

The Birth Ball Experience: Outcome Evaluation of the Intrapartum Use of Birth Ball

Winnie SC KWAN RN, RM, BSCN, BCM

Sze-wing CHAN RN, RM

Wan-hon LI MBBS, FRCOG, FHKCOG, FHKAM (O&G)

Department of Obstetrics and Gynaecology, Queen Elizabeth Hospital, Kowloon, Hong Kong

Nowadays, the normality of labour and birth has been blurred by risk-focused management. The routine use of medical devices and connection to intravenous lines make it more convenient for midwives and obstetricians if the labouring women remain in bed. While close monitoring of the high-risk women with advanced technology is well justified to strive for optimal birth outcomes, the sense of normality should be maintained at least for low-risk women so as to encourage control over their own birth process. Birth ball has been introduced to the obstetric setting to facilitate the mobilisation of the labouring women. This article reports outcome evaluation of using the birth ball in the intrapartum period. The relationship between the duration of use and the perception of pain intensity has been explored. Although not statistically significant, the clinical significance of the high satisfaction rate reported should nevertheless be recognised. Outcomes including the duration of the first and second stages of labour and the mode of delivery were also evaluated. No detrimental effects on babies were identified as evidenced by satisfactory Apgar scores and low admission rates to the neonatal intensive care unit. Further research is recommended to explore the effect of the birth ball on these outcomes and to understand the perception of women and their partners towards its use during labour. Midwives should extend their role in promoting normal birth with vigilance by using complementary therapies like the birth ball.

Hong Kong J Gynaecol Obstet Midwifery 2011; 11:59-64

Keywords: Labour pain; Posture; Pregnancy

Introduction

The use of advanced technology in monitoring the maternal and fetal conditions during labour and delivery has contributed much to sustaining excellent birth outcomes. Advanced maternal age, expectancy of one healthy child, pre-existing or pregnancy-induced diseases, better survival rates of preterm infants, increasing success in assisted reproduction with the occurrence of more multiple pregnancies are just a few factors that make obstetric care more and more risk-oriented. The traditional trend of managing labour and delivery as a normal process has given way to a risk management approach. Labouring women used to ambulate during the intrapartum period and were even allowed a light diet if they wanted. Without the many medical devices and monitors, midwives used to walk around the ward, periodically auscultating fetal heart beats with a fetal stethoscope or doptone. In some

clinical settings in Hong Kong today, it is unusual for a woman not to be connected to a fetal monitor. Very often intravenous (IV) therapy is there to replace food by mouth, because risk factors identified during the antepartum period make many women potential candidates for Caesarean section. It should therefore be appreciated that these various measures can serve to limit mobilisation during labour to a great extent. A similar observation was reported by two authors from Taiwan who shared their experience of using the birth ball in an obstetric setting¹.

While many midwives appreciate the fact that this sort of monitoring allows early detection of abnormalities and immediate access to urgent

Correspondence to: Ms Winnie Kwan

Email: bkscw01@ha.org.hk

interventions, some also advocate for upholding the normality of birth among the low-risk women^{2,4}. To promote this essence of normality, the birth ball programme for pregnant women has been launched at the Queen Elizabeth Hospital since 2009. Midwives were encouraged to extend their role in promoting non-pharmacological means of labour pain management. The aim was to provide additional choices to attain comfort and pain relief for labouring women and at the same time promote their sense of control during the birth process. It is also believed that the progress of labour can be facilitated by adopting different positions. The effectiveness of the programme should be evaluated by on-going data collection. This article reports data collected from women participating in the birth ball programme from July to December 2010. The duration of women using the birth ball will be explored in relation to their perception of pain intensity, satisfaction with pain relief and comfort, the length of labour, and the mode of delivery.

