LITERATURE REVIEW

Singleton breech presentation at term: Review of the evidence and international guidelines for application to the New Zealand context

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ABSTRACT

Background: Over the last few decades the management of a breech baby at term has been immersed in controversy. It is important that New Zealand midwives and doctors have sufficient understanding of the evidence to be able to effectively counsel women to make an informed decision when a baby presents in a breech position at term.

Aims: To review the evidence and international guidance related to mode of birth for singleton breech presentation at term, identify the current evidence and gaps in knowledge and highlight how the evidence can be used to support women within the New Zealand context of maternity care.

Method: We searched Scopus, PubMed and the Cochrane Database of Systematic Reviews for peer reviewed publications about term breech presentation. The search terms used were "breech presentation" and "term". Limiters were set for the time period between 2000 and 2015, English language, human pregnancies, and peer reviewed journals.

Findings: We found 456 published papers covering breech presentation related to clinical outcomes, professional commentaries, professional guidelines and the woman's perspectives. We identified and retrieved 37 papers as relevant to our search criteria. We report specifically on the papers that provided professional commentary (detailed critique of the evidence), clinical studies, systematic reviews, meta-analyses and professional guidelines.

Following the publication of the Term Breech Trial there was a change in practice to that of recommending planned caesarean section for term breech presentation. Subsequent critiques and reviews have identified concerns with the study which undermine its reliability. Further retrospective/prospective studies, a systematic review and a meta-analysis have demonstrated equivocal results and suggest that perinatal mortality during vaginal breech births can be reduced when strict criteria are applied and an experienced clinician is involved. Many professional guidelines now advise that offering women the option of a vaginal breech birth is reasonable.

Conclusion: New Zealand midwives and doctors need to be in a position to inform women with breech presenting babies about factors that support the safety of vaginal breech birth, as well as about the benefits and potential harms of both caesarean section and vaginal breech birth, to support their decision making.

Keywords: breech, term, birth, evidence, guidelines

INTRODUCTION

It is estimated that breech presentation occurs in 3-4% of all births, with the proportion of breech presentations decreasing as gestational age increases, so that 1-3% of all pregnancies will be breech at term (Thorogood & Donaldson, 2015). A recent review of term breech presentation in New South Wales, Australia, identified an overall rate of 3.1% in a population of 914,147 singleton term births over the period from 2002 to 2012 (Bin, Roberts, Nicholl, Nassar, & Ford, 2016). Over these years the annual rate decreased from 3.6% in 2002 to 2.7% in 2012 due to the increasing use of external cephalic version (ECV).

Identifying the rate of breech presentation prior to birth for New Zealand is difficult, due to a lack of specific data. However, the incidence of vaginal breech birth is reported annually by the Ministry of Health. The rate of vaginal breech births in New Zealand is low and has reduced from 0.26% to 0.20% (n=145 to n=132) between 2002 and 2014 (Ministry of Health, 2015), with the rate of singleton term vaginal breech births reducing from 0.14% to 0.10% (n=78 to n=63) between 2002 and 2014 (National Maternity Collection personal correspondence, 2016).

This is the first paper in a planned series of papers based on the Illuminate Forum: A Breech Experience, held in New Zealand in November, 2015. The Illuminate Forum was a joint venture between the New Zealand College of Midwives and the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG). The aim was to discuss term

breech presentation and birth for the New Zealand context. The presenters from the forum subsequently agreed to collaborate and share their knowledge and expertise related to breech birth through this series of papers, so that the information shared at the forum can be disseminated to a wider clinical audience. Other planned papers relate to the mechanisms of physiological vaginal breech birth, and to the barriers to, and enablers of, vaginal breech birth in the New Zealand context.

The aims of this paper are to review the evidence and international guidelines related to a singleton baby presenting breech at term, identify the current gaps in knowledge and highlight how the current evidence can be applied to support women in the New Zealand context of maternity care.

BACKGROUND

The management of term breech presentation has been the subject of debate since the 1980s and continues to cause controversy and polarisation of views (Kotaska, 2007, 2009; Lindqvist, Norden-Lindeberg, & Hanson, 1997). The question that has caused the controversy is: what is the optimum mode of birth for a singleton baby who is presenting in the breech position at term?

Hannah et al. (2000) sought to provide a resolution to the controversy by undertaking a randomised controlled trial (RCT) with the aim of determining whether planned caesarean section was better than planned vaginal breech birth when a baby presented breech at term. This research, which became known as the Term Breech Trial (TBT), involved 2088 women in 121 centres and 26 different countries. The women were randomised to having a planned caesarean section or planned vaginal breech birth. The inclusion criteria were: a singleton, live fetus; frank or complete breech; and more than 37 weeks gestation. There were 1041 women assigned to planned caesarean section with 941 (90.4%) having a caesarean section. A further 1042 women were assigned to a planned vaginal breech birth and 591 (56.7% of these) had a vaginal breech birth. In all, there were 16 perinatal related mortalities, three in the planned caesarean section group and 13 in the planned vaginal breech birth group. The authors reported that perinatal mortality, neonatal mortality or serious morbidity were significantly lower for the planned caesarean section group (1.6%) than for the planned vaginal breech birth group (5.0%), with a relative risk of 0.33% (95% CI 0.19 to 0.56). They found no difference in serious maternal morbidity or mortality.

RCTs and meta-analyses of RCTs are generally considered to be the gold standard of the evidence that results from scientific research (Keirse, 2012). The RCT can provide a way of testing for causal relationships and also controls for, and measures, pre-intervention differences (Shields & Watson, 2012). It is a valuable research methodology but has some limitations in clinical contexts, the main one being the need to ensure simple protocols for care are consistently followed within the randomised groupings. This is problematic in maternity care, where care pathways are often complex and may require alteration dependent on the clinical picture.

