Novel Intracorporeal Knot Tying Device During Laparoscopic Surgery

Sara L. Lee MD MEng[1], Alexander Y Yang MSE MD[2], Megan Z Chiu MD[1], Farokh R Demehri MD[1], Heung Bae Kim MD[1]

[1]Department of Surgery, Boston Children's Hospital and Harvard Medical School, Boston, MA

[2]Department of Surgery, Massachusetts General Hospital, Boston, MA

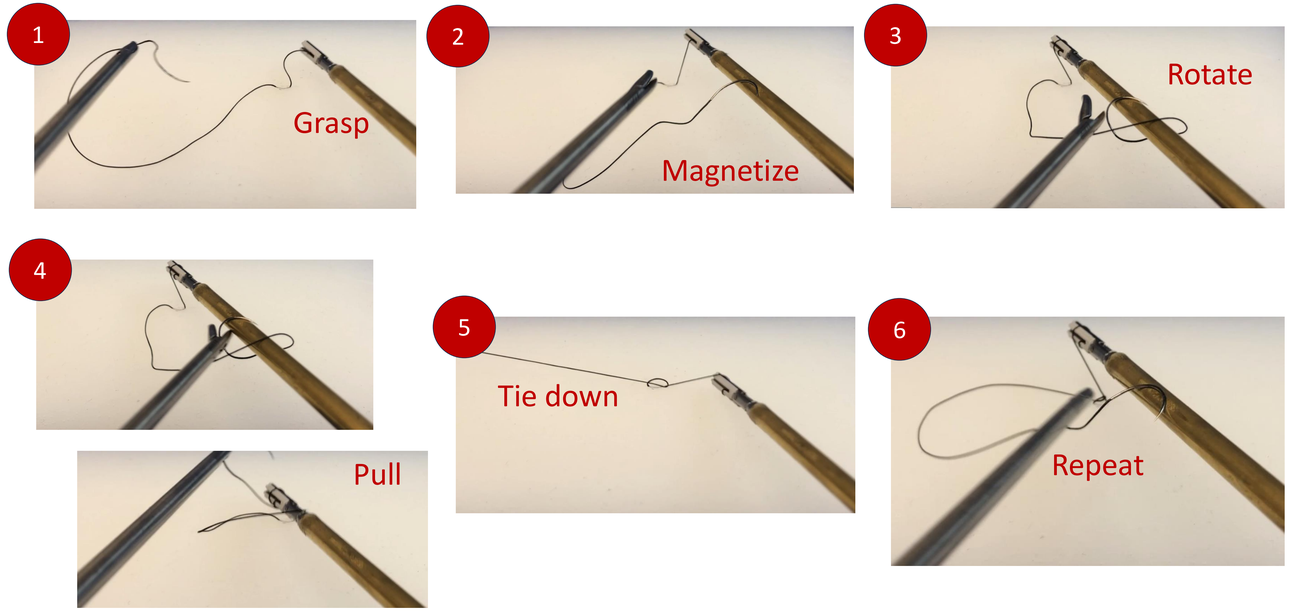
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Objectives

- Intracorporeal knot tying is a challenging technique to master in the field of laparoscopic surgery.
- Proficiency requires performing a series of technical movements in a restricted space and range of motion. In these settings, traditional knot tying is often made more challenging with poor triangulation of laparoscopic instruments. Ease and speed of intracorporeal knot tying reduces operating time significantly.
- We have developed a device that employs an established and efficient method of knot tying without the need for triangulation – the winding method – to simplify and speed up one of the most cumbersome parts of a laparoscopic case.

THE SIDEWINDER



Description



1. During laparoscopic suturing, surgeons use the instrument just as they would a traditional laparoscopic needle driver to bring the desired tissue together.
2. During knot tying, a surgeon grabs the suture tail with the device's needle clamp, places the needle end of the suture onto the device's magnetized segment.
3. Push the button trigger to spin the segment one 360-degree revolution.
4. The magnetized segment will rotate and a loop will form in the suture.
5. Finally, a simple motion to pull the suture tail through the newly created loop will easily generate a knot.
6. These steps are repeated until the desired number of knots has been tied down.

Methods

- For the initial design and proof of concept, the device was developed using a LigaSure™ Blunt Tip Open and Laparoscopic Sealer/Divider from Medtronic (Dublin, Ireland) as the skeleton.
- This was then modified using components produced with an Eden260VS 3-D printer (Stratasys, Eden Prairie, MN) to produce a fully functional device. This novel laparoscopic needle driver was created by magnetizing a short segment of a standard laparoscopic needle driver just proximal to its jaws. This magnetized segment can rotate around the axis of the needle driver shaft.

Conclusion/Future Direction

- As the field of robotic laparoscopic surgery grows, there will be less training and demand for laparoscopic skills. Intuitively, this can seem like a smaller market for laparoscopic instruments but in contrast, we support the case of increased need for laparoscopic instruments which allow ease during surgery for newer trainees who developed their skills with robotic tying.
- There is a growing market for developing more advanced laparoscopic skills for surgeons who have limited access to robotic surgery. Our novel laparoscopic knot-tying device makes the process of intracorporeal knot-tying quick and intuitive while affording surgeons the familiarity of using a conventional needle driver and sutures.