

REVIEW ARTICLE

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Complications of Unsafe and Self-Managed Abortion

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WHEN ABORTION IS LEGALLY RESTRICTED OR OTHERWISE INACCESSIBLE, girls, women, and those who care about them look outside formal medical care to end pregnancies.¹ Worldwide, people increasingly choose misoprostol or a combination of mifepristone and misoprostol to end pregnancies on their own (referred to as self-managed abortion).²⁻⁴ These medications are safer and more effective than older, invasive techniques of self-managed abortion, and patients who have used these medications may be clinically indistinguishable from those who have had uncomplicated spontaneous pregnancy loss.¹⁻⁵ Similarly, patients with complications of self-managed medication-induced abortion and those with complications of miscarriage may have identical clinical presentations.

As U.S. abortion laws become increasingly restrictive, people will decide to end pregnancies without clinical supervision. Health care providers must become familiar with the normal course of self-managed abortion with medications and its rare complications, as well as complications of unsafe methods. This review provides the information clinicians need to prepare for an increasingly restrictive legal climate for abortion. Ultimately, we conclude that appropriate care is centered on two clinical concepts. First, because medication-induced abortion and spontaneous abortion are clinically similar processes, care can usually be given without knowledge of whether the abortion is self-managed or spontaneous. Second, because medication-induced abortion is safe, many patients who seek care will require only confirmation that their abortion is complete or outpatient intervention for incomplete abortion. In contrast, those using unsafe methods may need life-saving critical care for sepsis, hemorrhage, pelvic-organ injury, or toxic exposures. The hallmark of skilled care in this new era will be judicious use of intervention in most cases and readiness for aggressive treatment when needed.

Appropriate care also involves understanding that women's legal safety — their risk of prosecution — may be the biggest threat to their well-being. Seven states criminalize self-managed abortion, and 24 others have laws that can be interpreted as doing so.⁶ However, no state mandates that health care providers report suspected or confirmed self-managed abortion, including for minors.⁶ Indeed, reporting may violate patients' privacy rights and result in penalties for those who report. Reporting is also problematic because caregivers are more likely to report women of color and low-income women than white or affluent women in similar circumstances.⁷ When patients present with bleeding in pregnancy and caregivers involve the police, patients may face detention and prosecution, regardless of whether they induced the abortion.

BACKGROUND

Before 1973, when abortion was illegal in most U.S. states, approximately 800,000 illegal abortions took place annually, although the clandestine nature of illegal

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abortion makes enumeration imprecise.⁸ As access to legal abortion increased after *Roe v. Wade*, morbidity and mortality from illegal abortion declined by a factor of nearly 8.⁹ Similar precipitous declines in mortality occurred with the legalization of abortion in Romania and South Africa.¹⁰

Before U.S. legalization of abortion, some women found relatively safe methods of self-managed abortion; others used dangerous means, such as vaginal or cervical insertion of implements, objects, or caustic substances.¹¹ Some women were able to obtain safe surgical abortion care — for example, with lay caregivers of the Jane Collective. Other women underwent surgery performed by inadequately trained providers. Pelvic-organ injuries, hemorrhage, dangerous clostridial infections, and sepsis resulted, leading to emergency hysterectomies and sometimes death. Doctors working in hospitals at that time recall the regularity with which patients presented with life-threatening complications,¹² and some hospitals had entire clinical wards dedicated to septic abortion.

More recently, women worldwide have been managing abortion with the use of mifepristone and misoprostol or with misoprostol alone. These drugs are the most extensively studied, safe, and effective agents for clinician-supervised abortion and miscarriage management, as well as for self-managed abortion¹³⁻²¹ (Table 1). After taking the medications, patients have bleeding, cramping, and expulsion of pregnancy tissue at home. The World Health Organization recommends both regimens, preferring those with mifepristone where available.¹³ With clinical supervision, major complications associated with the combination of mifepristone and misoprostol (those requiring hospitalization, surgery, or blood transfusion) are rare, occurring in 0.3% of cases. Mortality is approximately 0.65 deaths per 100,000 medication-induced abortions, making medical abortion more than 13 times as safe as childbirth in the United States.²²⁻²⁴

Evidence from Ireland, Peru, and other countries indicates that using these medications outside of clinician supervision is also effective and associated with a low rate of complications.²⁻⁴ In Latin America, where abortion has historically been legally restricted, the increase in self-managed abortion with misoprostol has been associated with reduced maternal mortality.²⁵ Though abortion is legal in the United

States, at least for now, 2 to 7% of patients seeking this service report efforts to self-induce abortion.^{26,27} They do so for a variety of reasons, including those related to privacy, cost, distance from clinics, and a preference for self-managed care.²⁸

