Early Experience of Robotic Assisted Laparoscopic Radical Prostatectomy

Sittiporn Srinualnad MD*, FRCS (Glasgow)*

* Division of Urology, Department of Surgery, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok

Introduction: Quality of life after laparoscopic radical prostatectomy has been a discussed issue among patients. Robotic Assisted Laparoscopic Radical Prostatectomy (RALRP) has been shown to provide the best surgical outcomes in terms of potency and continence. The program of robotic prostatectomy was started at Siriraj Hospital. Early result of the author’s experience was evaluated.

Objective: To evaluate the feasibility of Robotic Assisted Laparoscopic Radical Prostatectomy done at Siriraj Hospital.

Material and Method: From March 2007 to November 2007, 34 patients (Group 1) with localized prostate cancer underwent Robotic Assisted Laparoscopic Radical Prostatectomy (RALRP). Perioperative data was evaluated and compared to those of 34 patients (group 2) who underwent Laparoscopic Radical Prostatectomy (LRP) during the same period by the same surgeon.

Results: There were no demographic differences between the two groups. Catheterization time was significantly shortened in the RALRP group (p < 0.05). There was no major complication in the RALRP group, one LRP patient suffered bilateral ureteric injuries and required bilateral reimplantation. In pathological T2 patients of the last 17 consecutive cases, positive surgical margin rate was similar (14%) in both groups.

Conclusion: The author early experience has shown that RALRP is feasible and safe. Oncological outcome can be improved with more experience and long term follow up is needed to evaluate functional outcome including potency rate and incontinence rate.

Keywords: Radical prostatectomy, Prostate cancer, Robotic prostatectomy, Impotency

Full text. e-Journal: http://www.medassocthai.org/journal

Open radical prostatectomy has been accepted as one of the standard treatments in clinically localized prostate cancer for many decades(1). In 2006, the author has reported 56 cases of transperitoneal laparoscopic radical prostatectomy(2). Since then the number of laparoscopic radical prostatectomy is increasing dramatically at Siriraj Hospital. Subsequently, the authors have changed the approach to extraperitoneal laparoscopic radical prostatectomy. Extraperitoneal laparoscopic radical prostatectomy is as good as open retroperineal radical prostatectomy at Siriraj Hospital(3). Since 2001, Robotic Assisted Laparoscopic Radical Prostatectomy has been reported(4). The procedure has been popular among potent patients who suffered from prostate cancer. Since the author have experience in laparoscopic radical prostatectomy, the author therefore started our program of robotic prostatectomy. Early experience of Robotic Assisted Laparoscopic Radical Prostatectomy has been analyzed and reported here.

Material and Method

From March 2007 to November 2007, 34 patients (group 1) with localized prostate cancer underwent Robotic Assisted Laparoscopic Radical Prostatectomy (RALRP) at the department of surgery, Faculty of Medicine Siriraj Hospital. All patients were histologically proven as having adenocarcinoma of the prostate from biopsy. All patients gave informed consent for the procedure. Patients’ data was collected...
and compared to those 34 patients (group 2) under-
gone Laparoscopic Radical Prostatectomy (LRP) by
the same surgeon during the study period.

**Operative technique is described here**

Robotic Assisted Laparoscopic Radical Prose-
tatectomy is usually performed with the patient under
general anesthesia. Patients are placed in a dorsal supine position with 30-45° head down tilt.

The next step in the procedure is to create a
pneumo-peritoneum and the placement of the first
camera canula. The author then placed the 2nd and 3rd
8 mm working canulas 9 cm lateral to the first canula
at the level of 1 cm below the umbilicus. The 4th and
5th-12mm assisting trocars are placed at the right and
left anterior axillary line to the level of umbilicus. Finally the 6th trocar is 5 mm size, placed in the right
subcostal area.

