UTERINE SOUNDING:

Is there a difference between blind and hysteroscopically-directed measurements?

Kari Lynn Purcott, MD
Department of Obstetrics & Gynecology
Kaiser Permanente Southern California
Los Angeles Medical Center

Uterine Sounding Background

CONTEMPORARY USE OF SOUNDING

- Intrauterine device (IUD) placement
- Non-resectoscopic endometrial ablation (NREA) techniques
  - Patient selection
  - Device positioning ± configuration
- Other

Uterine Sounding Background

SOUNDING PITFALLS…

1. Uterine perforation at Hysteroscopy
   - May lead to termination of procedure
2. Suboptimal/inappropriate IUD positioning
3. Nonresectoscopic endometrial ablation (NREA)
   - Inappropriate patient selection
   - Suboptimal positioning or configuration of the device
   - Perforation of the uterus with potential for thermal injury to surrounding organs
Overestimation of Length

- PERFORATION

Underestimation of Length

NovaSure® NREA Placement

Uterine length
Cavity
Cervix

Correct Placement

Potential Causes For Inaccurate Sounding

- Congenital Structural
  - Mullerian fusion/absorption anomalies

- Acquired Structural
  - Uterine leiomyomas
  - Intrauterine synechiae
  - Stenotic cervix
  - Patulent cervix
Uterine Sounding Background

CAUSES FOR INACCURATE SOUNING MEASUREMENT

ACCURACY OF BLIND SOUNING

- How accurate is blind uterine sounding?
- Would visual sounding provide more accurate results?

- Review of the literature failed to reveal any comparison of the two techniques
  - (MEDLINE Keywords: uterine sounding, perforation, uterus, uterine cavity, intrauterine device)

HYPOTHESIS

- There is a difference between blind uterine sounding and sounding obtained by hysteroscopically-directed technique
OBJECTIVE

- Primary Outcome
  - Accuracy of blind uterine sounding compared to hysteroscopic technique

- Secondary Outcome
  - Identification of factors that may influence the differences between blind and hysteroscopic sounding

METHODS

- Prospective study
- Subjects
  - elective hysteroscopic procedures
    - LAMC Operating Rooms
    - Office
- IRB-approved protocol
  - sounding standard of care
  - informed consent waived
- Preliminary results previously presented

METRICS

- Uterine length (mm) - Cervical length (mm) = Cavity length
Methods
Measurement Technique

Dilators

Blind & Hysteroscopic Sounding
Cervical Length

Methods
Measurement Technique

Blind & Hysteroscopic Sounding
Uterine Length
Methods
Measurement Technique

Methods
SAMPLE SIZE CALCULATION

- Largest study of uterine metrics reported measurements with 2 mm standard deviation
- To detect a real difference of 1 mm between techniques, with an $\alpha = 0.05$ and a power of 80%, would require 34 subjects

Methods
Statistical Methods

- Descriptive
- Correlation
  - Primary outcome by Pearson coefficient
- Linear regression for relationships to cavity type and observed pathology
RESULTS

N= 82 patients (ages: 24-82y)

<table>
<thead>
<tr>
<th>Complete Data</th>
<th>74</th>
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<tbody>
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* Perforations N=2

INDICATIONS

<table>
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<tr>
<th>Indication</th>
<th>N</th>
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<tbody>
<tr>
<td>Postmenopausal Bleeding</td>
<td>21</td>
</tr>
<tr>
<td>Irregular Bleeding</td>
<td>11</td>
</tr>
<tr>
<td>Menorrhagia</td>
<td>11</td>
</tr>
<tr>
<td>Menometrorrhagia</td>
<td>11</td>
</tr>
<tr>
<td>Endometrial Polyp(s)</td>
<td>10</td>
</tr>
<tr>
<td>Infertility</td>
<td>9</td>
</tr>
<tr>
<td>Thickened Endometrial Stripe</td>
<td>9</td>
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<tr>
<td>Other</td>
<td>15</td>
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FINDINGS

<table>
<thead>
<tr>
<th>FINDINGS</th>
<th>N</th>
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<tbody>
<tr>
<td>Endometrial Polyps</td>
<td>28</td>
</tr>
<tr>
<td>Leiomyoma (Types 0,1,2)</td>
<td>24</td>
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<tr>
<td>Normal Cavity</td>
<td>23</td>
</tr>
<tr>
<td>Adhesions</td>
<td>5</td>
</tr>
<tr>
<td>Septum/Bicornuate</td>
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<tr>
<td>Unicornuate</td>
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Results

PROCEDURES

<table>
<thead>
<tr>
<th>Procedure</th>
<th>N</th>
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<tbody>
<tr>
<td>Hysteroscopy (Diagnostic)</td>
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<tr>
<td>Polypectomy</td>
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<tr>
<td>Endometrial Ablation</td>
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<tr>
<td>Myomectomy</td>
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<tr>
<td>Adhesiolysis</td>
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<td>Metroplasty</td>
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</tr>
<tr>
<td><strong>Total</strong></td>
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Results – UTERINE LENGTH
Hysteroscopically Determined

Hysteroscope: Mean 86.5 mm (SD 22.3)

Results – CERVICAL LENGTH
Hysteroscopically Determined

Hysteroscope: Mean 46.2 mm (SD 11.9)
Uterine Length: ALL
Overestimation (perforation risk)

P = 0.01

Underestimation (suboptimal positioning risk)

Results: Uterine Length Differences

<table>
<thead>
<tr>
<th>mm</th>
<th>+</th>
<th>-</th>
<th>Total</th>
<th>%</th>
<th>Cumulative %</th>
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<td>22</td>
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<td>2</td>
<td>13</td>
<td>1.4</td>
<td>5.4</td>
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In 31% of cases the difference between techniques was at least 11 mm.
Results: Cervical Length Differences

<table>
<thead>
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<th>Range</th>
<th>Cases</th>
<th>Difference</th>
<th>Cumulative %</th>
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<td>10</td>
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<td>74</td>
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In 32.4% of cases the difference between techniques was at least 11 mm.

Discussion

- Overall Results
  - Sounded uterine measurements differed from hysteroscopically-directed measurements by greater than 5 mm over 50% of time.
  - Surprisingly, blind sounding was similarly inaccurate in both normal cavities and those with structural abnormalities.
  - Blind sounding overestimated the fundus a minimum of 6 mm in 18/74 cases; a minimum of 11 mm in 9/74 cases.

- Strengths
  - Apparently unique evaluation of blind intrauterine biometry by direct visualization.
  - Sample size provides adequate power for primary outcome.

- Weaknesses
  - Not all parameters adequately assessed:
  - Version, flexion; myoma type, location, and diameter.
  - Subgroup analysis limited by sample size.
Conclusions

- Using hysteroscopically-determined metrics, blind sounding is frequently inaccurate for the determination of uterine metrics.
- When precise measurement of these parameters is required, practitioners should consider methods other than blind sounding.

THANK YOU!

- Dr. Malcolm Munro
- Dr. Jackie Guerrero
- Raoul Burchette
- Kaiser LAMC Operating Room staff
- Kaiser LAMC residents