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No. 360-Induced Abortion: Surgical Abortion and Second Trimester Medical Methods

This guideline has been prepared by the Surgical Abortion Working Group, reviewed by the Guideline Management and Oversight Committee, and approved by the Board of the Society of Obstetricians and Gynaecologists of Canada.

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Abstract

Objective: This guideline reviews evidence relating to the provision of surgical induced abortion (IA) and second trimester medical abortion, including pre- and post-procedural care.

Intended Users: Gynaecologists, family physicians, nurses, midwives, residents, and other health care providers who currently or intend to provide and/or teach IAs.

Target Population: Women with an unintended or abnormal first or second trimester pregnancy.

Evidence: PubMed, Medline, and the Cochrane Database were searched using the key words: first-trimester surgical abortion, second-trimester surgical abortion, second-trimester medical abortion, dilation and evacuation, induction abortion, feticide, cervical preparation, cervical dilation, abortion complications. Results were restricted to English or French systematic reviews, randomized controlled trials, clinical trials, and observational studies published from 1979 to July 2017. National and international clinical practice guidelines were consulted for review. Grey literature was not searched.

Values: The quality of evidence in this document was rated using the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) methodology framework. The summary of findings is available upon request.

Benefits, Harms, and/or Costs: IA is safe and effective. The benefits of IA outweigh the potential harms or costs. No new direct harms or costs identified with these guidelines.

SUMMARY STATEMENTS

Periprocedural Care

1. Women seek abortion for many reasons, each of which is valid. Counselling needs may differ for women with an unintended pregnancy than for those with an intended but abnormal pregnancy.
2. Doxycycline, metronidazole, and beta-lactams are each suitable to reduce the risk of post-abortal infection (Level of evidence: High).
3. Moderate sedation combined with a paracervical block provides improved intraoperative pain control compared with local anaesthesia alone (Level of evidence: High).
4. Feticide prior to second trimester surgical abortion is associated with more side effects and a higher complication rate without reduction in operating time (Level of evidence: Low).
5. More evidence is required to determine if feticide prior to second trimester medical abortion confers benefit (Level of evidence: Very low).

Method Selection and Technique

6. Intracervical vasopressin may reduce blood loss in second trimester surgical abortion (Level of evidence: Low).
7. For early second trimester surgical abortion, use of buccal/vaginal misoprostol 400 μg 3–4 hours before dilation and evacuation:
   a. may not achieve as much dilation as osmotic dilators alone (Level of evidence: Moderate).
   b. results in similar complication rates as for osmotic dilators, but does increase side effects (Level of evidence: Medium).
   c. reduces ease of procedure compared with use of osmotic dilator (Level of evidence: High).
8. More research is required to state whether use of mifepristone confers benefit for cervical dilation prior to early second trimester surgical abortion (Level of evidence: Very low).
9. For late second trimester surgical abortion, use of buccal misoprostol 400 μg 3–4 hours plus laminaria/synthetic osmotic dilators before D&E:

ABBREVIATIONS

CHC	combined hormonal contraception
CI	confidence interval
COC	combined oral contraceptives
CS	Caesarean section
D&C	dilation and curettage
D&E	dilation and evacuation
DMPA	depo-medroxyprogesterone acetate
EC	emergency contraception
EVA	electric vacuum aspiration
EP	ectopic pregnancy
FU	follow-up
GA	gestational age
GAn	general anaesthesia
GRADE	Grading of Recommendations, Assessment, Development, and Evaluation
GS	gestational sac
GTN	gestational trophoblastic neoplasia
hCG	human chorionic gonadotropin
IA	induced abortion
IUP	intrauterine pregnancy
DIC	disseminated intravascular coagulation
IM	intramuscular
IV	intravenous(ly)
KCl	potassium chloride
IUCD	intrauterine contraceptive device
LBW	low birth weight
MA	medical abortion
MIFE	mifepristone
MISO	misoprostol
MVA	manual vacuum aspiration
NO donors	nitric oxide donors
NSAID	non-steroidal anti-inflammatory drug
OD	synthetic osmotic dilators
OR	odds ratio
PCA	patient-controlled analgesia
PCB	paracervical block
$PGF_{2\alpha}$	prostaglandin $F_{2\alpha}$
PGE_1	prostaglandin E_1
PGE_2	prostaglandin E_2
POC	products of conception
PP	placenta previa
PTB	preterm birth
PUL	pregnancy of unknown location
RCT	randomized controlled trial
RR	risk ratio
SA	surgical abortion
SGA	small for gestational age
SOGC	Society of Obstetricians and Gynaecologists of Canada
UP	uterine perforation

- achieves significantly more dilation than osmotic dilators alone, without influencing procedure time (Level of evidence: Moderate).
- does not decrease severe complications (Level of evidence: Moderate), but may produce prostaglandin side effects (Level of evidence: Low).

10. For late second trimester surgical abortion, use of mifepristone overnight with osmotic dilators and/or buccal/sublingual/vaginal misoprostol 400 μg 3–4 hours before D&E facilitates cervical preparation and decreases procedure time (Level of evidence: Low).
11. For second trimester medical abortion:
    - use of mifepristone 24–48 hours prior to induction reduces time to expulsion without added side effects (Level of evidence: High).
    - mechanical dilation with intracervical catheters prior to induction rarely confers benefit (Level of evidence: Low).
    - laminaria/synthetic osmotic dilators prior to induction do not confer any benefit and may increase both pain and time to expulsion (Level of evidence: Moderate).
12. Immediate placement of intrauterine contraception reduces repeat abortion and unintended pregnancy compared with other methods (Level of evidence: Moderate).

Post-Abortion Care

13. An abundant amount of evidence provides reassurance concerning future reproductive outcomes following induced abortion (Level of evidence: Low).
14. Sharp curettage during induced abortion is associated with the development of uterine adhesions, risk of miscarriage, placenta previa, and subfertility (Level of evidence: Low).

RECOMMENDATIONS

Periprocedural Care

1. A preprocedural assessment should take place prior to induced abortion to identify somatic and mental health conditions associated with an elevated risk of complications and therefore warrant an in-hospital procedure (Strong recommendation. Level of evidence: Very low).
2. Women should be given an opportunity to explore the circumstances around their decision to undergo induced abortion and be offered counselling as deemed necessary (Strong Recommendation. Level of evidence: Low).
3. Ultrasound should be performed prior to induced abortion to confirm gestational age and aid in operative planning (Strong recommendation. Level of evidence: Low).
4. Placental localization by ultrasound is recommended before second trimester abortion when placenta previa is suspected, and when there is a history of uterine scar (Strong recommendation. Level of evidence: Very low).
5. Expert consultation is advised when invasive placentation is suspected, particularly in women with a uterine scar (Strong recommendation. Level of evidence: Very low).
6. Preoperative antibiotics should be given to all women undergoing surgical abortion (Strong recommendation. Level of evidence: High).
7. Women at risk or suspected to have a sexually transmitted infection should be screened at the time of abortion. If positive, the woman should receive evidence-based treatment, in addition to any pre-procedural antibiotics received. (Strong recommendation. Level of evidence: Very low).
8. Women should be offered contraception counselling before abortion, and provided with their chosen method (Strong recommendation. Level of evidence: Low).
9. Women undergoing first trimester surgical abortion with no contraindications should receive non-steroidal anti-inflammatory medication (Strong recommendation. Level of evidence: High).
10. Moderate sedation combined with a paracervical block should be offered to women undergoing first or second trimester surgical abortion when available (Strong recommendation. Level of evidence: High).
11. Feticide may be performed prior to second trimester surgical abortion, following discussion of both medical and psychosocial considerations (Weak recommendation. Level of evidence: Low).
12. Feticide may be performed prior to second trimester medical abortion, following discussion of both medical and psychosocial considerations (Weak recommendation. Level of evidence: Very low).

Method Selection and Technique

13. Early surgical abortion (<7 weeks) should be performed with routine preoperative and postoperative ultrasound, direct examination of products of conception, and β-human chorionic gonadotropin follow-up when products of conception are not identified (Strong recommendation. Level of evidence: Low).
14. For women who cannot or refuse serial β-human chorionic gonadotropin follow-up following early surgical abortion, the procedure should be delayed until an intrauterine pregnancy can be confirmed (Strong recommendation. Level of evidence: Very low).

15. Cervical preparation is not routinely required prior to first trimester surgical abortion (Strong recommendation. Level of evidence: Moderate).
16. Cervical priming before first trimester surgical abortion may be considered in nulliparous women, and when cervical dilation is expected to be difficult (Weak recommendation. Level of evidence : Very low).
17. The following are recommended cervical preparation regimens (Strong recommendation; Level of evidence: High):
    a. misoprostol 400 µg vaginally 3 hours pre-procedure; or
    b. misoprostol 400 µg sublingually, 2–3 hours pre-procedure; or
    c. laminaria placed intracervically 6–24 hours pre-procedure; or
    d. synthetic osmotic dilator placed intracervically 3–4 hours pre-procedure; or
    e. mifepristone 200–400 mg orally, 24–48 hours prior to procedure.
18. Vasopressin 4 units added to a 20-mL paracervical block during second trimester surgical abortion may be used to reduce blood loss (Strong recommendation. Level of evidence: Low).
19. The use of misoprostol for second trimester medical abortion is safe after 1 prior low-transverse Caesarean section. There is insufficient evidence regarding its use in women with 2 or more prior Caesarean sections or a prior classical Caesarean section (Weak recommendation. Level of evidence: Very low).
20. For early second trimester surgical abortion, cervical preparation can be achieved with laminaria/synthetic osmotic dilators alone or misoprostol 400 µg 3–4 hours pre-procedure (Strong recommendation. Level of evidence: Moderate).
21. For early second trimester surgical abortion, mifepristone is not recommended for cervical preparation (Weak recommendation. Level of evidence: Very low).
22. For late second trimester surgical abortion, the addition of misoprostol 400 µg 3–4 hours pre D&E after serial insertions of osmotic dilators is recommended, but is associated with side effects (Strong recommendation. Level of evidence: Moderate).
23. For late second trimester surgical abortion, use of prior-day mifepristone 200 mg orally is recommended, in addition to osmotic dilators and/or misoprostol 400 µg 3–4 hours pre-procedure (Weak recommendation. Level of evidence: Low).
24. For second trimester medical abortion, use of mifepristone 24–48 hours prior to misoprostol induction is recommended (Strong recommendation. Level of evidence: High). The specific timing of mifepristone should be based on provider and patient preference (Weak recommendation. Level of evidence: Moderate).
25. For second trimester medical abortion, use of mechanical dilation or osmotic dilator prior to induction is not recommended (Strong recommendation. Level of evidence: Low). Mechanical dilation may be considered when other cervical priming approaches must be avoided (Weak recommendation. Level of evidence: Low),
26. For second trimester medical abortion, there is insufficient evidence to recommend the use of nitric oxide donors or misoprostol priming prior to induction (Weak recommendation. Level of evidence: Low),
27. In the presence of placenta praevia, intracervical vasopressin, ultrasound guidance, and rapid removal of the placenta are recommended. Expert backup is advised in case of significant bleeding (Strong recommendation. Level of evidence: Very low),
28. Routine gross examination of the uterine contents should be performed immediately after induced abortion (Strong recommendation. Level of evidence: Very low),
29. Histopathological examination of products of conception must be performed when gestational trophoblastic neoplasia or ectopic pregnancy is suspected (Strong recommendation. Level of evidence: Very low).

