Novel Uterine Suture Technique for Treatment of Postpartum Hemorrhage

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Postpartum Hemorrhage (PPH)

Primarily caused by uterine atony – failure of the uterus to properly contract after birth – leading to excessive blood loss.
PPH is the *leading* cause of maternal death globally

Responsible for over 20% of all maternal deaths globally

More than 14 million women experience PPH each year
Existing Solutions

**Hayman Compression Suture**
- 2-4 sutures fixed to back and front of uterine walls

**B-Lynch Compression Suture**
- Sutures may migrate to the middle of fundus
Our solution

Reduce operation time
Limit complications
Minimally invasive
Past Work

Materials Validation
- Absorption
- Instron Testing
- SEM Image Analysis

Conclusion: They will not retain mechanical properties and will degrade in the body

Current Work

Benchtop Validation Testing
Compared prototype to B-lynch

In-Vitro Animal Testing
Tested prototype on a C-sectioned sheep uterus
**Validation Testing**

<table>
<thead>
<tr>
<th>Technique</th>
<th>Blood Flow (mL)</th>
<th>Total Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novel Compression Technique</td>
<td>100</td>
<td>3 minutes, 3 seconds</td>
</tr>
<tr>
<td>B-Lynch</td>
<td>350</td>
<td>15 minutes, 21.26 seconds</td>
</tr>
<tr>
<td>No Technique</td>
<td>1000</td>
<td>1 hour, 20 minutes, 16 seconds</td>
</tr>
</tbody>
</table>

**Graphs:**

- **B-Lynch**: Force vs. Time
- **Manual Compression**: Force vs. Time
- **Novel Compression Technique**: Force vs. Time
Future Work

Prototype Consistency
Additional reiterations will be made to make the technique more precise and reproducible.

Ex-Vivo Testing
More quantitative ex-vivo testing with new and more accurate pressure sensor mechanism.

Packaging
Further adjustments to be made.

Feasibility Test
Product will be sent to and tested at the UCI Medical Center.
New Pressure Sensor Grid

Better pressure sensor

- Provides better measurements
- 8 x 8 matrix
  - Forces will be averaged

Modeled after “Intelligent Medical Velostat Pressure Sensor Mat Based on Artificial Neural Network and Arduino Embedded System”
In-vitro Animal Testing: Compression Technique

Methods:
1. Extracted fetuses from pregnant sheep uterus
2. Created and applied novel compression technique

Observations:
1. Uterus was visibly compressed.
2. Cesarean section cut was visibly compressed.
3. Vertical strands were too long
   a. Compression on fundus was not as effective
Packaging Model
Thank you!