

Multidisciplinary applications of a new single port robotics platform

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Objective of the technology or device

Single Port laparoscopic surgery, while representing a theoretical advance in minimally invasive access, was not widely accepted by the surgical community due to poor ergonomics and a difficult learning curve. Advanced surgical robotics has been proposed to solve most of these issues and perhaps broaden the application of and acceptance of single port surgeries. We present early experience with a new single port robotic system, The SPORT Surgical System by Titan Medical Inc.

Description of the technology and method of its use or application

The SPORT Surgical System, used in its advanced prototype version, combines minimally invasive single port access with robotic instruments providing an increased range of motion, precision and dexterity compared to single port laparoscopic instruments. The system comprises of two primary components, the Surgeon Workstation and the Patient Cart. The Insertion Tube houses a 3-D high-definition camera and 2 multi-articulated instruments and is introduced via a single abdominal incision (25-30mm) using traditional access port solutions. For additional instruments, a second laparoscopic port can be placed separately or via the same access port. The surgeon controls camera and robotic instruments from a remotely located open format, ergonomic workstation equipped with a flat screen LCD monitor displaying 3D high-definition image of the operative field.

Preliminary results:

The completion of critical tasks including tissue dissection, approximation, grasping, cutting and the use of monopolar as well as bipolar electro-surgery was achieved. This also included complex suturing tasks such as Nissen fundoplication and ureteral anastomosis. Function of the robot was demonstrated by performance of validated benchtop manual skills including FLS and LASST skills modules. These tests documented a rapid learning curve for all levels of experience with robot naïve as well as robot experienced surgeons. We performed several complete preclinical procedures on large animal models, including single port cholecystectomy and single port Nissen fundoplication using an intracorporeal liver retractor eliminating the need for an additional retractor port.

Conclusions/future directions

A variety of abdominal procedures can be performed with the advanced prototype SPORT Surgical System. In conjunction with the first preclinical robotic procedures performed in the field of gynecological, urological and colorectal surgery, the feasibility experience encourages further development of single port robotic surgery.