Post-Abortion Care

30. Every facility where abortions are performed should have written emergency protocols (Strong recommendation. Level of evidence: Very low).
31. Every facility where abortions are performed should engage in regular emergency drills (Strong recommendation. Level of evidence: Very low).
32. If women fail to have a period within 8 weeks following induced abortion and/or complain of continuing symptoms and signs of pregnancy, a new or ongoing pregnancy should be suspected and repeat procedure offered (Strong recommendation. Level of evidence: Very low).
33. Sharp curettage is not recommended as a replacement for vacuum aspiration (Strong recommendation. Level of evidence: Low), nor should routine sharp curettage be performed during induced abortion (Weak recommendation. Level of evidence: Low).
34. Contraception should be started as soon as possible after the abortion (Strong recommendation. Level of evidence: High).
35. Women referred for abortion from a fetal diagnosis clinic should be offered follow-up to review any additional information obtained from the abortion and

provide support (Strong recommendation. Level of evidence: Low).

INTRODUCTION

Definition and Scope

In Canada, approximately 100 000 Induced Abortions (IAs) occur annually.[1] Most IAs are surgical (95%), and over two thirds take place within 13 gestational weeks.[1] First trimester SA is defined as less than 14 weeks from last menstrual period. Second trimester IA is defined as taking place between 14 and 24 weeks. Second trimester SA, most commonly D&E, is performed following cervical preparation and requires specialized training; second trimester MA uses various pharmacological combinations to effect expulsion (vaginal delivery) of the pregnancy, usually in a supervised setting. In Canada, there were 587 terminations over 21 weeks reported in 2015.[1]

These guidelines review evidence regarding first trimester SA and second trimester SA and MA. First trimester MA is addressed in another SOGC guideline.[2] Recognizing that other clinical practice or accreditation standards exists,[3] this guideline is intended for providers who wish to review current best practices and evidence. It is also intended for obstetrician/gynaecologists and family physicians who provide abortions, some of whom may not be members of an abortion provider organization.

The quality of evidence in this document was rated using the criteria described in the GRADE methodology framework (Table 1). The interpretation of strong and conditional (weak) recommendations is described in Table 2.

Surgical Abortion Providers

In Canada, most abortion providers are family physicians, followed by gynaecologists.[4] Physicians and adequately trained midlevel providers (midwives, nurses, and others) may safely provide first trimester IA. Although a 2015 Cochrane review[5] showed that complication rates were similar, SA failure rate was slightly increased with midlevel providers.[6–10]

PERIPROCEDURAL CARE

Women who are contemplating IA require timely care. A comprehensive review of pre-abortion care is included in the first trimester MA guideline, including a detailed discussion outlining differences in outcomes, risks, and patient preferences regarding medical versus surgical abortion.[2] In general, MA and SA are equivalent prior to 49 days' GA, and there is a small increased risk of subsequent treatment (aspiration) and bleeding with MA beyond this limit.[2]

Table 1. Key to GRADE[1,2]

Strength of the recommendation	Definition
Strong	Highly confident of the balance between desirable and undesirable consequences (ie, desirable consequences outweigh the undesirable consequences, or undesirable consequences outweigh the desirable consequences).
Weak[a]	Less confident of the balance between desirable and undesirable consequences.
Quality level of a body of evidence	**Definition**
High|++++	We are very confident that the true effect lies close to that of the estimate of the effect.
Moderate|+++0	We are moderately confident in the effect estimate. The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low|++00	Our confidence in the effect estimate is limited. The true effect may be substantially different from the estimate of the effect.
Very low|+000	We have very little confidence in the effect estimate. The true effect is likely to be substantially different from the estimate of effect.

Examples:

Strong, moderate|+++0: Strong recommendation, moderate quality of evidence.

Weak, low|++00: Weak recommendation, low quality of evidence.

[a]Weak recommendations should not be misinterpreted as weak evidence or uncertainty of the recommendation.

Medical Assessment

A medical evaluation is required to identify women at elevated risk of an adverse event and those who may benefit from a hospital-based procedure.[11] A minimal physical examination consists of height, weight, vital signs, and pelvic exam. Further examination is directed by history. Rh status should be determined in all women.

Lack of vaginal parity and prior cervical surgery may lead to poor cervical dilation.[12] Obese women experience increased operative times, with no increase in complications.[13,14] Women with uncontrolled medical conditions may require specialist consultation or, rarely, admission.[11] Women with American Society of Anesthesiologists status of 3 or greater should undergo anaesthesia consultation and may require anaesthesia support during IA.[3,15,16] Laboratory investigations should be directed by history.[17] A history of CS is associated with a higher rate of SA complications (OR 1.9, 95% CI 1.1–3.4).[18] The presence of placenta previa (PP), low anterior placenta with a history of CS, or bleeding diathesis increases the risk of hemorrhage.[12,18]

Table 2. Judgement and interpretation of strong and conditional recommendations[1,2]

Judgement/interpretation	Strong recommendation, "We recommend…."	Conditional (weak) recommendation, "We suggest…."
Judgement by guideline panel	It is clear to the panel that the net desirable consequences of a strategy outweighed the consequences of the alternative strategy.	It is less clear to the panel whether the net desirable consequences of a strategy outweighed the alternative strategy.
Implications for patients	Most individuals in this situation would want the recommended course of action, and only a small proportion would not.	Most individuals in this situation would want the suggested course of action, but many would not.
Implications for clinicians	Most individuals should receive the intervention. Adherence to this recommendation according to the guideline could be used as a quality criterion or performance indicator.	Clinicians should recognize that different choices will be appropriate for each individual and that clinicians must help each individual to arrive at a management decision consistent with his or her values and preferences.
Implications for policy makers	The recommendation can be adopted as policy in most situations.	Policy making will require substantial debate and involvement of various stakeholders.

If sedation is provided, nil per os status should be reviewed, and cardiorespiratory and airway examination performed.[15,16] The American Society of Anesthesiologists recommends fasting for 2 hours for clear fluids and 6 hours for solids prior to moderate sedation.[15,16] Two retrospective studies, 1 involving over 47 000 cases, found no increase in complications related to low-dose sedation protocols with midazolam and fentanyl in women who had a light meal before undergoing SA up to 18 weeks of gestation.[19,20]

Women may have discontinued certain medications upon learning of the pregnancy, in particular mood-stabilizers. Reviewing mental health conditions and medication histories may identify women who would benefit from additional anxiolysis or guidance on restarting their medications.

As discussed in the MA guideline,[2] women should be given an opportunity to discuss the circumstances surrounding the abortion decision. Some women present for abortion owing to a fetal diagnosis or change in circumstance in the setting of a wanted pregnancy. Common practice suggests that these women (and the man involved in the pregnancy) benefit from counselling; however, we could not identify studies that quantified this benefit.

Summary Statement

1. Women seek abortion for many reasons, each of which is valid. Counselling needs may differ for women with an unintended pregnancy than for those with an intended but abnormal pregnancy.

Recommendations

1. A preprocedural assessment should take place prior to induced abortion to identify somatic and mental health conditions associated with an elevated risk of complications and therefore warrant an in-hospital procedure (Strong recommendation. Level of evidence: Very low).
2. Women should be given an opportunity to explore the circumstances around their decision to undergo induced abortion and be offered counselling as deemed necessary (Strong Recommendation. Level of evidence: Low).

Ultrasound Scanning Including Localization of Placenta and Management of Abnormal Placentation

Routine ultrasound prior to IA is recommended, as determination of GA is critical.[21] In second trimester SA, intraoperative ultrasound has been shown to decrease complications including uterine perforation (UP).[22]

In the second trimester, ultrasound is important to determine placental localization.[23] If the placenta is anterior and low lying or previa, the risk of hemorrhage can be substantial.[24] In the presence of a uterine scar, further imaging, such as Doppler interrogation, computerized tomography, or magnetic resonance imaging, is required to rule out invasive placentation, recognizing the limitations of such studies.[12,24]

Recommendations

3. Ultrasound should be performed prior to induced abortion to confirm gestational age and aid in operative planning (Strong recommendation. Level of evidence: Low).
4. Placental localization by ultrasound is recommended before second trimester abortion when previa is suspected, and when there is a history of uterine scar (Strong recommendation. Level of evidence: Very low).

5. Expert consultation is advised when invasive placentation is suspected, especially in women with a uterine scar (Strong recommendation. Level of evidence: Very low).

Risk and Benefits of second Trimester Surgical Versus Medical Abortion (Table 3)

The complication rate of D&E is less than 1% before 16 weeks,[25–27] 1% between 16 and 20 weeks, 1.5% over 20 weeks, increasing by 1% per week thereafter.[25–27] Mortality has decreased over time to 0.65 in 100 000.[28] The mortality rates for D&E were 2.5 times lower than those for MA, but this difference is not statistically significant.[25,26] D&E is associated with a lower risk of complications[27] than MA.[29] All these rates are lower than birth mortality rate of 8.8 in 100 000 live births.[30]

Because of the increased risk of hemorrhage with PP, with or without prior CS,[24] SA is preferred to MA in this circumstance. If an MA takes place, urgent surgical backup should be available.

Preoperative Medications

Antibiotic prophylaxis

Although uncommon, post-abortal infections may have serious sequelae.[31] Two systematic reviews and meta-analyses of 19 RCTs showed that antibiotic prophylaxis for first trimester SA reduces post-abortal infection, with relative risks of 0.58 (95% CI 0.47–0.71)[32] and 0.59 (95% CI 0.46–0.75),[33] respectively. One RCT demonstrated a slight superiority of universal prophylaxis compared with a screen and treat strategy to reduce infection (RR 1.53; 95% CI 0.99–2.36).[34] Few studies have examined antibiotic prophylaxis for second trimester SA, but limited findings show benefits.[35] Most clinicians managing second trimester MA do not provide antibiotic prophylaxis.[29]

No antibiotic option is superior to another – commonly doxycycline, metronidazole, and beta-lactams are used.[33,36] The 2012 Cochrane meta-analysis found a similar risk reduction between single-dose (RR 0.63; 95% CI 0.50–0.80) and multidose regimens (RR 0.71; 95% CI 0.55–0.92) when compared with placebo.[33] Infection rates were also similar between 3- and 7-day courses of doxycycline initiated post-procedure.[37] In another RCT, pre-procedure initiation of antibiotics was significantly more effective than post-procedure.[38] As for all medication, antibiotic stewardship should be employed.[39]

Summary Statement

2. Doxycycline, metronidazole, and beta-lactams are each suitable to reduce the risk of post-abortal infection (Strong recommendation. Level of evidence: High).