The first step in the procedure is the dissec-
tion of the space of Retzius with the incision on the
peritoneum. The anterior surface of the bladder neck,
the anterior surface of the prostate and the endopelvic
fascia are exposed and the fatty tissue overlying these
structures is gently swept away. Often, a superficial
branch of the deep dorsal vein complex runs along the
anterior aspect of the prostate and divides at the bladder
neck into two branches. This vein is fulgurated with
bipolar forceps and divided. Then, the endopelvic
fascia is incised on both sides exposing the fibers of
the levator-ani muscle.

The bladder neck can be identified after the
removal of all of the prevesicular fatty tissue. It
overlaps the prostate in the shape of a triangle. The
dissection starts at a 12 o’clock position at the tip of
this triangle. Palpation with the forceps can help to
identify the border between the mobile bladder neck
and the solid prostate in difficult cases. The incision of
the bladder neck is enlarged from the 10 to the 2 o’clock
position, and the urethra is developed. The urethra
is incised and the deflated balloon-catheter is pulled up
into the retropubic space by the assistant under
continuous tension. The dissection is now continued
in the lateral direction, in the plane between bladder
neck and prostate.

Once, the bladder neck is completely dissected.
Care is taken to carry down the dissection in the correct
plane between the prostate and the bladder neck in
order to avoid any intraprostatic penetration. This
pitfall may occur in the case of a penetration directed
too caudally. The bladder neck is first completely
divided between at the 5-7 o’clock position; this is
then extended bilaterally by blunt and sharp dissec-
tion. After this step, the anatomical landmarks of the
ampullae and the seminal vesicles are visualized.

After complete dissection of the bladder neck,
the prostate is elevated anteriorly by the assistant. The
seminal vesicles are easily identified and completely
dissected. However, the tips of the seminal vesicles
can be left in place in order to avoid damage to the
neurovascular bundles which run in close proximity to
them. After dissection of the seminal vesicles, the
assistant holds the right ampulla and the right seminal
vesicle, the surgeon the left ampulla and the left
seminal vesicle in a craniolateral direction. With this
maneuver, a “window” is developed which reaches
from the dorsal aspect of the prostate to the prostatic
pedicles. Between these structures, the posterior layer
of Denonvillier’s fascia is incised and the prerectal fatty
tissue visualized. The posterior dissection is continued
as far as possible towards the apex of the prostate.

(If nerve sparing laparoscopic radical pros-
tatectomy is performed, the lateral prostatic fascia is
incised at the antero-lateral surface of the prostate gland
prior to the posterior dissection. During the posterior
dissection care must be taken not to injure the neuron-
vascular bundles by avoiding using heat of any kind
and stay in the middle with medial to lateral dissection.
Using this principle the neurovascular bundles should
can be left in place in order to avoid damage to the
prostate gland and urethra distally.)

Puboprostatic ligaments are divided sharply.
After this step, the urethra and the dorsal vein complex
can be easily visualized at the level of the prostatic
apex. The prostate is now retracted caudally by the
assistant for good access to the Santorini plexus. The
Santorini plexus is ligated with 0 Vicryl by selective
passage of the needle underneath the plexus from right
to left.

The urethra is sharply divided at the apex.
Coagulation of the urethral stump is to be avoided in
order to prevent damage to the external striated sphinc-
ter. In case of minor bleeding in this area, the CO2
pressure can be increased temporarily to 16-18mmHG.
For creation of the urethra-vesical anastomosis, the
author uses a running suture with 3-0 monocryl double
RB-1 needles tying ends together. The posterior layer
is completed first and the catheter was inserted into
the bladder. The anterior layer is then completed.

The water-tightness of the anastomosis is
finally checked by filling the bladder with 200 ml sterile
water. At the end of the procedure, a Jackson drainage
catheter is placed into the retropubic space.
LRP was performed by the technique as previously described by the author\(^3\)

Cystography was performed on post-operative day 7 and a urethral catheter is removed if there is no leak of contrast media from urethro-vesicle anastomosis. Peri-operative data, operative results, clinical outcomes and complication were analyzed. Data of the two groups were compared by t-test. The p-value of < 0.05 was considered as statistically significant difference.