Not all methods of self-managed abortion are effective or safe. Women in the United States report using herbs, including rue, sage, St. John's wort, and black or blue cohosh, among other understudied methods generally thought to be ineffective.²⁸ Toxic reactions and even death have been reported with some of these substances, especially rue.²⁹ In rare cases, women in the United States have also reported the use of other means, such as vaginal insertion of implements or objects or abdominal trauma to try to disrupt their pregnancy.³⁰

Data are limited on self-managed abortion during the second trimester. The mifepristone–misoprostol combination is probably the safest method.¹³ The research gap here is important, since approximately two thirds of deaths worldwide from unsafe abortion involve attempts after the first trimester.³¹

If U.S. abortion law is further restricted, some of the nearly 1 million people seeking abortion care annually will travel for medically supervised, legal care. However, since 75% of patients seeking abortion are poor or low-income,²⁶ many will need alternatives. Some will self-induce abortion using safe medications that they have obtained themselves. Others, lacking access or relying on misinformation, will use dangerous methods. Emergency-department (ED) physicians, obstetrician–gynecologists, family physicians, and internists will have a role in all these care paths. They will need to know where abortion care is legally available and be familiar with resources to assist patients (see Table S1 in the Supplementary Appendix, available with the full text of this article at NEJM.org). They will also need to understand the normal course of medication-induced abortion and be prepared to manage its rare complications. Finally, along with subspecialist consultants, they will need to effectively manage the life-threatening complications of unsafe abortion methods.

Although prevention of undesired pregnancy should remain a public health focus, restrictions on funding for contraceptive services make accessing family planning even harder for people with low incomes, contributing to an increase in

Table 1. Common Medication Regimens for Induced Abortion, Miscarriage, and Incomplete Abortion.*

| Clinical Scenario | Medication Regimen | Overall Success† % of cases | Ongoing Pregnancy‡ % of cases | Comments |
|--|--|--------------------------------|----------------------------------|---|
| Induced abortion | | | | |
| At ≤10 wk of gestation | Mifepristone, 200 mg administered orally, followed by misoprostol, 800 µg administered buccally, vaginally, or sublingually 24–48 hr later§ | 97 | 0.7 | Failure increases with increasing gestational age (at 57–70 days' gestation, the overall success rate is 93% and the rate of ongoing pregnancy is 3%) ¹⁴ ; major complications (requiring hospitalization, surgery, or transfusion) in 0.3% of cases ²² |
| At >10 wk to 12 wk of gestation ¹⁸ | Misoprostol, 800 µg administered buccally, vaginally, or sublingually every 3 hr for 3 doses ¹⁵ | 84 | 6¶ | Failure increases with increasing gestational age; effectiveness may increase with a fourth dose ¹⁶ ; transfusion required in 0.3% of cases, hospitalization in 0.3% |
| At >10 wk to 12 wk of gestation ¹⁸ | Mifepristone, 200 mg orally, followed 24–48 hr later by misoprostol, 800 µg administered buccally, vaginally, or sublingually, then misoprostol, 400–800 µg administered buccally, vaginally, or sublingually every 3 hr until expulsion of pregnancy tissue | 95 | 1.5 | Limited evidence; transfusion required in approximately 0.7% of cases |
| At >12 wk to 24 wk of gestation | Misoprostol, 800 µg administered buccally, vaginally, or sublingually every 3 hr until expulsion of pregnancy tissue | 75–93 | About 6 | Limited evidence |
| At >12 wk to 24 wk of gestation | Mifepristone, 200 mg administered orally, followed 24–48 hr later by misoprostol, 800 µg administered vaginally, then misoprostol, 400 µg administered buccally, vaginally, or sublingually every 3 hr until expulsion of pregnancy tissue | 93 | <1 | Vaginal administration may be superior to other routes for nulliparous patients; transfusion required in 1–4% of cases, infection occurs in 1% ¹⁹ |
| Early pregnancy loss (at ≤12 wk of gestation) ^{20,**} | Misoprostol, 400 µg administered buccally, vaginally, or sublingually every 3 hr until expulsion of pregnancy tissue | 77 | <1 | Vaginal loading dose of 600–800 µg may increase efficacy; transfusion required in 1–6% of cases, infection occurs in 2% ¹⁹ |
| Early pregnancy loss (at ≤12 wk of gestation) ^{20,**} | Mifepristone, 200 mg administered orally, followed 24 hr later by misoprostol, 800 µg administered vaginally | 84 | NA | Success rate increased to 91% with second dose of misoprostol; transfusion in 2% of cases, infection in 1% |
| Incomplete abortion with uterine size indicating <13 wk of gestation ²¹ | Misoprostol, 800 µg administered vaginally | 67 | NA | Success rate increased to 76% with second dose of misoprostol; transfusion required in 1% of cases, infection occurs in 1% |
| Incomplete abortion with uterine size indicating <13 wk of gestation ²¹ | Misoprostol, 600 µg administered orally or 400 µg administered sublingually | 95 | NA | May take up to 2 wk for completion of abortion |

* Recommended regimens are from the World Health Organization.¹³ NA denotes not applicable.