Recommendations

6. Preoperative antibiotics should be given to all women undergoing surgical abortion (Strong recommendation. Level of evidence: High).
7. Women at risk or suspected to have a sexually transmitted infection should be screened at the time of abortion. If positive, the woman should receive evidence-based treatment, in addition to any pre-procedural antibiotics received. (Strong recommendation. Level of evidence: Very low).

Contraception

Since many women do not attend follow-up appointments, contraception should be offered, according to needs,

Table 3. Risks and benefits of second trimester SA versus MA

Second trimester surgical abortion	Second trimester medical abortion
1–2 days of cervical preparation before the procedure followed by a post-anaesthetic recovery time	Procedure lasting hours to days with a stay of a 1–3 days in the facility
Performed by surgical extraction	Expulsion (delivery) following repeated administration of medication
Requires a procedure room, a D&E-trained provider, skilled staff, and local/moderate sedation	Requires skilled nurses and an obstetrics trained provider
Short-term analgesics and/or anaesthesia provided before and during the procedure	Short-term or continuous analgesia provided during cervical dilation and expulsion
Likely will not provide an intact fetus for viewing/holding and may limit autopsy results	Intact fetus may be desired when viewing/holding and/or autopsy to be performed
Cremation and burial may be offered	Cremation and burial may be offered
Potential complications: Heavy bleeding, uterine perforation, infection, incomplete abortion, transfusion (<1%), hysterectomy	Potential complications: Heavy bleeding, infection, incomplete abortion requiring D&C, transfusion (<5%), hysterectomy

Adapted from Paul et al.[12]

before IA.[40,41] Although 1 RCT demonstrated improved post-abortion contraceptive use after counselling compared with no counselling,[42] the most effective counselling type and timing are uncertain.[43,44]

Several RCTs and cohort studies have shown that insertion of an IUCD immediately following SA results in higher long-term use and lower rates of repeat abortion compared with delayed insertion or initiation of a different contraceptive.[45–49]

Summary Statement

12. Immediate placement of intrauterine contraception reduces repeat abortion and unintended pregnancy compared with other methods (Strong recommendation. Level of evidence: Moderate).

Recommendation

8. Women should be offered contraception counselling before abortion, and provided with their chosen method (Strong recommendation. Level of evidence: Low).

Preoperative medications

Oral NSAIDs such as ibuprofen, diclofenac, and naproxen have all been shown to decrease intraoperative and postoperative pain in first trimester SA compared with placebo.[50–54] Ibuprofen was superior to tramadol for postoperative pain,[53] and oral opioids have not demonstrated reduction in either intraoperative or postoperative pain.[55,56] Acetaminophen[57] and ketorolac[58] did not reduce pain in women undergoing GAn.

Benzodiazepines reduced neither pain[51,59] nor anxiety[60] when administered pre-procedure in RCTs. MISO increases preoperative cramping,[61–66] while data regarding intraoperative pain reduction are conflicting.[52,67,68] Antiemetic should be considered in women receiving IV opioids and women with hyperemesis.

Analgesia/Anaesthesia first and second Trimester SA

Local anaesthesia: A placebo (sham block) RCT of women not receiving sedation for first trimester SA demonstrated reduction in pain with a PCB of 20 mL 1% buffered lidocaine injected at 4 sites (2, 4, 8, and 10 o'clock) with a 3-minute wait prior to dilation.[69] A follow-up RCT found no difference in pain between immediate dilation versus waiting 3 minutes and less pain with a 4-site injection versus 2-site.[70] A Cochrane review concluded that carbonated lidocaine was superior to plain lidocaine, slow injection superior to fast injection, and deep superior to superficial injection for first trimester SA.[71] In women under moderate sedation, paracervical and intracervical injections appear to have similar effects.[72] Total lidocaine dose should not exceed 4.5 mg/kg and not more than 7 mg/kg if epinephrine or vasopressin is added.[73–75] Side effects of lidocaine include lightheadedness, tinnitus, circumoral tingling, and metallic taste in the mouth. Seizures, cardiac effects, and anaphylaxis are rare and dose related. Inadvertent IV lidocaine injection warrants increased monitoring for toxicity.

Sedation: Moderate sedation is commonly offered for SA, typically using fentanyl 50–100 μg IV and midazolam 1–2 mg IV. Moderate IV sedation with PCB is superior to PCB alone[76,77] or to PCB with oral opioid/benzodiazepine.[78] Addition of nitrogen dioxide and nitrous oxide 50:50 (Entonox) does not improve procedural or postoperative pain.[79,80]

Deep IV sedation and GAn using propofol are offered in some centres.[71,81,82] In an RCT comparing moderate sedation plus PCB versus GAn alone, intraoperative pain control was better with GAn, but postoperative pain control was worse.[83] Adding a 10-mL PCB in women undergoing GAn for SA up to 21 weeks did not improve postoperative pain.[84]

Non-pharmacological interventions: Evidence regarding pain reduction when listening to music has been conflicting.[85,86] Hypnosis may reduce sedation requirement[87] and decrease the need for nitrous oxide but does not affect pain rating.[88]

Summary Statement

3. Moderate sedation combined with a paracervical block provides improved intraoperative pain control compared with local anaesthesia alone (Level of evidence: High).

Recommendations

9. Women undergoing first trimester surgical abortion with no contraindications should receive non-steroidal anti-inflammatory medication (Strong recommendation. Level of evidence: High).
10. Moderate sedation combined with a paracervical block should be offered to women undergoing first or second trimester surgical abortion if possible (Strong recommendation. Level of evidence: High).

Analgesia for second Trimester MA

PCA with 50 μg fentanyl every 3 or 6 minutes was found to be superior to 25-μg fentanyl or 2-mg morphine PCA.[89] NSAIDs decreased opiate requirements.[90] Controlled trials demonstrated reduction in pain during MA when metoclopramide was added to PCA with morphine.[91] PCB did not confer benefit.[92,93]

Feticide

Feticide refers to the cessation of fetal cardiac activity prior to IA and is generally offered for psychosocial reasons (woman and provider).[94] It is achieved via:

1. transabdominal injection of pharmacological agents, such as:
   - KCl (mostly used in second trimester MA),[95–104]
   - digoxin (mostly used before second trimester SA),[105–120] or
   - lidocaine[121,122]
2. digoxin administered transvaginally[111,114,115]
3. umbilical cord transection[123]

Feticidal agents can be injected in the amniotic fluid[107–112,114,116–118,120] or by the intrafetal,[98,105,106,110–112,118,120] intracardiac,[95,97,99,101–103,113] or intrafunic route.[96,98,121]

A GRADE approach to assessing the role of feticide was performed. Articles selected are related only to feticide prior to IA and not multifetal pregnancy reduction.

Should feticide be used prior to second trimester SA?

In 12 descriptive studies,[96,103,105–108,110,112,115,117,118,123] where 8 to 4906 women received feticide before second trimester SA, the rate of major maternal complications (major unintended surgery, hemorrhage requiring transfusion, severe pelvic infection)[124] varied from 0[96,117] to 3.8%.[115] One case of hyperkalemic paralysis secondary to intra-amniotic injection of digoxin was reported.[116] Studies reported extramural deliveries in 0% to 0.5%.[103,110]

Two RCTs[111,120] compared intrafetal with intra-amniotic injection of digoxin: 1 did not find any difference,[111] while the other 1 found higher rate of absent cardiac activity with intrafetal injection (94.8% vs. 82.3%; $P = 0.002$), but with a trend towards more extramural deliveries (3.8% vs. 1.5%; $P = 0.28$).[120] Side effects were common in both studies; 40% experienced fatigue or nausea and 20% experienced vomiting, lightheadedness, or palpitations.[111,120]

According to 1 RCT,[109] 1 cohort study,[113] and 1 time-series,[114] the major complication rate was found to be significantly higher with feticide compared with no feticide (RR 3.73; $P = 0.002$) (Level of evidence: Moderate), with no difference in procedure time (Level of evidence: Low). Vomiting was more frequent with feticide (RR 5.05; $P = 0.03$) (Level of evidence: Low). Other outcomes could not be assessed with the GRADE approach because of limited evidence.

Summary Statement

4. Feticide prior to second trimester surgical abortion is associated with more side effects and a higher complication rate without reduction in operating time (Level of evidence: Low).

Recommendation

11. Feticide before second trimester surgical abortion may be performed following discussion of both medical and psychosocial considerations (Weak recommendation. Level of evidence: Low).

Should feticide be used prior to second trimester MA?

In 10 descriptive studies,[95,96,100,103,105–107,121,122,125] where 21 to 1677 women underwent feticide before second trimester MA, the rate of major maternal complications[124] varied from 0% to 0.8%.[95,96,100,105,106,121,122] Two serious adverse events were reported: 1 maternal cardiac arrest after a fetal intracardiac injection of KCl[99] and 1 case of *Clostridium perfringens* sepsis.[98] In a retrospective cohort study[99] comparing 17 women with feticide with 51 without, no difference in retained placenta, fever, and gastrointestinal side effects was noted. Women with feticide had a significant shorter time to expulsion (14.8 hours vs. 9.5 hours; $P = 0.006$) and required fewer doses of PGE_2 (2 vs. 3; $P < 0.01$). The mean GA in the feticide group was significantly greater (1 more week; $P < 0.01$).[99] In a time series[101] comparing 64 women with no feticide before 2001 with 82 women with feticide from 2001 onwards, D&C occurred in 82.9% of women with feticide versus 65.6% of women without ($P = 0.02$). One study comparing intrafunic versus intracardiac injection[104] and 1 case series on funic injection of KCl[96] reported live births in spite of feticide. There was no difference in the major rate of complication, or in the duration of the induction, between studied groups.[104]

In cases of PP, feticide may interrupt blood flow to the placenta, reducing bleeding risk.[126] Two small comparative studies in women with PP reported conflicting results regarding outcomes of MA, with 1 showing benefit in the feticide group.[126,127]

Of note, in an acceptability study (N = 101 providers), 78% of those who attended feticide said it improved their professional practice, and 52% said it improved women's experience.[125] This alone is sufficient to guide the decision to use feticide during IA.

Summary Statement

5. More evidence is required to determine if feticide prior to second trimester medical abortion confers benefit (Level of evidence: Very low).

Recommendation

12. Feticide may be performed prior to second trimester medical abortion, following discussion of both medical and psychosocial considerations (Weak recommendation. Level of evidence: Very low).