Methods

Data collection was carried out for all women who had used the birth ball from July to December 2010, at the Department of Obstetrics and Gynaecology in the Queen Elizabeth Hospital, Hong Kong. In our unit, women with a gestational age of ≥ 36 weeks were given information on the availability of non-pharmacological labour pain relief measures before the onset of labour or at the latent phase. These measures included the birth ball, cold or warm compresses, transcutaneous electrical nerve stimulation (TENS), as well as massage and aromatherapy. Women were also informed that if their labour pains became intolerable, pharmacological means like nitrous oxide + oxygen (Entonox; Hong Kong Oxygen & Acetylene Co Ltd), pethidine, and epidural analgesia were also available. It was up to the women to choose what kind of labour pain relief to have, bearing in mind fetal wellbeing and the progress of labour.

Women used the birth ball in the antenatal ward and the labour room on a voluntary basis, and for a duration that accorded with their own preference. They could use the ball continuously or for intermittently, whilst the total duration of use was recorded. Exclusion criteria were: gestational age < 36 weeks, malpresentation of the fetus, multiple pregnancy,

antepartum haemorrhage, placenta praevia, abruptio placenta, non-engaged fetal head, suboptimal fetal heart beats, and women with hypertension or other medical conditions that discouraged mobilisation or ambulation. Rupture of membranes was not a contraindication for using the ball. Women who wanted to participate might have their membranes intact or ruptured, but engagement of the fetal head was a requirement. A standard evaluation form was used to document outcomes of non-pharmacological labour pain management. To avoid data duplication, each woman was assigned one form, whether or not she used the birth ball in one or both settings.

All participants started using the birth ball during the latent phase of labour with a cervical dilatation of 4 cm or less. Characteristics of the women — including their age, parity, labour onset, fetal position, and birth weight of the baby — were recorded. The women were classified into two groups based on the duration they spent on using the ball. The mean duration of use was determined to be approximately 30 minutes. One group used the ball for 30 minutes or less, and the other for more than 30 minutes.

Outcomes including perception of pain intensity, use of other pharmacological pain relief, satisfaction with pain relief, and promotion of comfort were evaluated. The pain score was entailed a 0-to-10 scale, and was obtained before the women used the ball and 15 minutes after using it. In a Japanese study⁵, it was reported that women's perception of labour pain was altered by their positions even after a short duration (15 minutes) of use. Perception of pain intensity was categorised into three categories: less pain, no change in pain intensity, and more pain, all based on pain scores. The women were invited to give verbal feedback to determine their satisfaction with the birth ball experience. Satisfaction with pain relief was separately obtained for contraction pain and back pain. The women were also asked whether they felt comfortable while using the birth ball and if they would use it again in subsequent births. The relationship between duration of use and the length of labour was examined by determining the length of the first and second stages of labour in minutes for all vaginal deliveries, which included normal spontaneous and instrumental deliveries. The mode of delivery was also evaluated in relation to the duration of the women

spent on using the ball. Fetal outcomes were evaluated by Apgar scores at 1 and 5 minutes after birth, as well as the admission rate to the neonatal intensive care unit (NICU).

All data retrieved from the evaluation forms were analysed using the Statistical Package for Social Sciences for Windows 13.0 (SPSS Inc, Chicago [IL], US). Missing or indistinguishable items were labelled as missing values. The two groups of women with different durations of ball use were compared; categorical variables were analysed by the Chi-square test and continuous parametric data by the independent samples *t*-test. A difference was considered statistically significant if the *p* value was <0.05.

Results

A total of 267 women participated in the birth ball programme during the 6-month period. Only 12 women had attended the antenatal class on using the birth ball and had prior practice during pregnancy. The rest used the birth ball for the first time when they were admitted to the hospital. The duration of use was indicated for 241 of them, the mean value being 37 minutes. Among the 241 women, 161 had used the ball for 30 minutes or less, and 80 had used it for more than 30 minutes. Table 1 shows the characteristics of the two groups and there was no significant difference in age, parity, fetal position, and the birthweight of baby between the two groups. There were significantly more

women with a spontaneous onset of labour in the group of using the ball for 30 minutes or less (*p* = 0.01).

