

Incremental Expansion of Abortion Care from 13.6 weeks through 17 weeks

A collaboration between Patient Forward, TEACH and the Later Abortion Initiative at Ibis Reproductive Health

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Goal

The goal of this resource is to help clinicians expand access to abortion by independently expanding their abortion practice from 13.6 weeks through 17 weeks. The curriculum is intended for clinicians who are already comfortable providing aspirations through 13.6 weeks, and it assumes that they have a solid foundation to incrementally broaden these skills through 17 weeks, even when it not possible to train under a more seasoned provider.

Introduction

In the months after the *Dobbs* decision overturned *Roe v. Wade*, twenty-four states have banned abortion or likely will in the coming months.¹ In these states, women and transgender and gender-nonconforming individuals who may become pregnant no longer have access to abortion unless they self-manage with mifepristone and misoprostol or are able to travel to a “haven” state where abortion is legal. Legal challenges to FDA approval of mifepristone are threatening access to medication abortion and further delaying care. The myriad of barriers to abortion care in an increasingly hostile and restricted landscape are increasing the demand for abortions later in pregnancy. A reasonable response is to increase provision and scope of procedural abortion in the states where abortion remains legal and to support patients in accessing that care. Unfortunately, abortion training is limited during schooling and almost impossible to access post-training for all clinicians, even more so after *Dobbs*.

Guided in-person training in D&Es with an experienced provider is the gold standard for expanding a skill set to include instrumentation and evacuation of the uterus.² In an evolving political and legal landscape, non-traditional methods of expanding access are required. When access to supervised, hands-on training is not available, independent stepwise increases in gestational offerings allow clinicians to immediately expand provision while gradually broadening their procedural skill set.

Let us not forget that abortion restrictions disproportionately impact Black and Brown women, indigenous communities, and people living in poverty. All efforts to increase access to health care, including abortion care, should embrace a reproductive justice model and use the foundation of racial and economic justice to ensure excellent, community-centered care is provided.

This resource is written for clinicians who are already proficient in aspiration abortion care up to 13.6 weeks including counseling and ultrasound skills, patient-centered communication, equity models

and trauma-informed practices. The following recommendations are compiled from multiple resources, including the 2022 NAF Clinical Policy Guidelines, the invaluable textbook *Management of Abnormal and Unintended Pregnancies*, ACOG recommendations for D&E procedures, and the excellent TEACH abortion training curriculum. It offers an incremental and logically developed model written and reviewed by experts to promote abortion access in an unprecedented moment for abortion care when expanding provider capacity is paramount to patient access. Recommendations assume standard practices for first trimester aspiration abortions and represents common practice in early second trimester abortion provision.

Clinic preparation

Logistics

Logistical considerations are detailed in the online version of this resource available on teachtraining.org and include staff communication, values clarification, patient scheduling, telephone screening, clinic flow, addressing staff training needs (intraoperative ultrasound skills, IV starts, IV sedation and related monitoring/administration, instrument cleaning/sterilizing), advertising, and emergency drills.

Instruments and Supplies

Equipment needed to expand services from 14w0d through 17 weeks includes:

- All equipment that is needed to perform aspiration abortions up to 13w6d, plus:
- Dilators up to #49/51 Fr. Pratt (See Fig. 1), ideally up to #57/59 for more dilation when needed and to allow further expansion of services
- Forceps: rings, Van Lyth's, small Finks, regular Finks, Sopher, or Bierer (see Procedure Notes for recommendations per gestational age and Appendix A for visual chart of forceps)
- Cannulas up to 16 regular (rigid)



- Large tubing to accommodate larger cannulas (See Fig. 2)
- EVA machine “tops” for large tubing (See Fig. 2)
- An array of speculums to include short bivalve (shown in Fig 3)
- Cervical ripening agents: misoprostol 200 mcg tabs, mifepristone 200mg tabs, foley bulbs with stat lock cath stabilizers, and/or dilapan/laminaria
- Table basin or emesis-type basin
- Medications and IV supplies, including:
 - » conscious sedation medications and reversals, and hemorrhage medications such as misoprostol, methylergonovine, carboprost, and tranexamic acid (TXA).