The Impact of the Term Breech Trial

The TBT changed obstetric clinical practice around the world to a degree rarely seen from other individual research studies (Daviss, Johnson, & Lalonde, 2010; Hogle et al., 2003; Rietberg, Elferink-Stinkens, & Visser, 2005). This change occurred rapidly and consistently and was supported by obstetric professional guidelines (American College of Obstetricians and Gynecologists [ACOG], 2006/2016; Royal College of Obstetricians and Gynaecologists [RCOG], 2006) A review of 80 maternity centres in 23 countries found that the majority (92.5%) had changed practice to planned caesarean section for breech presentation at term as a result of the TBT (Hogle et al., 2003). In Canada, Daviss et al. (2010) surveyed 30 maternity centres (20 responded) and found that there was a marked increase in the number of caesarean sections for term breech presentation following the publication of the TBT. In the Netherlands, the caesarean section rate for singleton term breech presentation increased from 50% in 1998 to 80% in 2001 (Rietberg et al., 2005). Rietberg et al. found that the increase in caesarean section was associated with a significant decrease in the perinatal mortality (from 0.35% to 0.18%). Unfortunately, this change in practice was also associated with increased maternal mortality, with four maternal deaths reported in the Netherlands following elective caesarean section for breech presentation between 2000 and 2002, three of which were due to missed or incorrect prophylactic medications (Schutte et al., 2007). This association has not been found in other studies. Vlemmix et al. (2014) calculated that to avoid one perinatal death, 338 caesarean sections need to be performed.

In Australia and New Zealand, Phipps et al. (2003) surveyed 1284 members of RANZCOG to determine obstetric practice in the management of singleton breech pregnancies. Of the 956 respondents, 696 were practising obstetrics. Of these, 72% reported that they had routinely offered vaginal breech birth for uncomplicated singleton breech pregnancies prior to the TBT. This rate reduced to 20% after publication of the TBT.

The TBT has been heavily critiqued (Glezerman, 2006; Kotaska, 2004, 2007) and a number of other clinical studies have since been published. It is timely to explore the current evidence so that we can identify the gaps in knowledge and determine how the evidence relates to the New Zealand context of maternity care for women faced with a persistent singleton breech presentation at term.

METHOD

We designed this review to answer the questions: what is the current state of the evidence, and what are the professional guidelines around mode of birth for persistent breech presentation at term and how do these fit the New Zealand context? We searched Scopus, PubMed and the Cochrane Database of Systematic Reviews. The search terms used were "breech presentation" and "term". We limited the time period to papers published after 2000 so that the TBT and subsequent papers could be included. Other limiters were: English language, peer reviewed journals, and studies on humans only. We were looking for publications related to term breech birth outcomes (maternal/neonatal), so excluded papers that discussed management of breech presentation through ECV and alternative therapies such as moxibustion, women's experiences of breech pregnancies, and pre-term birth.

FINDINGS

A total of 456 articles were identified, of which 170 were related to breech birth and 37 papers were retrieved as being relevant for our search requirements. In order to answer the questions identified in our method, we report specifically on the papers that provided professional commentary (detailed critique of the evidence), clinical studies, systematic reviews, meta-analyses and professional guidelines.

Professional commentary on the TBT

The results of the TBT have been undermined by criticism related to violation of the inclusion/exclusion protocols, lack of informed consent to participate, variations in the standards of care provision, availability of clinicians with adequate expertise,

and availability of immediate resuscitation (Glezerman, 2006; Kotaska, 2007; Lawson, 2012). There was also criticism that some of the cases of perinatal mortality were not related to the mode of birth but to other causes (such as congenital abnormality), with at least two of the cases of mortality occurring at home after discharge from causes unrelated to the birth (Glezerman, 2006). A two-year follow-up of the children involved in the TBT found that planned caesarean section was not associated with a reduction in risk of death or neurodevelopmental delay in children at two years (Whyte et al., 2004).

In a secondary analysis of the TBT, Su et al. (2003) reviewed the timing of the caesarean section and outcomes compared to vaginal breech birth. Multiple regression analysis found that the risk of adverse perinatal outcome was lowest (odds ratio [OR] 0.13) for women who had a pre-labour caesarean section compared to a vaginal breech birth. Intrapartum factors that were significantly associated with adverse perinatal outcomes were: labour augmentation (OR 2.20, 95% CI 1.24 to 3.89), longer duration of active phase of the second stage ≥60 minutes (1-30 mins vs. ≥60 mins, OR 0.34, 95% CI 0.14 to 0.80) and low birthweight (<2800g vs. 2800g to 3500g, OR 2.56, 95% CI 1.38 to 4.73). Having an experienced clinician at the birth was associated with a reduction in adverse perinatal outcome (OR 0.30, 95% CI 0.13 to 0.68). Experienced clinicians were defined as those who considered themselves to be skilled and experienced at vaginal breech birth, confirmed by the Head of Department.

Clinical studies

Since the TBT there has been a number of observational studies reviewing outcomes for breech presentation at term and using either retrospective or prospective data collection (Table 1). The results of these studies are mixed, with some identifying increased risk of neonatal mortality or morbidity (Daskalakis et al., 2007; Golfier et al., 2001; Pradhan, Mohajer, & Deshpande, 2005), and others finding little difference and with safety attributed to strict adherence to criteria/protocols (Al-Inizi, Khayata, Ezimokhai, & Al-Safi, 2005; Alarab et al., 2004; Borbolla Foster, Bagust, Bisits, Holland, & Welsh, 2014; Goffinet et al., 2006; Uotila, Tuimal, & Kirkenen, 2005; Vistad, Cvancarove, Hustad, & Henriksen, 2013).

