Uterine Evacuation
Maryam Guiahi, MD, MSc
Michigan Consortium
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Disclosures
• No financial disclosures

Learning objectives
• To list US criteria for measurement of gestational age and diagnosis of early pregnancy loss (EPL)
• To review and discuss management options for EPL and first trimester abortion
• To summarize considerations for D&E vs. IOL
• To delineate surgical considerations for late first trimester and second trimester uterine evacuation
Early Pregnancy Loss

- ≤ 12 weeks gestation
- 12%–24% pregnancies
- 600,000 to 800,000 annually

<table>
<thead>
<tr>
<th>Age</th>
<th>20-30</th>
<th>35</th>
<th>40</th>
<th>45</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPLs</td>
<td>9-17%</td>
<td>20%</td>
<td>40%</td>
<td>80%</td>
</tr>
</tbody>
</table>

ACOG: Preferred terminology for Early Pregnancy Loss

- Chemical pregnancy
  - No evidence on US but had +pregnancy test
- Anembryonic pregnancy
- Embryonic demise
- Fetal demise
- Inevitable abortion
- Incomplete abortion

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Anembryonic pregnancy
- Gestational Sac +/- Yolk sac, no pole
- MSD: 2 sagittal, 1 transverse
- GA (days) = MSD (mm) + 30
- MSD ≥25 mm - diagnostic for EPL
- No FHTs 14 days after US with GS, no YS
- No FHTs 11 days after US with GS, YS

Embryonic demise
- 6-9 weeks
- Goldstein formula: GA (days) = CRL (mm) + 42
- Embryonic demise: CRL ≥7 mm without cardiac activity

Fetal Demise
- Fetus >9 weeks
- Fetal demise = Fetus without HTs
Concerning for EPL

- No cardiac activity, CRL <7 mm
- No embryo, MSD 16-24 mm
- No cardiac activity 7-13 days after US with GS, no YS
- No cardiac activity 7-10 days after US with GS
- No embryo 6 weeks after LMP
- Empty amnion (seen next to YS)
- Enlarged YS (>7mm)
- Gestational Sac is small in relation to embryo (<5mm)

ACOG PB Early Pregnancy Loss

Early Pregnancy Loss Treatments

- Uterine Aspiration

- Medications
  - Expectant Management: Effectiveness ranges between 40% (7 days) to 70% (14 days)

Medical management: Misoprostol (Cytotec®)

- Synthetic PGE1 analogue (1973)
- FDA approved for prevention and treatment of gastric ulcers for long-term NSAID users

- Advantages:
  - Inexpensive
  - Different administration routes
  - Heat stable
  - Widely available
Medical Management of EPL: Miso only

A randomized multicenter trial, n=652

- Embryonic or fetal demise
- Anembryonic gestation
- Incomplete abortion
- Inevitable abortion
- <12 weeks gestation or size
- 3:1 randomization (misoprostol 491, D&C 161)

Management: Miso vs. D&C

- Randomized multicenter trial, n=652
  - Embryonic or fetal demise
  - Anembryonic gestation
  - Incomplete abortion
  - Inevitable abortion
  - <12 weeks gestation or size
  - 3:1 randomization (misoprostol 491, D&C 161)

Study Design – Miso Prostaglandin Treatment Arm

- Day 1: Misoprostol 800 mcg vaginal
- Day 3: Follow-up ultrasound
  - Repeat miso if incomplete expulsion
    - Persistent sac
    - Endometrial thickness >30 mm
  - Suction aspiration if no expulsion within 1 week, subject request, or medical indication
Comparative Efficacy:

<table>
<thead>
<tr>
<th></th>
<th>Misoprostol 800 μg vaginally</th>
<th>Vacuum aspiration (MVA or EVA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Success by day 3</td>
<td>71%</td>
<td>--</td>
</tr>
<tr>
<td>Success by day 8</td>
<td>84%</td>
<td>--</td>
</tr>
<tr>
<td>Success by day 15</td>
<td>84% 97%</td>
<td></td>
</tr>
</tbody>
</table>

Incompletes more likely to expel

More bleeding after than D&C

Predictors of success

Overall success:
- Localized lower abdominal pain within past 24 h
- Vaginal bleeding within past 24 h
- Rh-negative blood type
- Nulliparity

