Complications from Hysteroscopic Distending Media

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“Advancing Minimally Invasive Gynecology Worldwide”
Disclosure

I have no financial relationships to disclose.

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Objective

Review how to recognize and prevent complications from hysteroscopic distending media.
Hysteroscopic Complications

- Uterine perforation
- Infection
- Premature conclusion of case
- Cervical trauma
- Hemorrhage
- Gaseous intravesation
- Excessive intravesation of distending media
Fluid Intravesation

...is the loss of uterine distending media into open uterine vessels.

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Factors to Consider in Excessive Intravesation of Distending Media

- Most critical with electrolyte free media
- Less critical with electrolyte media
- Depends on the amount.
- If not prevented and untreated it may result in death.
Problems From Uterine Distending Media

- Congestive heart failure (all media)
- Hyperammonemia (glycine)
- Coagulopathies and/or allergic reactions (dextran)
- Hyponatremia/hypo-osmolarity → death (electrolyte free media)
# Frequency of Fluid Overload

<table>
<thead>
<tr>
<th>Procedure</th>
<th>1988</th>
<th>1991</th>
<th>1993</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAGL survey</td>
<td>0.34%</td>
<td>0.14%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Submucous myoma</td>
<td></td>
<td></td>
<td>1.1%*</td>
</tr>
<tr>
<td>Endometrial ablation / resection</td>
<td></td>
<td></td>
<td>1.5%*</td>
</tr>
</tbody>
</table>

* FD Loffer Literature Review
Types of Distention Media

- **Gas:** CO$_2$
- **High viscosity fluid**
  - Dextran 70
- **Low viscosity fluid**
  - Glycine
  - Sorbitol
  - Mannitol
  - Saline / Ringers Lactate
Fluid Management

- Fluid management is required for operative hysteroscope
- Manual calculation is inadequate
  - Approximately 10% error in fluid packaging
  - Time delays
  - Nursing calculation errors
Use only in diagnostic cases
Direction of Flow Relates to Pressure

Pressure in:

Uterus
Blood Vessel

A: less
B: more
C: equal

(in fluid at rest the pressure is equal everywhere in the system)
Amount of Flow Relates to Pressure (with equal hole size)

Pressure = 2x

Pressure = 4x
Amount of Flow Relates to Hole Size (with equal pressure)
Relation Between Fluid Loss, Operative Time & Myomas

Relative Pressures
(approximate)

- Uterine distension: 50 – 70 mm Hg
- Fallopian tubes open: 55 – 110 mm Hg
- Blood pressure: 120/70 mm Hg
Fluid Delivery / Monitoring Systems

- Eyeball vs. measuring (seeing is not believing)
- Gravity vs. mechanical pumps (pressure is pressure)
Fluid Delivery / Monitoring Systems

Value of:

- Pumps – Convenience
- Monitoring – Early warning
  – Exact amounts
  – Evaluating rapidity
Choosing a low viscosity distending media
# Advantages of Bipolar and Unipolar Instrumentation

<table>
<thead>
<tr>
<th>Bipolar</th>
<th>Unipolar</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Electrical safety</td>
<td>• Commonly available in operating rooms</td>
</tr>
<tr>
<td>• Use of electrolyte distending media decrease intravesation risks</td>
<td></td>
</tr>
</tbody>
</table>
Osmolality of Distending Media

- Glycine 1.5%  200 mOsmol/l
- Sorbitol 3% - Mannitol 0.5%  178 mOsmol/l
- Mannitol 5%  280 mOsmol/l
- N S or Ringer’s Lactate  290 mOsmol/l

(Normal serum osmolality  290 mOsmol/l)
**Is Mannitol A Better Media Than Glycine?**

<table>
<thead>
<tr>
<th></th>
<th>1½% Glycine</th>
<th></th>
<th>5% Mannitol</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>pt 1</td>
<td>pt 2</td>
<td>pt 1</td>
<td>pt 2</td>
</tr>
<tr>
<td>Vol. Deficit (L)</td>
<td>2.124</td>
<td>2.448</td>
<td>3.640</td>
<td>2.735</td>
</tr>
<tr>
<td>P.O. Na (mmol/L)</td>
<td>124</td>
<td>124</td>
<td>105</td>
<td>110</td>
</tr>
<tr>
<td>Na diff (mmol/L)</td>
<td>18</td>
<td>15</td>
<td>36</td>
<td>31</td>
</tr>
<tr>
<td>Serum osmolality diff (mmol/L)</td>
<td>-13</td>
<td>-11</td>
<td>1</td>
<td>-3</td>
</tr>
<tr>
<td>Nausea &amp; vomiting</td>
<td>+</td>
<td>+</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Phillips, DR et al.  JAAGL 1997;4:567
5% Mannitol

**Metabolism**

- **Metabolism**
  - Absorption 6-10%
  - Excretion 90-94%
  - Plasma half life 15-102 min

- **Excessive intravasation**
  - Hypervolemia
  - Hyponatremia
  - Normal plasma osmolality
Cerebral Edema Following Absorption of Glycine Irrigating Solution

Intravascular half-life 85 minutes

H₂O crosses blood-brain barrier
Intravasation Increased By

- Open vascular channels
- High infusion pressure
- High flow rate
- Long operative time
Preventing Fluid Overload

- Anticipate possibility of problem
- Minimal distension pressures
- Operate quickly
- Use mannitol solution?
- Accurate intake & output
- Diuretic and kidney function
- Use of oxytocin, vasopression or GnRh agonists?
Medical Preparation

- Vasopressin 20 u/100 saline = 0.2 u/cc
- Direct intracervical injection at 4 and 8 o’clock
  - Alert anesthesiologist
  - Aspirate before injection
  - Administer 10 cc/side = 4 units
  - Assess for cardiovascular response before second injection
Randomized Comparison of Vasopressin and Placebo
Randomized Placebo Controlled Trial \( N=106 \)

<table>
<thead>
<tr>
<th></th>
<th>Vasopressin</th>
<th>Placebo</th>
<th>( P = )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood loss mL</td>
<td>20.3</td>
<td>33.4</td>
<td>(&lt;0.001)</td>
</tr>
<tr>
<td>Intravesation mL</td>
<td>448.5</td>
<td>819.1</td>
<td>(&lt;0.001)</td>
</tr>
<tr>
<td>Operating time (min)</td>
<td>31.1</td>
<td>34.1</td>
<td>(&lt;0.001)</td>
</tr>
</tbody>
</table>

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