

Single Port Robotic Partial and Hemi Nephrectomy Using A Novel Single Port Robotic Platform: Pilot Study In A Pig Model

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Key words

Single access, single port, single incision robotic surgery, partial nephrectomy, SPORT, Titan Medical Inc.

Objectives

We present our initial experience performing 10 partial/hemi nephrectomies in a preclinical setting using an advanced prototype of the SPORT™ Surgical System (manufactured by Titan Medical Inc), a new single port robotic platform.

Materials and Methods

This pilot study (n=10) was conducted in male large white pigs (*sus scrofa domesticus*) to determine the feasibility and repeatability of robotic single port partial and hemi nephrectomies using SPORT Surgical System. The study was conducted at Institut Hospitalo Universitaire (IHU), a premier international training center in Strasbourg, France. The advanced prototype of the system included state of the art features of current multi-port robotic platforms such as 3D high definition visualization, multi-articulated instruments and natural handle interface. In contrast, SPORT system consisted of a single arm patient cart and open-view surgeon workstation. Specifically, in terms of robotic instruments, monopolar scissors, bipolar maryland grasper and a pair of needle drivers were utilized for the study.

Under general anesthesia, a single abdominal access was created through a 3-4cm intraumbilical incision. The pigs were placed in lateral flank position. The robotic device and an assistant port were inserted through this incision and capnoperitoneum was established. Bilateral extirpative renal surgery was performed on each pig. Specimen sizes amongst all partial and amongst all hemi nephrectomies were maintained to be similar. Results were analyzed statistically to determine any statistical trends with the data.

Results

Four male pigs underwent bilateral partial (N=4) or hemi-nephrectomies (N=6) for total of 10 procedures. There were no intraoperative complications and there was no need for an additional port except for the assistant port introduced via the same incision. Both upper and lower poles were accessed on both kidneys while successfully incorporating selective clamping of the renal hilum where necessary. The mean (range) Warm Ischemia Time (WIT) was 12.9min (4.5 to 21min) for Hemi-Nephrectomy and 8.1min (2.1 to 10.5min) for partial nephrectomy. The blood loss for all procedures

was negligible. All the critical surgical tasks (Hilum dissection and clamping, tumor excision, suturing) were successfully completed.

Conclusion

SPORT surgical system was able to perform complex surgical procedure (Single Port Partial and Hemi Nephrectomy) with the same requirements as multi-arm robotic surgery. This allows to consider new, less invasive robotic approaches.