METHOD SELECTION AND TECHNIQUE

Early SA (<7 Weeks)

When a woman presents for early IA – prior to 7 weeks – either MA or SA is equally effective and acceptable.[2] Delaying SA until beyond 7 weeks (with the intention of determining viability and rule out EP) is no longer advised,[128] given the increasing risk of complications with advancing GA and the emotional stress of prolonging an unintended pregnancy.[129]

Early SA can be performed by MVA or EVA with similar success and complication rates.[130,131] The relative lack of tissue presents 2 diagnostic challenges. The first is ruling out ongoing pregnancy,[132–134] which varies from 1.3 per 1000 under 6 weeks of gestation when performed by a skilled provider using routine preoperative and postoperative transvaginal ultrasound, direct examination of POC, and rigorous FU[135,136] to 23 per 1000 when multiple providers are involved.[137]

The second diagnostic challenge is excluding EP in the setting of a PUL, when a yolk sac (and, in some instance, a definite GS) has not been seen. Early SA may provide confirmation of IUP if villi are identified on tissue exam. A PUL, unless intraoperatively confirmed to be an IUP, should be followed with serial serum β-hCG. A 50% drop in levels is expected within 24 hours following successful pregnancy evacuation.[128,135–138]

While some studies suggest slightly higher pain ratings in early SA,[139,140] these can be performed using local anaesthesia.

Recommendations

13. Early surgical abortion (<7 weeks) should be provided with routine preoperative and postoperative ultrasound, direct examination of products of conception and β-human chorionic gonadotropin follow-up when products of conception are not identified (Strong recommendation. Level of evidence: Low).
14. For women who cannot or refuse serial β-human chorionic gonadotropin follow-up following early surgical abortion, the procedure should be delayed until an intrauterine pregnancy can be confirmed (Strong recommendation. Level of evidence: Very low).

First Trimester SA (7 to <14 Weeks)

First trimester SA is one of the most common and safe surgical procedures performed in Canada,[1,141] with a risk of serious complications under 0.2%.[1,25,28,142–144] Use of a *no touch* technique and antibiotic prophylaxis reduce the risk of infection.[32,33,36,145] Routine IV access for first trimester SA is not required,[3,146–148] but most providers recommend it. Although performed by most clinicians,[149] and recommended by 1 guideline,[147] routine cleansing of the cervix is not supported by studies.[150]

Gentle cervical dilation should be achieved before the introduction of an aspiration cannula[3,147,151,152]; Pratt or Denniston dilators are effective and exert lower force on cervical tissue than Hegar dilators.[3,152,153] The selected cannula is typically the same diameter in millimetres as GA in completed weeks (eg, 9 mm up to 9 weeks 6 days), or 1 mm smaller. Abortion by sharp curettage (D&C) is obsolete,[3,147,151,154] and sharp curettage should not be routinely performed in first trimester SA.[3,147,149,151,155] Both MVA and EVA are safe and effective.[3,130,147,151]

Blood loss is typically minimal,[156,157] even in women on anticoagulant therapy.[151] There is no evidence that anticoagulants need to be stopped for SA prior to 84 days.[156] Immediate examination of the aspirated uterine contents should be done at the time of the procedure to identify POC.[3,147,151]

Cervical dilation prior to first trimester abortion

Routine cervical priming is not recommended[3,41,151,152] because it adds delay, is associated with side effects, and the baseline complication rate is very low. However, nulliparous women with a late first trimester gestation and women with uterine anomalies or known cervical stenosis may benefit from cervical priming.[152] Cervical preparation agents include synthetic osmotic dilators (ODs), laminaria, prostaglandins (PGE_1, PGE_2, $PGF_{2\alpha}$), MIFE, and NO donors. Use of pharmacological agents requires informed consent owing to the risk of anomalies if pregnancy continues.

Three Cochrane reviews,[158–160] 1 comprehensive review,[152] and a few additional RCTs[131,161–163] have been published on cervical priming prior to first trimester SA. The following conclusions were reached:

- When compared with placebo, cervical dilation was improved when MISO, gemeprost, MIFE, dinoprostone, carboprost, and NO donor were used.[152,158–160]
- Compared with placebo, MISO significantly reduced procedure time and force required for dilation and blood loss, although side effects such as nausea and/or cramping were significantly higher.[162,158,159,164] There is a significant reduction in incomplete abortion as well (0.78% vs. 2.26%; RR 0.35; 95% CI 0.21–0.58, number needed to treat = 68).[164]

Based on data from comparative studies, the following conclusions can be made about MISO:

- MISO 400 µg is superior to MISO 200 µg[158,162] or gemeprost 1 mg.[158]
- Vaginal and sublingual routes are superior to oral,[158,163] and sublingual are superior to vaginal.[158]
- Effectiveness and side effects of MISO increase with dosage.[162] One recent RCT[161] did not find differences among oral, vaginal, and sublingual administration of MISO 400 µg 1.5 to 4 hours pre-procedure; however, side effects, such as nausea and diarrhea, were significantly more frequent in the sublingual group.[161]
- There are no comparative studies on buccal MISO for cervical priming in first trimester SA.
- The most effective timing of MISO is 3–4 hours vaginally[152,158] or 2–3 hours sublingually pre-procedure.[158]

With respect to other forms of cervical ripening:

- MIFE 200 mg 24–48 hours orally prior is superior to MISO 600 orally or 800 µg vaginally 16–24 hours pre-procedure without a difference in side effects.[158]
- Laminaria is superior to $PGF_{2\alpha}$ or Gemeprost 1 mg administered 3–4 hours pre-procedure; $PGF_{2\alpha}$ is associated with unplanned expulsions prior to procedure.[158]

No difference in initial dilation was observed:

- between MISO 200–400 µg 4 hours pre-procedure and overnight laminaria,[158] OD,[159] or $PGF_{2\alpha}$ 125 µg IM 2 hours prior to procedure.[158]
- between gemeprost 1 mg and OD inserted 3–4 hours prior to procedure.[158]

NO donors are inferior to prostaglandins,[160] including MISO[159] or use of prostaglandin plus NO.[156] NO donors are associated with more bleeding and more side effects.[160]

Recommendations

15. Cervical preparation is not routinely required prior to first trimester surgical abortion (Strong recommendation. Level of evidence: Moderate).
16. Cervical priming before first trimester surgical abortion may be considered in nulliparous women and when cervical dilation is expected to be difficult (Weak recommendation. Level of evidence: Very low).
17. The following are recommended cervical preparation regimens (Strong recommendation. Level of evidence: High):
    a. misoprostol 400 µg vaginally 3 hours pre-procedure; or
    b. misoprostol 400 µg sublingually, 2–3 hours pre-procedure; or
    c. laminaria placed intracervically 6–24 hours pre-procedure; or
    d. synthetic osmotic dilator placed intracervically 3–4 hours pre-procedure; or
    e. mifepristone 200–400 mg orally, 24–48 hours prior to procedure.

Second Trimester SA (≥14 Weeks)

D&E consists of cervical preparation, dilation, and extraction with a combination of aspiration and forceps. It is safe when performed by trained clinicians. Routine cervical preparation is recommended, as are IV access, no touch technique, and rapid access to uterotonics.[3] Very high doses of oxytocin are required to obtain any significant clinical effect on uterine tone.[165] Direct examination of uterine contents should take place at the time of the procedure. When compared with first trimester procedures, second trimester SA is associated with more complications, which increase with advancing GA.[163,164,166]

Does prophylactic vasopressin reduces blood loss in second trimester SA?

Two RCTs[167,168] assessed the use of vasopressin for second trimester SA. In 1 RCT,[163] vasopressin 4 units in 20 mL of local anaesthetic (n = 181) compared with placebo (n = 156) significantly reduced blood loss from D&E, without increasing blood pressure (Level of evidence: Moderate). Beyond 15 weeks, vasopressin was associated with a lower likelihood of blood loss >250 mL.[163] A small RCT[164] in women with a mean GA of 16.8 weeks showed that paracervical vasopressin (n = 13) compared with placebo injection (n = 15) did not result in significant changes in uterine pulsatility or blood loss (Level of evidence: High).

Both the National Abortion Federation and the Society of Family Planning clinical guidelines recommend the use of dilute intracervical vasopressin to reduce blood loss for second trimester SA.[3,166] Adverse effects of vasopressin are rare and self-limiting (high blood pressure, bradycardia, etc.).[169,170]

Summary Statement

6. Intracervical vasopressin may reduce blood loss in second trimester surgical abortion (Level of evidence:
   Low).

Recommendation

18. Vasopressin 4 units in 20 mL for cervical local anaesthesia may be considered during second trimester surgical abortion to reduce blood loss (Strong recommendation. Level of evidence: Low).

Cervical dilation prior to second trimester SA

Laminaria/ODs are routinely used in second trimester SA.[62,171,172] They reduce the risk of cervical laceration: from 14–18 weeks, the risk decreases from 0.8% to 0.4%, and at 18–20 weeks, the risk is reduced from 5% to 1.6%.[173,174] A GRADE approach was used to answer the following question:

Should MISO, laminaria/ODs, MIFE, or a combination of previous options be used prior to second trimester SA?

Early second Trimester SA (Before 17 Weeks)

MISO versus laminaria/ODs: Two retrospective case studies[175,176] and 2 RCTs[62,177] compared the use of buccal MISO 400 µg or 600 µg, 3–4 hours pre-D&E with the use of overnight ODs and showed no difference in procedure time. One RCT[61] reported a significantly longer procedure time with vaginal MISO alone compared with laminaria. Three RCTs[61,62,177] reported that women using MISO alone had a lower baseline dilation or required additional dilation before D&E compared with those using ODs. One RCT[63] showed no benefit in procedure time when MISO was added to laminaria. One lower-quality retrospective cohort study[178] showed that improved baseline dilation when laminaria was added to pre-procedural MISO.

Complication rates were similar between MISO and ODs (4.02% vs. 3.2%, chi square test; $P = 0.63$).[61–63,176,178] However, women using MISO reported more pain before D&E,[61–63] more chills[61,178] and more diarrhea.[177,178] Women using laminaria reported more pain overnight in 1 study.[61]

Physicians rated procedures significantly harder when cervical preparation was done with MISO alone[61,62,177,178] compared with ODs (with or without MISO). Overall satisfaction of physicians and women was identical between groups.[62] In 1 study,[61] women preferred MISO over overnight laminaria because of shorter overall procedure time.

Summary Statements

7. For early second trimester surgical abortion, use of buccal/vaginal misoprostol 400 µg 3–4 hours before dilation and evacuation:
   a. may not achieve as much dilation as osmotic dilators alone (Level of evidence: Moderate).
   b. results in similar complication rates as for osmotic dilators, but does increase side effects (Level of evidence: Medium).
   c. reduces ease of procedure compared with use of osmotic dilator (Level of evidence: High).

Recommendation

20. For early second trimester surgical abortion, cervical preparation can be achieved with laminaria/synthetic osmotic dilators alone or misoprostol 400 µg 3–4 hours pre-procedure (Strong recommendation. Level of evidence: Moderate).

