

AOGS COMMENTARY

Important surgical measures and techniques at cesarean hysterectomy for placenta previa accreta

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Key words

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Conflict of interest

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Introduction

Surgical procedures may decide success or failure within obstetrics. Many obstetric surgical procedures are much less frequently mentioned than the obstetric pathophysiological aspects. Modern obstetrics appear to emphasize medical rather than surgical aspects, leaving the latter behind. A multidisciplinary team approach is also now emphasized in obstetrics. Although this has led to improved management, the attending obstetrician should supervise or perform the emergency surgery. This may be typically illustrated in cesarean hysterectomy (CH) for placenta previa accreta.

The rates of placenta previa accreta (accreta, increta, and percreta) have increased. CH for placenta previa accreta is one of the most difficult obstetric surgeries: a recent review showed an average mortality rate of 4.8%

Abstract

For cesarean hysterectomy with placenta previa accreta, “universally achievable” measures are required. We propose eight measures: (i) placement of intra-iliac arterial occlusion balloon catheters; (ii) placement of ureter stents; (iii) “holding the cervix” to identify the site to be transected; (iv) uterine fundal incision; (v) avoidance of uterotonics; (vi) “M cross double ligation” for ligating the ovarian ligament; (vii) “filling the bladder” to identify the bladder separation site and “opening the bladder” for placenta previa accreta with bladder invasion; and (viii) to continue to clamp the medial side of the parametrium or the cervix or employment of the “double edge pick-up” to ligate it. These eight measures are simple, easy, effective, and thus “universally achievable”.

Abbreviations: CH, cesarean hysterectomy; CS, cesarean section.

for emergency peripartum hysterectomy (1). Although the mortality rate may be lower in elective than emergency surgery, CH for placenta previa accreta, irrespective of whether electively planned or an emergency, has always been challenging. Few articles have described standard or “universally achievable” measures for this surgery. We have devised eight such measures from our three-decade-

Key Message

Eight “universally achievable” measures for cesarean hysterectomy for placenta previa accreta are described, which have been devised by our three-decade-long tertiary obstetric center practice, and thus their effectiveness is time-tested.

long experience of about five such procedures annually and they have become our department protocol, which we describe here. Some of the measures described here have been published previously and are referred to successively.

We have decided upon CH when both ultrasound and magnetic resonance imaging strongly indicated the presence of placenta previa accreta. As described previously (2), if placenta accreta was only a probable diagnosis, after delivery of the infant we usually have waited for spontaneous placental delivery for approximately five minutes. If undelivered, we lightly pulled on the cord to help start placental delivery where the placenta was in reality a non-accreta. If delivery was not effected, we used ultrasound on the operating table and identified the presence or absence of the signs of accreta. If signs of accreta were present, we decided to perform CH. We describe our department protocol where steps 1–8 are performed in this order in the surgical procedure.

Eight measures

Step 1. Intra-arterial occlusion balloon catheter placement

The intra-arterial occlusion balloon catheter is placed electively. Initially, catheters were placed in both internal iliac arteries (3,4). However, we noticed that this did not achieve satisfactory reduction of bleeding. A recent article (5) indicated that occlusion of the uterine arterial flow by intra-operative ligation did not achieve sufficient hemostasis: hemorrhage occurred mainly from branches of the external iliac arteries. We now place a balloon in both common iliac arteries, as reported before (6). From the bilateral femoral artery approach, the occlusion balloon catheter is advanced over the aortic bifurcation to the opposite common iliac artery to prevent catheter tip migration. We place a pulse-oximeter on the 1st toe of each foot to monitor the oxygen saturation and blood flow to avoid ischemia caused by arterial occlusion. The balloon is usually inflated when either uterine artery upper branch transection or bladder separation is started. This will be described in Step 7. The shorter the occlusion time, the less frequently an ischemic insult may occur. Although no definite data regarding the permissible occlusion time are available, we are cautious that balloon occlusion should be within 40 min; if longer occlusion is needed, the balloon is deflated, and then inflated once again. We have had no problems associated with arterial occlusion balloon catheter employment.

