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Abstract

Perineal trauma is associated with short and long term maternal morbidity. Research has found that maternal position at birth can influence perineal trauma. However, no evidence examining specific maternal positions, including waterbirth and how these can influence incidence and degree of perineal trauma could be found. The evidence is important to help reduce trauma rates and improve information for women and midwives.

To address this dearth in reliable evidence, a systematic review was conducted. Seven studies met the inclusion criteria. Compared to landbirth, waterbirth was found to cause an increase in perineal trauma. Kneeling and all-fours positions were most protective of an intact perineum. Allowing for different variables; sitting, squatting and using a birth-stool caused the greatest incidence of trauma.

The findings of this review demonstrate further research is required around perineal guarding in alternative birth positions and how parity affects trauma rates with waterbirth in order that women may be advised appropriately. However, this review suggests findings that midwives can use when discussing alternative birth positions with women.

Introduction and Background

Genital tract sepsis is now the leading cause of direct maternal death in the UK, with the incidence rising since 2006 (CMACE, 2011). Perineal trauma can increase the risk of puerperal infection potentially leading to sepsis (Kettle, 2004, CMACE, 2011). It is also associated with long and short term morbidities such as pain and dyspareunia, stress and urge urinary incontinence and flatus incontinence (McCandlish *et al.*, 1998, Barrett, 2000, Williams *et al.*, 2007). These morbidities can lead to women experiencing complex psychological issues such as social isolation, anxiety, embarrassment and avoidance of intimate contact due to fear of pain (Priddis *et al.*, 2013, Williams *et al.*, 2005, O'Reilly *et al.*, 2009). Also women may fear and anticipate pain during the suturing process (Priddis *et al.*, 2013), an intervention which can blight an otherwise satisfying birth experience.

Perineal trauma is classified on the severity of the tear into 1st, 2nd, 3a, 3b, 3c and 4th degree, depending on the level to which the surrounding tissues are involved.

Anterior perineal trauma can also occur to the labia, urethra and clitoris, though this is usually associated with little morbidity (Aasheim *et al.*, 2011). The degree of morbidity is directly related to the degree of perineal injury sustained (Aasheim *et al.*, 2011, Radestad *et al.*, 2008, Williams *et al.*, 2007). Consequently it is essential that midwives practice in such a way to reduce where possible, perineal trauma.

Ample research has been conducted into what causes and increases the incidence of perineal trauma (Albers *et al.*, 2005, da Silva *et al.*, 2012, Christianson *et al.*, 2003, Mayerhofer *et al.*, 2002) with a multitude of factors being attributed, including primiparity, instrumental delivery, ethnicity, heavier babies, maternal age and body mass index. . In addition controllable factors have been found to affect perineal trauma including delivery techniques and different birth positions (da Silva *et al.*, 2012, Dahlen *et al.*, 2007, Meyvis *et al.*, 2012).

There are published guidelines advising on birth positions (NICE, 2014, RCM, 2012a, RCM, 2012b). However these identify a lack of robust evidence differentiating between different birth positions, including waterbirth when compared with recumbent positions and the incidence and degree of perineal trauma sustained (NICE, 2014, RCM, 2012a, RCM, 2012b). NICE (2014) state that there is no difference in the rate of intact perineia when a supine position is compared with upright positions. However, the guidelines question the methodological quality of the studies used to substantiate their evidence. Consequently the results should be interpreted with caution. The guidelines also rely on studies which included lateral and semi-recumbent as “upright” positions, positions not recommended by the RCM Better Birth Initiative as neither of these positions allow for the assistance of gravity during the birth (RCM, 2005).

A Cochrane review (Gupta *et al.*, 2012) examined duration of the second stage of labour, comparing limited birth positions (upright, birth-stool/squatting and birth chair/cushion) with supine/lithotomy positions, excluding waterbirth. However, different upright positions were not compared and perineal trauma was only

considered as a secondary outcome. Trauma not requiring suturing was also excluded.