MIFE: Two studies comparing MIFE with other cervical preparation methods were identified. One RCT[179] compared MIFE 200 mg orally (n = 24) with ODs (n = 25) for overnight cervical preparation at gestation of 14 to 16 + 6 weeks. No difference was shown in procedure time, but baseline dilation and ease of procedure were significantly greater when ODs were used. One unintended fetal expulsion and significantly more pain and diarrhea were experienced in the OD group. Women's satisfaction was higher with MIFE.

Another RCT[180] compared oral MIFE 200 mg (36 hours before SA) plus oral MISO 400 µg (3 hours prior) with 2 groups receiving either MIFE or MISO alone, for gestations of 12 + 1 to 14 + 3 weeks. Procedure time was reduced, baseline dilation increased, and intraoperative bleeding was less in the combined MIFE-MISO group. Rates of hemorrhage and side effects were similar in all groups. Ease of procedure and satisfaction were rated higher by physicians in the MIFE-MISO group. Women's satisfaction did not differ between groups.

Summary Statement

8. More research is required to state whether use of mifepristone confers benefit for cervical dilation prior to early second trimester surgical abortion (Level of evidence: Very low).

Recommendation

21. For early second trimester surgical abortion, mifepristone is not recommended for cervical preparation (Weak recommendation. Level of evidence: Very low).

Later second trimester SA (17–24 weeks)

MISO versus laminaria/ODs: Two RCTs compared use of overnight laminaria alone with MISO 400–800 µg buccally 3–4 hours pre-D&E[177] or 600 µg vaginally overnight.[181] Four RCTs compared use of ODs alone with MISO 400 µg buccally 3 hours pre-D&E plus ODs for 2 days,[64] overnight,[63,65] or the same day.[66] Another cohort study[178] compared MISO with MISO plus overnight laminaria. Inconsistent effects on procedure time were observed,[63,64,177,181] although MISO plus overnight ODs reduced procedure time among nulliparous women.[65] Most

studies showed that baseline dilation was higher when MISO was added to an ODs regimen.[63–65,177,178]

The addition of MISO to dilators does not decrease complication rates (7.88% vs. 9.02%, chi square test; $P = 0.559$).[63–66] However, women using MISO reported more pain 3–4 hours before D&E, more analgesic requirement,[63–66] and more side effects (nausea,[64,181] chills[64,65,178] and diarrhea[177,178]). The risk of unscheduled fetal expulsion occurred more often when overnight MISO was given.[181]

Inconsistent effects on ease of procedure were reported.[63–65,177,178,181] In 1 study, 25% of women in the MISO plus laminaria group versus 6% in the laminaria alone group found this abortion worse than a prior second trimester abortion ($P = 0.04$).[64] In 2 other studies, satisfaction of women was identical between groups.[65,66]

Summary Statements

9. For late second trimester surgical abortion, use of buccal misoprostol 400 µg 3–4 hours plus laminaria/synthetic osmotic dilators before dilation and evacuation:
   a. achieves significantly more dilation than osmotic dilators alone without influencing procedure time (Level of evidence: Moderate).
   b. does not decrease severe complications (Level of evidence: Moderate) compared with use of osmotic dilator alone, but may increase side effects such as pain, nausea, chills, and diarrhea (Level of evidence: Low).

Recommendation

22. For late second trimester surgical abortion, the use of misoprostol 400 µg 3–4 hours pre–dilation and evacuation in addition to serial insertions of osmotic dilators is recommended but is associated with side effects (Strong recommendation. Level of evidence: Moderate).

MIFE: Five RCTs using MIFE before late gestation D&E were identified. MIFE 200 mg orally was used overnight,[65] or 48 hours pre-procedure,[182] along with ODs,[65] buccal/sublingual/vaginal MISO 400 µg 1.5–6 hours pre-procedure,[182–184] or both.[182,185] Comparator groups were overnight OD alone,[65,183] serial sets of ODs plus buccal MISO 400 µg 90 minutes pre-procedure,[185] vaginal/sublingual MISO 600 µg 1.5–2.5 hours pre-D&E with or without ODs,[182] or vaginal MISO alone 400-µg 4–6 hours pre-procedure.[184]

Procedure time was not different among groups in 3 RCTs[183–185]; however, in 1 RCT, 1 less day of cervical preparation was required when MIFE was added to ODs and MISO.[185] Procedure time was significantly shorter in the MIFE groups in 2 RCTs.[65,182] Baseline dilation and side effects were variable across studies.[65,182–184] Complications rates reported in 2 RCTs[65,185] were 3.3% in the MIFE groups versus 9% in non-MIFE groups (Fisher exact test; $P = 0.11$). In 1 RCT, 9 unscheduled fetal expulsions before D&E were reported, but MIFE was given 48 hours pre-procedure (n = 877).[182]

Ease of procedure was assessed as identical in both groups in 2 RCTs,[183,185] while physicians' satisfaction was higher with MIFE groups in 2 RCTs.[65,184] Satisfaction of women was either equal between groups[65,185] or higher in the MIFE groups.[183,184]

Summary Statement

10. For late second trimester surgical abortion, use of mifepristone overnight with osmotic dilators and/or buccal/sublingual/vaginal misoprostol 400 µg 3–4 hours before dilation and evacuation facilitates cervical preparation and decreases procedure time (Level of evidence: Low).

Recommendation

23. For late second trimester surgical abortion, use of mifepristone 200 mg orally overnight is recommended, in addition to osmotic dilators and/or misoprostol 400 µg 3–4 hours pre-procedure (Weak recommendation. Level of evidence: Low).

Second Trimester MA

Second trimester medical abortion consists in the use of medications that induce fetal expulsion. It may be preferred to D&E, and indeed offered, when an intact fetus is preferred for psychosocial or diagnostic indications. It is commonly performed in a hospital setting as induction may take more than 24 hours. While the regimens discussed may be considered in the setting of midtrimester fetal demise, only evidence pertaining to abortion was reviewed. The following regimens are inappropriate for midtrimester induction where a live birth is desired.

The World Health Organization–recommended MISO regimens are as follows[186,187]:

- 13–24 weeks: MISO 400 µg vaginal/sublingual/buccal every 3 hours
- 25–28 weeks: MISO 200 µg vaginal/sublingual/buccal every 4 hours
- >28 weeks: MISO 100 µg vaginal/sublingual/buccal every 6 hours

Cervical dilation prior to second trimester MA

Since induction requires significant resources, cervical ripening may decrease time to expulsion and cost. A GRADE approach was used to answer the following question:

Should mechanical dilation, ODs, MISO, NO, MIFE, or a combination of previous options be used prior to second trimester MA?

Mechanical dilation: One retrospective[188] and 4 prospective cohort studies[189–192] examined use of intracervical catheters prior to induction with MISO. When compared with no preparation, the use of a double-balloon catheter was associated with similar induction-to-expulsion times (21.1 hours vs. 23.1 hours; $P = 0.393$).[188] When compared with no cervical preparation, adding an intracervical catheter was not associated with a decrease in time to expulsion in 2 studies,[189,190] and a reduced duration in 1 study (7.5 hours [combined] vs. 11.76 hours [cervical preparation with MISO] vs. 19.76 hours [catheter]; $P < 0.0001$).[191] Catheter traction is superior to no traction.[192] In all studies, complication rates were similar among groups.

ODs: Seven studies[193–199] were identified where ODs were evaluated prior to second trimester MA. In 3 cohort studies[193–195] and 2 RCTs,[196,197] laminaria compared with no OD yielded limited reduction in time to expulsion. Conversely, in 2 cohort studies[193,194] and 1 RCT,[196] comprising 151 women, there was an overall increased duration in time to expulsion using laminaria with or without MISO versus MISO alone (18.1 vs. 15.4 hours; $P < 0.001$). In 1 time series on 174 women, adding laminaria to MIFE-MISO resulted in shorter time to expulsion (7.5 hours vs. 12.7 hours; $P = 0.001$) and time in hospital (3 days vs. 4 days; $P < 0.001$).[195] In an RCT comparing laminaria to MIFE prior to induction, laminaria was associated with more pain and longer time to expulsion (10 hours vs. 16 hours; $P = 0.01$).[198] Laminaria reduced time to expulsion compared with no preparation in 1 RCT where PGE_2 was used for induction.[199]

MISO: In 1 pilot study comparing 19 women who self-administered MISO 50 µg buccally the evening prior to MISO induction with a historical cohort not receiving such preparation,[200] median time to expulsion was 33% less when MISO priming was used; however, 3 women experienced nausea and 11 had cramping overnight. No unintended expulsion occurred prior to induction. Two small RCTs comparing oral MISO 400 µg versus placebo or no treatment prior with MISO[201] or gemeprost[202] induction reported conflicting results on time to expulsion.

NO donors: In an open-label RCT (50 women), time to expulsion was reduced by 8 hours with isosorbide mononitrate prior to MISO induction compared with no preparation.[203] In a placebo-controlled RCT (100 women), no significant difference was found in time to expulsion.[204] Complications rates were similar between groups in both studies.

MIFE: Four RCTs, comprising 610 women, demonstrated significant reductions in time to expulsion (−2 to −10 hours) when additional MIFE 200 mg was added to prostaglandin/oxytocin regimens, with similar rates of expulsion and side effects.[205–208] In most cases, MIFE was administered approximately 24 hours before admission. In a case series of 999 women, 2 had unintended expulsion prior to induction (0.2%).[209]

Two RCTs (99 women) showed that MIFE reduced time to expulsion by 3.5 to 6 hours when compared with laminaria priming and was associated with less pain.[198,210]

We identified 9 studies and 1 systematic review comparing the interval between MIFE and MISO administration for induction.[211–219] Simultaneous MIFE and MISO administration (2 RCTs) was associated with longer MISO-to-expulsion time by 5.1–5.3 hours when compared with administration of MIFE 24–36 hours prior to MISO induction.[211,212] In a 3rd RCT, administration of MIFE within 12 hours of MISO induction resulted in lower likelihood of expulsion within 12 hours, but similar rates at 24 hours.[213] Three RCTs and 2 cohort studies (752 women) compared 1- and 2-day MIFE-MISO intervals, showing either no or modest reduction in time to expulsion in the 48 hour-interval group (less than 2 hours).[214–218] In 1 cohort study using gemeprost induction, prolonging the MIFE interval to 72 hours resulted in longer time to expulsion.[219]

Summary Statements

11. For second trimester medical abortion:
    a. use of mifepristone 24–48 hours prior to induction reduces time to expulsion without added side effects (Level of evidence: High).
    b. mechanical dilation with intracervical catheters prior to induction rarely confers benefit (Level of evidence: Low).
    c. laminaria/synthetic osmotic dilators prior to induction do not confer any benefit and may increase both pain and time to expulsion (Level of evidence: Moderate).

Recommendations

24. For second trimester medical abortion, use of mifepristone 24–48 hours prior to misoprostol induction is recommended (Strong recommendation.

Level of evidence: High). The specific timing of mifepristone should be based on provider and patient preference (Weak recommendation. Level of evidence: Moderate).

