Integrated Saw Guide for Redo Sternotomy

SDT 14: Felix Agbavor, Rahul Akkem, Shamayel Alroomi, Daniel Graciano, Youssef Jouichate
Advisors: Amy Throckmorton, PhD & Randy Stevens MD, PhD

Medical Need:
- 40,000 babies are born with congenital heart defects
- 25% require redo heart surgeries [1]
- Current sternum saws on market are not intended for redo sternotomies

Objective:
- Design a safe and fast saw guide for redo sternotomies

Design Input:
- Minimize sternum cut time less than 15 seconds
- Minimize deviation from centerline of the sternum, less than 2 mm
- Constraint: Create a guide track mechanism, Stryker compatible

Solution - Design:
- Bar inserted into bar tubing to create guide track
- Saw guard inserted to guide cut through center

Solution - Build:
- Saw Guard (to guide saw):
  - Provides safer access to the heart
  - Reduces anesthesia time and surgery complications
  - Create adult size version of the saw guide, Customizable (cut to fit)
  - Quicken emergency detachment by using magnetic release

Verification:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency detachment time ≤ 15 sec.</td>
<td>4.5 ± 1.3 sec. (n=15)</td>
</tr>
<tr>
<td>Cut time &lt; 15 sec.</td>
<td>Pending</td>
</tr>
<tr>
<td>Deviation from the centerline &lt; 2 mm</td>
<td>Pending</td>
</tr>
</tbody>
</table>

Impact / Future:
- Provides safer access to the heart
- Reduces anesthesia time and surgery complications
- Create adult size version of the saw guide, Customizable (cut to fit)
- Quicken emergency detachment by using magnetic release

[1] Project Heart Organization