† Overall success for a gestation of 12 weeks or less is defined as complete abortion without the need for uterine aspiration. Overall success for a gestation of more than 12 weeks to 24 weeks is defined as fetal expulsion within 24 hours after the first misoprostol dose.

‡ Pregnancies that continue after misoprostol exposure are associated with an increased risk of congenital malformations such as the Möbius syndrome and limb defects.

§ The interval may be shortened to 6 hours with vaginal dosing.¹⁷

¶ The rate of ongoing pregnancy may be higher with buccal administration than with sublingual administration.¹⁶

|| Failed induction is rare with repeat dosing of misoprostol.

** Early pregnancy loss includes anembryonic pregnancy or embryonic or fetal death.

pregnancy rates.³² New restrictions on Title X funding also prevent clinicians from referring patients for abortion care.³³ These restrictions, in combination with more restricted access to abortion care, may lead to increased efforts of pregnant people to manage an abortion themselves.

CLINICAL ASSESSMENT

Assessment centers on determining hemodynamic status, including evaluation for life-threatening hemorrhage, sepsis, trauma, and toxin exposure (Table 2). Ectopic pregnancy must be considered in all pregnant patients who have no prior documentation of intrauterine pregnancy.

ACUTELY ILL PATIENTS

Hemodynamically unstable patients require rapid evaluation, supportive care, and immediate involvement of a gynecologic surgeon. Assessment, resuscitation, stabilization, and treatment occur simultaneously. Measurement of vital signs, a targeted physical examination, and appropriate laboratory testing are essential. Rapid bedside ultrasonography can be used to detect ongoing pregnancy, intrauterine tissue, and intraabdominal hemorrhage. Hemodynamically unstable patients with hemorrhage or suspected pelvic-organ trauma usually require assessment and treatment in the operating room. Use of uterotonic medications may be a temporizing measure. If sepsis is suspected, antibiotic agents should be administered immediately, followed by prompt uterine evacuation, performed under ultrasound or laparoscopic guidance if uterine injury is suspected. Hysterectomy may be required for advanced infection or uterine necrosis. Ruptured ectopic pregnancy, bowel or other visceral injury, and amniotic-fluid embolism must also be considered (Table 2).³⁴ Care teams should initiate massive-transfusion protocols or sepsis-resuscitation protocols as needed.

PATIENTS IN STABLE CONDITION

Although doctors must prepare for acute presentations related to trauma, hemorrhage, or sepsis, growing use of medications for abortion (in contrast to mechanical methods) means that most patients with abortion-related symptoms are in stable condition. Diagnosis and treatment center on determining whether clinically impor-

tant bleeding or infection is present and whether ectopic pregnancy can be ruled out. These factors guide decisions about uterine evacuation, antibiotic therapy, follow-up evaluation of human chorionic gonadotropin (hCG) levels, and in the case of ectopic pregnancy, surgery or treatment with methotrexate.

MEDICAL HISTORY

In most cases, a symptom-focused history, not one focused on the cause of pregnancy loss, will generate an appropriate differential diagnosis. Inquire whether the patient had prior ultrasound documentation of intrauterine pregnancy, which can rule out ectopic pregnancy. Asking about a history of uterine instrumentation (especially if there are peritoneal signs on physical examination) may be clinically relevant, though it may not be necessary to know whether instrumentation was for spontaneous or induced abortion. Pregnancy complications must be considered in transgender men.

People having a typical medication-induced abortion and those having a spontaneous abortion present similarly.⁵ Patients may describe bleeding or cramping that intensified over a period of several hours and peaked as the pregnancy tissue was expelled, with heavy bleeding and large blood clots. Symptoms usually subside shortly after expulsion. Nausea, vomiting, diarrhea, transient low-grade fever, and chills may occur on the day misoprostol is used.⁵ Second-trimester spontaneous or induced abortion resembles labor, with painful contractions over a period of hours or days, sometimes with bleeding or membrane rupture.