Step 2. Ureter stent placement

This is not always necessary; however, knowing the ureter position during surgery gives the surgeon peace of mind

and thus we usually employ it in elective surgery. Stent placement requires only approximately five minutes for an experienced urologist. We believe that ureter stents should be placed in the operating theater just before surgery with all the staff prepared, as we previously had a negative experience. In that case, the urologists were not available the following morning (the day of surgery) and thus they placed the stents the evening before. Just after stent insertion, uterine contractions occurred, requiring emergency surgery. Although a cause-effect relation between stent insertion and the uterine contractions was not identified, stent insertion may have been responsible. Since then, we have placed stents just before the surgery.

Step 3. "Holding the cervix" technique

The uterine cervix should be closed by round forceps placed simultaneously over the anterior and posterior cervical lips (Figure 1a,b) (3,7). This has two merits. First, we appreciate better the amount of bleeding over time. One decade ago, we had a negative experience when at cesarean section (CS) for placenta previa the placenta partially separated: the blood flowed into the vagina, whereas the abdominal field looked dry. Blood pressure fell abruptly, which indicated massive hemorrhage. Clamping the cervix, and thus eliminating the blood "exit", makes the blood enter the uterine cavity. This may also enable cell salvage via a cell saver.

Second, the metal consistency of the forceps clearly indicates the site to be transected (3,7). The cervix of the pregnant uterus is soft, which makes it difficult to identify the vaginal transection site: this is especially true when there is placenta previa accreta. We can easily feel the metal hardness of the forceps from the abdominal cavity (Figure 1b) and usually, 1–2 cm cephalad of the hardness is the site to be transected. Feeling the transection site gives the surgeon reassurance. The lower uterine

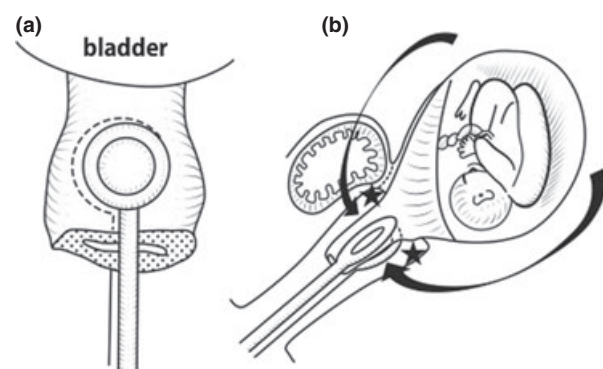


Figure 1. Step 3 (Holding the cervix). (a) Anterior-posterior view. (b) Lateral view. The metal hardness can easily be felt by bimanual sounding in the initial surgical step (curved arrows). Star; anterior and posterior fornix.

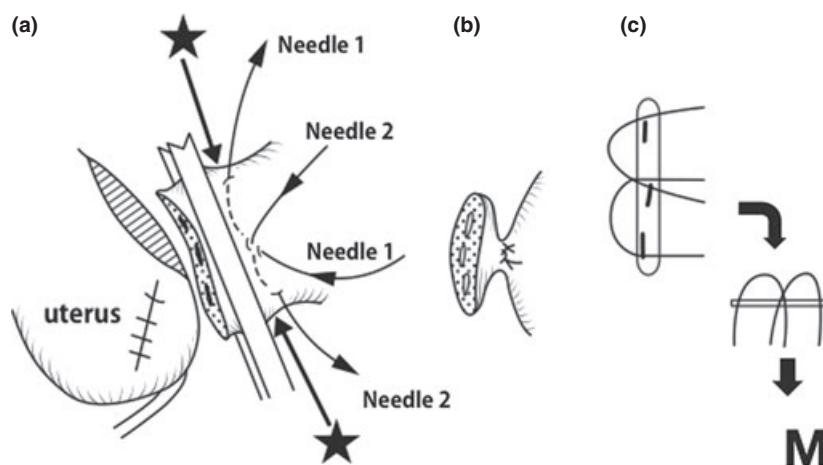


Figure 2. Step 6 (M cross double ligation). (a) The first needle (i) with one thread penetrates the middle of the tissue from anterior to posterior and then picks up the edge from posterior to anterior. Importantly, the edge should be picked up far from, and not adjacent to, the periphery or the clamp (star) to avoid slipping off. The same is performed with the second needle (ii) with another thread, with the threads crossed in the middle of the tissue. Both threads are tied simultaneously while declamping the forceps, and thus we perform two stitches with each needle having one thread/suture. (b) The resultant feature. (c) Rotating the figure 90 degrees; two threads form the letter M, and thus it is named “M cross double ligation”.

segment is usually elongated and widened with placenta previa accreta and thus the cutting line is difficult to imagine at this initial step of the surgery. Roughly identifying the cutting line at this stage is beneficial and helps to keep control of postpartum hemorrhage (8).