25. For second trimester medical abortion, use of mechanical dilation or osmotic dilator prior to induction is not recommended (Strong recommendation. Level of evidence: Low). Mechanical dilation may be considered when other cervical priming approaches must be avoided (Weak recommendation. Level of evidence: Low).
26. For second trimester medical abortion, there is insufficient evidence to recommend the use of nitric oxide donors or misoprostol priming prior to induction (Weak recommendation. Level of evidence: Low).

Additional Considerations in Late second Trimester IA

Previa: in the setting of PP, SA is preferable to MA as it is associated with lower blood loss.[220] Laminaria can be inserted as an outpatient in the presence of an asymptomatic PP.[216] Use of intracervical vasopressin and rapid removal of the placenta are recommended to reduce hemorrhage and perforation.

Recommendation

27. In the presence of placenta praevia, intracervical vasopressin, ultrasound guidance, and rapid removal of the placenta are recommended. Expert backup is advised in case of significant bleeding (Strong recommendation. Level of evidence: Very low).

Fetal anomalies: In cases of fetal anomalies, a stillbirth is not guaranteed unless feticide takes place, therefore; neonatal palliative care should be offered prior to induction.[221] To aid with grieving, many facilities have implemented measures to help women and families.[222] These include mementos such as footprints, ultrasound pictures, and identification bracelets, which can be provided whether the woman chooses SA or MA.

Stillbirths: In Canada, a stillbirth occurs after expulsion of a fetus greater than 20 weeks or 500 g. Some consider that "The process for the registration and reporting of therapeutic abortions should be separate from that for spontaneous fetal deaths." [223] In all jurisdictions, any stillbirth must be reported to Vital Statistics, recorded by a Certificate of Death, and be disposed of appropriately (cremated or buried).

Histopathology

Routine histopathological examination has been historically recommended for the detection of GTN, aneuploidy, and confirmation of an IUP.[224,225] Currently, ultrasonography, highly sensitive β-hCG serum testing, and gross examination of POC cost less and can identify tissue,[226,227] even in very early abortions.[135–137]

Although baseline risk of GTN in women undergoing abortions is not higher than in the general population (1 in 2699 cases in a Canadian study),[228,229] women with unidentified GTN are more likely to have delayed diagnosis and subsequent complications from invasive disease.[228] Therefore, histopathological examination of POC remains important in cases of abnormal exam or when GTN or EP is suspected.[40] Cytogenetics should also be performed when genetic diagnosis is required.

Standard POC examination: Immediately following the procedure, the aspirate is placed in a glass container with a small amount of water, or, if further analysis (eg, chromosomes) is needed, saline. Acetic acid may also be used. Examination is most often performed with backlighting, such as an X-ray view box placed flat on the countertop. Decidual tissue is clear, light colored, or reddish brown, and the decidua capsularis is an opaque sheet with hemorrhagic areas. The GS is thin, transparent, and can be fragmented. Chorionic villi are transparent frond-like projections that appear fluffy or feathery.[138,230] When blood and clots impede visualization, the tissue should be rinsed until good visualization is possible.

Prior to 7 weeks, confirmation of completion requires visualization of both sac and villi.[128] POC volume or weight poorly correlates with GA.[132,231] A GS, decidua, chorionic villi, and small fetal parts can be seen by 9 weeks of gestation. In the second trimester, major fetal parts including the calvarium, pelvis, spine, 4 extremities, and adequate placental tissue for gestational age must be visualized to confirm completion of the procedure.[147,232] If a discrepancy occurs between POC examination and pre-procedure GA, foot length should be used for fetal dating.[138,233–235]

Abnormal exam: When examination is inconsistent with preoperative assessment, retained POC must be ruled out, and imaging or reaspiration is mandated. If possible, ultrasound guidance should be used for reaspiration.

In early pregnancies or PULs when POC examination is inconclusive, serial β-hCG measurements should be used to rule out ongoing or ectopic pregnancy.

Hydropic villosities are associated with GTN or aneuploidy. In these cases, the specimen should be sent for histological analysis, and proper FU arranged. Women with persistent bleeding or who have not resumed their periods within 8 weeks must also be reassessed for ongoing pregnancy or GTN.

Recommendations

28. Routine gross examination of uterine contents should be performed immediately after induced abortion (Strong recommendation. Level of evidence: Very low).
29. Histopathological examination of products of conception must be performed when gestational trophoblastic neoplasia or ectopic pregnancy is suspected (Strong recommendation. Level of evidence: Very low).

POST-ABORTION CARE

Following SA, patients must be continuously observed until discharge criteria (Aldrete score[236]) are met, which varies by procedure and anaesthetic. Women should receive written information including normal findings, self-care, and warning signs of complications (Table 4). A 24/7 emergency number should be provided to the patient.

Following IA, most women feel normal emotionally and physically. Urine pregnancy tests may remain positive up to 60 days,[237,238] and are not recommended as part of FU. Pregnancy symptoms generally subside within 24–48 hours,[239] and the uterus involutes rapidly. Bleeding is variable but is usually less than menstrual flow. While some women experience no bleeding, bleeding and cramping may transiently increase 4–10 days after the procedure, and, if self-limiting, does not indicate a complication.[239] By 2–3 weeks, most women have stopped bleeding. Unscheduled bleeding may persist due to initiation of contraception. Like bleeding, cramping can be variable and is likely attributed to uterine involution.[239] Cramping may occur with or without bleeding and is generally relieved with NSAIDs. Routine prescribing of opioids is inappropriate.

In many studies, the dominant emotional reaction after IA is relief,[240,241] including after second trimester, although data are limited.[234,235,240,241] Because some women experience mood symptoms following any pregnancy outcome, clinicians should be attentive to women with pre-existing mental illness, postpartum depression, or premenstrual dysphoria.[242,243] Women terminating a wanted pregnancy because of fetal anomaly may benefit from short-term grief counselling.

Table 4. Warning signs of complications following IA

Symptoms	Severe pain not controlled by analgesics Feeling sick with flu-like symptoms (weakness/faintness, nausea, vomiting, diarrhea) Continuing symptoms of pregnancy Depressive symptoms and suicidal ideation
Signs	Soaking 2 maxipads per hour for 2 consecutive hours Severe pain not reduced by common analgesics Orthostatic symptoms: lightheadedness, fainting Fever more than 38°C lasting more than 6 hours Abnormal foul-smelling vaginal discharge Absence of menstruations for 8 weeks after IA

Immediate Complications

Complications of surgical abortion

Failed attempted abortion: Failed attempted abortion is rare (0.15%).[244] If a failed attempt occurs before disruption of the pregnancy (patient is stable and not bleeding), a repeat attempt should be planned after pre-treatment with MISO, MIFE, or ODs.[245,246]

If dilation becomes difficult and the pregnancy has been disrupted or there is bleeding (or another reason that immediate completion is necessary), os finders, and ultrasound-guided insertion of rigid dilators may be helpful. For more advanced gestations, simultaneous insertion of more than 1 large rigid dilator may allow passage of D&E forceps to facilitate tissue extraction. Many providers employ ovum forceps when there is inadequate dilation for second trimester procedures at the expense of increased passes.

In cases of marked obesity, hip flexion, increased uterine traction, use of Moore-Graves vaginal speculum, lateral retractors, steel cannula extender, and long forceps may help. When there is uterine anomaly, a markedly anteflexed or retroflexed uterine body, or a tortuous cervical canal, use of flexible cannula may be useful. Flexible hysteroscopy has also been utilized to enter the uterine cavity. MA may need to be considered to complete the termination.

Hemorrhage: Hemorrhage at the time of abortion is inconsistently defined and includes >250 mL, >500 mL, hemodynamic instability, or requiring transfusion.[166] In the United States, between 2011 and 2013, the Centers for Diseases Control and Prevention reported 6 deaths among abortion patients related to hemorrhage. Of these, 3 were related to perforation/cervical laceration, 2 to atony, and 1 was unspecified.[144]

Risk factors for hemorrhage at the time of abortion can be classified as[166]:

- Moderate risk: 2 or more CSs, PP following previous CS, bleeding disorder, history of postpartum hemorrhage not requiring transfusion, GA beyond 20 weeks, large fibroids, obesity.
- High risk: suspicion of abnormal placentation, history of postpartum hemorrhage requiring transfusion, clinician concern.

When determining causes of hemorrhage, the "Four Ts" (Tone, Trauma, Tissue, Thrombin) still apply, with atony

Table 5. Management of hemorrhage at the time of abortion

Steps: Re-evaluate at each step and determine next best step	Actions
1 – Identify risk factors	Determine if preoperative planning is needed or if patient is suitable for facility.
2 – Recognize bleeding and ask for help	Establish IV access and start IV fluids; consider complete blood count and group, crossmatch, coagulation profile, and screen. If unstable, CALL CODE or PREPARE FOR A TRANSFER. Obtain medications: • MISO 200 to 600 µg sublingual/buccal/rectal × 1 • Methylergonovine 0.25 mg IM q2h – DO NOT ADMINISTER IV • $PGF_{2\alpha}$ 0.25 mg IM or intracervical × 8 • Oxytocin 20–40 units in 250–500 mL IV if GA over 16 weeks If under GAn: notify anaesthetist and reduce inhaled anaesthetics.
3 – Palpation	Apply direct pressure to uterus with sponge stick/hand and fundal pressure.
4 – Inspection	To explore the source of bleeding, perform "cannula" test: insert cannula to fundus and slowly withdraw until brisk bleeding ensues. If bleeding is coming from the cervix, consider urgent embolization or laparotomy. If external laceration, repair under local anaesthesia.
5 – Retained POC	Re-examine tissue – re-image ultrasound – reaspirate
6 – Intervention	Intrauterine balloon tamponade Emergent referral to gynaecology (if needed) Laparoscopy if perforation suspected Laparotomy if unstable

Adapted from Hamilton Health Sciences Protocol with permission.[248]

being most common in the second trimester.[247] Procedure-specific causes include perforation, cervical laceration, retained POC and atony, and less commonly, abnormal placentation, arteriovenous malformation, and DIC.

Each facility should have a hemorrhage protocol (eg, Table 5), access to resuscitation medications, and a transfer protocol if out of hospital.

Bleeding from the tenaculum site responds well to direct compression. If there is increased bleeding from the uterus, direct bimanual compression, compression with a sponge on a stick with fundal counterpressure, or intrauterine tamponade (catheter) will improve tone and reduce bleeding. A low threshold for reaspiration should be maintained as retained POC can cause brisk bleeding, and aspiration encourages compression of the placental bed (Table 5). If there is suspicion of a high cervical laceration or perforation, transfer should be arranged. Embolization by interventional radiology, if available, is preferred. If unavailable, laparoscopy or laparotomy may be required.