For perception of pain intensity, 192 out of 267 women provided a valid before-and-after pain score. Among these 192 women, 66% reported a decreased level of pain after using the birth ball, 8% reported more pain than before, and 26% found no difference. If women with an increased pain level and those with the level of pain remaining unchanged after using the ball were grouped together as no improvement in pain level, there was no significant relationship between the improvement of pain according to before-and-after pain scores and the duration of ball use (*p* = 0.72). There was also no significant relationship between the duration of ball use and the consumption of pethidine (*p* = 0.31) or epidural analgesia (*p* = 0.2). The mean duration of ball use was 38 minutes and 36 minutes for women who did and did not receive pethidine injections, respectively (*p* = 0.61). Prior to receiving the epidural analgesia, the mean duration of ball use was slightly longer (44 minutes) among women who eventually opted for epidural analgesia compared to those who declined it (36 minutes), but this difference was not statistically significant (*p* = 0.12).

When asked about their satisfaction with the use of birth ball, 84% reported satisfaction for the relief of contraction pain, 79% were satisfied with the relief of back pain, and 95% stated that they found it comfortable

Table 1. Characteristics of the two groups with different durations of using the birth ball

| | Duration of using birth ball | | p Value |
|------------------------------|------------------------------|----------------|---------|
| | ≤30 minutes | > 30 minutes | |
| Mean age (years) | 29.89 (n = 161) | 29.99 (n = 80) | 0.88* |
| Parity | | | |
| Primigravid | 118 | 59 | |
| Multigravid | 43 | 21 | 0.94† |
| Labour onset | | | |
| Spontaneous | 108 | 40 | |
| Induction | 53 | 40 | 0.01† |
| Fetal position‡ | | | |
| OA | 107 | 48 | |
| Non-OA | 30 | 19 | 0.31† |
| Mean birthweight of baby (g) | 3261.6 (n=161) | 3235.8 (n=82) | 0.61* |

* Independent samples *t*-test

† Chi-square test

‡ n = 204 due to exclusion of missing values; OA denotes occipitoanterior

Table 2. Comparison of the mode of delivery in relation to duration of using the birth ball

| Mode of delivery* | Duration of using birth ball | | p Value |
|-------------------|------------------------------|-------------|---------|
| | ≤30 minutes | >30 minutes | |
| NSD | 130 (54%) | 53 (22%) | |
| VE/FD | 15 (6%) | 14 (6%) | |
| CS | 16 (7%) | 13 (5%) | |
| Total | 161 (67%) | 80 (33%) | 0.045† |

* NSD denotes normal spontaneous delivery, VE vacuum extraction, FD forceps delivery, and CS Caesarean section

† Chi-square test

to use, but no statistical relationship was found between satisfaction and duration of use. When asked whether the women would use the ball again in subsequent births, 96% answered that they would.

The duration of the first and second stages of labour were evaluated for vaginal deliveries only, because of incomplete data for most of the Caesarean deliveries. The mean duration of the first stage of labour was 203 minutes for women using the ball ≤30 minutes, compared to 217 minutes for those who used the ball longer, but this difference was not statistically significant ($p = 0.53$). For the second stage of labour, the mean duration was 27 minutes for the group using the ball ≤30 minutes, compared to 34 minutes in those who used the ball longer; however, this difference too was not statistically significant ($p = 0.07$).

Statistical significance ($p = 0.045$) was noted when comparing the mode of delivery in relation to the duration of birth ball use (Table 2). No significant relationship was found between the duration of ball use and whether the woman did or did not have a Caesarean section ($p = 0.16$). Statistical significance ($p = 0.01$) was noted, however, between the duration of using the ball and whether the woman had an operative delivery, be it Caesarean section or instrumental. 54% of the women who used the ball for less than 30 minutes had a normal spontaneous delivery (NSD). Regarding vaginal deliveries alone, the difference between the duration birth ball use and whether the woman had an instrumental delivery was also significant ($p = 0.04$). Among all vaginal births, 61% of the women who used the ball for less than 30 minutes achieve a NSD.

In terms of fetal outcomes, 96% and 99% of the 267 babies achieved Apgar scores of ≥8 at 1 minute and 5 minutes after birth, respectively. The admission rate

to the NICU was 4.5%.