Step 4. Uterine fundal transverse incision

A midline skin incision is made from 2 cm above the upper edge of the pubic bone to approximately 3–4 cm above the umbilicus, with the incision large enough so that a fundal transverse incision for infant delivery can be made. We usually perform fundal and not uterine body, incision, according to the method reported by Shukunami et al. (9). The future fertility and subsequent obstetric outcome after fundal incision is unknown and thus caution should be exercised when the uterus is preserved. This does not matter with CH. According to our experience, the fundal transverse incision causes little bleeding. The infant is delivered and the cord cut close to the placenta. The incision is sutured and closed.

Step 5. Avoiding uterotonic agents

Uterotonic agents should not be used (2). Inexperience or an urgent situation may tempt an anesthesiologist to routinely administer uterotonic agents. The placenta usually invades a previous CS scar but its remaining part may not invade the uterine muscle: uterotonics may cause partial placental separation. This may lead to massive bleeding just at the beginning of hysterectomy.

Step 6. “M cross double ligation” for ovarian ligament

We usually apply a mechanical retractor (Table Mounted Retractor, Pelvic FastSystem–UF100; Integra LifeSciences Corporation, Plainsboro, NJ, USA), the retractor usually used for ovarian cancer surgery. This enables a better view of the field. The order of the procedures for CH is fundamentally the same as that for ordinary non-pregnant hysterectomy. After transection of the round ligament as usual, the ovarian ligament should be transected. Here, “M cross double ligation”, our own ligation method, should be used (Figure 2a–c) (10). In the pregnant uterus, especially in placenta previa accreta, vessels running in the ovarian ligament are highly engorged. Never-slip-off mass ligation should be used; “M cross double ligation” is quite easy and remains in place.

Step 7. “Filling the bladder” technique to determine the appropriate site for separating the bladder

Determining the site for separating the bladder from the lower segment area is sometimes difficult for two reasons. First, most women with placenta previa accreta have a previous history of CS, and thus the bladder top is usually located more cephalad compared with those without a previous history of CS, tempting a surgeon to start separating the bladder higher than usually to avoid bladder injury (line B of Figure 3a). Identification of the bladder top, and thus the separation site, is difficult

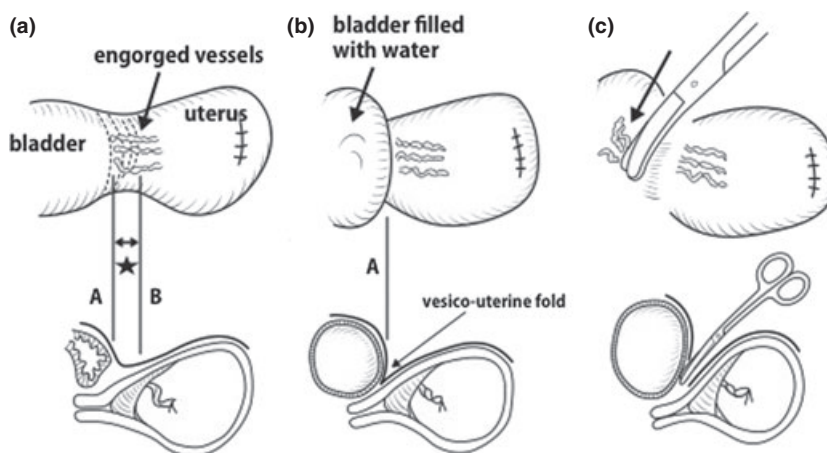


Figure 3. Step 7-1 (Filling the bladder). (a) Empty bladder. We cannot distinguish where (line A or B) the bladder separation should be started. Star; area between line A and B. (b) "Filling the bladder" indicates the bladder top and thus the site to be separated from (line A). (c) The bladder should continue to be filled during bladder separation.

because of the thickened tissues around the vesico-uterine reflection. Secondly, abundant engorged vessels usually run longitudinally around or across the vesico-uterine fold in placenta previa accreta (Figure 3a). If we start separation higher up on the anterior uterine wall, we must cut the engorged vessels, causing massive hemorrhage.

