

**Title:**

Impact of dedicated ECV clinic is limited by antenatal breech detection: a retrospective cohort study.

**Running title:**

Management of singleton breech at term.

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## **Abstract**

### **Background**

External cephalic version (ECV) reduces the chance of breech presentation at term birth and lowers the chance of a Caesarean section. ECV services are now in place in many units in the United Kingdom but their effectiveness is unknown. The aim of this study was to investigate the reasons for breech presentation at term birth.

### **Methods**

We performed a retrospective cohort study of 394 consecutive babies who were in breech presentation at term birth in a large UK maternity unit that offers ECV. The cohort was analysed over two time periods ten years apart: 1998-1999 and 2008-2009.

### **Results**

Only 33.8% of women had undergone a (failed) ECV attempt. This low proportion was mainly because breech presentation was not diagnosed antenatally (27.9%). Other contributing factors were: ECV not offered by clinicians (12.2%), ECV declined by women (14%) and contraindications to ECV (10.7%). Over the 10-year period the proportion of breech presentations that were not diagnosed antenatally increased from 23.2% to 32.5% ( $p=0.04$ ), which constituted 52.8% of women who had not undergone an ECV attempt in 2008-2009. Failure of clinicians to offer ECV reduced from 21.6% to 3% ( $p=0.0001$ ) and the proportion of women declining ECV decreased from 19.1% to 9% ( $p=0.005$ ). Overall, ECV attempts increased from 28.9% to 38.5% ( $p=0.05$ ).

## **Conclusions**

While ECV counselling, referral and attempt rates have increased, failure to detect breech presentation antenatally is the principal barrier to successful ECV. Improved breech detection would have a greater impact than methods to increase ECV success rates.

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## **Keywords**

Breech presentation; counselling; external cephalic version; ECV; vaginal breech birth.

## **Introduction**

The incidence of breech presentation at term is 3-4%. The publication of the Term Breech Trial (1) led to an increase in the Caesarean section rate for term breeches and a reduction in associated perinatal mortality and neonatal morbidity (2-4). However, Caesarean section carries a small increase in serious immediate complications for the mothers and potential future obstetric complications (5). Given these adverse effects, methods to reduce the incidence of breech presentation at term have become a priority.

With an approximately 50% success rate and a low spontaneous reversion rate, external cephalic version (ECV) considerably reduces non-cephalic presentation at term and Caesarean section (6). Much effort has been put into optimising ECV success rates, including use of tocolytics (7). As a result of the reported safety (8), effectiveness (6) and cost-effectiveness (9) of ECV, ECV services are now in place in many units (10, 11). Nevertheless, it is unclear how effective the implementation of ECV services has been as the incidence of breech presentation at term remains high and breech presentation remains a major contributor to both elective and emergency Caesarean section rates (2).

The impact of an ECV service may be limited by factors other than the ECV success rate, including failure to diagnose breech (12), perceived contraindications to ECV (13), failure to offer or recommend ECV by the care provider and to refer the patient to an ECV service (14, 15), and unwillingness of the woman to undergo ECV (15). The relative contribution of these factors is unknown. The aim of this study was therefore to investigate the reasons for breech presentation at term birth.

## Methods

We conducted a retrospective cohort study of the management of pregnant women who delivered singletons in breech presentation at term at the John Radcliffe Hospital, Oxford, United Kingdom. A dedicated, weekly ECV clinic has been in place since March 1998. Women with a suspected breech at term can be referred by anyone to the ECV clinic, where a presentation scan will be performed. Where consent is given and contraindications considered absent, ECV is attempted from 36 weeks in nulliparous women and 37 weeks in multiparous women. The success and safety of this service have been previously reported (16).

We reviewed case notes of 194 consecutive women with live singleton term ( $\geq 37^{+0}$  weeks) breech births between 20 July 1998 and 30 August 1999, and of a further 200 consecutive women with live singleton term breech births between 1 September 2008 and 31 December 2009. The 1998-1999 data were available before embarking on the 2008-2009 data collection and it was known that ECV was not offered by the practitioner, ECV was declined by patients, and breech was not diagnosed antenatally in around 20% of cases each. The study sample was designed to have 80% power to detect a reduction from 20% to 10% with two-sided  $\alpha$  of 0.05. Eligible women were identified via the electronic OXMAT (Oxford Maternity) database. Data extracted from the notes were immediately anonymised on collection and held on secure electronic data files. Where certain data were missing, women were excluded from the calculations of the relevant proportions. The study was registered with the institutional audit department and formal ethical approval and consent procedures were not required.

