72.0	72.2% (26)	56.3–84.7
Previous CS, % (n)	3.8% (7)	1.7–7.2	3.3% (5)	1.3–7.2	5.6% (2)	1.2–16.6
BMI, Kg/m <sup>2</sup>	27.7	27.0–28.4	27.5	26.8–28.3	28.6	27.0–30.1
-BMI <25, % (n)	28.5% (53)	22.4–35.3	30.7% (46)	23.7–38.4	19.4% (7)	9.1–34.4
-BMI 25–30, % (n)	45.2% (84)	38.1–52.3	44.7% (67)	36.9–52.7	47.2% (17)	31.7–63.2
-BMI 30–35, % (n)	16.1% (30)	11.4–21.9	15.3% (23)	10.3–21.7	19.4% (7)	9.1–34.4
-BMI 35–40, % (n)	8.6% (16)	5.2–13.3	7.3% (11)	4.0–12.3	13.9% (5)	5.5–27.8
-BMI >40, % (n)	1.6% (3)	0.5–4.2	2.0% (3)	0.6–5.2	0% (0)	
EFW before ECV, grams	2797	2749–2845	2795	2741–2849	2806	2698–2914
Placental location, % (n)						
-Anterior, % (n)	51.6% (96)	44.5–58.7	50.7% (76)	42.7–58.6	55.6% (20)	39.4–70.8
-Posterior, % (n)	39.8% (74)	33.0–46.9	40.0% (60)	32.4–48.0	38.9% (14)	24.3–55.2
-Fundus, % (n)	4.3% (8)	2.1–8.0	5.3% (8)	2.6–9.8	0% (0)	
-Lateral wall, % (n)	4.3% (8)	2.1–8.0	4.0% (6)	1.7–8.1	5.6% (2)	1.2–16.6
Amniotic fluid pocket, mm	52.1	48.9–55.2	53.2	49.3–57.0	48.3	43.9–52.6
Transversal lie, % (n)	7.0% (13)	4.0–11.3	7.3% (11)	4.0–12.3	5.6% (2)	1.2–16.6

Data presented as mean or % (number (n)). *p*-value < 0.05 in bold, when comparing characteristics between Group A and B, *T*-student test for normally distributed variables, and Chi-squared for categorical variables. GA, Gestational Age; BMI, Body Mass Index; ECV, External Cephalic Version; CS, Cesarean Section; EFW, Estimated Fetal Weight.

**Table 2. External cephalic version (ECV) and obstetric outcome by group.**

Outcome	Total (182)	95% CI	Group A (148)	95% CI	Group B (34)	95% CI
ECV Success, % (n)	<b>68.8% (128)</b>	61.9–75.1	<b>74.0% (111)</b>	66.6–80.5	<b>47.2% (17)</b>	31.7–63.2
GA at delivery, weeks	39.5	39.3–39.7	39.5	39.2–39.8	39.5	39.0–40.0
Type of labor, % (n)						
-Spontaneous, % (n)	35.7% (65)	29.0–42.9	37.8% (56)	30.3–45.8	26.5% (9)	14.0–42.8
-Induction, % (n)	31.3% (57)	24.9–38.3	33.8% (50)	26.5–41.7	20.6% (7)	9.7–36.2
CS, % (n)	33.0% (60)	26.4–40.0	<b>28.4% (42)</b>	21.6–36.0	<b>52.9% (18)</b>	36.5–68.9
Mode of delivery, % (n)						
-Spontaneous, % (n)	29.7% (54)	23.4–36.6	31.1% (46)	24.0–38.8	23.5% (8)	11.8–39.5
-Operative, % (n)	23.6% (43)	17.9–30.2	25.0% (37)	18.6–32.4	17.6% (6)	7.7–32.8
-Urgent CS, % (n)	22.0% (40)	16.4–28.4	21.6% (32)	15.6–28.8	23.5% (8)	11.8–39.5
-Planned CS, % (n)	24.7% (45)	18.9–31.4	22.3% (33)	16.2–29.5	35.3% (12)	20.9–52.0

Four pregnant women gave birth in a different institution. Data presented as mean or % (number (n)). *p*-value < 0.05 in bold, when comparing characteristics between Group A and B, *T*-student test for normally distributed variables, and Chi-squared for categorical variables. ECV, External Cephalic Version; GA, Gestational Age; CS, Cesarean Section.