- Treatment success by day 3:
  - Heavy bleeding after first dose
  - Open cervical os

- Treatment success by day 8:
  - Passage of tissue after a second miso dose
  - Old blood in the vagina

Robledo Int J Gynaecol Obstet. 2007

Summary: Misoprostol Only for EPL

Evidence-based regimen

Vaginal or buccal misoprostol 800μg
Repeat in 12–48 hours, if needed
No antibiotics needed

Medical management: Mifepristone (Mifeprex®)

- Competitive progestrone receptor antagonist (RU 486)
- FDA approval to use with misoprostol up to 70 days (10 weeks)
- >95% effective
- MOA: Progestrone receptor blockade
  - Primes the myometrium and cervix
  - Potential to induce formation of a second dose when closed or which 15-40% require second dose

Medical Management of EPL: Miso + Mife

Routes of Misoprostol administration: Vaginal vs. Buccal
RCT 1:1
300 Women
Clinically stable pts with:
• Anembryonic
• Embryonic/fetal death
• + Closed cervical os
• <12 weeks
Protocol for one dose vaginally

Primary Outcome: Treatment Success
Gestational sac expulsion by initial follow-up
No additional interventions within 30 days

Treatment Success Rate
Mife group also more likely to succeed with second miso (88% vs 71%)
No difference in transfusion rates

Mifepristone + Misoprostol Only for EPL

Better Evidence-based regimen

Pretreatment with mifepristone 200 mg + 800µg of vaginal misoprostol.

Barriers to Mifepristone for EPL management

- FDA - Risk Evaluation & Mitigation Strategies (REMS)
  1. Providers must be certified
  2. Only dispensed in certain healthcare settings or under the supervision of a certified prescriber.
  3. Must inform patients about the risk of serious complications

- Cost/ reimbursement
- Abortion association
Surgical Management

- MVA: Manual Vacuum Aspiration
- EVA: Electric Aspiration
- Sharp Curettage

Current State of EPL Treatment

- Aspiration remains the standard of care
- Potential complications:
  - Infection (<2%)
  - Retained POCs (<2%)
  - Cervical tear (<1.2%)
  - Uterine perforation (<0.4%)
  - Excessive bleeding (<0.3%)
  - Missed abortion (<0.3%)
  - Hematometra (<0.2%)
  - Asherman's syndrome (16/100,000) cases

The Outpatient Advantage

- Inpatient OR is necessary when emergent
  - Also consider with prolonged demises (>4 weeks)
  - Consider when failed medical management
- Out-patient care (clinic/ED) option for stable patients:
  - Safe
  - Convenient, simplify scheduling
  - Patient-centered Care
Comparison of EVA to MVA

<table>
<thead>
<tr>
<th>EVA</th>
<th>MVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vacuum</td>
<td>Electric pump</td>
</tr>
<tr>
<td>Noise</td>
<td>Variable</td>
</tr>
<tr>
<td>Portable</td>
<td>Not easily</td>
</tr>
<tr>
<td>Cannula</td>
<td>4–16 mm</td>
</tr>
<tr>
<td>Capacity</td>
<td>350–1,200 cc</td>
</tr>
<tr>
<td>Suction</td>
<td>Constant</td>
</tr>
</tbody>
</table>

Blumenthal et al. Contraception 2003

Manual Vacuum Aspiration: Cost analysis

- Compared “standard” D&C in OR to MVA in ER or L&D after change of treatment policy
- Gestations ≤12 weeks size
- Mean charges
  - D&C (OR): $1404
  - MVA (ED/L&D): $827
- Reduction in anesthesia charges (93%), admission charges (92%) and supplies (54%)


Manual Vacuum Aspiration: Time analysis

<table>
<thead>
<tr>
<th></th>
<th>OR D&amp;C</th>
<th>MVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedure</td>
<td>33</td>
<td>19 *</td>
</tr>
<tr>
<td>Waiting</td>
<td>7.2</td>
<td>3.5 *</td>
</tr>
<tr>
<td>Total hospital time</td>
<td>19.3</td>
<td>5.8 *</td>
</tr>
</tbody>
</table>

