The goal of this project is to design a new, more secure connection for Medtronic’s LP Strata Valve. This shunt helps to treat hydrocephalus, a condition where there is a buildup of cerebrospinal fluid in the brain cavity. The shunt is implanted in the lumbar region of a patient, and works by creating a pressure drop to induce a flow of cerebrospinal fluid, which is then drained into the abdominal cavity. With the current design, it is difficult to attach the lumbar catheter to the nozzle of the LP Strata valve in a controlled, dry environment, and even more difficult to do so in a slippery surgical environment.

**Overview**

The new Sharkfin connector has a much simpler assembly process than the current design.
- No suture is required
- Easy to slip catheter over the metal stylet because the outer diameter of the stylet is equivalent to the inner diameter of the catheter.
- Fewer steps to assemble the connection.

These improvements will greatly decrease the connection time, as well as greatly lower the risk of tearing to the catheter.

**Exploded View**

The Sharkfin connector notably improves the current connection method in a few key areas.
- Fewer steps to assemble
- Improves security of connection
- Decreases time to connect

**Key Components**

- **Built in Connector**
  Redesign of the current valve nozzle for the Sharkfin Connector. Interior features are conserved while exterior features are modified to improve the connection.

- **Cap**
  Functions as a strain relief and improves the security of the connection in the Sharkfin connector.

- **Metal Stylet**
  The catheter slides over this component to improve the ease of the connection.

**Testing**

<table>
<thead>
<tr>
<th>Engineering Characteristic</th>
<th>Minimum Requirement</th>
<th>Testing Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile Strength</td>
<td>700 psi</td>
<td>Catheter failed before connection</td>
</tr>
<tr>
<td>Cyclical Fatigue</td>
<td>100,000 cycles of 10% elongation</td>
<td>Passed</td>
</tr>
<tr>
<td>Leakage</td>
<td>No leak at 1 meter depth for 5 min</td>
<td>Passed</td>
</tr>
<tr>
<td>Flow Rate</td>
<td>No Change</td>
<td>No Change</td>
</tr>
</tbody>
</table>

Minimum requirements of testing were drawn from ISO 7197 Standard for shunts. All tests were passed and the design is ready for implementation.

**Conclusion**

The Sharkfin connector notably improves the current connection method in a few key areas:
- Fewer steps to assemble
- Improves security of connection
- Decreases time to connect

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This would not have been possible without Medtronic, and support from Jeff Bertrand and Stephen Laguette. A special thanks to Kirk Fields and Elliott Hawkes’ Lab team for assistance in the testing process.