Some signs and symptoms associated with complications of abortion may be the same as the signs and symptoms that occur during the normal course of an uncomplicated medication-induced abortion. For example, dizziness can signify either hypovolemia due to hemorrhage or a vagal reaction as tissue passes through the cervix. Low-grade fever can be a typical reaction to misoprostol or may indicate infection. Nausea and vomiting can be due to misoprostol or can be a result of serious infection or bowel injury from uterine perforation. Patients may report tissue passage even if the pregnancy itself has not passed; decidualized endometrium can shed even with ongoing pregnancy.

Some presentations suggest a specific diag-

nosis more readily. For example, severe cramping without bleeding suggests hematometra (accumulation of blood in the uterus) or possibly infection. In contrast, cramping accompanied by bleeding suggests incomplete abortion.

PHYSICAL EXAMINATION

A complete physical examination is indicated, with a focus on the abdomen and pelvis; speculum and bimanual examinations are essential. The examiner may need to gently rotate the speculum to look for cervical or vaginal lacerations. If pregnancy tissue is visualized at the cervix, it may be possible to gently remove it with the use of ring forceps; however, the examiner should be prepared for heavy bleeding, which may require rapid uterine evacuation. If pain or bleeding limits the assessment, the examination should be performed in the operating room while the patient is under anesthesia.

IMAGING

Ultrasound imaging can identify ongoing pregnancy, the duration and site of pregnancy, adnexal masses, hematometra, and intraabdominal fluid, suggesting uterine perforation or rupture, vascular injury, or ruptured ectopic pregnancy. Echogenic material in the uterus, or a “thickened stripe,” may indicate incomplete abortion; however, this is also a normal finding after medication-induced or spontaneous abortion, and this ultrasound finding alone is not diagnostic and should not dictate treatment (Fig. 1). The clinical picture as a whole determines the need for intervention.^{5,35} Computed tomography may help in an evaluation for possible pelvic abscess, bowel injury, hematoma, or uterine myonecrosis.

LABORATORY TESTS

To assess for clinically important bleeding, infection, renal or hepatic effects of toxins, or possible ectopic pregnancy, laboratory evaluation should include, at a minimum, a complete blood count, blood typing and screening, a blood chemistry panel, and hCG measurement. Successful first-trimester, medication-induced abortion can be diagnosed when the hCG level drops by at least 80% 5 to 8 days after initiation of the abortion.³⁶ When initial hCG levels are unknown and prior ultrasound confirmation of intrauterine pregnancy is unavailable, hCG levels should

be measured at appropriate intervals to rule out ectopic pregnancy. Suspected sepsis warrants measurement of the serum lactate level, blood and cervical cultures, and endometrial cultures from uterine aspiration. If disseminated intravascular coagulation is suspected, a platelet count and fibrinogen and D-dimer tests are indicated. Rh₀(D) immune globulin may not be needed for an Rh-negative patient with a pregnancy of less than 56 days' gestation.³⁷ When the duration of the pregnancy is unclear, Rh₀(D) immune globulin should be offered.

DIFFERENTIAL DIAGNOSIS AND TREATMENT

In the era of mifepristone and misoprostol, patients who present for care are likely to be experiencing the normal course of medication-induced or spontaneous abortion or having incomplete abortion. For medication-induced or spontaneous abortion, patients may need pain management or confirmation of abortion completion. When a thickened uterine stripe is the only finding and the patient does not have clinically important bleeding or evidence of infection, no treatment is needed.^{5,35}

INCOMPLETE ABORTION

Management options for incomplete abortion are expectant care, misoprostol (Table 1), or uterine aspiration.³⁸ The patient's preference is important. Uterine aspiration can be performed in the emergency department or office with a paracervical block and oral analgesic agents or intravenous administration of moderate sedation. If the patient requests deep sedation or general anesthesia, an operating room or other appropriate medical setting is required. Data on prophylactic antibiotics for uterine aspiration in patients with incomplete abortion are insufficient; however, it is reasonable to consider the use of prophylactic antibiotics in such patients on the basis of evidence that supports its use before surgical abortion.³⁹

When spontaneous or induced pregnancy loss occurs after the first trimester, patients may present with a range of complications, including incomplete abortion with retained fetus, placenta, or both. Patients with hemorrhage or infection require an expeditious dilation and evacuation procedure; in other situations, induction

