

Case Report

A case of placenta previa accreta successfully treated by open infrarenal aortic clamping

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Open infrarenal aortic clamping has been performed for traumatic pelvic hemorrhage or aortic rupture, and there are few reports of its use in the field of obstetrics and gynecology¹⁾. We report a patient with placenta previa accreta who was successfully treated by open infrarenal aortic clamping.

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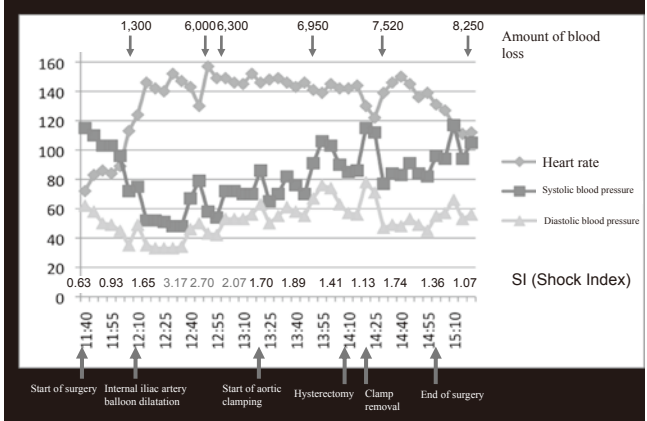
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Case Report

The patient was a 32-year-old, gravida 4, para 4 woman. She had undergone cesarean section for her fourth child because of fetal distress. She was referred to our department because of suspected placenta previa accreta, and underwent elective cesarean section at 35 weeks and 6 days of gestation. Since preoperative imaging studies suggested severe placenta accreta, we planned to deliver the baby by cesarean section, close the abdominal cavity, and perform hysterectomy in a two-stage procedure after methotrexate administration. We delivered the baby through a transverse incision in the uterine fundus, and sutured the uterus without separating the placenta, but excessive vaginal bleeding occurred during abdominal closure. The balloon catheters that had been placed in the internal iliac arteries preoperatively were inflated, but this failed to reduce the bleeding. We asked a radiologist to perform vascular embolization, which was ineffective. Therefore, we attempted to reduce the intrapelvic blood flow by aortic clamping and then perform hysterectomy. Intraoperative changes in vital signs are

shown in Table 1. Before aortic clamping, her blood pressure fell, and blood transfusion did not result in a reduction of the shock index (SI). However, aortic clamping led to a rapid reduction in uterine bleeding and concomitant decrease in the SI. The amount of blood loss in the surgical field was so small that we were able to resect the uterus by separating the placenta invading the bladder. The aortic

Table 1. Intraoperative changes in vital signs



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clamping time was 63 min. The total blood loss was 8,255 g, and 1,300 ml of autologous blood, 16 units of RCC, and 25 units of FFP were transfused. After surgery, the patient experienced right buttock pain suggested to be caused by vascular embolization, but no side effects attributable to aortic clamping were observed. Her postoperative course has been uneventful, and her pituitary function is normal.

Discussion

Abnormal bleeding during delivery is an important cause of maternal mortality, and its prompt, appropriate management is essential for saving the mother's life. Table 2 shows the current procedures for the management of abnormal obstetric bleeding. Many centers have reported that, when the risk of excessive intrapartum bleeding (as occurs during cesarean section for placenta previa accreta) is anticipated, balloon catheters are placed preoperatively in pelvic arteries or the abdominal aorta, and inflated during surgery to reduce blood flow into the uterus, thereby reducing uterine bleeding, and the effectiveness of these procedures has been recognized^{2,3}.

Table 2. Management of abnormal obstetric bleeding

- (1) If excessive bleeding is anticipated (e.g., placenta previa accreta)
 - Place a pelvic artery balloon occlusion catheter or intra-aortic balloon occlusion catheter (IABO catheter)
- (2) If unexpected, excessive bleeding occurs in the absence of laparotomy (e.g., atonic bleeding)
 - Balloon tamponade procedure
 - Vascular embolization
 - Abdominal aortic balloon occlusion
- (3) If excessive bleeding occurs during laparotomy
 - Transverse imbricating suture, Open abdominal aortic clamping

However, preoperative intravascular balloon catheter placement presents several problems. Firstly, if unexpected excessive uterine bleeding occurs, it cannot be managed using this procedure. Even if catheter insertion is scheduled, excessive uterine bleeding requires emergency surgery, and there may be no time for catheter placement. In addition, intravascular catheter placement requires cooperation from radiologists involved in catheterization, and is currently performed in a limited number of centers.