- » IV fluids: 500-1000mL bags of isotonic solution for fluid resuscitation.
- Optional: Adjuvant medications for paracervical block (vasopressin, epinephrine, bicarbonate)
- Example tray below (See Fig. 3 & 4)

Incremental Increases

To establish confidence and skill with aspiration and D&E abortions >13w in the absence of supervised training by an experienced provider, establish a timeline for gradually increasing gestational age offerings, generally in 3- or 4-(gestational) day increments over time. For example, an increase from 13w6d to 14w3d will not require vast changes to procedural technique.

Instruments for D&E



FIGURE 1:
Advanced dilators (sizes 33/35, 37/39, 41/43, 45/47, 49/51)



FIGURE 2:
Regular (3/8") and Larger (3/4") tubes + tops for EVA machines



FIGURE 3:
Addition to standard 1st tri set up: larger dilators, forceps, sharp curette



FIGURE 4:
Sterile D&E tray (from L to R): Gauze, ring/sponge forceps, tenacula, dilators up to #49/51, two types of forceps, two sizes of sharp curettes



After seeing enough patients at 14w3d to ensure clinician proficiency and clinic flow, increase to 14w6d, then to 15w3d, then up to 15w6d, and so on. Competency is best evaluated with skill-based criteria rather than number of procedures performed, so the decision of when to increase in a step-wise fashion will depend on the comfort of each clinician as well as each clinic and its staff. Alternatively, a clinic may opt to increase by larger increments (eg: from 13w6d to 15w6d, then 15w6d to 17w6d) to allow adequate volume for clinicians to achieve experience with early second trimester procedures.

Pre-Abortion evaluation

As with patients undergoing first trimester abortion, a systematic review of the patient’s medical history, sexual and reproductive history, medications, substance use, and allergies is recommended. Essential additional information for early second trimester procedures includes:

- Rh testing must be offered to people with unknown Rh status > 12 weeks LMP and anti-D IG offered to patients > 12 weeks who are Rh negative.¹
- Baseline Hematocrit/Hemoglobin: Low H/H should not prevent proceeding with abortion, but might allow risk-stratification, and may be a factor in deciding to refer for a hospital-based abortion. Also, degree of change from baseline can inform need for transfusion in event of a hemorrhage.
- Ultrasound should include an evaluation of placental location and in patients with a prior uterine scar, evaluation to assess for placenta accreta spectrum (PAS). If unable to assess placental location or screen for PAS for high-risk individuals in your facility, an outside formal ultrasound with doppler flow should be obtained prior to the procedure. For rare cases of PAS, refer to a higher level of care to mitigate risk of catastrophic hemorrhage.

1. Rho(D) Immune Globulin (Human) Dosing recommendations for abortions between 12 and 18 weeks range from at least 100mcg to 300mcg.

Pre-Abortion Procedures

Patients receiving abortion care at gestational ages >14 weeks should receive:

- an IV prior to the procedure for ease of administration of medications and due to the increased risk of hemorrhage in later gestations.³
- routine antibiotic prophylaxis⁴ co-administered with pain medications prior to misoprostol cervical preparation, initiated at the time of insertion of osmotic dilators⁵, or at the time of the procedure itself. Effective regimens include metronidazole, tetracyclines (e.g. doxycycline) or azithromycin.⁶

Pain Management

Refer to TEACH workbook Chapter 5 pain management and other medications for description of paracervical blocks, procedural medications, monitoring and consent guidelines.

Cervical Preparation

Adequate cervical ripening and dilation is necessary to decrease cervical injury, allow for evacuation of the uterus, and to minimize prolonged, difficult, or traumatic procedures.^{7,8} Cervical preparation initiated early in the day can facilitate same day D&E procedures. (See chart below) Two-day procedures can also be planned, using cervical preparation with mifepristone (depending on legality/availability) and/or osmotic dilator placement on day one, followed by misoprostol the day of the procedure.

