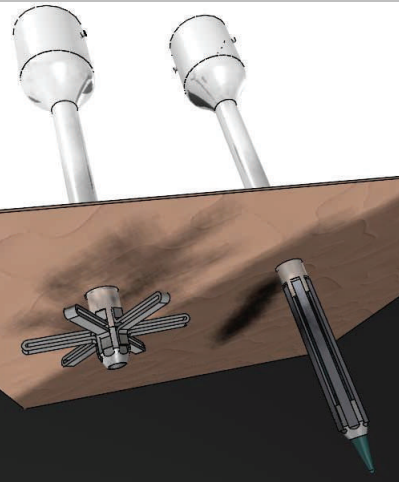




April 2008

Non-Slipping Trocar (NST) Group



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We would like to thank our mentors:

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We would like to give a special thanks to our Baylor surgical advisors:

Vadim Sherman, MD,
Stephanie Kreml, MD



This initiative is made possible by the Department of Bioengineering at Rice University.

Bioengineering Design Challenge

Laparoscopic surgery is minimally invasive abdominal surgery. Trocars are tubular instruments that are inserted into the abdomen and allow for passage of surgical instruments into the operative field during laparoscopic surgery. Approximately 2 million laparoscopic surgeries are performed in the U.S. annually and about 60,000 patients experience complications after surgery due to trocar-related incidents. The largest problem surgeons have is outward slippage, which necessitates time-consuming reinsertion which can widen incisions and cause hernias and scarring.

Appropriate Solution

The NST trocar, code named the “Artemis” trocar for the greek goddess of the hunt, features a radially expanding tip that resists slippage. Nitinol hairpins form a gripping catch and are easily streamlined for insertion with the custom obturator, which safely locks in place. As obturators are already in use by most surgical trocars, no extra steps are required by the surgeon to deploy the catch mechanism. Additionally, the profile of the catch mechanism is thin, and it will not block the field of vision of laparoscopic cameras.

Current Status

The Artemis trocar is currently in its final prototype design stage. In vitro testing in an abdominal wall model has shown that the Artemis trocar requires twice as much force as competitor trocars to dislodge from the abdomen. Further work will be done to streamline the hairpins and minimize their straightened radial diameter. Different sizes of nitinol hairpins will be tested to ascertain the most efficient balance between strength and flexibility. In the future, in vivo studies may be performed to evaluate the performance of the Artemis trocar within the body.

