Neo-Anal Sphincter Fabrication in the Rat
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Background: Cancers, diseases and accidents can lead to surgical removal of an individual’s anal sphincter. Lack of a functioning anal sphincter can greatly decreases quality of life. Current medical options include medications and dietary changes, palliative care, such as diapers, pads, and anal plugs, and the use of devices such as the magnetic anal sphincter (MAS) and the Thiersh ring. Better solutions are needed. Our long term goal is validate methods for reconstructing a neoanal sphincter from autologous skeletal muscle. The purpose of my study is to determine the functioning characteristics of the latissimus dorsi muscle during steps of neoanal sphincter construction.

Method: In a rat model, the latissimus dorsi muscle is unilaterally elevated from its native position. The muscle is either replanted to the native position or rolled into a neosphincter. After time for recovery from surgery, the latissimus dorsi muscle and the neoanal sphincter are dissected free and evaluated for contractile pressure. At final evaluation, muscle tissues are harvested for histology.

Results: Latissimus dorsi muscles of the neoanal sphincter contracted with pressure similar to the native anal sphincter. The contractile force produced by the elevated and replanted latissimus dorsi muscle with a layer of biological scaffold was very similar to the elevated latissimus dorsi muscle without a biological scaffold.

Conclusion: Isolation of the latissimus dorsi muscle for reconstruction of neosphincters developed similar pressure as native anal sphincter muscles. Elevation of muscle for subsequent sphincter construction did not significantly compromise force capacity of the muscle.
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BACKGROUND
Cancers, diseases and accidents can lead to surgical removal of an individual’s anal sphincter. Lack of a functioning anal sphincter can greatly decrease quality of life. Current medical options include medications and dietary changes, palliative care, such as diapers, pads, and anal plugs, and the use of devices such as the magnetic anal sphincter (MAS) and the Thiersh ring. Better solutions are needed. Our long term goal is validate methods for reconstructing a neoanal sphincter from autologous skeletal muscle. The purpose of our study is to determine the functioning characteristics of the latissimus dorsi muscle during steps of neoanal sphincter construction.

METHODS
In a rat model, the latissimus dorsi muscle is unilaterally elevated from its native position. The muscle is either replanted to the native position or rolled into a neo sphincter. After time for recovery from surgery, each latissimus dorsi muscle is again dissected free and contractile pressure and peak force are measured. Muscle tissues are harvested for histology.

RESULTS

<table>
<thead>
<tr>
<th>Neo-Sphincter</th>
<th>With Cells (n=9)</th>
<th>W/O Cells (n=6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non Stimulated Peak Pressure (V)</td>
<td>3.09 (0.6)</td>
<td>3.16 (0.35)</td>
</tr>
<tr>
<td>Non Stimulated Resting Pressure (V)</td>
<td>2.52 (0.56)</td>
<td>2.58 (0.48)</td>
</tr>
<tr>
<td>Stimulated Peak Pressure (mV)</td>
<td>281 (236)</td>
<td>343 (309)</td>
</tr>
<tr>
<td>Stimulated Peak Voltage needed for peak pressure(V)</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Stimulated Peak Frequency, median (Hz)</td>
<td>138</td>
<td>135</td>
</tr>
</tbody>
</table>

Values indicate mean (standard deviation).

CONCLUSION
Reconstructed neo-sphincters developed similar pressure as native anal sphincter muscles. Elevation of muscle for subsequent sphincter construction did not significantly compromise force capacity of the latissimus dorsi muscle. This model of neoanal sphincter construction is appropriate for future studies.

ACKNOWLEDGEMENTS
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