**Table 3. Logistic regression analysis to determine predictors of successful external cephalic version (ECV).**

Factors	Crude OR	95% CI	<i>p</i> -value	Adjusted OR <sup>a</sup>	95% CI	<i>p</i> -value
ECV super-specialization	3.18	1.50–6.73	<b>0.03</b>	3.40	1.23–9.42	<b>0.02</b>
Multiparity	2.54	1.23–5.25	<b>0.01</b>	2.23	0.73–6.79	0.16
Previous CS	0.17	0.03–0.89	<b>0.03</b>	0.08	0.06–0.94	<b>0.04</b>
BMI, Kg/m <sup>2</sup>	0.91	0.85–0.98	<b>0.01</b>	0.89	0.80–0.98	<b>0.02</b>
AF Pocket, mm	1.06	1.03–1.09	<b>&lt;0.01</b>	1.08	1.04–1.12	<b>&lt;0.01</b>

*p*-value < 0.05 in bold. <sup>a</sup> Adjusted for multiparity, amniotic fluid pocket, body mass index, previous cesarean section, maternal age, and estimated fetal weight. OR, Odds Ratio; CI, Confidence Interval; AF, Amniotic Fluid; BMI, Body Mass Index.



APGAR at 5 minutes of life = 6. After 7 days, the newborn was discharged to neonatal unit care, where she was admitted for 23 days. No complications arose during the following year.

One patient suffered bronchoaspiration. This event occurred just after ending the procedure. The patient was admitted to the maternal unit care with intravenous antibiotic therapy. Although a cephalic presentation was achieved, finally a cesarean section was performed due to the bronchoaspiration after 7 days of treatment. A female was born with an APGAR score at 1st minute of life = 9 and Apgar at 5 minutes of life = 10. Arterial cord blood pH was 7.32, venous cord blood pH was 7.28. The patient and her newborn were discharged with no sequelae.

#### 4. Discussion

The experience is considered crucial in medicine in general, and in obstetrics particularly. Super-specialization in medicine improves the experience acquisition and makes daily work safer. It seems logical that the introduction of a super-specialized team in ECV, would improve the success rate and would make the procedure safer. National and International Obstetrics organizations should not only support but also lead specific formation and accreditation plans for External Cephalic Version specialization for obstetricians, midwives, and anesthesiologists in light of this and previous results.

In this study, the ECV success rate increases from 47.2% (95% CI 31.7–63.2) to 74.0% (66.6–80.5%) with the introduction of a dedicated team. The number needed to treat was 6.7, meaning that 6.7 ECVs performed by the experienced dedicated ECV team led to one additional vaginal delivery in comparison with ECVs performed by the non-dedicated team. The creation of a dedicated experienced team of obstetricians to perform ECV led to an increase in the success rate and a significant decrease in the cesarean section rate overall.

If the results are compared in nulliparas, a greater increase is reported from 38.5% (95% CI 21.8–57.6) in group B to 69.1% (95% CI 59.4–77.6).

Several studies proved that analgesia [8,12–16,20] and tocolysis [8,11] improve the ECV success rate. The present study had remarkable procedure characteristics such as, as far as we are concerned, it is the first group in which propofol is used for deep sedation in ECV, and what tocolysis concerned, ritodrine is administered for half-hour just before the procedure [21,22].

Although several prediction models for the success of ECV have been published, none of them included the operator experience as a predictor [23,24]. Kim *et al.* [25] highlighted the importance of the operator experience by developing a learning curve for ECV. They estimate that to achieve an expected success rate of 70% success rate, approximately 130 ECV attempts are needed. In contrast, in multiparas, only 10 attempts would be necessary for an ex-

pected success rate of 70%.

Several studies have analyzed their results in ECV when it is performed by a dedicated team: single-operator [17,18] or dedicated team [5,10,19,26]. Bogner *et al.* [27] showed that the ECV success rate depended not only on parity and gestational age but also on the operator.