Cervical preparation approaches ^{9,10,11}

Gestational Age	Misoprostol	Osmotic Dilators
12w0–15w6	400–600 mcg x 90 min	dilapan +/- lams x 4 hour
16w0–16w6d ²	400–600 mcg x 90 min – 3 hour	dilapan +/- lams x 4 hour
17w0–19w6 ²	400–600 mcg x 4 hour	dilapan +/- lams x 4 hour or overnight lams or foley

1. Some providers consider shorter wait times for those with a history of prior vaginal delivery and no prior cesarean section.

2. Some providers use a combination of same-day osmotic dilators with misoprostol, though no evidence of improved procedural outcomes for GA <18–19 wk.¹²

Wait times and approach are suggested rather than prescriptive, as many various approaches have been validated as safe and effective with little difference in procedure time and complication rates;¹³ timing and approach may be altered based on available resources, clinical history, and patient-centered considerations for wait times as well as



staffing availability and flow. This resource only addresses procedures up to 17w6d which can be accomplished via same-day cervical prep methods (see above), so the dilation achieved by two day methods including overnight osmotic (laminaria/dilapan) or mechanical (foley bulbs) dilators, and/or mifepristone administration is rarely required.

Deciding whether patients may leave the clinic area after administration of misoprostol and/or osmotic dilator placement will depend on each clinic and patient. If the patient is comfortable, experiencing no more than scant bleeding, has normal vital signs, no IV in place, has no history of cesarean section, does not have a placenta previa on US, and has not received opioids or benzodiazepines, the patient may leave during cervical prep wait time. Pain management, anti-emetics, and anxiolytics should be offered as early as needed for the patient.

Procedural Steps

Cervical Preparation

Initiate cervical preparation:

1. Place misoprostol vaginally (and/or invite patient to self-administer) or buccally. This is a good time to do a bimanual exam if clinician is placing misoprostol vaginally; or,
2. If using osmotic dilators or foley bulb, place speculum, apply antiseptic solution to cervix, administer paracervical block, slowly place tenaculum. Dilate as necessary for placement of dilators or foley. Place dilators or foley bulb into cervical canal using ring forceps, ensuring mechanical dilator spans both internal and external os. After placement of osmotic dilators, and removal of tenaculum, may place 1–2 gauze sponges into the vagina abutting the dilator ends to absorb vaginal fluid and blood and to help maintain dilators in position before they swell in size. Remove speculum (holding gauze sponges in place with a ring forceps during speculum removal if used), place patient’s feet in the center of the table or bed, and re-cover their legs. Note: Sedation is typically not required for this step, but in facilities where this can be done, moderate or deep sedation can be useful and, in rare cases, necessary.

Cervical Dilation Under Ultrasound Guidance

1. After appropriate wait time for cervical prep, perform time-out, answer any new questions, assess vitals, and administer IV medications. As you prepare the room and your patient for the procedure, remember that appropriate (and relaxed) patient

positioning will allow the clinician to more safely visualize the cervix and maneuver instruments in the cervix and uterus.

2. Perform bimanual exam. Benefits of pelvic exam in >13w procedures include evaluation of cervical consistency, adequacy of dilation after cervical prep, and uterine mobility (especially in setting of C/S scar), as well as standard benefits to abortion care in general: patient tolerance of exam, uterine size and positioning, and possible leiomyomas (with irregular or larger than expected uterine size) which might impact instrumentation of the uterus.
3. Initiate intra-procedure ultrasound¹⁴ with abdominal probe, ensuring all staff are positioned in an ergonomically safe manner. An US machine with dual monitor arm is ideal but not required.
4. Insert the speculum, evaluate, and collect samples as needed for screening / testing (STI, pap). (Optional: Remove any remaining misoprostol fragments if administered vaginally.) Remove gauze sponges and osmotic dilators or foley if using, ensuring the same number of gauze and dilators that were placed are accounted for.
5. If using, apply antiseptic solution to cervix.
6. Administer paracervical block, assessing patient’s pain level throughout procedure. Studies indicate the addition of vasopressin decreases overall blood loss in second trimester D&Es, with increasing effect in increasing gestational age,¹⁵ but the cost of vasopressin can be prohibitive.
7. While applying gentle traction to straighten cervical canal, dilate sequentially up to appropriate size (see chart for recommendations). If using forceps, more dilation allows easier instrumentation and decreases risk of uterine and cervical injury. If planning uterine evacuation with aspiration only using a large cannula (14–17mm), dilate up to equivalent size +/- 1mm. Note: cannula sizes >15mm necessitate use of large bore tubing, however a pass with a smaller cannula (i.e. flexible 8mm) at the end of the procedure can be achieved with an MVA so that two packages of tubing do not need to be used.