With research demonstrating birth position affects the rate and degree of perineal trauma (Gupta et al., 2012, Dahlen et al., 2013, Cluett and Burns, 2009), it is important to consider which birth positions midwives are best to promote to reduce the degree of trauma women experience. However, no evidence could be found specifically examining data related to this. Consequently, this article will now discuss a systematic review that was undertaken to address this with the following review question: 'Do different maternal positions at birth affect the incidence and degree of perineal trauma?'

Methods

The review protocol was formulated using the Centre for Reviews and Dissemination's (CRD) Guidance for undertaking systematic reviews (CRD, 2009) An initial literature scoping exercise revealed sufficient literature and no previously conducted reviews with the same review question. A combination of search terms was collated (See Table 1) then used in an extensive search of 19 databases and department of health publications. Reference lists of relevant articles were hand searched and known experts in the field contacted. The review was limited to English language and published studies only due to feasibility constraints, but was not limited by year of publication. Studies which were considered to meet the eligibility criteria (Table 2) based on the title, abstract and subject descriptors were obtained for data synthesis.

The final search generated 113 citations and a further 13 studies were discovered through contacting experts and searching reference lists of identified studies. A total of 32 citations were obtained and assessed for eligibility against the inclusion and exclusion criteria, leaving 10 studies suitable to be included in the review (Figure 1). These studies were then subject to quality assessment using the validated checklist from the Critical Appraisal Skills Programme (CASP, 2013). The results from the CASP checklists were presented in a table relating them to the PICOS framework to

allow easy comparison of the findings (Table 3). One citation was lost during this process as the study did not address a clearly focused issue.

Data extraction was undertaken using the Cochrane Collaboration Data Collection (CCDC) form (Cochrane, 2013), a standardised form providing consistency and improving reliability and validity for quantitative studies (Higgins and Deeks, 2011). Risk of bias due to non-randomised studies and poor methodology was considered within the CCDC form using the Cochrane Collaboration's Risk of Bias (CCRB) tool (Higgins *et al.*, 2011). 2 studies were excluded due to interventions and outcomes not being reported separately. For transparency of the selection process excluded studies with the reason for rejection were recorded in a table.

Data synthesis adopted a narrative approach due to the heterogeneity of the included studies (CRD, 2009). Tables were used to assist with the textual narrative, allowing visual exploration of their relationships. As narrative synthesis is inherently a more subjective process than meta-analysis the author followed the guidance and framework produced by the Economic and Social Research Council (ESRC) Methods Programme (Popay *et al.* 2006, Rodgers *et al.* 2009). The academic supervisor offered ongoing support to reduce the risk of bias.

Findings

Summary of included studies

Table 4 gives an overview of the included studies and Table 5 a quality assessment with 'strong' quality studies to the left and studies with an increased risk of bias to the right of the table. As can be seen, there was vast heterogeneity within the studies, with variability of study design, population, setting, interventions and outcomes. Only one study (Cortes *et al.* 2011) was undertaken in the UK. The others were conducted in different countries across Europe and Australia all of which have very different maternity systems and practices. Some studies were conducted in hospital labour wards, others birth centres: the increased risk of intervention in a hospital setting (NICE 2014) is an important factor for consideration when interpreting results. Some women were attended by midwives, others obstetricians. These variations such as

episiotomies being standard practice in Turkey, as is being attended by an obstetrician rather than a midwife (MidwiferyToday, 2015, Hotun Şahin 2007) will have influenced results. It is acknowledged that these variations may have influenced the findings of this review.

There was only one randomised controlled trial included (table 4), considered the 'gold standard' of research, (Altman *et al.*, 2007), the other six were cohort studies, all deemed to be weaker in relation to quality and risk of bias when assessed using the CCRB tool (Higgins *et al.*, 2011, Lodge, 2015). Authors justified not selecting a RCT from an ethical perspective, that restricting women to certain positions and withholding choices could not be ethically justified. Despite the perceived limitations of cohort designs, the overall assessment of quality was good consequently the results can be considered propitiously.