Table 2. Differential Diagnosis and Treatment of Abortion Complications, According to the Clinical Presentation.*

| Variable | Clinically Stable | | Clinically Unstable | |
|------------------------|--|---|--|---|
| | No Evidence of Infection | Infection | No Evidence of Sepsis | Sepsis |
| Signs and symptoms | Pain or cramping, vaginal bleeding, no evidence of infection | Pain or cramping, vaginal bleeding, evidence of infection (fever, elevated white-cell count, purulent discharge) | Pain, hemorrhage, no evidence of sepsis | Pain, hemorrhage, evidence of sepsis (fever, chills, elevated white-cell count, hypotension, tachycardia, tachypnea, oliguria) |
| Differential diagnosis | Complete spontaneous abortion Complete medication abortion Incomplete spontaneous abortion Incomplete medication abortion Uterine atony Uterine perforation (no vascular injury) Postabortion hematometra (often with minimal bleeding) Cervical laceration Ectopic pregnancy Cautic agent Failed abortion | Postabortion endometritis, with or without retained tissue Failed abortion with endometritis Pelvic abscess or tubo-ovarian abscess | Uterine atony Uterine perforation (with vascular injury) Placenta abnormality (accreta, increta, or percreta) Uterine arteriovenous malformation Ruptured ectopic pregnancy Uterine rupture Toxic agent Other trauma (e.g., abdominal injury) DIC or coagulopathy Amniotic-fluid embolism | Septic abortion or septic incomplete abortion Uterine necrosis Ruptured tubo-ovarian abscess Bowel injury |
| Evaluation† | History, including prior ultrasound documentation of IUP; physical examination (must include pelvic examination); CBC, hCG, Rh, blood typing and antibody screening; bedside or formal ultrasonography | History, including prior ultrasound documentation of IUP; physical examination (must include pelvic examination); CBC, hCG, Rh, blood typing and antibody screening; serum lactate measurement and blood cultures, if indicated; cervical cultures; bedside or formal ultrasonography; consideration of additional imaging (e.g., CT) | History, including prior ultrasound documentation of IUP; physical examination (must include pelvic examination); CBC, hCG, Rh, blood typing and cross-matching; DIC laboratory tests; bedside or formal ultrasonography; additional imaging (CT, MRI, IR) | History, including prior ultrasound documentation of IUP; physical examination (must include pelvic examination); CBC, hCG, Rh, blood typing and cross-matching; blood and endometrial cultures, serum lactate measurement; bedside or formal ultrasonography |

| | | | | |
|------------------------------|---|--|--|--|
| <p>Management strategies</p> | <p>Complete abortion: expectant management (if no prior confirmed IUP, perform serial hCG measurements to rule out ectopic pregnancy) Incomplete abortion: expectant management, misoprostol, or uterine aspiration in the office, ED, or OR, according to patient's preference (if no villi or prior confirmed IUP, perform serial hCG measurements to rule out ectopic pregnancy) Atony: bimanual massage, uterotonic agents, balloon tamponade Hematometra: uterine aspiration, uterotonic agents Uterine perforation: laparoscopy to rule out bowel or other visceral injury Cervical laceration: application of ferric subsulfate (Monsel's solution) or repair using absorbable suture Ectopic pregnancy: methotrexate, laparoscopy Caustic agent: mucosal and other supportive care or repair as needed</p> | <p>Oral or intravenous antibiotics Uterine aspiration if retained tissue is present</p> | <p>Uterotonic agents Balloon tamponade IR (angiography, embolization) Surgical evaluation (laparoscopy or laparotomy with repair) Hysterectomy ICU, supportive care Blood products Toxicology consultation as needed Trauma evaluation</p> | <p>IV antibiotics Uterine aspiration Hysterectomy or surgical exploration Infectious disease consultation ICU, supportive care</p> |
|------------------------------|---|--|--|--|

* CBC denotes complete blood count, CK creatine kinase, CT computed tomography, DIC disseminated intravascular coagulation, ED emergency department, hCG human chorionic gonadotropin, ICU intensive care unit, IR interventional radiology, IUP intrauterine pregnancy, IV intravenous, MRI magnetic resonance imaging, and OR operating room.
 † Knowledge of whether the abortion was induced or spontaneous is often unnecessary.

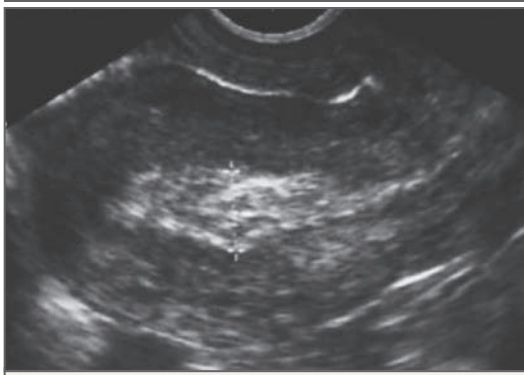


Figure 1. Ultrasound Findings after Successful Medication-Induced Abortion.