Uterine Evacuation

Most clinicians use one of two methods to evacuate the uterus in early second trimester abortions: aspiration alone or dilation and evacuation (D&E). According the experience of this author & her colleagues, suction aspiration is often adequate to remove the fetus and placenta without requiring forceps through 16w, although forceps removal of calvarium and/or spine becomes increasingly necessary with advancing gestational age.

Cervical Dilation Under Ultrasound Guidance

Approx. Weeks Gestation	Dilate to	Cannula	Recommended Forceps
Up to 14w	14 denniston 43 Pratt	14 regular. May follow with 8	None (if needed Ring, Hern Van Lyth)
14w0 – 14w6	43–45 Pratt	Either 14 reg or 12 reg and forceps Followed by 8 flexible	None (Ring, Hern Van Lyth)
15w0d – 15w6d	45–47 Pratt	Either 15 reg (large tubing) or 12 reg and forceps Followed by 8 flexible	None or Small finks (or Ring, Hern Van Lyth)
16w0d – 16w6d	49 Pratt	Either 16 reg (large tubing) or 12 reg and forceps Followed by 8 flexible	Small finks (or Regular Finks)
17w0d – 17w6d	49/51 Pratt	Either 16 reg (large tubing) and forceps or 12 reg and forceps Followed by 8 flexible	Small finks (Regular Finks)



ASPIRATION TECHNIQUE:

1. Introduce appropriately sized cannula (12–13-mm cannula for 14wga, 14- 15-mm cannula for 15wga, and 16-mm for 16wga) through cervix into lower uterus.
2. Connect aspirator (EVA) to cannula using large bore tubing, and empty uterus under US guidance. Generally, with steady patience, suction is powerful enough to remove all fetal tissue, including auto-decompressing and removal of the calvarium. Slowly pulling the calvarium down into the lower uterine segment using suction while gently withdrawing the cannula can be a helpful technique to avoid pushing it further into the fundal space while attempting to decompress. If tissue gets caught and is not moving into the cannula, gently place the cannula end (with tissue) against the inside of the lower uterus or internal os (avoiding 3 and 9 o'clock areas) and “push” the tissue into the cannula by compressing it against the wall of the uterus using an anterior (and away from the fundus) motion. This action is like pulling a squeegee against the *inside* of a windshield while standing outside a car. Alternatively, pull the clogged items into the lower uterine segment and attempt to remove by pulling the cannula through and out the cervix. Some clinicians then press the cannula’s distal tip against sterile gauze to de-clog.
3. If unable to aspirate calvarium or remove all tissue through the vacuum cannula, refer to procedure step 3–5 below for forceps extraction.
4. Ensure empty uterus, good tone, and no bleeding with ultrasound prior to removal of instruments (or placement of IUD).
5. Check POC for adequacy (4 limbs, spine, calvarium, placenta), if not already done. Inform patient of complete procedure & initiate recovery process.