The majority of these studies were small, with the largest being from the PREsentation et MODe d'Accouchement (PREMODA) study group which described the outcomes for 8105 women according to the planned mode of birth for term breech presentation (Goffinet et al., 2006). This prospective observational study had an intention to treat analysis with data collected from 138 centres in France and 36 centres in Belgium. Caesarean section was planned for 5579 women (69.8%) and vaginal breech birth for 2526 (31.2%). Of the women who planned a vaginal breech birth, 1796 (71%) achieved a vaginal breech birth. The main outcome measure combined fetal and neonatal mortality and severe neonatal morbidity. The rate of the combined neonatal outcome was low, with no demonstrable difference between groups of women (1.59%, 95% CI 1.33 to 1.89 for the general population vs. 1.60%, 95% CI 1.14 to 2.17 for vaginal breech birth). The study had strict criteria for deciding mode of birth, with vaginal breech birth a widespread practice in the study centres. The authors concluded that, in places where planned vaginal breech birth is a common practice and when strict criteria are met (before and during labour), planned vaginal breech birth is a safe option.

One such country is Finland where almost half of all women (48%) with a term breech pregnancy planned to give birth vaginally (n= 4805) over the decade from 2005-2014. Macharey et al., (2017) conducted a retrospective, population-based, case-control study to investigate factors associated with adverse perinatal outcome when a woman laboured, planning a vaginal breech birth. Of these women, 3123 (65%) had a vaginal birth and 1682 (35%) had a caesarean section. The rate of composite adverse perinatal outcome was 1.5% (n=73), which is significantly lower than that reported in the TBT (5.1%). This study corroborates Su et al.'s (2003) findings of fetal growth restriction as a risk factor (aOR [adjusted odds ratio] 2.94, 95% CI 1.30 to 6.67). The additional risk factors identified were oligohydramnios (aOR 2.94, 95% CI 1.15 to 7.18), history of caesarean section (aOR 2.94, 95% CI 1.28 to 6.77), gestational diabetes (aOR 2.89, 95% CI 1.54 to 5.54), epidural anaesthesia (aOR 2.20, 95% CI 1.29 to 3.75) and nulliparity (aOR 1.84, 95% CI 1.10 to 3.08). The authors note that some of these factors are also linked with increased perinatal risks in the general population.

Systematic reviews and meta-analyses

A Cochrane systematic review of planned caesarean section for term breech birth identified three randomised trials involving 2396 women and babies (Hofmeyr, Hannah, & Lawrie, 2015). The largest contributor of data was the TBT, while the two other RCTs were from the USA in the 1980s (Collea, Chein, & Quilligan, 1980; Gimovsky, Wallace, Schifrin, & Paul, 1983). Of the women allocated to a planned vaginal breech birth, 550 (45%) had a caesarean section while 1061 (91%) of the 1169 of women allocated to caesarean section underwent a caesarean section. There was significant heterogeneity between the studies and the quality of the evidence ranged from moderate to low, due to blinding not being possible, suboptimal allocation randomisation and study design limitations. Combined data from all three studies showed that planned caesarean section was associated with a modest increase in short term maternal morbidity (RR 1.29, 95% CI 1.03 to 1.61). One study of 1025 women, in which the evidence was graded moderate in quality, showed that perinatal or neonatal death (excluding fatal anomalies) was reduced for women with a planned caesarean section, in settings with a low national perinatal mortality rate (RR 0.07, 95% CI 0.02 to 0.29). One study showed that more infants born by planned caesarean section had medical problems at age two (RR 1.41, 95% CI 1.05 to 1.89); however, the numbers were too small for there to be certainty around the conclusions. The authors concluded that planned caesarean section compared with planned vaginal breech birth reduced perinatal or neonatal death and morbidity but at the expense of a modest increase in maternal morbidity. They conclude that the benefits of caesarean section need to be weighed up with the mother's preferences and with the risks to maternal and longer term child health.

Berhan and Haileamlak (2016) undertook a meta-analysis which included RCTs and observational studies to determine the absolute risk and relative risk of perinatal mortality and morbidity according to planned mode of birth. They examined 27 articles published between 1993 and 2014, with a total sample size of 258,953 women. The included studies were from Europe (20), Australia (2), Asia (2), multi-country (1), United States of America (1) and Trinidad (1). Of the 27 studies, 17 concluded that vaginal breech birth was an acceptable option if there were strict selection criteria. The other 10 studies concluded that routine elective caesarean section was a safer option. The meta-analysis found that the absolute risk of perinatal mortality was 0.3% or 1 in 333 babies for planned vaginal breech birth, compared to 0.05% or 1 in 2000 for planned caesarean section. Considering planned vaginal breech birth and planned caesarean section respectively, the risk of fetal neurological morbidity was 0.7% compared with 0.1%, birth

Table 1: Studies reviewing mode of birth and outcome for term breech presentation

