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A Seven-Step Approach to Control Severe Hemorrhage in Cesarean Delivery with the Placenta Accreta Spectrum Disorders

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Women with Placenta Accreta Spectrum disorders (PAS), especially the placenta overlying a prior cesarean incision and Cesarean-Scar Pregnancy (CSP) undergoing cesarean delivery must be with severe hemorrhage, though there is a great many of methods described to control hemorrhage. We will describe a novel procedure with common surgical skills and techniques to treat hemorrhage. The novel procedure without particular surgical instruments and approaches is easy to learn and suitable for the serious hemorrhage occurred in primary hospital.

We divide it to seven major steps as follows:

The first step: Avoiding the placenta incised in uterine incision.

The purpose of this step is mainly to reduce the blood loss. The planned hysterotomy site should be chosen by ultrasound or the surgeon's examination to try to avoid the placenta incised. The transverse incision is still preferred, though most of incisions are not performed at the lower uterine segment.

The second, third and fourth step: Elevating upward the uterine after delivery of fetus, grasping the lower uterine segment and clamping the uterine arteries with sponge forceps.

These three steps are used to control the initial hemorrhage. Because the hemorrhage is already planned, the placenta should be left undisturbed in situ and the uterus should be quickly elevated upward out of the abdominopelvic cavity and the lower uterine segment was grasped tightly with a hand (the second and third steps). The severe hemorrhage must be controlled. Then angled away from the targeted uterine artery, Pennington or sponge forceps can be applied for hemostasis. With a sponge forceps, the targeted uterine artery is clamped and ligated. The oviduct, round ligament, medial mesosalpinx and broad ligament are hold by the sponge forceps to ligate the tubal branch of uterine artery and Sampson's artery to round ligament. The clamps are placed as close as to the uterine as possible taking care not to include excessive tissue in each clamp. And the clamps must be placed at the level of the cervix (the fourth step). The procedure is repeated on the other side.

The fifth step: Removing the placenta manually and control the vigorously bleeding.

Placental delivery needs the urgent help to aid placental separation. Placenta must be removed immediately by surgeon's finger or sponge forceps. In either situation, if the incision is still bleeding appreciably, sponge forceps can be applied for hemostasis. The lower uterine segment especially below the uterine incision is observed for any vigorously bleeding sites. These should be promptly clamped with sponge forceps. And the clamps are placed at the level of the internal OS. It may be more advantageous in case of profuse hemorrhage to rapidly double clamp and divide all of the vascular pedicles between clamps to gain hemostasis. The excessive bleeding should be control.

The sixth step: Opening the vesicouterine space from unilateral paravesical space.

The vesicouterine space is opened with Metzenbaum scissors held perpendicular to the cervix in the midline. This space is further defined and stretched by gentle dissection with the index finger. But in these cases, the opening of the vesicouterine space may be particularly difficult because of adhesion. Even though more careful sharp dissection is performed, laceration of bladder is more common and carries a risk of damage to the bladder. We usually open the vesicouterine space from the right or left paravesical space toward the midline due to the paravesical space is rare adhesion.

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In practice, once unilateral paravesical space is clearly indentified, we usually started suturing. When the whole vesicouterine space was opened and the suture of the lower uterine segment was finished.

The seventh step: Suturing from the level of the internal OS with figure-of-eight and interrupted suture techniques.

This step is the critical and essential procedure to completely control hemorrhage. Suture ligated is still the initial and important method. The figure-of-eight and interrupted suture techniques are strongly considered. All the sutures are used to enter and exit the uterine cavity laterally in the uterine segment. The initial stitch is taken just slightly beyond the internal OS by figure-of-eight or interrupted suture techniques. Index and middle fingers are placed in the lower uterine cavity and against the lower uterine segment in case of suturing the lower posterior uterine segment. And then, the suture is continued upward until approaching the edge of uterine incision. It is important to carefully select the site of each stitch and to avoid too many sutures. Suture should be placed as little as possible to achieve approximation and hemostasis. An absorbable suture ligated is also placed in the posterior uterus. The surgeon's index finger is placed in the posterior uterus. If the surgeon considered that there is thinner than others, it needs an absorbable figure-of-eight suture.

Though all the skills of the seven-step approach are common, it also requires surgeon and assistant's perfect cooperation and needs to maintain and improve the surgical skills. Before the surgery, the procedure is discussed between surgeon and assistant, including details of an entire surgical procedure, even how to correctly apply a clamp. The surgeon must make sure the assistants grasp how to do it in the operation. Though all the operations were performed by the authors, we still use visualization and mental imagery rehearsal to enhance the technical skills and increase emotional preparedness before every operation and performed perfectly.