

A Better Braided Suture

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Suture materials are used extensively in orthopedic surgery for closure of wounds, repair of muscles, tendons, ligaments, joint capsules, and as tension banding of certain fractures. Multifilament sutures exhibit higher mechanical properties and tissue drag than monofilament sutures. Based on our preliminary work showing increased mechanical properties of manually braided biodegradable polymer fibers compared to unbraided controls, we propose to develop a suture braiding device to create sutures in the form of a triple helix braid with enhanced mechanical properties and high reproducibility. The device also allows optimization of the suture performance by using a combination of absorbable and non-absorbable suture materials. After looking at market and doing some background research we decided there needs to be a better way to develop a suture braided into a triple helix design. We decided to go with this design because we noticed that most braided sutures on the market today are twisted together like rope. Our goal is to design a device to make a triple helix braided suture. The device will improve on reproducibility of the suture, we want to produce the exact same suture over and over with the exact same braid angle. This device will take human error out of the equation when making the braided suture.

The selection for the design of the suture braiding machine was an arduous and detailed process. Device design and prototyping began in early October. It was soon realized that the initial design would not work. With a painstaking amount of detailed research we all came to the conclusion of a single design that has one key feature. This specific feature was missing from our initial concepts. This was, in fact, the addition of a waggler. This key feature involves an arm that translates the materials from one side of the track to the next and back again, in a figure eight pattern. The device works with a crank by hand but we have implemented the use of a stepper motor, as shown in the figure below.



Figure 1. Suture braiding machine