

## Steerable Laparoscopic Cable-Ring Forceps

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Laparoscopic surgery is carried out using long and slender endoscopes and instruments that are inserted through small incisions in the abdominal wall. Current endoscopes and instruments are rigid and have the drawback that their motion is restricted to

4-degrees of freedom (DOF). This paper describes a 6-DOF steerable laparoscopic grasping forceps incorporating a novel and very simple “cable-ring” mechanism consisting out of a ring of cables surrounded by two coil springs. Methods are described to increase stiffness and to improve manual control, resulting in a well-working prototype suitable for commercialization. The paper ends with a discussion on a number of cable-ring variants suitable for challenging new steerable designs in the future.

## Shape-Memory Nitinol Tympanostomy Tube and All-in-One Introducer Device for Treatment of Otitis Media

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Otitis media is the most common bacterial illness in children, resulting in millions of office visits, antibiotic prescriptions, and surgical procedures annually in the United States. Antibiotics are commonly prescribed and has resulted in increased prevalence of antibiotic resistant strains of organisms. Additionally, patients

with otitis media are candidates for tympanocentesis, myringotomy, and tympanostomy tube placement procedures. The ability to safely and efficiently perform these procedures to accurately diagnose, identify the bacterial organism, and treat otitis media with point of care therapy is needed. A shape-memory nitinol tympanostomy tube and an all-in-one introducer device (OtoStent tympanostomy device) currently under development will allow clinicians to safely and efficiently perform myringotomy, tympanocentesis, and tympanostomy tube placement with a single disposable device.