### Results

Of 34 patients who underwent RALRP, 1 patient had previous transurethral prostatectomy and 24 patients underwent RALRP with nerve sparing procedure.

The mean ages of the patients were 67.1 ± 6.5 years and 68.6 ± 7.7 years in the RALRP group and the Laparoscopic Radical Prostatectomy (LRP) group, respectively. Mean PSA was 14.4 ng/ml and 13.4 ng/ml in RALRP and LRP groups, respectively. In the RALRP group the average operative time was not significantly longer than in the LRP group (239.4 ± 107.4 minutes in RALRP and 226.5 ± 64.2 minutes in LRP, p > 0.05). Average blood loss was not much reduced in RALRP compared to those of LRP [(657.4 ± 319.1) ml vs. (772 ± 291.6) ml, p = 0.57]. Transfusion rate was not much different between the two groups (26.4% and 29.5% in group1 and group 2, respectively. Mean catheterization time was shorter in RALRP group [(7.6 ± 2.8) days vs. (8.8 ± 3.1) days, p < 0.05]. Median hospital stay was not different between the two groups at (6.9 ± 2.0) days and (8.0 ± 2.8) days in RALRP and LRP groups, respectively. Mean prostatic weight was slightly higher in LRP than in RALRP, but it did not reach statistically significant level (54.7 ± 29.9 gm in LRP and 47.0 ± 26.3 gm in RALRP). All data is shown in Table 1.

Extra-prostatic disease was found 41% in RALRP but 50% in the LRP group. In pathological stage T2, surgical margin was positive at a rate of 11.8% (2/17) in LRP but was slightly higher in RALRP at the rate of 30% (6/20). However, in the last 17 consecutive cases the surgical margin positive rate was similar in the two groups with 14.2% and 14.3% in LRP and RALRP groups, respectively (Table 2).

Table 3 shows the early result of continence (pad free) rate at 1 month. There was no difference among the two groups (29% vs. 15%, in RALRP and LRP, respectively).

Table 4 shows complications in both groups. In the LRP group: one case of bilateral ureteric injury required bilateral reimplantation; one case of urinary tract infection (UTI); one patient with urinary retention after catheter removal; one case of pulmonary embolism; and one case of ureteric injury.

### Table 1. Shows mean varies of PSA, Blood loss, Catheter time, Hospital stay in both groups

<table>
<thead>
<tr>
<th></th>
<th>RALRP (n = 34)</th>
<th>LRP (n = 34)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>67.1±6.5</td>
<td>68.6±7.7</td>
<td>0.34</td>
</tr>
<tr>
<td>PSA (ng/ml)</td>
<td>14.4±17.8</td>
<td>13.4±12.4</td>
<td>0.40</td>
</tr>
<tr>
<td>IPSS</td>
<td>11.4±6.9</td>
<td>12.7±7.4</td>
<td>0.95</td>
</tr>
<tr>
<td>SHIM</td>
<td>16.1±6.5</td>
<td>10.0±7.8</td>
<td>0.22</td>
</tr>
<tr>
<td>OR time (minutes)</td>
<td>239.4±107.4</td>
<td>226.5±64.2</td>
<td>0.30</td>
</tr>
<tr>
<td>Blood Loss</td>
<td>657.4±319.1</td>
<td>772.1±291.6</td>
<td>0.57</td>
</tr>
<tr>
<td>Prostatic weight (gram)</td>
<td>47.0±26.2</td>
<td>54.7±29.9</td>
<td>0.19</td>
</tr>
<tr>
<td>Catheter time (day)</td>
<td>7.6±2.8</td>
<td>8.8±3.1</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Post operation stay (day)</td>
<td>6.9±2.0</td>
<td>8.0±2.8</td>
<td>0.06</td>
</tr>
</tbody>
</table>

Note: p-value by t-test

IPSS: International prostatic symptoms scores
SHIM: Sexual health inventory for men

