Short Communication

Menses, fertility and pregnancy following the use of balloon tamponade technology in the management of postpartum haemorrhage

Christos GEORGIOU1,2

1 Obstetrics and Gynaecology, Illawarra Health and Medical Research Institute/Graduate School of Medicine, University of Wollongong, and 2 Wollongong Hospital, Illawarra, New South Wales, Australia

This manuscript describes five cases of pregnancies and births in women that have previously required the uterine-specific BakriTM balloon in the management of postpartum haemorrhage. In addition, this manuscript reviews the impact on menses, fertility and subsequent pregnancies as potential surrogate effects on the myometrium and endometrium, when balloon tamponade technology is used as a ‘uterine-sparing’ second-line approach in the management of postpartum haemorrhage.

Key words: balloon tamponade, fertility, menses, postpartum haemorrhage, pregnancy, second-line approaches.

Introduction

Evidence-based data depicts that various pharmacological agents should be used as a first line approach in the management of postpartum haemorrhage (PPH) after rubbing up the uterus.1 These uterotonics include oxytocin, ergometrine, misoprostol and PGF2α. If these first line uterotonics (FLU) are unsuccessful, various second-line approaches (SLA) have been advocated. These include hypogastic and uterine artery ligation, embolisation, compression sutures, uterine tamponade and ultimately hysterectomy.2

Although many factors are considered when deciding which SLA is/are to be used, the parity of the mother and her potential future fertility is an important consideration. Consequently, hysterectomy is not always the first choice in women of low parity. The belief is that by sparing the uterus, a woman’s future fertility is preserved.3,4

Unfortunately, some SLA such as the B-Lynch suture and uterine artery embolisation have been associated with subsequent complications that do not preserve future fertility, for example, uterine necrosis and amenorrhoea, respectively.5,6

With respect to uterine tamponade using intra-uterine balloons, despite the increasing number of publications demonstrating the effective use of the uterine-specific BakriTM balloon (Cook Medical, Bloomington, IN, USA) in the management of PPH, few publications have commented on subsequent pregnancies.7–10 Furthermore, when such pregnancies are described, they have resulted from index cases in which multiple SLA were used when FLU proved ineffective.11,12

Interestingly, the use of the nonuterine-specific Sengstaken–Blakemore tube within the oesophagus has been associated with necrosis, ulceration and perforation.8

This case series describes five women in whom a subsequent pregnancy occurred following the use of a BakriTM balloon that was solely used as a SLA in the management of PPH when FLU failed.

Index pregnancy

Five women aged 25–31 years presented in early labour at 37+2–39+4 weeks gestation (Table 1: Cases 4–8). Following vaginal births in all cases, a PPH ensued despite the use of 10 iu oxytocin intramuscular (Syntocinon®; Novartis Pharmaceutical Australia Pty Ltd., North Ryde, New South Wales, Australia). First line uterotonics such as 40 iu oxytocin infusion, 250 μg intramuscular ergometrine (Hospira, Australia Pty Ltd., Melbourne, Victoria, Australia) and rectally administered (800 μg) misoprostol (Cytotec®; Pfizer Australia Pty Ltd., West Ryde, New South Wales, Australia) were insufficient to stop the PPH. All cases involved an atomic uterus and therefore, a BakriTM balloon was used to resolve the PPH, requiring 250–450 ml N-Saline to achieve a positive ‘tamponade test’. The estimated blood loss was 1000–3500 ml.
Table 1 Subsequent menses, fertility and pregnancy from cases in which balloon tamponade technology was used in a preceding pregnancy as a second-line approach for the management of PPH