Uterine Perforation: The risk of UP with SA is around 1–4 in 1000 cases,[29,151] most commonly occurring during dilation for first trimester SA and with forceps evacuation in second trimester SA. The risk increases with uterine anomalies, marked uterine flexion, cervical stenosis, inadequate cervical, difficult or prolonged uterine evacuation, or less experienced providers.[246,249] For advanced gestations or when the cervix is stenotic, cervical preparation decreases the risk of cervical trauma and perforation compared with mechanical dilatation alone.[250] In 2 retrospective analyses, underestimation of the duration of pregnancy, inadequate cervical dilation, and failure to use ultrasound during the procedure were associated with UP.[22,251]

In practice, UP often is often unrecognized and does not need further intervention.[147] Special management (Table 6) should be considered if any of the following occurs:

- woman experiences sudden pain during the procedure
- instruments pass without resistance further than expected
- contact with the gritty surface of the endometrium lost
- fat or bowel brought down with the suction or identified on gross examination
- bleeding in excess of what is expected,
- persistent post-procedural pain especially if lateralized or associated with rebound tenderness
- suspicion of a possible lateral perforation
- unstable vital signs present following completion of the procedure
- missing fetal parts following D&E when uterus feels empty

Cervical trauma: In the second trimester, cervical laceration occurs in approximately % to 2% of SAs[173] and is a potentially severe complication. Risk increases with increasing GA, history of cervical surgery (eg, conization), and cervical/uterine abnormalities. Cervical preparation reduces the risk of laceration, particularly at 18+ weeks.[173] Superficial laceration related to tenaculum use and application of local anaesthetic is normal during an abortion and can be observed. Persistent tenaculum site or injection site bleeding is most easily rectified by applying pressure or compression with a sponge stick or a ring forceps. If a laceration is bleeding, or is large (>1 cm), it should be repaired with an absorbable suture.

Table 6. Management of suspected uterine perforation[3,245,252]

Stop the procedure immediately; evaluate and reassess the patient.	
If vital signs are not stable, IV fluids should be started. Evaluate with ultrasound or laparoscopy. Prepare for a transfer to hospital if necessary.	
If the uterine perforation occurs and the pregnancy is *disrupted*	Complete the procedure under laparoscopic guidance as soon as possible in order to evaluate visceral injury, to assess bowel integrity, and ensure internal bleeding is controlled.
If the uterine perforation occurs and the pregnancy is *not disrupted* and the patient is stable with no signs of hemorrhage or injury	Complete the procedure with either ultrasound or laparoscopic guidance, either immediately or after a 1–2 week-delay to allow for uterine healing.
If the procedure is thought to be *complete* when uterine perforation is suspected	Evaluate the patient: • If there are stable vital signs, no sign of visceral injury, minimal bleeding (<200 mL): close observation. • Uterotonics and antibiotics may be considered. • In select cases where patient is stable after 2–4 hours: patient may be discharged with close FU plans and instructions to seek emergent care if they develop concerning symptoms.
If bowel or omentum is visualized at the cervix or brought into the uterine cavity	Leave tissue in situ to identify and repair of bowel as well as the uterus. These patients must be evaluated by laparoscopy or laparotomy and may require surgical consult.
If there is suspicion of a lateral perforation	Transvaginal ultrasound and/or laparoscopic evaluation should be performed owing to the risk of retroperitoneal bleeding

While external lacerations are largely benign, internal ones are more serious as they can result in significant bleeding. Visible lacerations can be repaired vaginally when possible; higher cervical tears may require urgent embolization or laparoscopy. Cervical laceration can be diagnosed in part using a cannula test (Table 5).

Repeat aspiration: A systematic review of 36 studies reported that ≤3.0% of SAs required repeat immediate or delayed aspiration.[253] Reaspiration is indicated for ongoing pregnancy, retained POC, hemorrhage, and hematometra.[128,254]

Hematometra is the result of an accumulation of blood in the endometrial cavity that the uterus is unable to expel. Women present with increasing pelvic pain (some women report deep pressure or rectal pain), absent or decreased vaginal bleeding, and, at times, hemodynamic compromise. This may develop immediately after abortion or insidiously over 2–3 days. It occurs at a rate of 2 per 1000 SAs[245] and may be treated with repeat aspiration.[245,255]

DIC: DIC results from activation of clotting and fibrinolytic systems and leads to hemorrhage, end-organ ischemia/necrosis, hypotension, and microangiopathic hemolysis.[256] It is rare, affecting about 0.2% of second trimester abortions.[257] Risk factors include advanced GA, intrauterine fetal demise (particularly if remote), previous abruption, abnormal placentation, amniotic fluid embolization, and blood transfusion.[145,256] Amniotic fluid embolism is rare but often fatal, occurring in 1 in 8000 to 1 in 80 000 pregnancies.[258] DIC often manifests after a few hours: in a case series of 24 women with idiopathic DIC, the mean time to presentation was 153 minutes following D&E.[257] The clinician may be alerted to DIC in the setting of ongoing oozing despite adequate management, blood that does not clot in a basin, or a significant decrease in hemoglobin compared with pre-procedure.

Management consists of inpatient correction of hypovolemia, factor replacement, typically fresh frozen plasma, and treatment of underlying cause. Platelets should be replaced only if there is significant thrombocytopenia. The benefit of recombinant factor VII must be weighed against the lack of evidence, the high risk of thrombosis, and cost.[245]

Other

Seizure: If a seizure occurs during SA, the abortion should be discontinued.[259] Initial treatment includes maintaining the patient's airway, monitoring vital signs, administering IV fluids, and oxygen.[245,259] The majority of seizures will resolve spontaneously.[245,259] Treatment options for seizure lasting greater than 5 minutes or repetitive seizures include IM midazolam 10 mg single dose if no IV access, IV midazolam 2–5 mg, or IV diazepam 0.15–0.2 mg/kg/dose to a maximum of 10 mg/dose and may repeat dose once.[260] Transfer to the nearest hospital should be done if SA was performed in an outpatient setting.[259]

Asthma exacerbation: Approximately 8% of women seeking IA report current use of asthma medication.[245] Women with well-controlled asthma can undergo usual SA but should be advised to use their asthma medication the day of the procedure and to bring their inhalers.[259] A delay in the procedure may be considered if a woman's asthma symptoms require continuous steroid therapy or if she has current acute symptoms, frequent exacerbations, or a recent attack requiring medical treatment.[245] If an asthma exacerbation occurs (mostly in relation to NSAID sensitivity), observation in a monitored setting and oxygen administration to maintain oxygen saturation of at least 90% must be done.[245,261] If there is no response, consider oral systemic corticosteroids,[261,262] and organize transfer to the nearest hospital.

Vasovagal syncope: A vasovagal reaction can be precipitated by stress, pain, venipuncture, PCB, or cervical dilation.[245] The woman may experience hypotension and, rarely, bradycardia.[245] She should remain supine with legs elevated. All instruments should be removed from the vagina and cervix. Most episodes resolve without treatment.[245] For prolonged or severe incidents, consider treatment with atropine 0.5 mg IV in addition to hydration, antiemetics, and airway support.[245]

Recommendations

30. Each facility where abortions are performed should have easily available written emergency protocols (Strong recommendation. Level of evidence: Very low).
31. Every facility where abortions are performed should engage in regular emergency drills (Strong recommendation. Level of evidence: Very low).

Complications of second trimester MA

Uterine rupture: Uterine rupture is a rare complication of labour induction.[263,264] It was reported with scarred and unscarred uterus and with urea/$PGF_{2\alpha}$,[265] oxytocin,[266] MISO,[267–272] and MIFE-MISO.[273,274]

The incidence of rupture with the use MISO was 0.4% (2 of 461) with 1 prior low-transverse CS, 0% (0 of 46) with 2 prior low-transverse CS, and 50% (1 of 2) with a prior classical CS in 1 review,[275] and it was 0.28% (2 of 722) in women with a prior CS in another review,[276] compared with 0.04% (1 of 2834) in women without a prior CS.[276] In 1 prospective study[277] and several retrospective studies and case series,[278–291] uterine rupture was observed with scarred uterus in some studies[283,285–287,290] and not in others.[277–282,284,288,289] Uterine rupture happened at any GA, with any MISO dosage, and, in some cases, with oxytocin.[291]

Recommendation

19. The use of misoprostol for second trimester medical abortion is safe after 1 prior low-transverse Caesarean section. There is insufficient evidence regarding its use in women with 2 or more prior Caesarean sections or a prior classical Caesarean section (Weak recommendation. Level of evidence: Very low).

Severe bleeding: In women undergoing MA, the incidence of hemorrhage requiring transfusion is between 0.7% and 3.0%.[209,292–294] One recent study reported a higher incidence of blood transfusion of 6% in 2008/2010 and 4% in 2014.[295] Retained POC is the most common cause.[166] MIFE-MISO might be associated with less blood loss.[166] Comparative studies of second trimester MA versus SA found either less severe bleeding with SA[294,296] or no difference.[293,296,297]

Late Complications

Infection

The incidence of infection requiring antibiotics after first and second trimester SA has been reported to be 0.01% to 2.44% and 0.8% to 1.6%, respectively.[36] Rates are more difficult to measure with second trimester MA due to prostaglandin-induced pyrexia.[36] Some report that the difference in infection rate is not significative between second trimester SA and MA,[296] while others find it higher for second trimester MA.[36] Typical symptoms of infection start within a few days and include fever (≥38°C), chills, increased pelvic pain, and foul-smelling discharge or prolonged bleeding. Findings also include uterine tenderness and possibly an elevated white blood cell count. Treatment includes broad-spectrum antibiotics and antipyretics and, in case of severe infection, hospitalization, debridement, and IV antibiotics. Retained POC should be aspirated to eliminate a nidus of infection.[40,41,245] There is no evidence that abstaining from sexual intercourse after SA or MA reduces post-abortion infection.

Retained products of conception

Symptoms of retained POC commonly include vaginal bleeding, abdominal pain, and signs of infection.[41] Routine ultrasonography following IA to exclude retained products is not recommended. Appropriate treatment includes vacuum aspiration or MISO.[41]

First trimester SA: Retained POC is uncommon (0.7% to 4%) following vacuum aspiration by a skilled provider.[41,128] Sharp curettage does not decrease the risk of retained POC.[41] Inspection of the POC immediately after SA is recommended, and, if incomplete, imaging and reaspiration are indicated.[3,41]

Second trimester IA: Retained POC are more common following second trimester MA than SA. In 1 RCT on 18 women,[250] 4 of 9 women in the MA group required a vacuum aspiration: 3 for retained placenta and 1 for delayed presentation of retained POC. One case series of D&E between 13 and 26 weeks[173] and another case series with MIFE-MISO between 13 and 21 weeks[209] showed retained POC in 0.3% of D&E versus 7% of MIFE-MISO MA. The initial method failed in 0.2% of D&E versus 3% of MIFE-MISO MA at 24 hours and 1% at 36 hours.[209] Experts recommend that, for second trimester MA, 4 hours should be allowed following fetal expulsion for the expulsion of the placenta if the woman is stable. If bleeding is heavy or if the placenta does not deliver, vacuum aspiration with a large cannula (14–16 mm) can be used. If the placenta is sitting in the cervix, attempt extraction with sponge forceps. Immediate inspection of the placenta is always necessary.