Discussion

The birth ball, also known as Swiss ball or fit ball, is actually a professional physiotherapy ball originally designed for use in low-impact and strengthening exercise. It is believed to be one of the most versatile and helpful labour support tools available to women^{6,7}. Many midwives and women think that the birth ball can shorten labour or at least make it more efficient by helping the woman to open her pelvis wide for the fetus to travel through the passage more easily. Common sense also assumes that the help of gravity in the upright position possibly brings the fetus down more efficiently. By taking the advantage of the rolling function of the ball, it allows the woman to sway or rock in rhythmic motions at her own pace, thus promoting a sense of control. Change of position and movement often aids maternal comfort and is the most natural way of reducing labour pain.

Most women in this report adopted the sitting position while using the birth ball. About two-thirds of the women used the birth ball for 30 minutes or less. If the birth ball was effective in relieving labour pain, pain improvement with a longer duration of use might be expected. Among those women who provided a valid before-and-after pain score, two-thirds perceived the pain intensity was decreased after using the ball, but no significant relationship was found between pain improvement and the duration of use. Not surprisingly, some women feel a greater intensity of pain in the upright position, as the fetal head presses against the cervix and stimulates more intense and frequent contractions. Indeed, 8% of the women in this report experienced an increase of pain after using the ball. It should be noted that there were 75 out of the 267 women who did not have a valid before-and-after pain

score recorded. One explanation for this was that some women used the ball for comfort and distraction without any subjective experience of pain. Failure to follow-up on the effectiveness of pain relief by the midwives was another common reason. It was also not uncommon for some, especially the multiparous women, to go into active labour and proceeded to delivery quickly after using the ball, and therefore the before-and-after pain scores could not be completed.

Notably, narcotics or epidural analgesia should not be used while a woman is using the birth ball, because of possible side-effects. In these patients, the women used pethidine and epidural analgesia only when they no longer wanted to use the birth ball. There was no significant difference between the duration of birth ball use and the consumption of pethidine and epidural analgesia. The mean duration of ball use was not significantly different prior to administration of pethidine and epidural analgesia. The women's decisions of using pethidine or epidural analgesia did not seem to be affected by the time they spent on the ball. Entonox inhalation was routinely introduced for labouring women in the current setting, all of whom had it, as it was not contraindicated while using the birth ball. As Simkin and O'hara⁸ pointed out, the use of pain medication may not be a reliable indicator of the woman's pain as it can be affected by the attitudes of staff and usual practices of the institution. Further study should explore the use of pain medication in women using and not using the birth ball.

For labour pain relief, the birth ball can be used concomitantly with other non-pharmacological means such as massage, aromatherapy, music therapy, warm or cool compresses, and TENS⁹. To relieve pain, 30% of the women in this study used one or more of these measures together with the ball. These confounding factors obviously constitute a major limitation of this study as they may affect outcomes.

Although statistical significance was not attained for variables such as perception of pain, possible clinical significance should not be overlooked as a high percentage of women reported satisfaction with the relief of contraction pains and back pain. The fact that 95% of the women found it comfortable to use the ball and 96% would use it again in subsequent births clearly

demonstrates that the birth ball should be offered as an option to promote comfort during labour. A few women also stated that they recognised more interaction with their midwife while using the birth ball as opposed to just lying in bed in a lateral position. Some partners also commented that they could provide massage for the woman, while she was using the ball and therefore perceived participation and contribution to the labour process. Qualitative research is recommended to further explore the perception of women and their partners towards the use of the birth ball during labour.

There was no significant difference in the relationship between the duration of ball use and the duration of the first and second stages of labour. The mean durations of both the first and second stages of labour were longer in women who used the ball for a longer time than 30 minutes. This makes no sense if it is assumed that the longer duration of use hastens the labour progress. Arguably, a shorter, probably more active, labour progress lets the woman use the birth ball only for brief periods. This could also explain why more women seemed to go into spontaneous labour with shorter durations of use. Women for whom labour was induced could have relatively more time to use the ball while waiting for definite onset of labour. A systematic review of 21 studies with 3706 women showed that the duration of the first stage of labour was approximately 1 hour shorter for women randomised to upright (including walking, sitting, standing, and kneeling) as opposed to recumbent positions¹⁰. There were no differences in the duration of the second stage of labour, mode of delivery and other maternal and fetal outcomes, except that women randomised to upright positions were less likely to have epidural analgesia. The authors concluded that during the first stage of labour, women should be encouraged to adopt whatever position they find most comfortable¹⁰.