<table>
<thead>
<tr>
<th>Case</th>
<th>Age/years</th>
<th>Gravity/Parity</th>
<th>Gestation (Weeks + Days)</th>
<th>Mode of delivery</th>
<th>Cause of PPH</th>
<th>Other causes of bleeding</th>
<th>SLA used prior to BTT</th>
<th>BTT used to stop bleeding (Vol required)</th>
<th>PPH Volume</th>
<th>Breast feeding duration</th>
<th>Mode of delivery</th>
<th>Gestation</th>
<th>EBL at delivery</th>
<th>Other comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>19</td>
<td>NM</td>
<td>NM</td>
<td>VB</td>
<td>'Morbidly adherent placenta'</td>
<td>–</td>
<td>SBT; Arterial embolisation</td>
<td>Rusch (500 ml)</td>
<td>4000 ml</td>
<td>NM</td>
<td>NM</td>
<td>Within 3 years*</td>
<td>NM</td>
<td>NM</td>
</tr>
<tr>
<td>2</td>
<td>NM</td>
<td>NM</td>
<td>NM</td>
<td>C/S</td>
<td>Hypotonic Uterus</td>
<td>–</td>
<td>B-Lynch suture Bakri (60–250 ml)**</td>
<td>Bakri (60–250 ml)**</td>
<td>2000–3000 ml**</td>
<td>NM</td>
<td>NM</td>
<td>NM</td>
<td>NM</td>
<td>NM</td>
</tr>
<tr>
<td>3</td>
<td>NM</td>
<td>NM</td>
<td>NM</td>
<td>C/S</td>
<td>Hypotonic Uterus</td>
<td>–</td>
<td>B-Lynch suture Bakri (450 ml)</td>
<td>Bakri (450 ml)</td>
<td>2500 ml</td>
<td>8 weeks</td>
<td>After cessation of breast feeding Normal (Frequency, amount, duration)</td>
<td>18</td>
<td>VB</td>
<td>39** weeks</td>
</tr>
<tr>
<td>4</td>
<td>26</td>
<td>G1P0</td>
<td>39</td>
<td>VB</td>
<td>Atonic uterus</td>
<td>Cervical/ perineal trauma</td>
<td>None</td>
<td>Bakri (400 ml)</td>
<td>3500 ml</td>
<td>10 weeks</td>
<td>Normal (Frequency, amount, duration)</td>
<td>23</td>
<td>VB</td>
<td>38** weeks</td>
</tr>
<tr>
<td>5</td>
<td>28</td>
<td>G1P0</td>
<td>37**1</td>
<td>VB</td>
<td>Adherent placenta, manual removal, atonic uterus</td>
<td>–</td>
<td>None Bakri (400 ml)</td>
<td>Bakri (400 ml)</td>
<td>1000 ml</td>
<td>7 weeks</td>
<td>Menses at 8 weeks</td>
<td>15</td>
<td>VB</td>
<td>37**10 weeks</td>
</tr>
<tr>
<td>6</td>
<td>28</td>
<td>G4P3</td>
<td>37**3</td>
<td>VB</td>
<td>Manual removal of placenta, atonic uterus</td>
<td>–</td>
<td>None Bakri (400 ml)</td>
<td>Bakri (450 ml)</td>
<td>2000 ml</td>
<td>5 months</td>
<td>After cessation of breast feeding Normal (Frequency, amount, duration)</td>
<td>29</td>
<td>VB</td>
<td>40**2 weeks</td>
</tr>
<tr>
<td>7</td>
<td>25</td>
<td>G1P0</td>
<td>37**2</td>
<td>VB</td>
<td>Atonic uterus</td>
<td>–</td>
<td>None Bakri (450 ml)</td>
<td>Bakri (450 ml)</td>
<td>2500 ml</td>
<td>No Breast Feeding Menses at 6 weeks</td>
<td>36</td>
<td>VB</td>
<td>40**4 weeks</td>
<td>–</td>
</tr>
<tr>
<td>8</td>
<td>31</td>
<td>G2P1</td>
<td>39**4</td>
<td>VB</td>
<td>Manual removal of placenta, atonic uterus</td>
<td>–</td>
<td>None Bakri (250 ml)</td>
<td>Bakri (250 ml)</td>
<td>2500 ml</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
</tbody>
</table>

BTT, balloon tamponade technology; C/S, caesarean section; NM, Not mentioned; SBT, Sengstaken–Blakemore tube; SLA, second-line approach; VB, vaginal birth.
*Calculated from data in paper.
**Range from five cases, two of which ‘have had a subsequent pregnancy’.
Although three of the five cases were complicated by retained placenta, the histopathology did not demonstrate placenta accreta (Table 1: Cases 5, 6 and 8).

**Postpartum**

Four of the five women introduced breast feeding for 7 weeks–5 months (Table 1: Cases 4–7). Menses returned after breast feeding, or in the case of one women who did not breast-feed her baby, at 6 weeks postpartum (Table 1: Case 8). Subsequent menses were described as ‘normal’ in frequency, amount and duration. Ultrasound scan of the uterus following resumption of menses was performed in four of the five cases. The results were reported as ‘normal’ or ‘unremarkable in appearance’ (Table 1: Cases 4, 5, 7 and 8).

**Subsequent pregnancy**

The women represented 15–36 months later, with a subsequent pregnancy. The pregnancies were uncomplicated with the exception of a succenturiate lobe in one case (Table 1: Case 5). There were no ultrasound scan diagnosed growth related issues in any case. In addition to their routine antenatal care, controlled cord traction and the use of prophylactic 40 iu syntocinon infusion were recommended. All five cases experienced a subsequent vaginal birth with an estimated blood loss of 250–1000 ml. There was one recurrent PPH that was managed with additional first line uterotonicics (Table 1: Case 4).

All cases presented in spontaneous labour except one case that required a social induction of labour by amniotomy, due to living at a distant location from the main hospital (Table 1: Case 4).

One woman experienced a repeat retained placenta that was removed in theatre and a ‘prophylactic’ Bakri™ balloon was inserted. This was subsequently removed, without a recurrent PPH (Table 1: Case 6).