Year	Authors	Title	Study type & population	Country	Findings	Conclusion
2001	Golfier, F., Vaudoyer, F., Ecochard, R., Champion, F., Audra, P., Raudrant, D.	Planned vaginal delivery versus elective caesarean section in singleton term breech presentation: A study of 1116 cases	Retrospective review of 1116 women with breech presentation from 1991-1995	France	702 (62.9%) C/S pre labour 414 (37.1%) planned vaginal birth 72 (6.5%) C/S 342 (30.6%) vaginal birth 2 perinatal deaths in vaginal group; 0 in C/S group.	Vaginal birth increases risk of mortality and morbidity.
2004	Alarab, M., Regan, C., O'Connell, M. P., Keane, D. P., O'Herlihy, C., Foley, M. E.	Singleton vaginal breech delivery at term: Still a safe option	Retrospective review of 641 women from 1997-2000	Ireland	343 (54%) C/S 298 (46%) trial of vaginal birth; 146 gave birth vaginally. No perinatal mortality or major morbidity. Strict criteria for vaginal birth.	Safe vaginal breech birth can be achieved with strict selection criteria, adherence to careful intrapartum protocol and with an experienced obstetrician in attendance.
2005	Al-Inizi, S. A., Khayata, G., Ezimokhai, M., Al-Safi, W.	Planned vaginal delivery of term breech remains an option – result of eight years experience at a single centre	Retrospective review of 299 women from 1996-2003	United Arab Emirates	96 (32.1%) vaginal birth 203 (67.9%) C/S Increased incidence in C/S in last 2 years of study. No difference in perinatal mortality	Planned vaginal delivery is associated with no significant adverse perinatal outcome and remains an option for selected women with term breech presentation
2005	Uotila, J., Tuimal, R., Kirkenen, P.	Good perinatal outcome in selective vaginal breech delivery at term	Retrospective review of 986 women from 1995-2002	Finland	396 electice C/S 590 planned vaginal births, of whom 455 had vaginal birth and 135 C/S No birth-related perinatal mortality and no significant difference in morbidity	Selective vaginal breech deliveries may be safely undertaken in units having a tradition of vaginal breech deliveries
2005	Pradhan, P., Mohajer, M., Deshpande, S.	Outcome of term breech births: 10-year experience at a district general hospital	Retrospective review of 1433 women from 1991-2000	England	881 (61.5%) vaginal birth 552 (38.5%) C/S pre labour 416 (29.1% vaginal birth and 465 (32.4%) C/S during labour 4 intrapartum deaths (1 lethal anomaly) Small increased risk of perinatal death and short-term morbidity for vaginal birth	Vaginal breech delivery or C/S in labour was associated with a small but unequivocal increase in the short-term mortality and morbidity. The long-term outcome was not influenced by the mode of delivery
2006	Goffinet, F., Carayol, M., Foidart, J.M., Alexander, S., Uzan, S., Subtil, D., Breart, G., for the PREMODA study group	Is planned vaginal delivery for breech presentation at term still an option? Results of an observational prospective survey in France and Belgium	Observational prospective with intent to treat analysis. 138 French and 36 Belgian maternity units involving 8105 women from 2001-2002	France & Belgium	5579 (68.8%) planned C/S; 2526 planned vaginal birth, of whom 1796 (71%) delivered vaginally. The rate of combined neonatal outcome (aggregate of adverse perinatal outcomes) measured 1.59% overall and 1,60% in the planned vaginal birth.	Planned vaginal birth is a safe option in places where it is a common practice, and strict criteria are met before and during labour and birth.
2007	Daskalakis, G., Anastasakis, E., Papantoniou, N., Mesogitis, S., Thomakos, N., Antsaklis, A.	Cesarean vs. vaginal birth for term breech presentation in 2 different study periods	Retrospective review of 1552 women from 1988-2000 and a further 502 women from 2001-2004	Greece	Significant difference in morbidity found in first study period, only a reduction in rate of admission to NICU found in second study period. Change in policy did not improve neonatal outcome	Planned C/S was found to be safer than planned vaginal delivery for breech presentation. The change in policy did not demonstrate improved neonatal outcome
2013	Vistad, I., Cvancarove, M., Hustad, B., Henriksen, T.	Vaginal breech delivery: Results of a prospective registration study	Prospective study of 568 women from 2001-2011	Norway	279 (49%) planned C/S 289 (51%) planned vaginal birth 104 (36.3%) C/S during labour No neonatal deaths, increased short-term morbidity but not long-term morbidity. Strict guidelines in place. Increased blood loss for women with C/S	Strict guidelines in place and followed in all cases. There were no neonatal deaths but two infants had serious neonatal morbidity in planned vaginal group without long-term sequelae.
2014	Borbolla Foster, A., Bagust, A., Bisits, A., Holland, M., Welsh, A.	Lessons to be learnt in managing the breech presentation at term: An 11-year single-centre retrospective study	Retrospective study. 243 women (31.7%) were eligible for planned vaginal breech birth, of whom 58% achieved a vaginal breech birth.	Australia	No perinatal or maternal mortality. Morbidity rates were low and compare favourably with similar studies. There was a non-significant trend towards higher rates of serious short-term neonatal and maternal morbidity in the planned vaginal birth group compared to planned C/S (1.6 vs. 0.4% and 8.2 vs. 4.8% respectively).	Attempted vaginal birth for breech presentation remains an option for carefully selected women under strict protocols.

trauma 0.7% compared with 0.17, 5 minute Apgar score of <7 was 2.4% versus 0.3% and neonatal asphyxia 3.3% versus 0.6%. The authors acknowledge that the relative risks are higher for vaginal birth than caesarean section for breech. However, they focus on the low absolute risks and argue that vaginal breech birth may have comparable safety to that of a vaginal cephalic birth when compared to statistics from a World Health Organization multi-centre study (Villar et al., 2007). They conclude that the evidence isn't strong enough to abandon vaginal breech birth completely and they advocate individualised decision making.