Other authors have focused on the effect of a dedicated team [10,28]. Hickland *et al.* [28] replaced their ECV operator every 15 days and reported an increase in the success rate from 32.6% to 41.9% over 3 years. Thissen *et al.* [10] compared ECV performed by a non-experienced team with their results after the introduction of a dedicated team. They reported an increase in the ECV success rate (39.8% to 59.66%) with the greatest increase in nulliparas.

Previous studies tried to describe fetal and maternal characteristics that may predict the ECV result [6,23,24,26,29]. Normal or high amniotic fluid volume, multiparity, BMI <35 Kg/m<sup>2</sup>, reduced bladder volume, fetal transverse lie, and increased estimated fetal weight are predictors of the success of ECV in several studies [9,24,26]. The present study found that previous cesarean section, normal to high amniotic fluid volume, and lower BMI were associated with the success of ECV. Other factors such as transverse lie, placental position, multiparity, or estimated fetal weight (EFW) before ECV were not associated with statistical significance with ECV success rate in the multivariable model. These associations would have reached a statistically significant association if a larger number of pregnant women had been recruited.

ECV is considered to be a safe procedure for achieving a cephalic presentation. Two studies analyzed ECV complications rate in the dedicated team [30,31]. Beuckens *et al.* [30] reported 47.2% of ECV success and 2.63% of complications during the 48 hours next to the procedure. Rodgers *et al.* [31] reported a success rate of 35% for nulliparas and 62% for multiparas and an ECV complication rate of 4.73%. In both studies, ECV was performed without analgesia nor tocolysis which may explain the lower success and complication rates. The present study found that an experienced dedicated team decreases the ECV complications rate from 22.2% (95% CI 11.1–37.6) to 9.3% (95% CI 5.5–14.8) with the introduction of an ECV dedicated team when the procedure was performed under sedation with propofol and with ritodrine as tocolytic.

Super-specialization in obstetrics is essential for improving results and maintaining safety in procedures. ECV is an effective procedure for reducing the cesarean section rate and offering a chance for a vaginal delivery. When ECV is performed by experienced obstetricians a reduction in complications rate and an increase in success rate are observed [10]. Although how experience influences in ECV have already been analyzed, an experienced dedicated team was compared with residents or non-experienced obstetricians [10]. This study has compared the results, in terms of effectiveness and safety, between the dedicated team and

experienced senior obstetricians.

The introduction of a dedicated team not only supposes an advantage in comparison with residents or other colleges but also with other experienced obstetricians. Super-specialization in ECV, in the light of this study, should be enhanced for tertiary hospitals by nationals and international obstetrics and gynecology associations.

Some key questions are still unanswered, such as the optimal learning curve, the best anesthetic technique, the most effective tocolytic drug, etc. Besides, clinical trials are needed to evaluate definitively the effectiveness of super-specialization in ECV. without the potential bias that could affect observational studies.

#### *Strengths and Limitations*

A strength of this study is the fact that it is the first cohort study to assess the influence of an experienced dedicated team on the success rate of ECV in comparison with senior experienced obstetricians. This is the first study in which propofol is used for sedation in patients who underwent ECV. It should be also highlighted that in the present study ritodrine is administered for 30 minutes just before the procedure. There were no significant differences in patient and obstetric characteristics making selection bias less likely.

This study has some limitations. First, this is a retrospective observational study with potential bias. These results must be confirmed with a prospective randomized trial. In addition, the number of women who underwent ECV in a non-dedicated team is small, which may affect the power of statistical analysis. However, differences observed in the present study, despite the lack of power, are consistent. Due to the differences in complications rate, increasing the patients enrolled in a non-dedicated team in this study could not be ethical. Besides, the learning curve cannot be evaluated in this study due to the absence of temporal analysis.

## 5. Conclusions

ECV is a safe and effective procedure. The introduction of an experienced dedicated team improves the ECV success rate. Previous cesarean section, lower BMI, and normal or high amniotic fluid volume have been associated with an increase in the ECV success rate. The introduction of an experienced dedicated team reduces the ECV complications rate. ECV super-specialization plan should be led by national and international obstetrics organizations.

## Author Contributions

JSR, RMGP helped to record data, performing an ultrasound scan, and to design the study. FAR, JEBC, AND and MLSF helped to record data and to design the study. FAR and JHG helped to design the study. All authors read and approved the final manuscript.

