



Robotic-assisted laparoscopic radical prostatectomy

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Robotic surgical systems fall into three categories; active, semi-active or master-slave systems. Active systems have artificial intelligence allowing a procedure to be performed autonomously under the supervision of the surgeon. Semi-active systems have an automatic and surgeon driven component. Master-slave systems, on the other hand, are passive in that they allow the surgeon to control the robot from a local or remote control center. The daVinci™ robotic surgical system available at Sacred Heart Medical Center falls into the master-slave category.

The daVinci system consists of a freestanding tower and a surgeon console. The robotic tower has a camera arm and two or three instrument arms. The surgeon console provides a 6 to 10 times magnified three-dimensional image of the surgical field and an ergonomically-designed interface that provides control of instrumentation.

During the past decade, there has been widespread advancement and acceptance of laparoscopic procedures among urologists treating both oncologic and reconstructive problems. Using robotic assistance for laparoscopic procedures offers several potential advantages, particularly for radical prostate surgery, which can present a challenging learning curve.

One important benefit of robotic assistance is a vision advantage. Traditional laparoscopy has depended upon an assistant to "drive the camera" and provide a clear and steady image of the operating field. In addition, standard laparoscopic camera systems provide two-dimensional views that can pose problems with depth perception. The daVinci robotic system provides a steady tireless magnified three-dimensional view which is controlled by the primary surgeon.

Another potential benefit is that of surgical precision. Compared to standard laparoscopic instruments that allow the surgeon 4 degrees of freedom, robotic instruments provide 7 degrees of

freedom approximating the actual movements of a human hand and wrist. This feature is particularly important in radical prostate surgery as it allows for the fine maneuvers in tight confined pelvic spaces.

Potential problems with robotic assisted laparoscopy (RLRP) include a cost disadvantage. Not only is the daVinci system expensive (more than \$1 million), additional costs include yearly service contracts and the cost of instruments that have a limited lifespan. As with most forms of new technology, there is hope that prices will decrease over time. In the short term, it is also possible that shorter hospital stays may reduce the cost. In fact, several centers now list RLRP as an outpatient procedure since the average hospital stay is 23-27 hours.

In addition, it is still unknown if the greater precision and improved visualization will translate into superior outcomes. Data on potency, continence and disease margins are relatively immature. Regardless of these issues, it would appear that RLRP is gaining favor. During the past two years, the number of RLRPs done in the U.S. tripled, from 800 to 2,500. Another doubling or tripling is anticipated by the end of 2005.

At Providence Cancer Center 35 RLRP cases have been completed as of July 2005. Operative times have decreased from six hours initially to three and half hours. With further experience, times of less than three hours may be realized, more closely approximating typical open operative times of two hours. On average, blood loss appears to be less compared to open radical prostatectomy and although not yet critically evaluated, continence and margin outcomes appear to be similar to open radical prostatectomy. Finally, although our patients are not yet treated as outpatients, several of our more recent patients have been discharged within two days of admission. In conclusion, RLRP appears to be an exciting option in the surgical management of prostate cancer.