D&E OR PRIMARY FORCEPS TECHNIQUE:

1. Release amniotic fluid by either placing a cannula through the cervix and internal os and letting drain by gravity or by inserting forceps* into the lower uterus and opening, allowing fluid to drain into basin under the perineum.
2. Determine location of the fetal tissue by ultrasound, most often in a sagittal plane view including cervix and entirety of uterus.
3. While applying traction to straighten the endocervical canal, close forceps to enter into the lower uterus, remaining mindful of the uterine arteries at 9 and 3 o'clock. As soon as the jaws of the forceps extend beyond the internal os, open the jaws as widely as possible to surround and grasp fetal tissue without pushing it higher into the fundus. Using the forceps lower in the uterus rather than at the fundus decreases risk of uterine perforation.
4. Using US guidance, grasp largest presenting part which is not the calvarium (best to aim for torso/thorax) and apply steady traction while repeatedly supinating/pronating the forceps hand. At 14 to 16 weeks, the fetal parts may be soft and non-calcified, making haptic feedback from forceps difficult to assess. At this gestation, forceps with smaller/finer teeth are appropriate to use. Between 16 and 18 weeks, fetal parts may have more calcification

and may be easier to sense in the forceps’ jaws. Larger teeth allows easier grasping. Continue traction with rotation to the internal os, through the cervical canal, and out until tissue is free. Separation of fetal tissue may occur, or removal of an extremity could bring the torso into the lower uterine segment. If tissue is still connected, advance the forceps up the torso and grasp for removal. Drop grasped fetal tissue into basin sterilely. Close forceps, reenter cervical canal,* and repeat until all fetal tissue (except calvarium) +/- placenta is removed. Fewer instrument passes through the cervix decreases the risk of trauma.

5. Place forceps through cervix,* open forceps and attempt to encircle calvarium placing serrated jaws on opposite sides; then, close forceps around calvarium to grasp and decompress. If this part “floats” high in the uterus, grasp any part and apply slow traction to move lower into uterus before reattempting decompression. Grasping the calvarium may require opening forceps wider than expected. (Hint: Removing thumb from forceps ring will enhance widest opening. Ensure hinge/joint is at level of cervix and remain vigilant about distal tip orientation inside uterus. Thick, bright white fluid (neural tissue) can sometimes be seen leaking from external os after collapsing the calvarium.
6. The placenta can be grasped and removed with light traction +/- fundal massage while observing US to ensure no uterine wall movement concerning for myometrium entrapment in forceps. The placenta will feel thicker, softer, and bulkier than the fetal tissue and is best removed intact. Alternatively, the placenta may be removed with suction alone.
7. Confirm that all fetal tissue (4 limbs, spine/torse, calvarium, and placenta) has been removed from the uterus using visual inspection during evacuation and the intraoperative ultrasound.
8. A final suction curettage using a smaller cannula (8mm–12mm) can be used to ensure the uterus is empty of residual blood and tissue, or to gently evaluate the myometrium for any irregularities or injury. Some clinicians gently use a sharp curette for this purpose.

Pearls:

- When coaching a new medical assistant on procedural ultrasound, the provider needs to be direct and deliberate with feedback to ensure they are always seeing their instrument in the uterus.
- Consider removing your thumb from the forceps loop to enhance widening of the forceps. Use thumb to push against medial (palmar) aspect of loop for stability.
- Be very cautious whenever grasping tissue at or near the cervix. Accidentally grasping and tractioning against a cervix with toothed forceps instead of grasping fetal tissue can cause cervical trauma. Almost all D&E providers have learned this lesson the hard way. It is often better to push tissue back into the lower uterine segment to observe your instruments grasping the tissue by US.



When inserting forceps, through the cervix into the uterus, always insert with jaws closed, shanks oriented vertically with top jaw at 12 o'clock and bottom jaw at 6 o'clock



- If you are uncertain or concerned that something is not going well, the best advice is to PAUSE FOR A MOMENT. Put down your instruments, breath, roll your shoulders, and reassess. What can you optimize? Can you improve sedation for patient comfort? Does the patient need to be repositioned? Do you need a different speculum for better visualization? It's ok to give more misoprostol or consult with a colleague. Rarely do good things happen after you have been struggling for a long time.
- When struggling to remove a portion of the tissue with forceps, micro-movements are usually sufficient to approach the tissue in a different way to achieve removal. Newer providers usually make larger movements than necessary. Sometimes rotating the forceps 180 degrees or changing to a different type of forceps can be sufficient to achieve grasp.
- 15–17 week calvariums can become stuck in the fundus or a uterine horn. You may be able to decompress by aspirating with a 12–14mm cannula. Also, using suction can bring the calvarium lower in the uterus even if it won't decompress.