## Ethics Approval and Consent to Participate

This study was approved by the Clinical Research Committee of the 'Virgen de la Arrixaca' University Clinical Hospital (2020-5-6-HCUVA). This study conforms with the 2013 Helsinki World Medical Association Declaration.

## Acknowledgment

Not applicable.

## Funding

This research received no external funding.

## Conflict of Interest

The authors declare no conflict of interest.

## References

- [1] Hofmeyr GJ, Kulier R, West HM. External cephalic version for breech presentation at term. *Cochrane Database of Systematic Reviews*. 2015; 2015: CD000083.
- [2] 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. *The Lancet*. 2000; 356: 1375–1383.
- [3] Lee HC, El-Sayed YY, Gould JB. Population trends in cesarean delivery for breech presentation in the United States, 1997-2003. *American Journal of Obstetrics and Gynecology*. 2008; 199: 59.e1–59.e8.
- [4] Hindawi I. Value and pregnancy outcome of external cephalic version. *Eastern Mediterranean Health Journal*. 2005; 11: 633–639.
- [5] Melo P, Georgiou E, Hedditch A, Ellaway P, Impey L. External cephalic version at term: a cohort study of 18 years' experience. *BJOG: an International Journal of Obstetrics & Gynaecology*. 2019; 126: 493–499.
- [6] Isakov O, Reicher L, Lavie A, Yogev Y, Maslovitz S. Prediction of Success in External Cephalic Version for Breech Presentation at Term. *Obstetrics & Gynecology*. 2019; 133: 857–866.
- [7] Grootsholten K, Kok M, Oei SG, Mol BWJ, van der Post JA. External Cephalic Version-Related Risks: A Meta-Analysis. *Obstetrics & Gynecology*. 2008; 112: 1143–1151.
- [8] Cluver C, Gyte GML, Sinclair M, *et al*. Interventions for helping to turn term breech babies to head first presentation when using external cephalic version. *Cochrane Database of Systematic Reviews*. 2015; 2015: CD000184.
- [9] Levin G, Rottenstreich A, Weill Y, Pollack RN. The role of bladder volume in the success of external cephalic version. *European Journal of Obstetrics & Gynecology and Reproductive Biology*. 2018; 230: 178–181.
- [10] Thissen D, Swinkels P, Dullemond RC, van der Steeg JW. Introduction of a dedicated team increases the success rate of external cephalic version: a prospective cohort study. *European Journal of Obstetrics & Gynecology and Reproductive Biology*. 2019; 236: 193–197.
- [11] Levin G, Ezra Y, Weill Y, Kabiri D, Pollack RN, Rottenstreich A. Nifedipine versus ritodrine during external cephalic version procedure: a case control study. *The Journal of Maternal-Fetal & Neonatal Medicine*. 2021; 34: 3008–3013.
- [12] Katz D, Riley K, Kim E, Beilin Y. Comparison of Nitroglycerin and Terbutaline for External Cephalic Version in Women who Received Neuraxial Anesthesia: a Retrospective Analysis. *Obstetric Anesthesia Digest*. 2020; 40: 130–131.