### Table 2. Shows pathological results in both groups

<table>
<thead>
<tr>
<th></th>
<th>RALRP (n = 34)</th>
<th>LRP (n = 34)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extraprostatic disease</td>
<td>41.2%</td>
<td>50.0%</td>
</tr>
<tr>
<td>Surgical margin positive in pT3</td>
<td>35.7%</td>
<td>70.6%</td>
</tr>
<tr>
<td>Surgical margin positive in pT2</td>
<td>30.0%</td>
<td>11.8%</td>
</tr>
<tr>
<td>Surgical margin positive in pT2 (last 17 consecutive cases)</td>
<td>14.3%</td>
<td>14.2%</td>
</tr>
</tbody>
</table>

### Table 3. Shows continence rate at 1 month in both group

<table>
<thead>
<tr>
<th></th>
<th>RALRP</th>
<th>LRP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continence Rate at 1 month (no pad require)</td>
<td>29%</td>
<td>15%</td>
</tr>
</tbody>
</table>

### Table 4. Shows peri-operative and immediated post-operative complications

<table>
<thead>
<tr>
<th></th>
<th>RALRP (n = 34)</th>
<th>LRP (n = 34)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UTI</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Urinary retention after catheter removal</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Pulmonary emboli</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Ureteric injury</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>
retention after catheter removal on post-operative day 8; three cases of UTI; and one case of pulmonary emboli. In the RALRP group there was one case of urinary retention after removal of the urethral catheter. There was no open conversion in both groups.

Discussion

Robotic Assisted Laparoscopic Radical Prostatectomy (RALRP) was firstly reported in 2001(4). With the use of three-dimension view and endo-wrist technology, RALRP is comparable to the value of conventional laparoscopic radical prostatectomy(5). Patients who undergo RALRP can gain benefit of minimally invasive surgery. The recent developed surgical techniques provide a good oncological control with excellent functional outcomes(6-12). The largest cohort study has shown that 5-year biochemical recurrence of PSA was 2.3%. Median duration of incontinence was 4 weeks; 0.8% of patients had total incontinence at 12 months. The intercourse rate was 93% in men with no preoperative erectile dysfunction(13). With experienced surgeons, the complication rate was considerably low(14).

In the RALRP group of the present study, positive surgical margin rate was 30%, which is higher than the author’s experience in conventional laparoscopic radical prostatectomy(3). However, of the last 17 consecutive cases the positive surgical margin rate had been reduced to 14.3%, which was in the same range of positive marginal rate of the LRP group. This is probably due to the author’s early experience in recognizing the tissue plan without tactile sensation using the new approach of the robotic surgery. Transfusion rate was too high compared to other world series(7,15,16). However, there was no major complication, and no conversion of RALRP to either open prostatectomy or laparoscopic prostatectomy. Complication rate and operative time can be reduced with experience in laparoscopic prostatectomy prior to RALRP. This has been shown in the recent study from the USA(15). Oncological outcome is affected by the experience of robotic prostatectomy. Positive surgical margin rate can be reduced after approximately 30 cases of robotic prostatectomy(17). To gain a better functional outcome one needs to gain experience of more than 150 cases of robotic prostatectomy(18).

RALRP appears to offer a significant benefit to laparoscopically naive surgeons with respect to learning curve when compared to laparoscopic radical prostatectomy. This, however, comes at an increased cost(16,19-22). At Siriraj Hospital, the cost of RALRP is approximately 2-2.5 times more than that of laparoscopic radical prostatectomy. Therefore, more cases are required to make use of the robotic machine efficiently.

Conclusion

In the present study, Robotic Assisted Laparoscopic Radical Prostatectomy is feasible. The surgical technique has been improved in order to match with oncological outcome of those of conventional Laparoscopic Radical Prostatectomy. A long term study comparing nerve-sparing laparoscopic radical prostatectomy to robotic assisted laparoscopic radical prostatectomy is required to access quality of life after radical prostatectomy.