A statistical significant difference ($p = 0.045$) was noted when comparing the mode of delivery in relation to the duration of ball use. No statistical significant difference was found between the duration of birth ball use and the chance of having a Caesarean section, but with regard to operative delivery as a whole or instrumental delivery in particular, statistical significance was noted. These results suggest that women should not spend more than 30 minutes using

the birth ball to avoid operative delivery. One might also consider that women having NSDs actually had shorter durations of the first stage of labour (mean, 189 minutes) compared to those who had instrumental delivery (mean, 343 minutes), and therefore spent relatively less time using the birth ball. A randomised controlled study is warranted to clarify the relationship between the use of the birth ball and the mode of delivery.

For the vast majority of babies, satisfactory fetal outcomes were reflected by the reassuring Apgar scores obtained 1 and 5 minutes after birth. The NICU admission rate was 4.5%, which is much lower than the average of 10% among all babies born in our current setting. This suggests that birth ball use has no detrimental effects on babies as long as contraindications for its use are carefully observed.

Conclusion

While the midwife should be vigilant in monitoring for any abnormalities during labour and birth, in the low-risk women it should also be their

role to advocate normal birth and promote a sense of wellbeing. Implementing complementary therapies for labouring women requires discernment and should not interfere with the medical interventions necessary for the high-risk group of women. By the same token, medical interventions such as intravenous therapies and electronic fetal monitoring should not hinder the use of complementary therapies when contraindications for mobilisation are excluded. The birth ball is an excellent tool to facilitate mobilisation and can be used with other non-pharmacological means of pain relief.

This paper reports the preliminary findings of a birth ball programme introduced in antenatal and labour ward settings. Confounding factors including parity, concomitant use of other pain relief methods, intrapartum position of the fetus, and birthweight of the baby should be controlled to achieve a good-quality study. Formally designed research is recommended to further explore the effect of birth ball use on maternal and fetal outcomes and to understand the perception of women and their partners towards its use.

References

1. Chang CY, Gau ML. Experiences applying a birth ball to help a parturient woman in labor [in Chinese]. *Hu Li Za Zhi* 2006; 53:98-103.
2. Newburn M. Promoting and protecting normal birth. *Pract Midwife* 2009; 12:4-6.
3. Lamaze International. Position paper: promoting, supporting, and protecting normal birth. *J Perinat Educ* 2007; 16:11-5.
4. Stephens L. Birthwrite: normal birth is the core business of our profession. *British Journal of Midwifery* 2009; 17: 550.
5. Adachi K, Shimada M, Usui A. The relationship between the parturient's positions and perceptions of labor pain intensity. *Nurs Res* 2003; 52:47-51.
6. Watkins SS. Get on the ball – the “birth ball” that is! *Int J Childbirth Educ* 2001; 16:17-9.
7. Shallow H. My rolling programme – the birth ball: ten years experience of using the physiotherapy ball for labouring women. *MIDIRS Midwifery Digest* 2003; 13:28-30.
8. Simkin PP, O'hara M. Nonpharmacologic relief of pain during labor: systematic reviews of five methods. *Am J Obstet Gynecol* 2002; 186(5 Suppl Nature):S131-59.
9. Simkin P. Reducing pain and enhancing progress in labor: a guide to nonpharmacologic methods for maternity caregivers. *Birth* 1995; 22:161-71.
10. Lawrence A, Lewis L, Hofmeyr GJ, Dowswell T, Styles C. Maternal positions and mobility during first stage labour. *Cochrane Database Syst Rev* 2009; (2):CD003934.