Echogenic material in the uterus, called a thickened endometrial stripe, is a normal finding and is consistent with successful medication-induced abortion. Intervention is not needed on the basis of this ultrasound finding alone.

of labor with mifepristone–misoprostol, misoprostol alone, or oxytocin may be appropriate.^{19,40} Hysterotomy is much riskier and is seldom indicated.⁴⁰ In rare cases, patients may present with self-induced abortion after 24 weeks of gestation, which may appear clinically similar to spontaneous preterm delivery and is managed similarly.⁴¹

INFECTION

Endometritis after spontaneous, surgical, or medically induced abortion is unusual, occurring in approximately 0.5% of surgical or misoprostol-only abortions and in 0.01 to 0.2% of mifepristone–misoprostol abortions.⁴² Infection is typically polymicrobial, including vaginal and bowel flora, *Neisseria gonorrhoeae*, and *Chlamydia trachomatis*. Most infections are mild and treatable with the use of outpatient antibiotic regimens recommended by the Centers for Disease Control and Prevention.⁴³ If retained tissue is suspected, outpatient uterine aspiration is also indicated. When more serious infection is suspected, admission for treatment with broad-spectrum parenteral antibiotics is required, followed by prompt uterine aspiration. If postabortion infection is not treated expeditiously, it can rapidly progress to septic shock and acute respiratory distress syndrome (ARDS).³⁴ Blood and endometrial cultures guide treatment, though the odds of uncontaminated results are greater with blood cultures. Parenteral antibiotics should be contin-

ued until 48 hours after the first signs of consistent improvement, followed by oral antibiotics, for a total of 14 days of treatment (Table 3).^{34,43}

Clostridial infection, including infection with *Clostridium perfringens* and *C. sordellii* species, is particularly dangerous and is reported after spontaneous, medication-induced, and surgical abortion.^{23,34,45} In a 10-year period, eight deaths from toxic shock associated with *C. sordellii* infection were reported among nearly 2 million women in the United States who were undergoing mifepristone–misoprostol abortions.^{23,45} Clostridial infection can lead to full-thickness uterine necrosis (gas gangrene) and rapid deterioration and death. It should be suspected if endometrial Gram's staining shows large, gram-positive rods and patients have tachycardia, dramatic leukocytosis, hemolysis, hematuria, or rapidly developing shock and ARDS.³⁴ Broad-spectrum antibiotics are indicated (e.g., high-dose penicillin G, gentamicin, and clindamycin). Consultation with critical care and infectious disease specialists is needed. If the patient's clinical status worsens or does not rapidly improve, hysterectomy is indicated. In rare cases, other bacterial pathogens can cause uterine necrosis and require hysterectomy for source control.³⁴ Postabortion sepsis can also be caused by unrecognized bowel injury.

HEMORRHAGE AND UTERINE INJURY

Uterine atony, retained products of conception, abnormal placentation (placenta accreta, percreta, or increta), arteriovenous malformation, and bleeding disorders can all be causes of uterine hemorrhage. Uterotonic agents, uterine aspiration, balloon tamponade (with a Foley catheter, or Bakri balloon), aggressive volume repletion, and activation of massive-transfusion protocols may be indicated, with embolization (performed by an interventional radiologist) or hysterectomy, if other efforts fail.⁴⁴ Large hemorrhage can lead to disseminated intravascular coagulation, requiring specialized supportive care.

Mechanical injuries to the uterus, cervix, or vagina can also cause hemorrhage. Injuries to the lateral cervix and uterus are the most dangerous, involving branches of the uterine artery. Since such injuries can lead to potentially catastrophic pelvic, broad-ligament, and retroperitoneal bleeding, they require expert surgical repair (Fig. 2).³⁴ Small fundal perforations may not result in clinically significant bleeding and may

Table 3. Selected Medications Commonly Used for Complications of Induced or Spontaneous Abortion.*

