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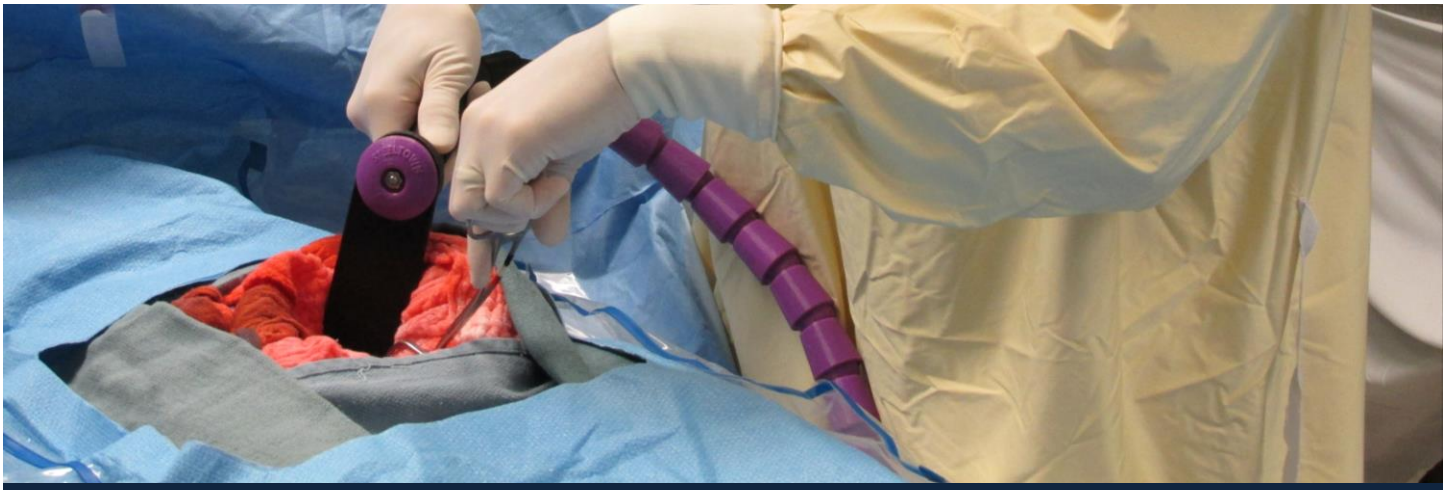

Steeltown Retractor ID: 03966

Featured Innovators: Peter Allen, MD, Jeffrey S. Vipperman, PhD, and Chris Dumm

In abdominal surgery, setting up and adjusting surgical retractor systems regularly consumes 5 to 20 minutes of operating room (OR) time, which costs about $100 per minute. After the surgery is complete, cleaning and sterilizing the system's dozens of components takes another 2 to 3 hours. Steeltown Retractor provides surgeons with rapid and precise surgical exposures while minimizing OR and overhead costs for the hospital. The system consists of two simple-to-use parts: a motorized base unit that quickly clamps to the OR table and a retractor-carrying flexible arm. The surgical team simply peels the arm from a sterile pack, snaps it onto the base, and discards it after use. The combined US and European market opportunity – 2 million open abdominal surgeries annually – is estimated at $235 million.

Technology Description

Existing retractor systems require surgeons to locate and assemble dozens of pieces in the correct order during a surgery, and adjustments require a partial teardown and rebuild of the system before the surgery can progress. Furthermore, the geometry of the retractor system limits retractor positioning, which necessitates the use of handheld retractors for hard-to-reach locations. Steeltown Retractor's flexible arm provides a simple, intuitive interface that allows surgeons to rapidly reposition surgical tools as if they were handheld retractors. Surgeons simply press a button on the arm to make it flexible, move the arm to the desired position, release the button to make the arm rigid again, and then lock the retractor in place. The motorized base unit carries out the actuation. Team-affiliated surgeons have evaluated proof-of-concept prototypes have been evaluated for form and function.

Advantages

- Simplified user experience
- Unconstrained retractor positioning options
- Minimal setup and adjustment time
- Eliminates sterilization requirements

Applications

- Surgical Retraction
- Limb Positioning

Stage of Development

Development of generation-III pre-commercial devices is ongoing. These devices will be tested through real-application use in approximately 100 abdominal surgeries starting in 2018.

IP Status

A US provisional patent application was filed on February 2, 2017.

Notable Mentions

- Coulter Translational Partnership II Program at the University of Pittsburgh ($100k)
- University of Pittsburgh Center for Medical Innovation ($45k, two rounds)
- Pitt Ventures First Gear (2nd place, $8k)

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Innovators

Jeffrey S. Vipperman, PhD

Vice Chair and Professor
Department of Mechanical Engineering and Materials Science
Department of Bioengineering
University of Pittsburgh

Dr. Vipperman has over 25 years of experience in the measurement and processing of sound and vibration signals. He has authored or co-authored over 100 technical publications, including 39 journal articles and 3 book chapters. He also holds three patents, with a fourth one filed and another in preparation. His work focuses on systems engineering with particular emphasis on energy systems and medical device development. In 2011 and 2014 he received the University of Pittsburgh Innovator Award.

Education

PhD Mechanical Engineering
Duke University

MS Mechanical Engineering
Virginia Tech

BS Mechanical Engineering
Virginia Tech

Publications

- Dumm CM, Vipperman JS, Carvajal JV, Walter MM, Czerniak L, Ruane AS, Ferroni P, Heibel MD. Thermoacoustic power sensors: Principles and prediction. The Journal of the Acoustical Society of America. 2016 Oct;140(4):3002-.
- Wang C, Pahk JB, Balaban CD, Miller MC, Wood AR, Vipperman JS. Computational study of human head response to primary blast waves of five levels from three directions. PloS one. 2014 Nov 19;9(11):e113264.
- Kuxhaus L, Schimoler PJ, Vipperman JS, Miller MC. Validation of a feedback-controlled elbow simulator design: elbow muscle moment arm measurement. Journal of Medical Devices. 2009 Sep 1;3(3):031002.
- El-Kurdi MS, Vipperman JS, Vorp DA. Design and subspace system identification of an ex vivo vascular perfusion system. Journal of biomechanical engineering. 2009 Apr 1;131(4):041012.

Peter Allen, MD

Chief Resident
Department of General Surgery
UPMC Mercy

Dr. Allen is a chief resident at UPMC Mercy training in the field of General Surgery. He received his bachelor's degree in bioengineering (with a concentration in biomechanics) from the University of Pittsburgh in 2009. He received his medical degree as a member of the 2013 charter class of The Commonwealth Medical College. Dr. Allen is receiving his training in Pittsburgh prior to serving as a general surgeon for the US Navy starting in 2018. He plans to specialize in trauma and acute care surgery.

Education

MD The Commonwealth Medical College

BS Bioengineering
University of Pittsburgh

Christopher Dumm

PhD Student
Mechanical Engineering and Materials Science

Education

BS Mechanical Engineering
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