**Discussion**

Uterine packing using cotton gauze soaked with various substances, thought to act as haemostatic agents, has been used as a method for the management of PPH since the 19th century. More recently, balloon tamponade technology (BTT) that uses material such as silicone and latex/rubber as an expandable balloon, have been used to achieve a ‘tamponade’ effect within the postpartum uterus.

Although BTT in the management of PPH is used with the primary aim of controlling the bleeding, the methodology is considered as ‘uterine-sparing’ as compared to a hysterectomy. Balloon volumes reaching 500–1500 ml have been reported. The consequential effect of distending the myometrium and compressing the endometrium do not appear to have been evaluated in such a group of patients. Potential surrogate functions of the endometrium and myometrium include future menses, fertility and pregnancy outcomes. These have been evaluated in other second-line approaches (SLA) such as hypogastric artery ligation, uterine artery embolisation and compression sutures. For example, studies have suggested that a reduction in uterine perfusion following hypogastric artery ligation may result in fetal growth restriction. This, however, has not been consistently demonstrated.

With respect to the use of the various nonuterine-specific and uterine-specific balloons, follow-up data is minimal and few examples of subsequent pregnancies appear to have been reported in the literature (Table 1: Cases 1–3). In addition, the index pregnancies have actually resulted from situations in which other SLA have failed.

The first such case was reported in a 19 year old woman who birthed vaginally and required piecemeal removal of the retained morbidly adherent placenta. A Sengstaken-Blakemore tube was inserted following the failed use of FLU, and this was unsuccessful in stopping the PPH. The reason for this failure was not mentioned. Following this, an attempt was made at bilateral arterial embolisation. Although, the left uterine artery was cannulated and embolised, the right uterine artery was not accessible. A Rusch balloon was subsequently inserted and filled with 500 ml normal saline, successfully managing the PPH. A total EBL of 4000 ml was documented. The woman recovered well and ‘had another normal delivery’. From the dates given in the publication an assumption is made that this subsequent pregnancy occurred within 3 years of using the Rusch balloon (Table 1: Case 1).

The initial report of SLA combinations involving a balloon (three-way prostatic balloon catheter) was following a failed B-Lynch suture. This paper did not comment on subsequent menses, fertility or pregnancy outcomes. However, one study involving such a ‘B-Lynch sandwich’ using a Bakri balloon, reported two patients from an original series of five patients, that were subsequently pregnant. The limited information provided was that one of these pregnancies was complicated by uterine atony at the time of an elective repeat C/S (Table 1: Case 2 and 3).

By contrast, the five case reports described within this manuscript demonstrate pregnancies following the sole use of BTT as a SLA in the management of PPH following failed FLU. Normal regular menses returned following cessation of breast feeding at 7 weeks–5 months, and subsequent pregnancies occurred within 15–29 months. In one case in which breast feeding was not introduced, normal menses returned at 6 weeks and the interval to the next pregnancy was 36 months. The interval between pregnancies was ‘planned’ in all cases. There were no reported interval pregnancies such as miscarriages, ectopic pregnancies or terminations of pregnancy. Ultrasound appearances of the uterine cavity following the resumption of menses in the index pregnancy were described as normal. Although, no antenatal complications with respect to fetal growth and development were noted, the presence
of a succenturiate lobe may represent an example of abnormal placentation (Table 1: Case 5). Four of the five cases established labour spontaneously. All cases birthed vaginally and although a PPH recurred in one of the patients, this was successfully managed with FLU (Table 1: Case 4).

Although, the use of multiple SLA in the management of PPH is not uncommon, BTT may not be the first SLA used. Therefore, possible concerns with respect to surrogate effects on the endometrium and myometrium when BTT is used in conjunction with other SLA may not necessarily be attributed to the use of the balloon.

In conclusion, with respect to balloon tamponade technology, and specifically the uterine-specific Bakri balloon, minimal effect on menses, fertility and future pregnancies have been demonstrated in these reported cases. However, this may reflect reporting bias and the lack of any long-term follow-up data. Future studies may be directed to generating a database of BTT-pregnancies to better evaluate the potential surrogate effects on the myometrium and endometrium, namely, menses, fertility and pregnancy.

Acknowledgements

The author would like to acknowledge the excellent library facilities of the Wollongong Hospital (Jessica Clarke, Sharon Hay, Christine Monnie, Gnama Segar, and Jessy Wiggins).

Disclosure of interests

CG has provided workshops in Australasian countries during National and International O&G Conferences on ‘Balloon Tamponade Technology in the management of PPH’. The travel and accommodation for these meetings have been supported by Cook Medical. CG has also received Honoraria from Cook Medical that is solely used for medical research in areas of PPH, dermoids and the role of oxytocin in complications of pregnancy.

Details of ethics approval

Ethics approval for these case reports was granted from the University of Wollongong/Illawarra Shoalhaven Local Health District and Human Research Ethics Committee (HE13/455).

References

2 Royal College of Obstetricians and Gynaecologists Green-top guideline No.52. Prevention and management of postpartum haemorrhage. London RCOG 2009