| Condition and Medication | Dose (Route of Administration) | Comments |
|--|---|---|
| Hemorrhage^{34,44} | | |
| Misoprostol | 800–1000 µg (buccal, sublingual, rectal, or oral) | Vaginal administration is also effective but usually not feasible with hemorrhage; buccal or sublingual administration is preferred because of the pharmacokinetic profile |
| Methylergonovine | 0.2 mg (IM or injected into cervix) | Avoid in patients with hypertension or Raynaud's phenomenon; no consensus on dosing frequency but sometimes as frequently as every 5 min, with a maximum of 5 doses |
| Carboprost† | 0.25 mg (IM) | Avoid in patients with asthma |
| Oxytocin | 10 units (IM) or 10–40 units/liter of IV fluid (500-ml bolus followed by continuous infusion) | Unclear role in postabortion hemorrhage, since first- and second-trimester uterus has few oxytocin receptors; water intoxication is possible with prolonged use of higher doses |
| Vasopressin | 2–5 units/10–20 ml of saline or local anesthetic (injected into cervix at several sites) | Avoid intravascular injection; used routinely for prophylaxis, but no clear evidence for use in patients with hemorrhage |
| Infection‡ | | |
| Ceftriaxone and doxycycline, with or without metronidazole | 250 mg of ceftriaxone (IM), one dose, plus 100 mg of doxycycline (oral administration) twice a day for 14 days, with or without 500 mg of metronidazole (oral administration) twice a day for 14 days | For outpatient use |
| Clindamycin and gentamicin (plus penicillin G for clostridium) | 900 mg of clindamycin (IV) every 8 hr, with either 2 mg/kg of gentamicin (IV) as a loading dose and then 1.5 mg/kg every 8 hr, or 3–5 mg/kg gentamicin (IV) once daily | For parenteral use; add penicillin G for suspected clostridial sepsis, 4 million units IV every 4 hr |
| Cefoxitin and doxycycline | 2 g of cefoxitin (IV) every 6 hr and 100 mg of doxycycline (IV or oral administration) every 12 hr | For parenteral use |
| Cefotetan and doxycycline | 2 g of cefotetan (IV) every 12 hr and 100 mg of doxycycline (IV or oral administration) every 12 hr | For parenteral use |

* Regimens are from Borgatta and Stubblefield.³⁴ IM denotes intramuscular.

† Carboprost is a uterotonic agent also known as 15-methylprostaglandin F_{2α}.

‡ See the Centers for Disease Control and Prevention guidelines for additional intramuscular, oral, and parenteral regimens.⁴³ Caregivers should be familiar with the sensitivity patterns of the usual organisms involved in pelvic infection at their institution.

not require repair; however, when such perforations are caused by suction devices or forceps, injury to the bowel, bladder, omentum, or other structures must be ruled out with exploratory surgery.³⁴ Uterine rupture also may cause hemorrhage and is a particular risk in patients with a history of cesarean section; it requires surgical evaluation and repair. Catastrophic damage to the uterus or its vasculature may require hysterectomy.

Patients with postabortion hematometra, which is generally not life-threatening, present with severe cramping. The condition is best managed with the combined use of uterotonic agents and outpatient uterine evacuation.³⁴

PREPARING FOR SHIFTS
IN THE LEGAL CLIMATE

In addition to becoming familiar with the necessary clinical care after self-managed abortion, doctors should consider their larger role in a legally restrictive environment. When patients present after efforts to self-manage abortion, prompt, nonjudgmental, evidence-based care is critical and should not be delayed out of the physician's fear of being legally implicated in an abortion or because of ethical objections.⁴⁶ When a facility's policies — or possibly future laws — restrict needed intervention (e.g., when uterine evacuation is prohibited because of fetal cardiac