- [13] Sullivan JT, Grobman WA, Bauchat JR, Scavone BM, Grouper S, McCarthy RJ, *et al.* A randomized controlled trial of the effect of combined spinal-epidural analgesia on the success of external cephalic version for breech presentation. *International Journal of Obstetric Anesthesia*. 2009; 18: 328–334.
- [14] Mancuso KM, Yancey MK, Murphy JA, Markenson GR. Epidural analgesia for cephalic version: a randomized trial. *Obstetrics & Gynecology*. 2000; 95: 648–651.
- [15] Magro-Malosso ER, Saccone G, Di Tommaso M, Mele M, Berghella V. Neuraxial analgesia to increase the success rate of external cephalic version: a systematic review and meta-analysis of randomized controlled trials. *American Journal of Obstetrics and Gynecology*. 2016; 215: 276–286.
- [16] Chalifoux LA, Bauchat JR, Higgins N, Toledo P, Peralta FM, Farrer J, *et al.* Effect of Intrathecal Bupivacaine Dose on the Success of External Cephalic Version for Breech Presentation: A Prospective, Randomized, Blinded Clinical Trial. *Anesthesiology*. 2017; 127: 625–632.
- [17] Levin G, Rottenstreich A, Weill Y, Pollack RN. External cephalic version at term: a 6-year single-operator experience. *Birth*. 2019; 46: 616–622.
- [18] Levin G, Rottenstreich A, Weill Y, Pollack RN. Late preterm versus term external cephalic version: an audit of a single obstetrician experience. *Archives of Gynecology and Obstetrics*. 2019; 300: 875–880.
- [19] Burgos J, Rodríguez L, Cobos P, Osuna C, del Mar Centeno M, Larrieta R, *et al.* Management of breech presentation at term: a retrospective cohort study of 10 years of experience. *Journal of Perinatology*. 2015; 35: 803–808.
- [20] Burgos J, Pijoan JI, Osuna C, Cobos P, Rodríguez L, Centeno MDM, *et al.* Increased pain relief with remifentanyl does not improve the success rate of external cephalic version: a randomized controlled trial. *Acta Obstetrica Et Gynecologica Scandinavica*. 2016; 95: 547–554.
- [21] Sánchez-Romero J, García-Soria V, Araico-Rodríguez F, Herrera-Giménez J, Blanco-Carnero JE, Nieto-Díaz A, *et al.* External Cephalic Version: Is it an Effective and Safe Procedure? *Journal of Visualized Experiments*. 2020; e60636–e60657.
- [22] Sánchez-Romero J, López-Pérez J, Flores-Muñoz AB, Méndez-Martínez MJ, Araico-Rodríguez F, Mendiola-Olivares J, *et al.* Sedation with Propofol plus Paracetamol in External Cephalic Version: An Observational Study. *Journal of Clinical Medicine*. 2022; 11: 489.
- [23] Velzel J, de Hundt M, Mulder FM, Molkenboer JFM, Van der Post JAM, Mol BW, *et al.* Prediction models for successful external cephalic version: a systematic review. *European Journal of Obstetrics & Gynecology and Reproductive Biology*. 2015; 195: 160–167.
- [24] Kok M, van der Steeg J, van der Post J, Mol B. Prediction of Success of External Cephalic Version after 36 Weeks. *American Journal of Perinatology*. 2011; 28: 103–110.
- [25] Kim SY, Han JY, Chang EH, Kwak DW, Ahn HK, Ryu HM, *et al.* Evaluation of the learning curve for external cephalic version using cumulative sum analysis. *Obstetrics & Gynecology Science*. 2017; 60: 343.
- [26] Ebner F, Friedl TWP, Leinert E, Schramm A, Reister F, Lato K, *et al.* Predictors for a successful external cephalic version: a single centre experience. *Archives of Gynecology and Obstetrics*. 2016; 293: 749–755.
- [27] Bogner G, Xu F, Simbrunner C, Bacherer A, Reisenberger K. Single-institute experience, management, success rate, and outcome after external cephalic version at term. *International Journal of Gynecology & Obstetrics*. 2012; 116: 134–137.
- [28] Hickland P, Gargan P, Simpson J, McCabe N, Costa J. A novel and dedicated multidisciplinary service to manage breech presentation at term; 3 years of experience in a tertiary care maternity unit. *The Journal of Maternal-Fetal & Neonatal Medicine*. 2018; 31: 3002–3008.
- [29] Burgos J, Cobos P, Rodríguez L, Pijoán JI, Fernández-Llebrez L, Martínez-Astorquiza T, *et al.* Clinical score for the outcome of external cephalic version: a two-phase prospective study: Clinical score for external cephalic version. *Australian and New Zealand Journal of Obstetrics and Gynaecology*. 2012; 52: 59–61.
- [30] Beuckens A, Rijnders M, Verburgt-Doeleman G, Rijninks-van Driel G, Thorpe J, Hutton E. An observational study of the success and complications of 2546 external cephalic versions in low-risk pregnant women performed by trained midwives. *BJOG: An International Journal of Obstetrics & Gynaecology*. 2016; 123: 415–423.
- [31] Rodgers R, Beik N, Nassar N, Brito I, de Vries B. Complications of external cephalic version: a retrospective analysis of 1121 patients at a tertiary hospital in Sydney. *BJOG: An International Journal of Obstetrics & Gynaecology*. 2017; 124: 767–772.