

# Comparison of Robot-Assisted Laparoscopic and Mini-Laparotomy Radical Prostatectomy in Prostate Cancer Treatment in Taiwan

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**Abstract:** The incidence of prostate cancer in Taiwan has increased in recent years, possible because of better detection with screening methods, such as the measurement of prostate-specific antigen (PSA) levels, transrectal ultrasonography, and magnetic resonance imaging. Most of the cases that are diagnosis early are operable and were, therefore, treated surgically. Historically, open radical prostatectomy (ORP) is the standard procedure to treat those patients surgically. However, as the robotic machine comes out, there is another option to treat localized prostate cancer. In this study, we retrospectively to compare the open radical prostatectomy and robot-assisted laparoscopic prostatectomy. Thirty three patients received mini-laparotomy radical prostatectomy (MRP), which is a new technique in our hospital and 27 patients received robot-assisted laparoscopic radical prostatectomy (RLRP). The days of hospital stay of MRP and RLRP were ten and eight days respectively. As we compared the results of the operation time, blood loss, catheterization's duration, and length of hospital stay, and cost, we conclude that open radical prostatectomy should not be given up in the developing country. Those young urologists who want to learn the robotic laparoscopic surgery techniques should have the basic training of open radical prostatectomy.

**Keywords:** Prostate cancer, robotic laparotomy, mini-laparotomy, open surgery, radical prostatectomy.

## INTRODUCTION

Prostate cancer has been rapidly increasing in Taiwan in the past years. Many years ago, we went to open radical prostatectomy only for such localized diseases. As the new techniques and instruments emerged, we developed a new technique of mini-laparotomy radical prostatectomy [1], and studied robot-assisted laparoscopic surgery. Owing to the high cost and effective benefits, robot-assisted laparoscopic prostatectomy is not a quite common procedure in this developing country. We have to ask the patients to shift to private sector if they prefer robot-assisted laparoscopic surgery. As we know that RLRP is known to dramatically decrease the complications of surgical procedure, such as bleeding, infection, and even the length of stay [2]. However, urinary incontinence and surgical positive surgical margin are still challenging in RLRP. As many people in this country cannot afford to pay the cost of RLRP, we prefer the open surgery should remain as a standard procedure to treat he patients. The aim of this study is to evaluate and compare the outcomes of open and laparoscopic radical prostatectomy. We take it for grant that only well experienced urologists in both surgical techniques will be fit to treat patients with localized prostate cancer.

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## MATERIALS AND METHODS

The Institutional Review Board of Chang Gung Memorial Hospital approved this study for the Protection of Human Subjects, and informed consent was obtained from each patient. All the cases were evaluated retrospectively. In addition, this is neither a randomized nor single/double-blinded studies. The study was carried out between January 2002 and December 2009. Baseline characteristics of both groups are shown in Table 1.

**Table 1. Patient Demographics in MRP and RLRP**

|                            | MRP             | RLRP            | P Value |
|----------------------------|-----------------|-----------------|---------|
| No. of pts                 | 33              | 27              | NA      |
| Age (y/o)                  | 47-74 (mean 64) | 60-75 (mean 68) | 0.09    |
| PSA (ng/ml)(mean)          | 16.8            | 22.1            | 0.08    |
| Prostate sizes (mean)      | 82 cu cm        | 70 cu cm        | 0.06    |
| Gleason score (mean)       | 7.4             | 7.0             | 0.09    |
| Operation time (hours)     | 3.6             | 6.3             | 0.04    |
| Blood loss (cc)(mean)      | 1200            | 280             | 0.03    |
| Hospital stay (days)(mean) | 10              | 8               | 0.08    |
| Catheterization's duration | 14              | 14              | 0.08    |
| Costs                      | USD\$300        | USD\$5,000      | 0.02    |

NA= nothing applicable, NHI=National Health Insurance.

Before the introduction of robotic laparoscopic instruments, most of the patients with localized prostate cancer with informed consent were treated with mini-laparotomy radical prostatectomy, which was performed via an eight-centimeter lower midline incision and a Book Walter retractor for surgical assistance. There were thirty three patients with an age range of 48-75, mean age of 64. All the patients received general and urological examinations such as physical examination, digital rectal examination, urine analysis, and transrectal ultrasound of prostate. Blood, biochemistry and prostate-specific antigen (PSA) were also checked. Imaging studies included chest radiography, bone scan and magnetic resonance imaging. The means of PSA and gleason score are 16.8 ng/ml and 7.4 respectively. The patients have joined the National Health Insurance and need to pay 10% of the balance if he went to the open surgery, which costs them about USD\$300.

With the introduction of robot assisted laparoscopic prostatectomy, twentyseven of the patients with prostate cancer enrolled the program. The patients' age is from 60 y/o through 75 y/o with a mean age of 68. The means of PSA and gleason score are 22.1ng/ml and 7.0 respectively. They also had the same studies as the above patients. Of course, robot surgery is an expensive one and all the patients must sign consent to shift to private sector. Patient has to pay about USD\$5,000 for the robot-assisted laparoscopic radical prostatectomy (RLRP). At that time, this robotic machine is the second one that it has been introduced to our country. Before that, the consultant has been assigned to go abroad to receive the special training for robotic surgery 6 months. Also, this is the same urologist who treated the patient with open radical prostatectomy.