We fill the bladder with 300 mL saline solution to indicate the bladder top (11) (line A of Figure 3b). This site is usually more caudal than expected and has less engorged vessels (line A vs. B of Figure 3a, and line A of Figure 3b). While separating the bladder, we sometimes encounter large vessels located between the posterior surface of the bladder and the anterior cervical wall. Bladder filling helps to identify these vessels (arrow of Figure 3c), which should not be touched.

Identifying the bladder separation site enables us to decide which should be performed first, uterine artery upper branch transection or bladder separation, as this depends on the spatial location of the two. The surgeon may be tempted to first perform the former, which will eliminate the main blood supply to the uterus; however, transection of the uterine artery upper branch without identifying the bladder top may cause bladder injury. The intra-arterial occlusion balloon should be inflated when either uterine artery upper branch transection or bladder separation is started.

In placenta previa percreta with bladder invasion, the "opening the bladder" technique can be used (3). This is the extreme end of the placenta accreta spectrum. If bladder invasion is confirmed, we do not separate the bladder because this will cause catastrophic bleeding and potentially severe bladder injury. Here the "filling the bladder" technique does not work well. Instead of separating the bladder, we intentionally cut the bladder wall with an

automatic stapling/cutting apparatus (Endo-GIA stapler; Tyco International Co Ltd., New York, NY, USA) without touching the engorged vessels. Directly confirming the placental invasion, the cervix or vagina is cut from within the bladder (Figure 4) with a partial resection of the invaded bladder wall.

Step 8. Cutting the parametrium and paracervix; the uterine side remains clamped or should be ligated using "double distal edge pick-up"

At this stage, the parametrium and paracervix should be cut. In hysterectomy for non-pregnant uterus, bleeding usually does not occur from uterine or cervical side (medial side); we should clamp and ligate only the pelvic (lateral) side, leaving the medial side (the side that will be

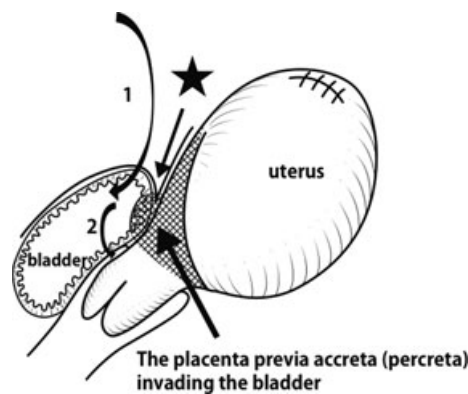


Figure 4. Step 7-2 (Opening the bladder). Star indicates the vesico-uterine fold with engorged vessels. The bladder wall should be cut (long curved arrow 1) and anterior cervix should be reached from within the bladder (short curved arrow 2).

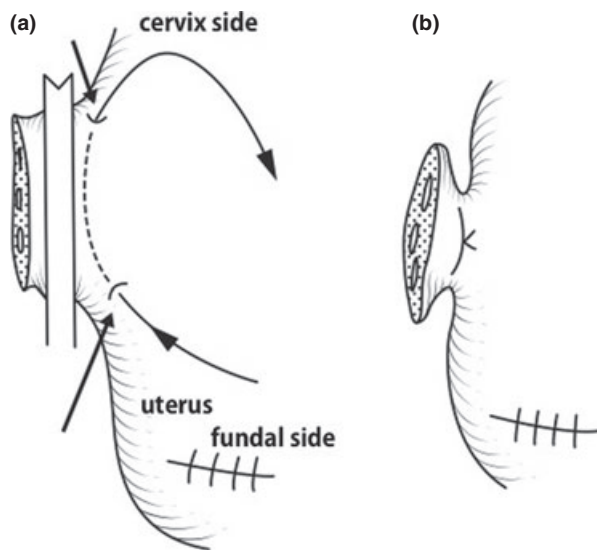


Figure 5. Step 8 (Double distal edge pick up). The needle penetrates the tissue some distance from, and not adjacent to, both the clamp and the periphery (short and long arrow), which stops the thread from slipping-off. The distance should be longer on the uterine fundal side (long arrow) than on the cervical side (short arrow), because the former has more to be picked up.