*p=0.01

MVA acceptability

- Randomized trial of women at <10 wks GA for elective abortion, MVA vs. EVA - compared satisfaction levels
  - No difference in:
    - patient pain level
    - satisfaction
    - physician assessment of difficulty
    - Complications
  - Significant difference in:
    - Patients “bothered by noise”
    - Physicians preferred for MVA

Dean et al., Contraception 2005

Products of Conception (POC)


Late first trimester/Second trimester Uterine Evacuation
IUFD Less common in second trimester

Uterine evacuation for fetal indications

Second trimester options

<table>
<thead>
<tr>
<th>IOL</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Surgical alternative</td>
<td>Longer inpatient hospitalization</td>
</tr>
<tr>
<td></td>
<td>Allows viewing/holding of fetus</td>
<td>Increased complications (retained placenta, infection, more procedures)¹,²,³</td>
</tr>
<tr>
<td></td>
<td>Successful autopsy more likely¹</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Experiences labor</td>
<td></td>
</tr>
</tbody>
</table>

¹ Lal AK et al, 2014; ² Bryant et al, 2011; ³ Edlow et al 2011; 4 Cowell et al 2006
Second trimester options

<table>
<thead>
<tr>
<th>IOL</th>
<th>D&amp;E</th>
<th>Hysterotomy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pros</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surgical alternative</td>
<td>Usually outpatient procedure</td>
<td>Could be performed urgently</td>
</tr>
<tr>
<td>Allows viewing/ holding of fetus</td>
<td>Shorter/faster times</td>
<td></td>
</tr>
<tr>
<td>Successful autopsy more likely</td>
<td>Lower complication rate</td>
<td></td>
</tr>
<tr>
<td>Experiences labor</td>
<td>Cost-effective</td>
<td></td>
</tr>
<tr>
<td><strong>Cons</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Longer inpatient hospitalization</td>
<td>Often precludes viewing</td>
<td>Morbid procedure</td>
</tr>
<tr>
<td>Increased complications</td>
<td>Requires experienced provider</td>
<td>Long recovery</td>
</tr>
<tr>
<td>(retained placenta, infection, more procedures)</td>
<td></td>
<td>Greater risks</td>
</tr>
</tbody>
</table>


Who chooses IOL vs D&E

Predictors of choosing D&E¹:
- Higher maternal age
- Proximity to academic center
- Earlier gestational age
- Singleton gestation
- Genetic anomaly

Qualitative themes²:
- Valued ability to choose the method
- Importance of religious beliefs
- Abortion attitudes
- Emotional coping style

IOL vs. D&E: Perinatal grief

- Comparison of grief resolution after self-selected D&E vs IOL for fetal anomalies (22 D&E, 27 IOL)
- No difference in:
  - Depression on enrollment (61.9% D&E vs. 53.8% IOL, p=0.58)
  - Depression at 4 months (23.5% D&E vs. 14.3% IOL, p=0.25)
  - Depression at 12 months (27.3% D&E vs. 20.0% IOL, p=0.70)
  - Perinatal grief scale at 4 months (74.1% D&E vs. 90.2% IOL, p=0.35)
  - Perinatal grief scale at 12 months (73.3% D&E vs. 86.4% IOL, p=0.66)


Induction regimens

**Preferred: Mifepristone 200 mg PO ➡ 24-48 hrs:**
- Miso 800 mcg PV ➡ miso 400 mcg PV/SL q 3 hrs (up to 5 doses)
- Miso 400 mcg buccally q 3 hrs (up to 5 doses)

If Mifepristone unavailable:
- Miso 400 mcg PV/SL q 3 hrs (up to 5 doses); PV better for nullips
- Load with miso 600-800 mcg PV ➡ miso 400 mcg PV/SL q 3 hrs

ACOG PB Early Pregnancy Loss

Dilation and Evacuation (D&E)

- Surgical procedure that opens the cervix and remove the pregnancy
- *Dilation and Evacuation*
  - Dilation—opening the cervix
  - Evacuation—Disarticulation and removal of fetus using forceps
- Intact D&E
### Considerations based on GA