The cohorts in 1998-1999 and 2008-2009 had very similar baseline characteristics in terms of proportion of nulliparous women (58% vs 60%, respectively), booking under midwife (60% vs 60%), mean age (30.4 vs 30.7 years), and previous Caesarean section (14% vs 15%).

Where appropriate, differences in frequencies of categorical variables were analysed with Fisher's Exact Test, using QuickCalcs by GraphPad. The manuscript was written in accordance with the STROBE reporting guideline (17).

## **Results**

### **Reasons for breech presentation at term birth**

Of the entire cohort of 394 women with breech presentation at term birth only 33.8% had undergone a (failed) ECV attempt (Table 1). There were no breeches which had spontaneously reverted after a successful ECV. The proportion of all breech presentations that were not diagnosed antenatally was 27.9%, which constitutes 42.1% of women who had not undergone an ECV attempt. Other factors contributing to the low ECV attempt rate were that ECV was not offered by the clinician (12.2%), ECV was declined by women (14%) or ECV was contraindicated (10.7%)[DELETED](Table 1).

The incidence of breech presentation at term birth decreased from 3.69% in 1998-1999 to 2.99% in 2008-2009 ( $p=0.0566$ ). Comparison of the two cohorts showed an increase from 28.9% to 38.5% ( $p=0.0549$ ) in the proportion of women who had undergone an ECV attempt (Table1). There was, however, also a significant increase, from 23.2% to 32.5% ( $p=0.0435$ ), in the proportion of all breech presentations that were not diagnosed antenatally; these women accounted for 32.6% and 52.8% ( $p=0.0011$ ), respectively, of women who had not undergone an ECV attempt. A decline was seen in the proportion of women who were not offered ECV by the clinician (21.6% vs 3%;  $p=0.0001$ ) and those who had declined ECV (19.1% vs 9%;  $p=0.0054$ ) [DELETED]. ECV was deemed to be contraindicated in 15% of cases in 2008-2009 compared to 6.2% in 1998-1999 ( $p=0.0052$ ), all of which complied with the relevant RCOG guideline (18). To further investigate why such low proportions of women had had an ECV attempt we analysed breech diagnosis, ECV counselling and referral, and ECV attempt in these cohorts.

### **Breech diagnosis**



[DELETED]There was a significant decline in the proportion of breeches diagnosed antenatally from 76.8% to 67.5% ( $p=0.0435$ ) (Table1, Figure1). The increase in breeches not diagnosed antenatally was due to increases in both breeches diagnosed in labour (21.1% vs 25.5%;  $p=0.3413$ ) and at Caesarean section (2.1% vs 7%;  $p=0.0275$ ). A significant increase in the proportion of breeches first diagnosed in the 1<sup>st</sup> and 2<sup>nd</sup> stage of labour was seen (9.3% vs 23%,  $p=0.0002$ ; Table1)

[DELETED]

### **ECV counselling, referral and attempts**

After antenatal breech diagnosis, significantly more women received counselling regarding ECV in 2008-2009 compared to 10 years earlier (65.8% vs 80.7%,  $p=0.0050$ ) (Figure1, Table2). This was mainly due to the decrease in the proportion of women who were not offered ECV by the practitioner (Table1). However, due to the low antenatal breech detection rate in 2008-2009, the proportion of women receiving counselling in the whole cohort was not different from the previous period (50.5 vs 54.5%,  $p=0.4801$ ) (Table2). [DELETED]

Of those who were counselled regarding ECV a higher proportion were referred for ECV in 2008-2009 compared to the earlier period (66.3% vs 87.2%,  $p=0.0004$ ), which contributed to the higher referral rate for the whole cohort (33.5% vs 47.5%,  $p=0.0056$ ) (Figure1, Table2). We examined whether the documented method of counselling might explain these findings. We found that in 2008-2009 a higher proportion of counselling episodes presented ECV as the sole management option after breech diagnosis (45.9% vs 58.6%,  $p=0.1386$ ) as opposed to presenting ECV as an alternative to Caesarean section and/or vaginal breech birth (Table2).

