

# Supporting evidence for robotic urological surgery

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Since the introduction of the da Vinci surgical system (Intuitive Surgical, Sunnyvale, CA, USA), the trend of minimally invasive surgery has accelerated. Recently, Intuitive Surgical launched the new da Vinci Xi platform and a prototype of a single-port surgical system. Other platforms from other robotic companies are on the horizon. The multiport surgical robotic ALF-X system (SORAR SpA, Milan, Italy) was initially introduced for gynecological surgery and was recently assessed in a preclinical animal study of robot-assisted partial nephrectomy (RPN) [1,2]. The ALF-X robot consists of a remote-controlled unit with a haptic handle, a three-dimensional high-definition monitor, an infrared eye-tracking system, and four detached robotic arms. The haptic feedback allows the surgeon to feel the force and resistance to the tissue. The surgeon can move the camera by gaze, and the system includes a large set of reusable instruments.

Other manufacturers include Medrobotics (Raynham, MA, USA), which received U.S. Food and Drug Administration clearance for the Flex Robotic System in July 2015. The Flex Robotic System provides surgeons with single-site access visualization of hard-to-reach anatomical locations. Titan Medical (Toronto, ON, Canada) is a public company based on Single Port Orifice Robotic Technology. The system utilizes a 25-mm single-access port that contains two articulating instruments and a three-dimensional high-definition camera. The Korean domestic manufacturer

Meree Company has developed the REVO I robot system. A clinical trial for the REVO I robot has been planned to supplement the global market.

Meanwhile, the Korean national evidence-based health care collaborating agency (NECA) published a preliminary report on the clinical feasibility and cost-effectiveness of robot-assisted radical prostatectomy (RARP) from a total of five high-volume centers to provide fundamental data for instituting the national health policy. Concerning oncological outcomes, there were no significant differences in biochemical recurrence or the positive surgical margin rate. Concerning functional outcomes, RARP revealed the highest continence rate of 88.7% and 95.3% achievement of complete continence at postoperative 3 months and 3 years, respectively.

Concerning cost analysis of the robotic system, with a threshold value of 30.5 million Korean won (KRW; 27,000 US dollars [USD]), a cost-effectiveness analysis of purchase among RARP, laparoscopic radical prostatectomy, and open radical prostatectomy (ORP) showed that RARP was not yet cost-effective. RARP could be cost-effective if the expenses could be reduced by 8.3 million KRW (7,400 USD). The effectiveness of the system could not offset the costs, because there was no significant difference in effectiveness among the different procedures, and the robotic cost of RARP was significantly more than that of the other procedures. However, owing to the short term of 1 year of data used for

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the cost-effectiveness analysis, long-term prospective study is necessary for further high-quality analysis.

Recently, high-quality evidence is emerging comparing robotics with its traditional counterparts. In a study of RARP, Wallerstedt et al. [3] performed a prospective comparative trial of ORP versus RARP in a Swedish group of 14 centers including a total of 2,506 patients. The study was conducted prospectively over a 3-year period with patient-reported outcome measurement. The RARP group had less perioperative bleeding and shorter hospital stays. Reoperation during the hospital stay and seeking health care for cardiovascular reasons were more frequent after ORP. Haglind et al. [4] performed a prospective, controlled, nonrandomized trial evaluating urinary incontinence and erectile dysfunction in a total of 14 centers in Sweden including 2,625 patients and concluded that RARP was beneficial in preserving erectile function compared with ORP, with no statistically significant differences in continence or surgical margins.

In an analysis of RPN, Choi et al. [5] performed a systematic review and meta-analysis of 23 studies and 2,240 patients. The authors concluded that RPN is more favorable than laparoscopic partial nephrectomy (LPN) in terms of a lower conversion rate to radical nephrectomy, more favorable renal function, a shorter length of hospital stay, and a shorter warm ischemia time. Potretzke and Bhayani [6] wrote an editorial comment on our previous article [5]. The authors mentioned the superior outcomes of RPN and the efficiency of excision and suturing. The true value of RPN is in its feasibility, accessibility, and learning curves, and the procedure competing with RPN now is not LPN, but rather radical nephrectomy, ablation, and observation.

There will be more new robotic platforms, and new prospective randomized data will become available. The

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## CONFLICTS OF INTEREST

The authors have nothing to disclose.

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