<table>
<thead>
<tr>
<th>GA (wks)</th>
<th>Cervical dilation method</th>
<th>Procedure</th>
<th>Anesthesia</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-14</td>
<td>Misoprostol (600 mcg x 1.5 hrs)</td>
<td>D&amp;C with EVA ± Ring forceps</td>
<td>Local paracervical Local &amp; conscious sedation General anesthesia</td>
</tr>
<tr>
<td>14-19</td>
<td>Laminaria/dilapan (One set) ± Miso 1-2 day procedure</td>
<td>D&amp;E: Sopher/Bierer forceps</td>
<td>Conscious sedation General anesthesia</td>
</tr>
<tr>
<td>19-24</td>
<td>Laminaria/dilapan (Two sets) ± Miso 2-3 day procedure</td>
<td>D&amp;E: Sopher/Bierer forceps, Intact D&amp;E</td>
<td>Conscious sedation General anesthesia</td>
</tr>
</tbody>
</table>
Comparison of dilators

<table>
<thead>
<tr>
<th>MOA</th>
<th>Misoprostol</th>
<th>Laminaria</th>
<th>Lamapan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pharmacologic-</td>
<td>prostaglandin</td>
<td>Mechanical-</td>
<td>prostaglandin</td>
</tr>
<tr>
<td>Softens</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Dose</td>
<td>600 mcg PV over at least 1.5 hours</td>
<td>Depends on GA and initial exam</td>
<td>Depends on GA and initial exam</td>
</tr>
<tr>
<td>Size</td>
<td>n/a</td>
<td>2-10 mm</td>
<td>2-10 mm</td>
</tr>
<tr>
<td>Significant effect</td>
<td>45 minutes</td>
<td>6-8 hours</td>
<td>2 hours</td>
</tr>
<tr>
<td>Maximum effect</td>
<td>4 hrs</td>
<td>24 hours</td>
<td>4-6 hours</td>
</tr>
<tr>
<td>Cost</td>
<td>V. Cheap</td>
<td>Cheap</td>
<td>More costly but can be fewer needed and shorter treatment</td>
</tr>
</tbody>
</table>

How many dilators?

- Consider:
  - Gestational age
  - Fetal size
  - Anomalies
  - Parity
  - History of cervical procedures
  - Baseline exam
  - Prior vaginal vs CS deliveries

Comparison of forceps

<table>
<thead>
<tr>
<th>Ring</th>
<th>Sophers</th>
<th>Hern</th>
<th>Bierer</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-12 mm</td>
<td>13-15 mm</td>
<td>13-15 mm</td>
<td>&gt;15 mm (2 cm)</td>
</tr>
</tbody>
</table>
Anesthesia

- Local: Paracervical block 1% lidocaine ±epi, 20 cc
- Conscious Sedation: start with 2mg of versed, up to 4mg; 100 mcg of fentanyl up to 200 mcg
- General Anesthesia: Total IV anesthesia; often intubate >20-22 wks

“Standard” D&E technique

1. Remove dilators and exam
2. Speculum ± betadine
3. Paracervical block (office)
4. Tenaculum on anterior lip
5. ± Dilate cervix
6. Suction (AROM)
7. Multiple passes of forceps (US) for removal of fetus and placenta
8. Suction, Curettage, Massage
9. ± Uterotonic
10. ± IUD

“Intact” D&E technique

1. Remove dilators and examine, decide if eligible
2. AROM with hand in cervix
3. Deliver feet
4. Transect cord
5. Standard breech maneuvers
6. Decompress
7. Use forceps to remove placenta
8. Suction, Curettage, Massage
9. ± Uterotonic
10. ± IUD


**Pregnancy outcomes after D&E**

- Not a risk factor for midtrimester pregnancy loss
- Not a risk factor PTB1,2, esp with greater preoperative cervical dilation
- Hx of D&E delivered slightly earlier (38.9 vs. 39.5 weeks, p=0.001)2
  - Some evidence points to increased risk of PTB if <6 months
- No difference in birth weight2
- No difference in abnormal placentation2
- No impact on fecundity


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**Conclusions**

- Early pregnancy loss can be managed the majority of the time in the outpatient setting
- Mifepristone improves efficacy rates for expulsion across all gestational ages
- Women faced with IUFD/fetal anomalies in second trimester value option of IOL vs D&E
- D&E in second trimester is very safe with low risks

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**Questions?**