The findings from the systematic review suggest that different maternal positions at birth do affect the degree and incidence of perineal trauma:

Waterbirth: This systematic review found more second degree tears compared to rates of intact perinea and 1st degree tears (Cortes *et al.*, 2011, Dahlen *et al.*, 2013) but with more intact perinea in multipara women (Mollamahmutoğlu *et al.* 2012). Only one study compared waterbirth with different landbirth positions (Dahlen *et al.*, 2013) finding it to be protective of perineal trauma in comparison to using a birth-stool and squatting positions but less protective than all-fours/kneeling positions (Dahlen *et al.*, 2013). Compared to landbirth in general, an increase in incidence of perineal trauma was found in waterbirth (Cortes *et al.*, 2011, Geissbuehler *et al.*, 2004, Mollamahmutoğlu *et al.*, 2012) contradicting previous research which found no difference in trauma rates between land and waterbirth (Cluett and Burns, 2009).

While Geissbuehier *et al.* (2004) found a reduction in 3rd and 4th degree tears with waterbirth in comparison to landbirth for nulli- and multi-gravid women combined; Cortes *et al.* (2011) found an increase. This study, however, only considered nulligravid women and cannot be compared to other included studies considering waterbirth and 3rd and 4th degree tears due to the possible inclusion of episiotomies (Dahlen *et al.*, 2013, Mollamahmutoğlu *et al.*, 2012) in their data. Cortes *et al.* (2011)

findings were linked to the length of immersion in water during labour and the study proposed the water caused an increase in perineal elasticity, shortening the second stage but giving less time for the tissues to stretch. This contradicts Cluett and Burns (2009) who suggested a potential benefit of waterbirth is an increase in elasticity of the birth canal and perineum which may reduce the incidence and severity of tearing.

All-fours and Kneeling Positions: The greatest incidence of intact perinea was found with all-fours position, with kneeling a close second, Rates above 50% were found in the majority of studies (Altman et al., 2007, Shorten et al., 2002, Soong and Barnes, 2005).

However, Altman et al. (2007) and Cortes et al. (2011) documented all degrees of perineal trauma as one outcome (Altman et al., 2007, Cortes et al., 2011) and others included anterior trauma in addition (Dahlen et al., 2013, Geissbuehler et al., 2004). Some studies included all tears requiring suturing as one outcome (Mollamahmutoglu et al., 2012, Shorten et al., 2002, Soong and Barnes, 2005). Consequently, it cannot be examined in any detail whether all-fours and kneeling positions can be protective of different types of perineal trauma.

Sitting, Squatting and Using a Birth-stool: These positions were found to have the highest incidence and degree of perineal trauma with rates being up to 85.7% for primiparous women (Altman et al., 2007). Rates of 2nd degree tear (or 1st and 2nd combined) was around 50% (Altman et al., 2007, Dahlen et al., 2013, Shorten et al., 2002, Soong and Barnes, 2005). Few studies considered anterior trauma but interestingly rates of labial tear were found to be lower with these positions than with waterbirth and other land birth positions (Dahlen et al., 2013, Geissbuehler et al., 2004). This review contradicts previous evidence (Thies-Lageren et al., 2011) which found no increase in perineal trauma when women used a birth-stool. However this trial restricted its use to 30 minutes. In this context, it was suggested that the high rates of trauma associated with the birth stool may have been linked to the way it was used in the second stage of labour when progress was slow (Dahlen et al., 2013) assisting in an upright position but possibly causing increased perineal oedema and therefore increased rates of trauma.

Parity: The systematic review intended to investigate whether perineal trauma and birth position may be influenced by parity. Conversely, despite parity being regularly discussed there were minimal studies included in the review where parity was recorded in relation to birth position, with only one study considering multiparity (Mollamahmutoğlu *et al.*, 2012) and birth positions being limited to kneeling, sitting (Altman *et al.*, 2007), waterbirth (Cortes *et al.*, 2011) and undefined landbirth (Mollamahmutoğlu *et al.*, 2012). Without further studies considering parity with birth position a strong conclusion cannot yet be drawn and practice cannot be influenced.