Post-Procedure Care

After an early second trimester abortion, patients should be monitored for bleeding and pain which might suggest immediate and sub-acute complications. Usually 30–60 minutes observation is adequate and allows time for contraceptive counseling (if desired by the patient), serial vital signs to ensure hemodynamic stability, and instructions on what to expect post-procedure. If the patient received IV sedation, they may require longer monitoring and should remain in clinic until awake/responsive, ambulatory, and no longer at risk for respiratory depression. Routine follow up care is not necessary but should be offered per patient desires¹⁶ and a 24-hour emergency contact service should be available to all patients.

Managing Complications

While the rate of complications begins increasing above 14 weeks compared to first trimester aspiration abortions, D&E has a low rate of serious complications, with the most common complications being hemorrhage, cervical or uterine injury, fever (most often from misoprostol), and infection. Risks are highest with inexperienced providers and with increasing gestational ages.¹⁷ Complications for procedures through 17 weeks are similar to those at <13 weeks, with the following nuances:

- **Atony:** Many threatened hemorrhages >13 weeks from poor tone can be prevented under ultrasound guidance. Ensure excellent uterine tone and no suspicious intrauterine blood flow is noted on US prior to removing instruments. If sonogram of lower uterine segment suggests atony, immediately provide bi-directional uterine compression with a ball of gauze held in ring forceps in the posterior fornix with lower abdominal compression applied either by the ultrasound probe or your free hand, or perform vigorous bimanual massage. Watch until tone returns. Uterotonics include: intramuscular methylergonovine (Methergine); intracervical vasopressin (Vasotric); sublingual, buccal, or rectal misoprostol (Cytotec); and intramuscular carboprost tromethamine (Hemabate). Many clinics are using tranexamic acid (TXA) as an adjunct, which is helpful for hemorrhages regardless of etiology. Lack of oxytocin receptors

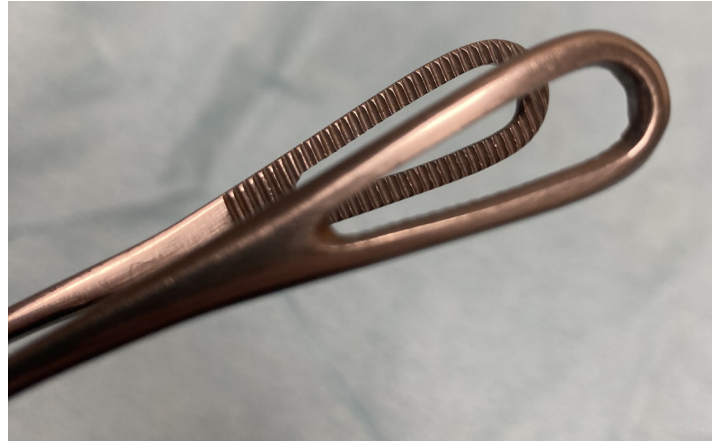
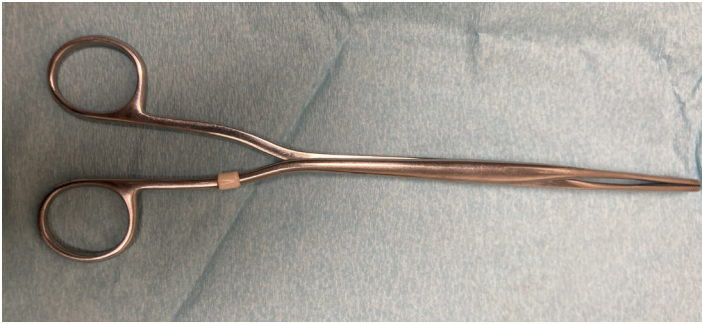
<20 weeks makes IM or IV oxytocin (Pitocin) less helpful in this setting. If bleeding continues despite above measures, provide intrauterine tamponade using a Foley balloon, Bakri balloon or vaginal pack with sterile gauze.