Professional guidelines

Professional guidelines related to breech birth from Australia/New Zealand, the United Kingdom, Canada and the USA were examined to identify similarities and differences in recommendations (Table 2). We did not find any midwifery professional guidelines on breech presentation at term. All of the guidelines examined state that there is an increase in perinatal mortality with vaginal breech birth compared with planned caesarean section. The differing tone and focus between the guidelines appear to be related to interpretation of the evidence, tolerance of risk levels and whether other outcomes, such as the risks to the mother of caesarean section and risks to future pregnancies, are given importance when considering the same research evidence. This may be reflective of the culture of obstetric care within these countries. The guidelines are discussed from the most to the least recent.

The RCOG guideline "Management of Breech Presentation" considers both term and preterm breech presentations (Impey, Murphy, Griffiths, & Penna, on behalf of the RCOG, 2017). It accords weight to full discussion of both options for birth when a woman has a persistent breech presentation at term. This includes benefits and risks of both caesarean section and planned vaginal breech birth, stating:

> Women should be informed that planned caesarean section leads to a small reduction in perinatal mortality compared with planned vaginal breech delivery. Any decision to perform a caesarean section needs to be balanced against the potential adverse consequences that may result from this. (RCOG, 2017, p.2)

Table 2: Recommendations from professional groups

Royal College of Obstetricians and Gynaecologists (Green-top Guideline No. 20b, 2017)

- Women should be informed of the benefits and risks, both for the current and for future pregnancies, of planned caesarean section versus planned vaginal birth for breech presentation at term.
- Women should be informed that planned caesarean section leads to a small reduction in perinatal mortality compared with planned vaginal birth for breech presentation. A decision for caesarean needs to be balanced against the potential adverse consequences that may result from this.
- Selection of appropriate pregnancies and skilled intrapartum care may allow planned vaginal breech birth to be nearly as safe as planned vaginal cephalic birth.
- Clinicians should counsel women in an unbiased way that ensures a proper understanding of the absolute as well as relative risks of their different options.
- Women should be advised that successful vaginal birth has the lowest rate of maternal complications; planned caesarean section for breech presentation carries a small increase in immediate maternal complications; emergency caesarean carries a higher risk of maternal complications than elective caesarean and that there is a 40% chance of caesarean section when vaginal birth is planned.
- Women should be advised that planned caesarean section for breech presentation does not carry any additional risk to long-term health outside pregnancy.
- Women should be advised that caesarean section has been associated with a small increase in the risk of stillbirth for subsequent babies although this may not be causal.

Royal Australian and New Zealand College of Obstetricians and Gynaecologists (2016)

- Where there is maternal preference for vaginal birth, the woman should be counselled about the risks and benefits of planned vaginal breech delivery in the intended location and clinical situation.
- Planned vaginal breech delivery must take place in a facility where appropriate experience and infrastructure are available:
  - Continuous fetal heart monitoring in labour.
  - Immediate availability of caesarean facilities.
  - Availability of a suitably experienced obstetrician to manage the delivery, with arrangements in place to manage shift changes and fatigue arrangements.

When breech presentation is first recognised in labour, the obstetrician should discuss the options of emergency caesarean section or proceeding with attempted vaginal breech birth with the woman, explaining the respective risks and benefits of each option according to her individual circumstances. Wherever practicable, point-of-care ultrasound should be performed when breech presentation is first diagnosed in labour.

American College of Obstetricians and Gynecologists' Committee on Obstetric Practice. (Number 340, 2006; reaffirmed 2016)

- The decision regarding the mode of delivery should depend on the experience of the health care provider. Cesarean delivery will be the preferred mode of delivery for most physicians because of the diminishing expertise in vaginal breech delivery.
- Obstetricians should offer and perform external cephalic version whenever possible.
- Planned vaginal delivery of a term singleton breech fetus may be reasonable under hospital-specific protocol guidelines for both eligibility and labor management.
- In those instances in which breech vaginal deliveries are pursued, great caution should be exercised, and detailed patient informed consent should be documented.

Before embarking on a plan for a vaginal breech delivery, women should be informed that the risk of perinatal or neonatal mortality or short-term serious neonatal morbidity may be higher than if a cesarean delivery is planned.

Society of Obstetricians and Gynaecologists of Canada (Clinical Practice Guideline, 2009)

Summary Statements:

- Vaginal breech birth can be associated with a higher risk of perinatal mortality and short-term neonatal morbidity than elective Caesarean section.
- Careful case selection and labour management in a modern obstetrical setting may achieve a level of safety similar to elective Caesarean section.
- Planned vaginal delivery is reasonable in selected women with a term singleton breech fetus.
- With careful case selection and labour management, perinatal mortality occurs in approximately 2 per 1000 births and serious short-term neonatal morbidity in approximately 2% of breech infants. Many recent retrospective and prospective reports of vaginal breech delivery that follow specific protocols have noted excellent neonatal outcomes.

Long-term neurological infant outcomes do not differ by planned mode of delivery even in the presence of serious short-term neonatal morbidity.

Throughout the literature, commentary is increasingly appearing about whether the appropriate comparison to make is between caesarean section and vaginal birth for breech presenting babies, or whether studies should be comparing outcomes for vaginally born breech babies compared to vaginally born cephalic babies. This is reflected in the RCOG guideline:

> Women should be informed that when planning delivery for a breech baby, the risk of perinatal mortality is approximately 0.5/1000 with caesarean section after 39+0 weeks of gestation; and approximately 2.0/1000 with planned vaginal breech birth. This compares to approximately 1.0/1000 with planned cephalic birth. (RCOG, 2017, p.2)

The RCOG guideline states that "Selection of appropriate pregnancies and skilled intrapartum care may allow planned vaginal breech birth to be nearly as safe as planned vaginal cephalic birth" (p.2). It continues that women should be told of the benefits and risks for both the current pregnancy and further pregnancies of planned caesarean section and that there should be careful case selection and intrapartum management.

