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Authors' response to the comment on "Antepartum hemorrhage from previous-cesarean-sectioned uterus as a potential sign of uterine artery pseudoaneurysm"

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Thanks for the good comment by Matsubara *et al*. (2017) on our case of "Antepartum hemorrhage from previous-cesarean-sectioned uterus as a potential sign of uterine artery pseudoaneurysm" (Zhang *et al*., 2017), published in the *Journal of Zhejiang University-SCIENCE B (Biomedicine & Biotechnology)*. In the comment, the authors clarified two possibilities of our scenario: the uterine artery pseudoaneurysm (UAP) could be newly formed in the present delivery as a result of vulnerability of uterine artery and/or its branches at the site of previous cesarean section (CS) scar to exogeneous stimuli during labor contractions; the other possibility is that previous CS caused UAP formation but remained unruptured, and UAP continued to be intrauterine, a hyper-dynamic state during labor causing UAP-sac rupture and resultant antepartum hemorrhage, as well as postpartum hemorrhage.

We agree with the above two possible scenarios involved in the UAP formation, and these bring out some interesting questions: How to define the source of UAP formation? Could we conclude that the UAP formation in our case was not necessarily linked with traumatic procedure-associated consequence? How to define the traumatic procedure-associated UAP? Generally, most researchers or clinicians regard the so-called "traumatic procedure" as the immediate or the present traumatic operation involved in the current delivery. In this regard, our case is a typical UAP example unrelated to a traumatic event. While writing the case report last year, we found 18 cases of UAP rupture after non-traumatic delivery/pregnancy termination by searching English-language published work in the PubMed database, and 6 of 18 patients had a history of prior traumatic procedure. Almost all the published papers acknowledged the "traumatic procedure" as the present event occurring in the current delivery, rather than in the previous history.

However, this comment raised our in-depth and prudent consideration on the definition of traumatic-related UAP, and the traumatic event should be clearly classified in each case including "just preceding (the last) delivery", "the second last delivery/abortion", and even any history of a traumatic event. As the comments indicated, all prior history deliveries may have responsibility for UAP (Baba *et al*., 2016). Most interestingly, a lag time between a preceding event and manifestation/detection of UAP may sometimes be very long, such as the 10 years and even 20 years after CS as mentioned in the comment.

The clarification of traumatic event should be stressed in future cases, as "all prior history of deliveries" even 20 years ago (Papadakos *et al*., 2008) may prove to be the culprit of UAP. This is very meaningful and helpful for clinicians in keeping a high awareness on UAP formation. Furthermore, we would like to stress that although the mechanism of UAP formation is largely unknown due to the diversity of its clinical features, the potential risk factors should be particularly noted including scarred uterus, traumatic procedures, precipitous delivery, uterine infection, and underlying vascular abnormality. Thirdly,

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UAP may manifest not only as postpartum hemorrhage but also as antepartum hemorrhage (Cornette *et al*., 2014).

Compliance with ethics guidelines

Ning ZHANG and Wen DI declare that they have no conflict of interest.

This article does not contain any studies with human or animal subjects performed by any of the authors.

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中文概要

题　目：作者对"疤痕子宫产前出血可能是子宫动脉瘤的潜在危险信号"的评论的回应

概　要：在 S. Matsubara 等人对我们在《浙江大学学报（英文版）B 辑：生物医学与生物技术》发表的一篇报道"疤痕子宫产前出血可能是子宫动脉瘤的潜在危险信号"（Zhang *et al*., 2017）的评论（Matsubara *et al*., 2017）中，对于子宫动脉瘤形成的机制给予了两种解释，进而结合其所在中心的研究数据和文献报道，提出子宫动脉瘤的形成可能与所有既往的创伤性操作史有关，两者间的时间间隔可能很长，比如 10 年甚至 20 年之久。这个结论对子宫动脉瘤的预防和诊疗等具有非常重要的指导价值。笔者查阅相关领域的文献，发现绝大多数研究者把创伤性操作的定义默认为当前妊娠分娩中所发生的操作，这样的定义容易让读者忽视既往创伤性操作史与子宫动脉瘤形成间的相关性。因此，笔者建议，在患者病例信息中，应该明确既往创伤性操作史的背景介绍，便于提高临床对子宫动脉瘤发生的警惕性，并有利于对子宫动脉瘤发生机制的研究。另外，临床工作者需要对疤痕子宫的产前出血特别重视，其可能是子宫动脉瘤发生破裂的潜在危险信号。

关键词：子宫动脉瘤；创伤性操作史；明确概念