- **Arteriovenous malformations (AVM):** Rare, life-threatening, and can be source of profuse bleeding. If intrauterine bleeding can be visualized on US, and reaspiration + uterotonics have not decreased flow, consider AVM and apply intrauterine tamponade using a Foley balloon, Bakri, or vaginal pack with sterile gauze and transport for embolization/cautery.
- **Cervical laceration/trauma:** Risk can be lowered by grasping large bite of cervical tissue with tenaculum, using atraumatic tenaculum or any non-single tooth tenaculum, adequate cervical preparation (which may require more time or repeat dosing), and decreasing the number of passes the forceps makes through the cervix.
 - » Low/anterior cervical lacerations can often be managed with direct pressure and/or silver nitrate or Monsel's solution.
 - » Endocervical trauma, often caused by a bony fetal part, can lead to lacerations which extend into the body of the cervix and may require suturing. Severe cervical injuries may extend up behind the bladder and may require repair in an operating room.
 - » High cervical or endocervical tears can be caused by forceful mechanical dilation and, if positioned laterally, can result in massive internal bleeding due to laceration of the uterine artery. Hemodynamic instability in the absence of external hemorrhage and in the setting of a well contracted uterus should suggest this injury which may respond to a balloon tamponade or may require surgical management. Also, an abdominal ultrasound may reveal free fluid behind posterior uterus and in dependent portions of abdomen in the setting of a significant internal bleed.
- **Placenta Accreta Spectrum** (see Pre-Abortion Evaluation above): Increasing risk for catastrophic hemorrhage as placenta grows. It is VITAL to locate placenta and determine blood flow, especially in history of C/S or uterine surgery. When placenta accreta is present/highly suspected, the procedure should be performed in location where blood transfusion and emergency surgical management is available to mitigate risks during the procedure.
- **Complete or partial Placenta Previa:** Second trimester patients with history of C/S and complete previa are at high risk for placenta accreta.
 - » Determine no placenta accreta by skilled US with doppler flow.
 - » Likely will cause scant to moderate bleeding with cervical preparation and during dilation.
 - » **Expert Recommendation:** With placenta previa, keep patient in clinic and monitor bleeding during cervical preparation (unless using overnight osmotic dilators). Consider using same-day dilapan in addition to misoprostol to assist with dilation. Initiate procedure early if bleeding increases prior to anticipated cervical prep "wait time". Under ultrasound guidance, remove placenta with forceps prior to initiating aspiration or D&E.

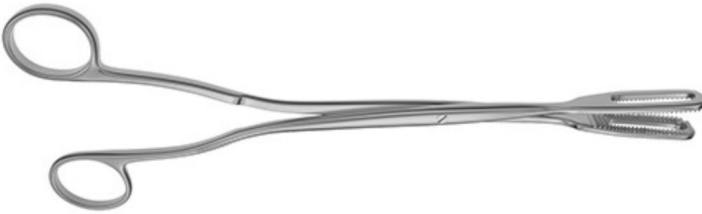


Appendix A: Forceps

Hern Van Lyth Evacuation Forceps 9½" (241mm) 9mm Jaws
Hern Van Lyth Evacuation Forceps 10" (254mm) 11mm Jaws



Small Finks Forceps 10½" (267mm) 13mm Jaws – smaller teeth



Fink Ovum Forceps 10½" (267mm) 13mm Jaws – larger teeth





Appendix A: Forceps

Sopher Ovum Forceps 11–13" (279–330mm) 12–14mm Jaws



Bierer Ovum Forceps 11–13" (279–330mm) 16–19mm Jaws





Contributors

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For copies of the curriculum, please contact Patient Forward or lai@ibisreproductivehealth.org. An expanded version of this curriculum is available on the TEACH website, teachtraining.org.

Citations

Fig 1–3: Photos by author, all rights reserved.

Fig 4: Photo by Dr. Stephanie Mischell, used with permission.

Appendix A: Photos by Dr. Stephanie Mischell, used with permission.

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