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## Correspondence

## Conservative management of postpartum hemorrhage



Dear Editor,

We appreciate Dr Wang's advice on our previous study [1] and his valuable review on this important topic. Dr Wang has pointed out several important issues, and we would like to respond and further discuss here.

First of all, our study included 47 cases of pregnant women who had postpartum hemorrhage (PPH), intractable to conservative medical management. The majority of our patients underwent cesarean section (CS), and some of them had high risk for PPH. As per our hospital's policy, the preoperative strategy for high-risk patients includes the preparation of adequate blood-transfusion products and the availability of at least one senior consultant obstetrician who is able to manage PPH. Two recent articles have shown the effectiveness of uterine-vessel embolization; however, we think that predelivery embolization is not a good alternative to CS in the case of a pregnant woman with a healthy third-trimester pregnancy with placenta previa [2,3]. Similarly, the article by Huang et al [2] showed its effectiveness in the termination of pregnancy with placenta previa due to fetal death and serious fetal malformations at 22–29 weeks, or persistent vaginal bleeding at 21–22 weeks of pregnancy before viability. Therefore, it is obvious that predelivery embolization cannot be accepted for the pregnant woman who has a healthy third-trimester pregnancy. Also, our institution has no resources for embolization, and so we have no strategy for that kind of treatment. Nonetheless, we think that it can be a good alternative to CS in the case of pregnancy termination before viability, as stated by Huang et al [2]. In addition, iliac or uterine-artery ligation might also be considered in patients with PPH. However, these techniques need some surgical skills, especially for internal iliac-artery ligation, and also cause concern for some complications. In our study, the intraoperative strategy when dealing with PPH, either due to the uterine atony or abnormal placentation, included firstly the medical conservative treatment (uterine massage, uterotonics, and bimanual compression), and then applying the Bakri balloon tamponade (BBT). If the bleeding did not stop, the invasive procedure, including vessel ligation or uterine compression sutures, was performed, and if this failed finally, hysterectomy was performed. We agree with the report by Liu et al [4], and it seems rational to ligate the uterine artery in pregnant women with uterine leiomyomas, who are undergoing CS. Importantly, it should be suggested to perform ligation to the uterine artery (right or left) that provides the blood supply to the leiomyoma.

Secondly, BBT should be applied when medical treatment fails to stop bleeding during delivery, either vaginal or CS, after exclusion

of genital lacerations. This is the ideal time to perform BBT. We could not give the time interval between the occurrence of PPH and the insertion of BBT as the data from medical records were not available. However, consistent with our experience, we can say that it is more efficient to use BBT in CS than in vaginal delivery because more time is spent on follow-up after a vaginal delivery. PPH was defined as >500 mL estimated blood loss after a vaginal delivery, or >1000 mL after a CS. In our study, the blood loss was calculated by blood volume after delivery (PPH), including the intraoperative blood loss during CS or vaginal delivery, as presented in Table 1 [1].

Thirdly, the strategy before the insertion of BBT differs in different types of PPH. We suggest performing multiple placental bed sutures in order to stop or minimize the bleeding in the case of PPH due to abnormal placentation, and then applying the BBT. However, in the case of uterine atony, we suggest the medical treatments, including uterotonics and uterine massage, either during CS or vaginal delivery, after exclusion of retained placental products or genital lacerations, and then if these failed, the BBT should be applied without delay. In our experience, it is crucial to protect patients from disseminated intravascular coagulation during an attempt to stop bleeding. If disseminated intravascular coagulation develops, it will be too late to apply BBT.

Fourthly, our study was a retrospective study, and so we could not measure the exact time that passed from failure of attempt to stopping the bleeding to using BBT. Similarly, when analyzing the literature, we could not find any data regarding the median time between the failure of attempt to stop bleeding and the use of BBT [5,6]. This might be caused by the emergency feature of PPH and the record of the time cannot be held. Therefore, we think that the delay in time to perform BBT differs between CS and vaginal delivery. Physicians tend to wait and monitor the bleeding during and after a medical conservative treatment, and this leads to spending more time in vaginal delivery. However, during CS, obstetricians are aware of the bleeding, and it is reasonable that the procedures are initiated more promptly than during vaginal delivery.

Finally, we appreciate the suggestions and comments from Dr Wang, and we accept the opinion that an earlier application of effective tools and the availability of a well-trained team might be the best chance to preserve fertility in patients with PPH.

## Conflicts of interest

The authors declare that they have no conflicts of interest.

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