removed) unclamped. In CH, especially for placenta previa accreta, the parametrial or paracervical medial cutting plane has abundant vasculature and will bleed. Two preventive methods can be used (2). First, the medial forceps, i.e. forceps clamping the side that should be removed, should remain clamped until hysterectomy is completed. Second, if many medial forceps are required, they block the field of vision: the medial side ligation using “double distal edge pick-up” (Figure 5a,b) (2) permits declamping these forceps. Bilaterally the edges should be picked up distally from, and not adjacent to, the clamp and periphery. “M cross double ligation” (10) may be required; however, “double distal edge pick-up” may suffice. Table 1 summarizes the eight measures.

Table 1. Summary of the procedures.

1. Placement of intra-iliac arterial occlusion balloon catheters
2. Placement of ureter stents
3. Employment of “holding the cervix” to identify the site to be transected
4. Uterine fundal incision to deliver an infant
5. Avoidance of uterotonics after infant delivery
6. Employment of “M cross double ligation” for ligating the ovarian ligament
7. Employment of “filling the bladder” to identify the bladder separation site and “opening the bladder” for placenta previa percreta with bladder invasion
8. To continue to clamp the medial side of the parametrium or the cervix or employment of the “double edge pick-up” to ligate it.

Discussion

We here describe eight “universally achievable” measures for CH for placenta previa accreta. Almost all articles dealing with placenta previa accreta emphasize that this surgery requires both experienced obstetric surgeons and the multidisciplinary team approach. We agree with this; however, experienced surgeons and multidisciplinary teams may not always be available. For example, let us assume emergency CH for placenta previa accreta at night. Attending doctors must handle this situation and perform CH, even though they are inexperienced in this surgery (12). Thus, “universally achievable” measures for CH for placenta previa accreta are required.

Some authors have used a “conserving” management for placenta previa accreta, in which the placenta was left in the uterus with expectation of spontaneous placental absorption or delivery (13). Our team also tried this management previously; however, unexpected bleeding, especially massive bleeding at night, obliged us to perform emergency CH (12). We believe that a “conserving” management may be employable only in a large center in which surgery can be performed in a 24-h manner (12). Thus, although superiority of CH over a conserving management has not been determined, CH may be the treatment of choice, or at least widely performed, for placenta previa accreta.

Authors of previous reports have also devised various measures for CH for placenta previa accreta, including Price et al.’s “posterior approach hysterectomy” (14), Pelosi and Pelosi’s “retrovesical lower uterine segment bypass hysterectomy” (15), and internal iliac artery ligation (16). We also previously tried these approaches; however, they were abandoned in a trial-and-error manner as they were not “universally achievable”. Of eight measures here described, while step 1 (intra-arterial catheter placement) and step 2 (placement of ureter stents) may require skills of specialists, the remaining six can be performed quite easily even by less experienced obstetricians. In an emergency setting, we can perform CH even without steps 1 and 2. Thus, our measures described here may be “universally achievable”.

Usually, a surgical measure is evaluated by the mortality, morbidity or blood loss associated with it. Since these eight measures have become our department protocol, controlled studies to determine their superiority over others were ethically impossible. Detailed data of individual patients have not been used; thus, we have no evidence to claim that these measures are the best. However, we have experienced no mortality during the past three decades and, to our knowledge, no grave sequelae have been reported, so time may have tested their effectiveness.

For better obstetric practice, understanding the pathophysiology coupled with a team approach are important;

however, surgical skills and measures are still vital. We describe eight “universally achievable” measures for CH for placenta previa accreta. We do not claim that these measures are the best; however, they may at least avoid harm if used.

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