On the other hand, open aortic clamping (Fig. 1) can be performed under direct vision using a relatively simple



Fig. 1. Open infrarenal aortic clamping.
A posterior parietal peritoneal incision was made, and the aorta was clamped immediately below the aortoiliac bifurcation.

technique and little or no special equipment. Since blood flow distal to the site of aortic clamping is reduced, the dynamics of blood flow in the upper half of the body become stable, resulting in improvement of the general condition. In addition, since the pelvic blood flow is markedly reduced, an adequate surgical field can be easily secured, and hemostatic procedures, as for total hysterectomy, can be performed securely and safely.

An aortic clamp is used to occlude the aorta (Fig. 2). Controversy exists as to the level of aortic clamping, but the abdominal aorta is usually clamped immediately below the renal artery. Clamping as close to the renal artery as possible is considered to be safe.

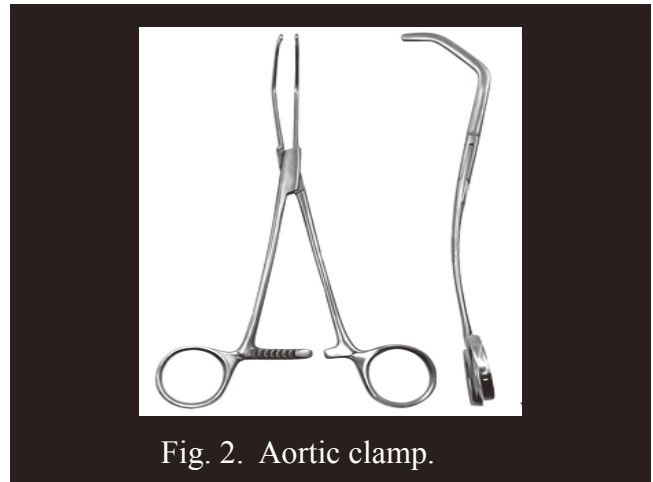


Fig. 2. Aortic clamp.

At laparotomy, the abdominal aorta is palpated first, and then the site of the posterior parietal peritoneal incision is determined. If the aortic aorta and common iliac arteries can be palpated, it suffices to make a 3- to 4-cm, anteroposterior incision immediately over the abdominal aorta and about 3 cm above the aortoiliac bifurcation. To minimize clamping injury to the arterial wall, occlusion of the aorta is

performed by counting the clips of the aortic clamp one by one at the lowest pressure at which the arterial pulse ceases.

Problems with aortic clamping include ischemic injury as a complication. It is generally believed that the occlusion time of the aorta should be within 30 min; however, a safe time limit for total occlusion has not been clearly defined in the literature. In the field of cardiovascular surgery, it is empirically believed that the abdominal aorta distal to the renal artery can be safely occluded for at least 60 min. However, when the aorta is acutely occluded, much remains unclear as to the interval after which sufficient blood is supplied to regions distal to the occlusion. In the future, it should be investigated for how long the abdominal aorta can be safely occluded.

Shower embolization is recognized as a serious complication of aortic clamping. It is a pathological condition in which arterial thrombosis and atheromatous plaque formation give rise to multiple embolisms in small peripheral arteries. If the aorta is occluded, an arterial thrombus may form at the site of occlusion, and travel distally to cause shower embolization; therefore, intravenous heparinization before clamping (at a bolus dose of 3,000-5,000 units) is necessary to prevent thrombus formation. In addition, bleeding due to vascular injury is a serious complication. Therefore, it is dangerous for obstetrics and gynecology specialists to initially perform aortic clamping on their own, and, to avoid this complication, they should seek cooperation from surgeons well-trained in this procedure. Furthermore, obstetrics and gynecology specialists have little or no experience with aortic clamping, which, as described above, presents issues that should be addressed. Therefore, it is necessary to obtain, if possible, informed consent from the patient in advance. Also, they should arrange with medical

staff, such as anesthetists, emergency physicians, and cardiovascular surgeons, about the selection of aortic clamping procedures (IABO is preferable if laparotomy has not been performed) and heparin administration protocols.

Conclusions

We have presented a case of open abdominal aortic clamping, and explained the practical details, advantages and disadvantages, and side effects of the procedure. Unexpected abnormal bleeding occurring during open aortic clamping can be promptly managed, and the hemostatic effect of the procedure is excellent, making it extremely effective. In addition, since the procedure is relatively easy to perform, even an obstetrician-gynecologist, if trained, can perform it. However, the procedure may cause serious complications such as large vessel injury; therefore, we consider that, at this time, this procedure is indicated as an emergency treatment for unexpected, excessive bleeding occurring during laparotomy, and should be performed in cooperation with vascular surgeons.

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