We found a very strong correlation between the method of counselling and the resulting referral rate in both time periods ( $p=0.0001$  and  $p=0.0003$ ; Table3). Between 93.3-97.1% of

women were referred for ECV if ECV was discussed alone, whereas only 43.4-58.3% were referred if ECV was discussed together with the mode of birth (Table3). [DELETED]Once referred for ECV, similar proportions of women had an ECV attempt (86.2% vs 81.1%,  $p=0.5199$ ) (Figure1, Table2).[DELETED]

### **Mode of birth**

Overall, the vast majority of term breech births were by Caesarean section in both periods and the proportion of vaginal breech births was 12.4% in 1998-1999 and 7.5% in 2008-2009 ( $p=0.1289$ ) (Table4). An increase in the proportion delivered by emergency Caesarean section, from 28.4% to 39.5% ( $p=0.0253$ ), was observed, which was due to increases in the group diagnosed antenatally (18.1% to 28.9%,  $p=0.0345$ ) as well as those diagnosed in labour (68.3% to 76.5%,  $p=0.4806$ ) (Table4). The emergency Caesarean section rate was 80% (4/5) in early labour, 86% (30/35) in 1<sup>st</sup> stage, and 46% (5/11) in 2<sup>nd</sup> stage (data not shown).[DELETED]

Vaginal birth occurred in 2.2% of breeches diagnosed antenatally and 23.5% of breeches diagnosed in labour in 2008-2009 (Table4). The majority (80%) of vaginal breech births had been diagnosed in labour in 2008-2009, compared to 54% in the previous period ( $p=0.195$ )(data not shown).

Birth outcomes were good, with Apgar scores of  $<7$  at 5 minutes for 1.9% on the elective Caesarean group, 1.3% in the emergency Caesarean group and 6.7% in the vaginal breech group.[DELETED]

## **Discussion**

### **Main findings**

Of the entire cohort of 394 women the majority (66.2%) of babies at term birth had not undergone an attempt at ECV. The main reason for this was a failure to diagnose breeches antenatally (27.9%).[DELETED] Over the 10-year period, [DELETED]the proportion of breeches that was not diagnosed antenatally increased from 23.2% to 32.5% ( $p=0.04$ ), accounting for 32.6% and 52.8% ( $p=0.0001$ ), respectively, of women who had not undergone an ECV attempt. [DELETED]However, increases in ECV counselling (65.8% vs 80.7%;  $p=0.005$ ) and ECV referral (66.3% vs 87.2%;  $p=0.0004$ ) led to an overall increase in ECV attempts (28.9% vs 38.5%;  $p=0.05$ ).[DELETED]

### **Strengths and limitations**

A real strength of our study is that we were able to compare recent data with data collected 10 years earlier in the same unit. A further strength is that our design allowed analysis of factors that contribute to ECV attempt rates, not merely events in the ECV clinic. A limitation of the study is the varied amount of data collected from different patients due to incomplete documentation in notes, a recognised limitation of a retrospective study design. [DELETED]Although our data indicate an increase in the proportion of breeches not diagnosed antenatally, a limitation of our study is that it does not account for breeches that were detected antenatally and had successful ECVs and cephalic presentations at birth. Neither does our data account for spontaneous version from breech to cephalic after 36 weeks. [DELETED]Although a strong association was found between the documented mode of counselling and referral for ECV, this finding could be partly due to bias as patients who were reluctant to be referred for ECV would have been more likely to have requested

information about alternatives to ECV, including mode of birth. Finally, our analysis is confined to one UK obstetric unit which limits its applicability to other units and countries which may have other practices.[DELETED]

## **Interpretation**

This is the first UK study to examine the reasons for breech presentation at term birth at a time of widespread availability of ECV services. For ECV to be effective, breech presentation needs to be detected antenatally. One of the striking findings of our study was the large and increasing proportion of women in whom breech had not been detected antenatally (19-23). Indeed, failure to diagnose breech antenatally was the most important reason why women in this cohort had not had an attempt at ECV. Our findings are in spite of an open referral system for confirmation of breech presentation, bypassing ultrasound and antenatal clinic appointments. Late diagnosis of breech in labour not only prevents ECV from being attempted but it also leads to higher rates of emergency Caesarean section and unplanned vaginal breech births, which are associated with worse perinatal outcomes compared to pre-labour Caesarean section (24).

Future reductions in the rates of breech at term birth will depend on improving breech detection at term. [DELETED] In the absence of routine third trimester ultrasound, which is currently not practised in many countries including the UK and US, there is a reliance on abdominal palpation. However, clinical examination only has a sensitivity of 70% for detecting breech presentation, leaving 30% of breeches undetected (12). Obesity is associated with lower manual breech detection rates (12) and it is possible that rising obesity rates between the two time points of our study contributed to the increase in the proportion of breeches that were not detected antenatally.