References


ประสบการณ์แรกเริ่มของการผ่าตัดต่อมลูกหมากโดยใช้หุ่นยนต์ช่วยผ่าตัด

สิทธิพร ศรีนวลนัด

บทนำ: คุณภาพชีวิตหลังจากการผ่าตัดต่อมลูกหมากเพื่อการรักษาเม็ดมะเร็งนั้นเป็นสิ่งที่สำคัญ และได้รับการวิพากษ์วิจารณ์ในผู้ป่วยมะเร็งต่อมลูกหมาก การผ่าตัดต่อมลูกหมากโดยใช้หุ่นยนต์ช่วยผ่าตัดนั้นสามารถช่วยให้ผู้ป่วยมีคุณภาพชีวิตได้มากกว่าอย่างทางกายภาพและสภาพจิตใจ จากการผ่าตัดด้วยหุ่นยนต์ช่วยผ่าตัด ที่โรงพยาบาลศิริราชโดยไม่ทำผ่าตัดเองและต่อมลูกหมากโดยใช้หุ่นยนต์ช่วยผ่าตัด และผลของการรักษาได้ถูกนำมาวิเคราะห์และแสดงในรายงานฉบับนี้

วัตถุประสงค์: ศึกษาถึงความเป็นไปได้ของการรักษามะเร็งต่อมลูกหมากโดยใช้หุ่นยนต์ช่วยผ่าตัด ที่คณะแพทยศาสตร์ศิริราชพยาบาล มหาวิทยาลัยมหิดล

วัสดุและวิธีการ: ระหว่างเดือนมีนาคม พ.ศ. 2550 ถึงเดือนพฤศจิกายน พ.ศ. 2550 ผู้ป่วยมะเร็งต่อมลูกหมากในระยะเริ่มต้น จำนวน 34 คน ได้รับการผ่าตัดต่อมลูกหมากโดยใช้หุ่นยนต์ช่วยเหลือ (กลุ่มที่ 1) ของชุมชนการผ่าตัดต่อมลูกหมาก และผลของการผ่าตัดในระยะเริ่มต้นโดยถูกนำมาวิเคราะห์และเปรียบเทียบกันกับกลุ่มที่ 2 จำนวน 34 คน ที่เข้ารับการผ่าตัดต่อมลูกหมากโดยการด้วยกล้อง (กลุ่มที่ 2) โดยศัลยแพทย์ท่านเดียวกัน

ผลการศึกษา: ไม่พบว่ามีความแตกต่างกันระหว่างข้อมูลพื้นฐานของการผ่าตัดทั้ง 2 กลุ่ม ระยะเวลาใส่สายยางในท่อปัสสาวะจะสั้นกว่าในกลุ่มที่ใช้การผ่าตัดโดยใช้หุ่นยนต์ช่วยเหลือ (p < 0.05) ไม่พบว่ามีผลการต่อเนื่องที่สำคัญในกลุ่มที่ใช้หุ่นยนต์ช่วยเหลือ พบมีผู้หญิง 1 คน ที่รับการด้วยกล้องมีการหนีกลับทางตอนที่จับเป็นต้องใช้การฝังท่อใหม่ นอกจากนี้ยังพบในกลุ่ม T2 ตรวจพบเซลล์มะเร็งชั้นขอบจำนวน 14% ในกลุ่มที่ 2 กลุ่ม

สรุป: จากประสบการณ์ในระยะเริ่มต้น พบการผ่าตัดต่อมลูกหมากโดยใช้หุ่นยนต์มีความปลอดภัยและสามารถทำได้ อย่างไรก็ตามเทคนิคการผ่าตัดต้องเตรียมการพยาบาลเพิ่มเติม เพื่อให้ได้การควบคุมมะเร็งที่ดีขึ้นกว่าระยะเริ่มต้น นอกจากนี้การติดตามผู้ป่วยในระยะยาวคือความจำเป็นที่จะประเมินถึงสภาพจิตใจของผู้ป่วย ทั้งระยะเริ่มต้น การติดตามผู้ป่วยในระยะยาวมีความจำเป็นที่จะประเมินถึงสมรรถภาพทางเพศ ที่มีการกลั้นปัสสาวะไม่ได้หรือยังไม่ได้กลั้นปัสสาวะในผู้ป่วยเหล่านี้