The RANZCOG guideline "Management of Breech Presentation at Term" identifies commentary from research papers and editorials that recommend caesarean section (RANZCOG, 2016). However, it also recognises the possibility that a woman may choose to have a vaginal breech birth and if this is the case she should be counselled about the risks and benefits of vaginal birth. The RANZCOG guideline does not state that a discussion about the risks and benefits of caesarean section should take place. Further recommendations are that vaginal breech birth must occur in a facility where there is infrastructure for caesarean section and that staff with appropriate experience are available throughout labour.

The ACOG Committee Opinion, "Mode of Term Singleton Breech Delivery", states that the decision on mode of birth depends on the experience of the healthcare provider and that many obstetricians may prefer caesarean section as they have diminishing expertise with vaginal breech birth (ACOG, 2006/2016). Having said this, ACOG also identifies that planned vaginal breech birth may be reasonable if attempted under a hospital specific protocol and advises careful case selection and protocols during the birth.

The Society of Obstetricians and Gynaecologists of Canada (SOGC) has entitled its guideline "Vaginal Delivery of Breech Presentation", with a particular focus on this mode of breech birth (SOGC, 2009). SOGC states that planned vaginal breech birth is a reasonable option to offer to carefully selected women, adding that, with this provision as well as labour management in a modern obstetric setting, there is the potential to achieve a level of safety similar to elective caesarean section.

The New Zealand Guidelines Group was a multidisciplinary group that produced a national guideline on the management of breech presentation at term in 2004 but this has since been withdrawn and not replaced, for unknown reasons.

Despite the differences in tone and focus there are some similarities in the recommendations made by each of these professional bodies. Each now reflects more overt support than earlier versions (although very cautious) for women who choose to have a vaginal breech birth and several recommend discussing the risks of caesarean section for the woman and the baby, both long and short term, as well as the risks of vaginal breech birth. All guidelines recommend selection criteria and labour protocols (Table 3) in an attempt to reduce the risks associated with vaginal breech birth.

Table 3: Factors commonly identified as important for a "safe" singleton vaginal breech birth at term

Prior to birth
Fetal size: Estimated fetal weight more than 2500g and less than 3800g-4000g
Flexed fetal head: absence of hyperextension of the fetal head
Flexed (complete) or extended (frank) breech
No signs of oligohydramnios or intrauterine growth restriction
No previous uterine scar and no other obstetric complications/ contraindications
Maternal preference
During labour and birth
Experienced clinician
Spontaneous labour onset
Good labour progress
No ARM or augmentation

DISCUSSION

The aims of this paper were to review the research evidence and international professional guidelines about vaginal breech birth at term, identify the current evidence and gaps in knowledge and highlight how the evidence can be used to support women in New Zealand. Since the publication of the TBT there have been major changes in obstetric clinical practice globally, with caesarean section becoming the prevalent mode of birth for persistent breech presentation. Subsequent critiques have identified many issues within the TBT, making the evidence less reliable than initially thought. In addition, subsequent studies and systematic reviews have identified lower perinatal mortality and morbidity rates than those reported by the TBT. Many professional guidelines are now advising that women be fully informed of the risks as they relate to both vaginal breech birth and caesarean section.

The New Zealand context

In New Zealand maternity care providers are required by the Code of Health and Disability Services Consumers' Rights (the Code) to provide full and unbiased information about the health condition and the risks and benefits of all relevant treatment or management options (Health and Disability Commissioner, 1996). For women who have a diagnosed persistent breech presentation at term, this means providing information on the risks and benefits of both caesarean section and vaginal breech birth for both the woman and her baby. Women have the right to decline treatment, which, in this case, would be caesarean section.

Women need to have information presented in ways that support them to determine the optimal mode of birth for their circumstances. Sackett, Rosenberg, Gray, Haynes, and Richardson (1996) define evidence based practice as the integration of research evidence with the woman's preferences alongside the clinician's expertise – all of which can support the woman to determine the optimal course of action to meet her individual circumstances.

In New Zealand, most women receive antepartum, intrapartum and postpartum care from a lead maternity carer (LMC) who is nearly always a midwife. When a breech presentation is diagnosed, whether antenatally or in labour, the Guidelines for Consultation with Obstetric and Related Medical Services (Referral Guidelines) require the LMC midwife to recommend to the woman that a consultation with a specialist obstetrician is warranted (Ministry of Health, 2012). The duties to provide full and unbiased information set out in the Code apply to all clinicians who support a woman in her decision making.

Risk and safety

Women need to be informed of potential harms and benefits in specific terms, which they can relate to themselves, their context and their clinical situation, and in absolute risk terms rather than relative risk terms (Powell, Walker, & Barrett, 2015). In addition, women may perceive risk differently to that of the clinician, with a variety of other factors influencing women's decision making. When women are provided with options and supported in their decision making they report positive breech birth experiences, regardless of the type of breech birth (Toivonen, Palomaki, Huhtala, & Uotila, 2014).

Risk in healthcare is seen as simple and linear, yet healthcare provision is frequently unpredictable and messy (Nieuwenhuijze et al., 2015). There are often unintended consequences, which may not be limited to the physical but also involve the psychological, emotional and social, and which may have a long-term impact on the woman's quality of life. Risk-averse healthcare can depersonalise care provision and support a reliance on rule-based, protocol-driven care. Explaining risk is often difficult and likely to be influenced by the health professional's perceptions of risk and previous experiences, whilst the woman's decisions are more frequently based on her own personal fears and values (Healy, Humphreys, & Kennedy, 2016).