Implications of findings

The RCM (2005) Better Birth Initiative advocates the use of active birth positions to promote gravity. Midwives are advised to encourage women to adopt different positions during labour and birth. Midwives could use the findings from this review when considering which upright position to encourage. Women could be advised that all-fours and kneeling positions may reduce the incidence and degree of perineal trauma. The findings also provide a possible counter argument to the evidence that waterbirth reduces perineal trauma for nulliparous women (Cluett and Burns, 2009). All-fours and kneeling positions are easily achievable for most women and may particularly benefit women who are reluctant to mobilise away from the bed. However, it is important to interpret the findings only tentatively due to the other variables that can influence the incidence and degree of perineal trauma and the limitations of this review.

Birth attendants

Some birth attendants are known to have a personal preference for birth position (Bodner-Adler *et al.*, 2004, Shorten *et al.*, 2002) but it is difficult to quantify the influence of this preference on the women's instinct and choice of position. Although maternal choice was promoted in some studies (Cortes *et al.*, 2011, Geissbuehler *et al.*, 2004, Shorten *et al.*, 2002) it is difficult to say whether the incidence or severity of trauma has been affected as a result of women adopting non-instinctive positions.

Perineal guarding

This is recommended practice by the Royal College of Obstetricians and Gynaecologists to reduce the incidence of perineal trauma (RCOG) (2015). Only Cortes et al. (2011) discussed perineal guarding suggesting an increase in third and fourth degree tears in the waterbirth group may be attributable to a lack of perineal guarding. However, as no other study discussed this practice, it is unclear as to whether not guarding the perineum has affected the rates and degrees of perineal trauma.

Review limitations

Due to the multiple locations of the trials included, some of the results may not be generalizable to the UK population. An example is the practice of routine episiotomies in the Turkish study (Mollamahmutoğlu *et al* 2012). This will reduce the number of documented tears whilst the recommendation that episiotomies are not performed in the water will increase the rates of both intact perineum and trauma requiring suturing in water compared to the land. Consequently the findings from this review are tentative and highlight the need for further research in order to substantiate the implications for practice. Although only one of the included studies was an RCT, this demonstrates the positive ethos of promoting maternal choice of birth position in many countries and birth settings across the world. A further limitation is the lack of the data presented by some of the studies including parity and the differentiated degrees of perineal trauma. Consequently the reviewer had to make some assumptions about the missing data, though they were not considered significant enough to have affected the overall findings.

Conclusion

This systematic review provides evidence to support midwives advising women antenatally on the benefits of using kneeling and all-fours positions to increase their chances of an intact perineum while having the gravitational benefits of being upright. These positions would be useful for women who are reluctant to leave the bed and require little physical support from another party. Women should also be alerted to the increased risk of perineal trauma when birthing in a sitting/squatting position or using a birth-stool and midwives should be mindful of the length of time a woman spends on a birth-stool in the second stage. However, further research is required into how parity and the length of immersion during waterbirth effects

perineal trauma, as well as the safety and practicalities of providing perineal support in active birth positions, including waterbirth. In addition further research is needed into the length of time women spend on birth-stools and also in the water and how this affects perineal integrity.

Further research is required in this field, though whether this research should take the form of RCTs or cohort studies is an area for ethical debate. Woodward and Kelly (2004) demonstrated that women are accepting of the idea of participating in RCTs which may produce the most reliable and unbiased form of research (CRD, 2009). However encouraging RCTs which restrict women's childbirth choices opposes the NMC Code (2015) which promotes empowerment and shared decision making between midwife and woman. In this context, partaking in an RCT would prevent women from adopting instinctive birth positions, a factor which may prove to be protective in itself. To investigate this area fully, including the power of instinct, a majority of good sized, multi-centred cohort studies, alongside a minority RCTs, would be required..

Key phrases

- There is a dearth of evidence examining different upright positions and how they affect the incidence and degree of perineal trauma
- This systematic review found that maternal position at birth affects the incidence and degree of perineal trauma.
- In comparison to landbirth in general, waterbirth was found to increase the risk of perineal trauma but may be protective of an intact perineum for multiparous women
- Kneeling and all-fours positions are most likely to result in an intact perineum.
- Sitting, squatting and using a birth-stool caused the highest rates and degrees of perineal trauma.

- Further research is required into the effects of birth-attendant and perineal guarding in alternative birth positions on perineal trauma.

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