Novel Vascular Clamp

Economic Analysis

Table 1: Summarized cost analysis of current design and estimated full scale production of novel design.

<table>
<thead>
<tr>
<th>Item</th>
<th>Current Design</th>
<th>Estimate of Full Scale Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSRP (10% profit)</td>
<td>$1760</td>
<td>$22</td>
</tr>
<tr>
<td>Total Cost/100 Uses</td>
<td>$2260</td>
<td>$2202</td>
</tr>
</tbody>
</table>

Conclusion

- Our hypothesis that the prototype would reduce endothelial damage was supported by our results.
- The prototype's percent endothelial relaxation CI overlapped with the control's percent endothelial relaxation CI.
- This indicated no significant difference between the unclamped control and the prototype.
- Although the goals for ease of use and decrease in training time was not met with the prototype, the future changes for the clamp, combined with a survey performed on first year residents, will yield results more favorable to the novel design.

References


Max Hammond, Nadia Hussein, Neha Patel, Francis Simpson, Eric Walk
Introduction

- During many surgical procedures, blood flow through vessels must be occluded by clamps to prevent hemorrhage
- Few changes have been made to clamp designs in the last 50 years, since they achieve the goal of occlusion and damage caused is not acute enough to draw clinical attention
- However, damage to vessels may result in stenosis, occlusion, and other chronic problems with severe long-term consequences
- Surgeons must use clamps with their non-dominant hand, and current designs require extensive training time

Requirements

- Training Time – Reduce by 50%
- Device Mass – Maintain or reduce
- Vessel Damage – Reduce by at least 20%
- Occlusion of Flow – Maintain 100% occlusion for 36 hours
- Sterility – Ensure that all parts can be sterilized or are disposable
- Cost – Less than $2000 per clamp
- Profitability – Ensure that product can be made without loss

Novel Design

- Radnoti force transducer
- Powerlab data acquisition system
- Depolarized using KCl
- Confirmed viability via KCl bath
- Control with no clamping
- Clamped with a debakey clamp
- Clamped with a hydrogrip
- Rings were then tested for endothelial-dependent relaxation

Endothelial Results

Figure 1: 3D and side views of the Novel Design.

Methods

- Radnoti force transducer
- Powerlab data acquisition system
- Depolarized using KCl
- Confirmed viability via KCl bath
- Control with no clamping
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- Rings were then tested for endothelial-dependent relaxation

Survey Results

<table>
<thead>
<tr>
<th>Category</th>
<th>Preferred</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comfort</td>
<td>Debakey</td>
<td>1.49E-06</td>
</tr>
<tr>
<td>Ease of Use</td>
<td>Debakey</td>
<td>3.32E-05</td>
</tr>
<tr>
<td>Training Time</td>
<td>Novel Clamp</td>
<td>0.0814</td>
</tr>
<tr>
<td>Ingenuity</td>
<td>Novel Clamp</td>
<td>2.80E-05</td>
</tr>
</tbody>
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