An alternative discourse to risk is that of safety, with the discussion focused not only on the chances of harm but on what can be done to support a safe outcome for the woman and her baby. This would include consideration of the physical, psychological and social benefits and harms for each course of action, individualised to the woman's health and that of her baby.

Benefits and harms of planned caesarean section

The main reason/benefit for offering an elective caesarean section for persistent breech presentation at term is the reduction in perinatal mortality. Reduction in mortality occurs for two reasons: the earlier gestation at which a caesarean section is performed and the reduced risk of hypoxia caused by potential complications during a vaginal birth (Pasupathy, Wood, Pell, Fleming, & Smith, 2009). Only the latter is specific to breech presenting babies. Other potential benefits that women may consider important are the ability to plan the date of birth (knowing that labour may spontaneously occur prior) and a reduced risk of perineal trauma, although these are not specific to breech presentations.

Women who are considering mode of birth for a breech presenting baby have the right to full information about not just the potential benefits but also the potential harms of the proposed treatment. Whilst maternal death following caesarean section is an extreme and rare event in developed countries, longer-term morbidity following caesarean section was found by Liu et al. (2007) to be higher following caesarean section births (27.3 per 1000) than vaginal births (9.0 per 1000 births). In order to assess the risks of caesarean compared to vaginal birth for an otherwise low-risk population, the researchers conducted a large, retrospective, population-based, cohort study of data from a 14-year period to compare the morbidity of 46,776 women who had a planned caesarean section, where breech presentation was the only indication, with 2,292,420 who were low risk (not breech presentation) and planned a vaginal birth. They identified increased risk of cardiac arrest, wound haematoma, hysterectomy, major puerperal infection, anaesthetic complications, venous thromboembolism, haemorrhage and a longer hospital stay for planned caesarean section. Having a caesarean section increases the likelihood of caesarean sections for future births. Serious complications become more common with repeated caesarean sections (RCOG, 2015), including uterine rupture and placental implantation problems (MacDorman, Menacker, & Declercq, 2008). An analysis in the USA found rates of placenta accreta increase incrementally with every subsequent caesarean section, from 0.24% with a first caesarean section to 6.74% with a sixth or subsequent caesarean section (Silver et al., 2006).

For the neonate born breech there is an increased risk of admission to a neonatal intensive care unit (NICU) in the short term, following both caesarean section and vaginal breech birth (Blustein & Liu, 2015). Short-term complications following caesarean section include temporary breathing difficulties, and the baby may receive a cut (usually minor) during the operation (RCOG, 2015). The two-year follow-up of the TBT found that 20.8% of parents in the planned caesarean section group reported medical problems with their baby, compared to 14.8% of parents whose baby was born by vaginal breech birth (Whyte et al., 2004). Other studies exploring caesarean sections have reported more upper respiratory, gastrointestinal, ear, skin and allergy issues and there is some evidence indicating a latent risk of chronic disease such as type 1 diabetes, obesity and asthma (Blustein & Liu, 2015). Hyde, Mostyn, Modi, and Kemp (2012) suggest that the stress response that occurs during labour and a vaginal birth may be a key mechanism affecting the long-term health of the child. Stress would appear to modify the differentiation of a number of cell types during labour and birth and following the birth. This concept has led to the EPIgenetic Impact of Childbirth (EPIIC) hypothesis, which argues that interventions such as caesarean section during the intrapartum period may affect the "physiological remodelling processes through DNA methylation" and subsequent health of both mother and baby (Dahlen, Downe, Kennedy, & Foureur, 2014, p. 1150). A list of harms and benefits identified by the literature is provided in Table 4.

Several large, retrospective, cohort studies indicate that, irrespective of how a woman births in a subsequent pregnancy, after caesarean section her subsequent baby is at higher risk of stillbirth and neonatal death after adjusting for potential confounders (Huang et al., 2011; O'Neill et al., 2013; Salihu, Bowen, Wilson, & Marty, 2011). Prospective trials are needed to investigate this association. O'Neill et al.'s (2013) findings were disputed when multivariate analysis was used to investigate possible residual confounding variables (Walker, Scamell, & Parker, 2016; Wood, Ross, & Sauve, 2015).

Benefits and potential harms of planned vaginal breech birth

The benefits for the woman of planning a vaginal breech birth include shorter postnatal recovery and reduced incidence of serious maternal morbidity. Second and subsequent labours are shorter than a first labour and birth (Vahratian, Hoffman, Troendle, & Zhang, 2006) and are lower risk due to the absence of a uterine scar. Risks of planned vaginal birth for the woman are not specific to breech presentation and include emergency caesarean section in labour, perineal trauma and increased rates of pelvic floor dysfunction compared to caesarean section (Memon & Handa, 2012).