Failed abortion and continuing pregnancy

SA includes a 0.1% risk of failure.[128] A study of 33 090 SAs using suction curettage up to 12 weeks reported a 0.23% failure rate.[133] The risk was increased with SA performed prior to 6 weeks of gestation, in multiparous women, and women with uterine anomalies.[128] Failed abortion is usually recognized by immediate POC examination.[12] In case of an ongoing pregnancy, women might fail to have a period within 4–8 weeks after abortion and complain of continuing symptoms and signs of pregnancy. A uterine evacuation procedure should be offered.[41]

Recommendation

32. If women fail to have a period within 8 weeks following induced abortion and/or complain of continuing symptoms and signs of pregnancy, a new or ongoing pregnancy should be suspected and repeat procedure offered (Strong recommendation. Level of evidence: Very low).

Follow-Up

Routine FU after IA is not required but may be recommended to confirm complete abortion, discuss or reinforce contraception, and diagnose complications.[298] Women who are referred for abortion following a diagnosis of fetal anomaly should be offered a follow-up appointment once the abortion is complete. A systematic review concluded that routine FU after SA is unnecessary when examination of POC confirms a complete abortion and contraceptive needs have been met.[299] All women should be informed about signs and symptoms (Table 4) that should trigger a visit, and those who wish to have FU care should be offered an appointment.

Recommendation

35. Women referred for abortion from a fetal diagnosis clinic should be offered follow-up to review any additional information obtained from the abortion and provide support (Strong recommendation. Level of evidence: Low).

Future Reproductive Outcomes

Many studies on long-term sequelae of SA are either case-control or retrospective cohort studies where choice of control groups is critical. Ideally, controls should be recruited from the same population as cases or exposed women and have had a IA in the most recent pregnancy.[300]

Asherman syndrome

Asherman syndrome (intrauterine adhesions) is a rare complication linked to direct and/or indirect trauma of the endometrium, and it can occur following delivery, miscarriage, or SA.[301–305] Gentle surgical techniques, use of vacuum aspiration (MVA or EVA), and limiting sharp curettage are advised.[41,151,306] Adhesion formation in the presence of retained POC may be more likely after CS than after SA or vaginal birth; curettage postpartum may lead to the most severe adhesions.[303,305] Management of the adhesions (hysteroscopic resection) has a reasonable success rate to restore fertility when desired.[303,305,307–310]

Subfertility

Studies on the risk of subsequent fertility impairment are limited to small cohort studies, case-control studies and case reports, many of which employing outdated techniques.[311–322] Reviews do not find evidence of association between SA and subsequent subfertility, but highlight methodologic problems and call for high-quality large prospective cohort studies.[315,317] Two notable, but rare, exceptions relate to: (1) midtrimester SA complicated by a retained fetal bone fragment; and (2) SA complicated by intrauterine adhesions.[310,313,315,323,324]

Ectopic pregnancy

Most large case-control studies with adequate control groups and control of confounding factors have found no association between 1 or more SAs and further risk of EP.[325–334] Significant associations between SA and subsequent EP were observed in studies with small numbers of EP cases, those that failed to control for important risk factors or chose inadequate control groups, and those conducted in countries where abortion was illegal and complicated by infection or retained POC.[311,332,335–338]

Miscarriage

The majority of large case-control or retrospective cohort studies with adequate control groups and control of confounding factors confirmed no association between 1 or more induced SAs and the risk of miscarriage in a subsequent pregnancy.[332,338–346] A dose-response effect was not demonstrated.[339,343,345,347] However, 1 large cohort study[346] showed an increased risk of miscarriage when women became pregnant within again less than 3 months of a first trimester IA (OR 4.06; 95% CI 1.98–8.31) regardless of abortion method. Significant associations between induced SA and subsequent miscarriage were observed in studies that failed to control for important risk factors or chose inadequate control groups.[332,347,348] In addition, an association between miscarriage and IA via dilation and sharp curettage has been described.[332]

Placenta previa

Most large case-control or retrospective cohort studies with adequate control groups and control of confounding factors confirm absence of association between 1 or more SAs and subsequent abnormal placentation, especially PP.[171,349–360] Similar findings are reported in women obtaining MA.[360–362] Significant associations between induced SA and placental abnormalities were observed in studies with small samples, inadequate control for risk factors or inadequate control groups, and those that were conducted in countries where abortion was illegal, complicated by infection or performed with sharp curettage.[338,358,363–367] With respect to causal relationship, sharp curettage may result in uterine scarring and subsequent faulty placentation.

Preterm birth

Two meta-analyses[368,369] and several large case-control or retrospective cohort studies with various control groups and control of some confounding factors found an association between 1 or more surgical IAs and an increased risk of subsequent PTB.[317,332,338,370–378] PTB risk increased with the number of previous surgical SAs.[368,369,371–374] However, several cohort studies with adequate control groups and control for important confounders,[327,379–383] as well as several smaller studies with various methodological flaws,[359,365,384–387] did not demonstrate an association between 1 or more induced SAs and the risk of PTB in the next further pregnancy. Many studies did not differentiate between spontaneous and induced PTB, which may confound the results.[316]

Low birth weight

The majority of well-designed case-control or retrospective cohort studies reported no association between 1 or more surgical IAs and risk of subsequent LBW.[339,345,359,363,365,373,376,379,380,386,388–390] However, a 2009 meta-analysis[368] found a slight increased risk of subsequent LBW following IA (OR 1.35; 95% CI 1.20–1.52) but no increased risk of SGA. LBW risk increased with the number of IAs.[368] One review article[332] found no significant increased risk of LBW in the pregnancy after IA via vacuum aspiration, but did find an increase association with second trimester SA. In addition, significant associations between IA and subsequent LBW infants were observed in 3 studies that failed to distinguish MA versus SA, chose inadequate control groups, or failed to control for important risk factors.[391–393]

Summary Statements

13. An abundant amount of evidence provides reassurance concerning future reproductive outcomes following induced abortion (Level of evidence: Low).
14. Sharp curettage during induced abortion appears associated with the development of uterine adhesions, risk of miscarriage, placenta previa, and subfertility (Level of evidence: Low).

Recommendation

33. Sharp curettage is not recommended in replacement for vacuum aspiration (Strong recommendation. Level of evidence: Low), nor should routine sharp curettage be performed during induced abortion (Weak recommendation. Level of evidence: Low).

Contraception Post-Abortion

Ovulation can occur as early as 8–10 days after an abortion, with a mean between 21 and 29 days after SA.[394–397] More than 80% of women ovulate within 1 month of IA, with estrogen and progesterone levels returning to near normal levels within 1 week.[394,397] Thus, if contraception is desired, it should be initiated promptly. Moderate-quality evidence indicates that same-day access to contraception and abortion leads to fewer subsequent abortions and births at 12 to 24 months and is associated with an increased likelihood of using a highly effective method.[398–400]

Intrauterine contraception

In the absence of method contraindications[401–403] or complications of IA, immediate insertion of a levonorgestrel intrauterine system or a copper IUD may be performed. Moderate-level evidence indicates that immediate IUCD insertion post SA is safe[45,400,404,405] and does not carry an increased risk of perforation, infection, or discontinuation.[45,405–408] Expulsion rates may be higher for immediate insertion compared with delayed insertion, but not all studies found the difference to be significant.[45,400,404,409]

An increase in expulsion rate was noted when insertion occurred after second trimester SA compared with first trimester SA,[45,48,404–407] but the difference was not significant in all studies and should not preclude immediate IUCD placement immediately after a second trimester IA.

RCTs have demonstrated that immediate IUCD placement at time of both trimester SA is associated with higher IUCD use at 6 months[45,48,49] and statistically significant reductions in repeat pregnancies compared with delayed placement,[48,49,399,410] likely due to lower likelihood of women returning for interval insertion.[48,49,399,410] One prospective cohort study[411] and 1 RCT[408] demonstrated a significant decrease in repeat abortions at 24 months after IUCD insertion compared with initiation of other contraceptive methods (6.5% vs. 14.5%; $P < 0.001$)[411] or oral contraceptives (1.4% vs 5.6%; $P = 0.003$).[408]

No backup contraception is required if the IUCD is inserted immediately. If initiation is delayed more than 7 days post-abortion, backup or abstinence is required for 7 days after levonorgestrel intrauterine system insertion (no backup is required following copper IUD insertion).[402]

Hormonal contraception

In the absence of contraindications, hormonal contraception can be initiated immediately after IA.[403]

CHC: CHC (COC, patch, and ring) can be initiated immediately after first trimester SA.[402,403] Although evidence is available, CHC may be started after a second trimester IA once completed. Immediate COC start after SA is not associated with an increase in vaginal bleeding, side effects, or clinically significant changes in coagulation parameters compared with delayed initiation or other non-hormonal contraceptive methods.[412,413] Limited evidence on vaginal contraceptive ring used immediately post first trimester IA has demonstrated no increase in infection or other adverse events at 3 months.[414] One RCT of immediate contraceptive patch initiation found no adverse effect on post-abortion bleeding and no improvement in method continuation at 6 months.[415]

If CHC is started immediately, no backup contraception is required. If CHC is not started immediately, backup contraception or abstinence should be used until initiation of CHC and for the first 7 days of CHC use.

Progestin-only contraception: The progestin-only pill and DMPA can be started immediately after IA.[402,403] Women who choose DMPA have lower repeat pregnancy rates at 12–24 months compared with those who choose COC.[408,410] If not started immediately, backup contraception or abstinence should be used until initiation of the method and for the first 48 hours of POP use or first 7 days following DMPA administration.

Other reversible contraceptives methods

Condoms and spermicides can be used as soon as intercourse resumes.[416,417] There is no optimal timing for use of the cervical cap or diaphragm after SA; it is suggested that the diaphragm and cap should not be used until 6 weeks after a second trimester IA.[403] Natural family planning methods should not be used until menstrual cycles have resumed. Women who have had a failure of their contraceptive method, who are relying on less effective methods, or who have difficulty with adherence should also be counselled about the use of EC.[417] Advance provision of EC is safe, increases the likelihood of EC use,[418] and should be considered for all post-abortion patients.[419]

Permanent contraception

Tubal ligation can safely be performed laparoscopically at the time of first and second trimester SA.[420–422] The risk of pregnancy following immediate tubal ligation is lower compared with women who delay their procedure.[421]

Recommendation

34. Contraception should be started as soon as possible after the abortion (Strong recommendation. Level of evidence: High).

CONCLUSION

One third of Canadian women will undergo abortion in their lifetime, and IA is among the commonly performed procedures in Canada and globally. While IA is very safe, evidence-based best practices are associated with fewer complications, improved ease, and increased satisfaction for patients and providers.

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