Increased antenatal breech detection may be achieved by raising awareness among patients and practitioners, through brochures and posters, about the importance of breech detection and the proportion of breeches that are currently not diagnosed antenatally (25). Further, focussed training in clinical detection of breech presentation by attending an ECV clinic could help improve detection (26). Routine ultrasound to determine presentation at term for every woman would require substantial costs, infrastructure and manpower. Focusing presentation scans on obese women at term, which could be performed in an ECV clinic, might be more cost-effective (12).

We found a significant increase in the proportion of women who were deemed to have a contraindication to ECV. However, even our figures in 2008-2009 are lower than those reported by others (19, 23) and all contraindications complied with the RCOG guideline on ECV (18). In this context it is important to note that there is very little agreement between international guidelines on what constitutes a contraindication for ECV, that evidence on contraindications is largely lacking, and for conditions for which evidence exists, such as previous Caesarean section and oligohydramnios, the evidence does not support their use as a contraindication (13). Perceived contraindications prevent a significant proportion of potential ECVs and should be limited to conditions where there is either clear evidence of adverse events or a clear pathophysiological rationale, such as increased risk of placental abruption or evidence of fetal distress (13).

Our study found high (>80%) ECV counselling and referral rates in 2008-2009, which were significant improvements on the earlier time period. Failure of the clinician to offer ECV has become rare (3%), and ECV is less likely to be refused by the women, though this latter group still constitutes 9% of cases. The publication of the Term Breech Trial resulted in an

increase in birth of breeches by Caesarean section, making ECV a more accepted means of avoiding the adverse effects of Caesarean section (15). Our study indicated that ECV acceptance and referral may be related to the mode of ECV counselling, a finding that has not been previously reported. Other studies have suggested that ECV uptake may be related to patient concerns regarding pain, safety for the baby, success rates and complications, and professionals' lack of knowledge regarding the procedure, success and complication rates, and guidelines and policies, leading to a perceived inability to counsel women appropriately (14, 15, 27, 28). Timely comprehensive written information regarding ECV for pregnant women may help overcome barriers to acceptance of ECV, and practitioners' ability to counsel could be improved by clear and accessible information and policies (29).

Over the 10 years since establishment of a dedicated ECV clinic our ECV attempt rates increased and our attempt rates in 2008-2009 are higher than those reported by others in comparable patient groups (19, 23). The increase in ECV attempts was due to an increase in the proportion that received ECV counselling (and a reduction in women not offered ECV by the practitioner) and an increase in the rate of referral for ECV (and a reduction in women declining ECV), despite a reduction in antenatal breech detection rates, more contraindications and similar ECV attempt rates once referred.

ECV is successful in 40-60% of women and is influenced by clinical factors such as race, parity, engagement of the breech, uterine relaxation, palpable fetal head and maternal weight, as well as ultrasound parameters such as placental localisation, breech position and amniotic fluid index (30, 31). Models incorporating these factors may be useful in the prediction of ECV success which may support patient counselling and decision making (32). However, the presence of one unfavourable characteristic should not discourage clinicians from attempting

ECV. Success rates may be increased using tocolytics, but evidence for other interventions is currently insufficient (7).

The increased proportion of breech births by emergency Caesarean section is of some concern as perinatal and maternal outcomes are worse when Caesareans are performed in labour compared to pre-labour (24). Furthermore, an increased proportion was performed in active labour, which is associated with worse perinatal outcomes than those performed in early labour (33). The small proportion of breeches delivered vaginally in 2008-2009 (7.5%) was mainly due to late diagnosis (80% diagnosed in labour) and high emergency Caesareans section rates, even in advanced labour. However, the benefit of emergency Caesarean section in active labour is doubtful. Secondary analysis of the Term Breech Trial showed that Caesarean section in early labour significantly reduced adverse perinatal outcomes compared to vaginal breech birth, whereas Caesarean section in active labour did not (24). A large population based cohort study from the Netherlands also did not detect a benefit of emergency Caesarean section over vaginal breech birth in relation to perinatal mortality (2). Better breech detection antenatally may further reduce the vaginal breech birth rate by allowing ECV and, if ECV is not successful, offered, declined or contraindicated, by increasing awareness of breech presentation at the onset of labour resulting in Caesarean section at less advanced stages of labour. Finally, antenatal breech detection may also allow planned vaginal breech birth for those women who prefer this option.

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**Disclosure of interests**

The authors declare that they have no conflicts of interest.

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None.



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