Finnish data suggests that risk factors for adverse perinatal outcome include fetal growth restriction, oligohydramnios, a history of caesarean section, gestational diabetes and nulliparity (Macharey et al., 2017). These are all factors which are known in advance of labour and could therefore be taken into account in prenatal counselling and decision making. In addition, avoiding epidural anaesthesia (Macharey et al., 2017), labour augmentation

Table 4: Benefits and harms of vaginal and caesarean section as modes of birth

Planned vaginal birth	Maternal health	Baby's health
Benefits	Quicker recovery following the birth Future labours shorter and risks lower	Better longer-term health
Harms	May need emergency caesarean section Potential for perineal trauma	Risk of fetal death (2 per 1000 for planned vaginal breech birth compared to 1 per 1000 for planned cephalic birth (Impey et al., 2017) Birth trauma (e.g. brachial plexus injury) (0.7%) Low Apgar (<7 at 5 min) (2.4%) Admission to NICU (3%) Neonatal asphyxia (3.3%) Neurological morbidity (0.7%) No difference in longer-term health (Berhan & Haileamlak, 2016)
Planned caesarean section	**Maternal health**	**Baby's health**
Benefits	Ability to plan date/time of birth No risk of perineal trauma	Reduced risk, perinatal mortality 0.5 per 1000 births if caesarean section after 39th week
Harms	Increased risk of • Infections • Blood clots • Haemorrhage Need for further caesarean sections which then increases risk of: • Risk of uterine/scar rupture (0.5%) • Placental praevia • Morbid placental adherence (0.3% to 2.33% dependent on number of caesareans woman has) • Haemorrhage • Hysterectomy • Urinary tract injury • Maternal death Potential increased risk of • Future stillbirth (0.4%)	Increased risk of: • Cut to the baby's skin during operation (1-2%) • Temporary breathing difficulties • Admission to NICU Potential for increased risk of chronic Immune disorders (e.g. asthma), obesity and diabetes

and prolonged second stage, and having an experienced clinician at the birth (Su et al., 2003), are likely to minimise risks associated with vaginal breech birth.

Having a skilled practitioner attending vaginal breech births to minimise risk to the baby is a standard recommendation. Unfortunately, in many countries, including New Zealand, obstetricians and midwives have been unable to maintain experience or build the skills needed to support vaginal breech birth with confidence (Walker et al., 2016) due to its low prevalence (RANZCOG, 2016). Thus, the ability for a woman to access a practitioner experienced with vaginal breech birth has decreased. New Zealand midwives have been taught breech birthing skills in basic or undergraduate midwifery education since the registration of midwives, and the knowledge and skills have been a component of mandatory recertification since 2004 (Midwifery Council of New Zealand, 2014). This has ensured that, when a woman who is otherwise low risk and birthing outside a hospital setting has a surprise breech presentation in labour, midwives have the knowledge and skills to support that woman. However, in practice, this may not translate to experience when it comes to planning a labour and vaginal birth when the breech is diagnosed during pregnancy.

Another issue that requires consideration for women when planning a vaginal breech birth is the risk that they may still have a caesarean section (which would be classified as an emergency caesarean section) either before or during labour. Roman et al. (2008) explored the prenatal determinants that were predictive of caesarean section during labour and found that, if vaginal breech birth is planned, the risk of caesarean section during labour varied from 17% to 50%. These authors found that success of vaginal breech birth depends on the progress of labour, along with parity (nulliparity increases risk of caesarean section), the type of breech presentation, macrosomia, fetal biparietal diameter (increasing diameter was positively correlated with a higher risk) and pre-labour rupture of membranes. Emergency caesarean sections are associated with higher rates of complications than pre-labour caesarean sections (Bergholt, Stenderup, Vedsted-Jakobsen, Helm, & Lenstrup, 2003; Su et al., 2003) and women labouring with breech babies have a higher chance of caesarean section in labour than those with cephalic babies.

For the baby, planned vaginal breech birth increases the risk of birth trauma (such as brachial plexus injury), a low Apgar score (<7) at 5 minutes, NICU admission, neonatal asphyxia and neurological morbidity (Berhan & Haileamlak, 2016). However, the TBT found that morbidity was short-term and there was no difference at the two-year follow-up between breech babies born vaginally or by caesarean section (Whyte et al., 2004). Other studies have found that the risk of fetal morbidity increased if the mother was older than 35 years (Pasupathy et al., 2009) or the baby was less than 39 weeks at birth, or had a birthweight under the 10th percentile (Azria et al., 2012).

Clearly, as Berhan and Haileamlak (2016) state, for women with a breech presentation at term, both vaginal breech birth and elective caesarean section carry some risk. Ultimately, the woman has the right to refuse a caesarean section and so it is important that New Zealand maternity service providers have the skills to support her in either option.

STRENGTHS AND WEAKNESSES

This is the first published review of the current knowledge and evidence related to breech presentation at term, as relevant to the New Zealand context. Specifically, given the patient-centred legal framework in New Zealand, the review takes a holistic approach to the evidence. New Zealand has more detailed requirements in the Code than other countries have in their common law. This arguably justifies providing women with a wider range of information and is the reason for the inclusion here of a broader range of sources than just RCTs. However, there are minimal

research data that are specific to New Zealand, so the majority of data in this paper have been sourced from other similar countries. Furthermore, the sources included here have not been graded for quality of evidence, although this has been undertaken in the RCOG (2017) and SOGC (2009) professional guidelines and the Cochrane Review (Hofmeyr, Hannah, & Lawrie, 2015) included in this paper. Finally, this paper does not address the growing literature about women's experiences of their maternity care in the later stages of breech pregnancies (Petrovska, Watts, Catling, Bisits, & Homer, 2017).

CONCLUSION

This paper has reviewed the evidence regarding the outcomes related to planned mode of birth for breech presentation at term. Following publication of the TBT there has been a major change in clinical practice and most women with a breech presentation at term are now advised to have a planned caesarean section. Subsequent critiques and reviews have identified concerns with the TBT which undermine the reliability of the trial's evidence. Further retrospective and prospective studies have demonstrated equivocal results and suggest that perinatal mortality can be reduced when strict criteria and an experienced clinician are involved. Professional guidelines now advise that offering women the option of a vaginal breech birth is reasonable. Women in New Zealand need to know the physical, psychological and social benefits and harms of both caesarean section and vaginal breech birth to support their decision making.

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