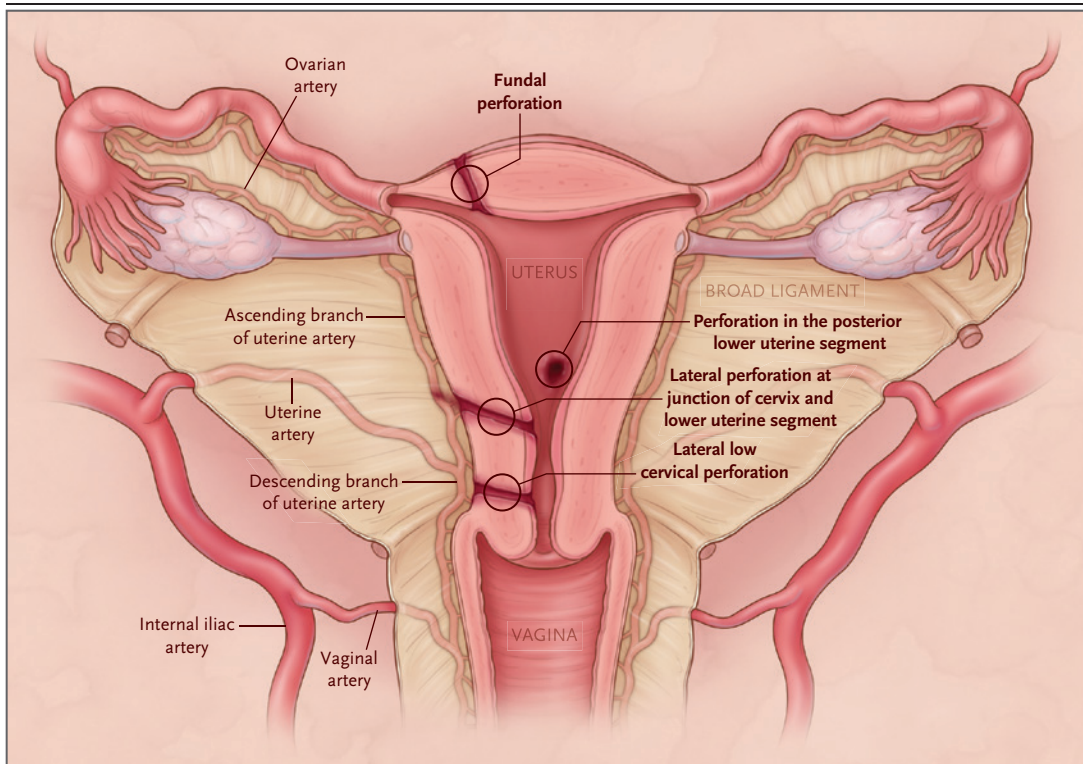


Figure 2. Sites of Uterine Injury.

The figure is adapted from Borgatta and Stubblefield.³⁴ Four types of injury are shown. The first is a lateral low cervical perforation with laceration of descending branches of the uterine artery, which generally results in vaginal bleeding through the cervical canal, without intraabdominal bleeding. The second is a lateral perforation at the junction of the cervix and lower uterine segment, with laceration of the ascending branch of the uterine artery, which can result in broad-ligament bleeding or hematoma and intraabdominal bleeding. With both types of vascular injury, vessels may initially constrict, with temporary cessation of bleeding, but recurrence is possible minutes, hours, or days later, resulting in clinically significant blood loss over time. The third type of injury is a fundal perforation, which is associated with a lower risk of hemorrhage than the first two types. However, injury to the bowel or omentum may accompany a fundal injury. The fourth type of injury is a perforation in the lower uterine segment (anterior [not shown] or posterior); anterior perforations may involve the bladder, including the trigone. With all perforations, the risk of complications and need for treatment depend on the instrument that caused the injury and whether the injury was recognized at the time of the procedure. Small fundal or lower-uterine-segment perforations caused by improper placement of uterine sounds or dilators may not require intervention, and it may be possible to complete the procedure under ultrasound guidance. Larger perforations, or those involving the use of suction, forceps, or sharp instruments outside the uterine cavity, require laparoscopy or laparotomy for assessment of the extent of damage.

activity), prompt consultation with lawyers or ethicists may be needed. Facilities should proactively establish communication and care protocols that prioritize the safety of pregnant patients.

Globally, in countries where abortion is legally restricted, programs focused on postabortion care that include outpatient uterine evacuation and management of complications have good clinical outcomes and high levels of patient satisfaction.⁴⁷ Health care centers in the United States will need to develop infrastructure for

ready access to outpatient uterine evacuation, if it is not already offered. Since care for complications of self-managed medication abortion and care for complications of miscarriage are essentially identical, institutions should ensure that their management of miscarriage is up to date and includes opportunities for patients to receive medical treatment and surgical treatment in the office, the ED, and the operating room.

There are also roles for physicians before patients attempt abortion. For example, clinicians working under restrictive laws in Uruguay

developed a harm-reduction approach that involved preabortion evaluation (confirming intrauterine pregnancy and offering information about safe self-managed methods of abortion), as well as postabortion care.⁴⁸ Doctors did not provide abortifacient medications, which were generally available at pharmacies without a prescription. This approach was effective and was associated with a low rate of complications.^{3,49} It remains to be seen whether harm-reduction models will be adopted in the United States, potentially relying on medications obtained online. Finally, some physicians may feel conscience-bound to provide safe abortion care because they believe patients will be harmed without it. Whether they or their patients face prosecution depends on local contexts.

CONCLUSIONS

As U.S. abortion restrictions increase, self-managed abortion will undoubtedly also increase. Health care providers must prepare for this clinical reality. This involves becoming comfortable with the ambiguity of providing care without knowing whether it is for spontaneous or

induced abortion. It also involves preparing to manage life-threatening complications of abortion, which are most likely to be caused by unsafe means. Given the safety of the combination of mifepristone and misoprostol for self-managed abortion, the biggest danger to patients may be legal prosecution.⁶ Both the American Medical Association and the American College of Obstetricians and Gynecologists take strong positions against criminalization of self-managed abortion, because it deters patients with complications from seeking care.⁵⁰ Furthermore, since medication-induced abortion and spontaneous abortion are clinically indistinguishable, criminalization of the former would inevitably lead to policing of all reproductive-age women with bleeding or pregnancy loss. Doctors and health care institutions must develop strategies that favor effective, compassionate clinical care over legal investigation of patients.

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