### Statistical Analysis

Statistical analysis was performed using a commercially available data analysis package (SPSS). Analysis of variance was used for testing numeric data. For categorical data, the chi-square test was utilized. A-sided p-value of less than 0.05 was considered statistically significant.

### RESULTS

The number of patients in MRP is somewhat larger than that of RLRP. Those patients were not randomized selected. As the introduction of the robotic machine, the number of patients went to open surgery decreased dramatically. The number of patients went to the RLRP increased. However, at that time, our hospital did not completely discontinue the open surgery since patients who opted for RLRP had to be shifted to the private sector. The cost of the ORP can be claimed from National Health Insurance. Although some patients in the ORP group were younger than those in the RLRP group, there was not statistically significant intergroup difference between the ages. There was no statistically significant intergroup difference in the PSA levels. The table shows that the Gleason scores of both groups were similar, which, we think, did not influence the outcome of either group.

The operation time for RLRP was almost double of that for MRP, and this difference was statistically significant. It is conceivable that the operator may require some time to learn to operate the new machine. The operation time of

MRP has not changed much to date, but the operation time of RLRP has shortened dramatically recently, and this reduction is probably associated with the learning curve for operating a new machine. The blood loss during MRP was about 4 times more than that during RLRP, which indicates that blood loss is a major problem with MRP. The durations of hospital stay among patients who received MRP and RLRP were 10 and 8 days, respectively, and the difference between these values was not statistically significant. There were only 3 cases (11%) with a positive surgical margin and 5 cases (18%) with incontinence after RLRP, while there were 4 cases (15%) with a positive surgical margin and 6 cases (20%) with incontinence after MRP. The intergroup differences between these values were not statistically significant. In addition, the duration of catheterization in both groups was the same.

### DISCUSSION

In our hospital, we developed a new technique of mini-laparotomy, namely, minilaparotomy radical retropubic prostatectomy, for treating prostate cancer<sup>1</sup>. Satisfactory continence was achieved in 80% of the patients. 85% of patients revealed a prostate-specific antigen at a serum concentration of less than 0.2 ng/ml. With this technique, the patients can be mobilized quickly. Many patients cannot afford to pay for the use of the robotic machines; however, treatment of patients with low income is one of our major concerns. Sadri *et al.* [2]. emphasized that ORP is still the gold standard procedure, but the employment of RLRP should be based on each individual patient's comorbid medical conditions. In our study, we found that not only the medical conditions but also the patient with low income is our consideration, especially in the developing country. Peña *et al.* [3]. suggested that the gradual incorporation of laparoscopic surgery has led to decreased hospital stay and reduced the learning curve for surgeons. However, the learning curve associated with the use of the robotic machine is still very steep. We have some robotic surgical cases shifted to open surgery. That is one of our major concerns that the technique of open surgery should be maintained. Because the technique of robot-assisted surgery is less invasive, the hospital stay and duration are shortened. In addition, robot-assisted surgery is justified for high-risk patients, but low-risk patients should also be evaluated for open surgery [4, 5]. Because it is understood that younger patients will better tolerate the open surgery, robot-assisted surgeries will be more suitable for geriatric patients. In our study, we have not divided the patients into high- or low-risk groups. For every 30 cases of RLRP, vesicourethral anastomosis time and postoperative stays were significantly shorter than those after ORP. However, the incidence of surgical margin in pT3 prostate cancer was not significantly reduced. As we also found the same problem, accumulated data from more cases is required in order to decrease the sequela of RLRP. Aside from meta-analysis, we do emphasize that it is not easy for us to accumulate the data of robotic surgery as the same as the modern country in a single hospital. A learning curve of more than 100 cases is required to decrease the positive surgical margin in pT3 tumors [6].

We do believe that no matter how high or low PSA levels will not affect the outcome of the results, but a high PSA level might indicate a larger prostate size, and therefore, a

highly vascularized prostate. Patients in MRP group had larger prostate although it is non-significant. It is understood that bigger prostates will have more blood loss. Men undergoing minimally invasive radical prostatectomy versus radical retropubic prostatectomy experienced shorter lengths of stay, fewer respiratory and miscellaneous surgical complications and strictures, and similar postoperative use of additional cancer therapies. However, these patients did experience more genitourinary complications, incontinence, and erectile dysfunction [7, 8]. Robot-assisted radical prostatectomy offered the benefits of a minimally invasive operation with less blood loss, shorter catheter time and hospital stay, and earlier continence. Although the data in this study did not support these findings, men undergoing RALP seem, in our experience, to have a greater likelihood of positive surgical margin(s) than those undergoing MRP. This may be because of the intrinsic limitations of the robotic machine. Our rate of incontinence was found non-significant. It might be due to the immature technique of robotic surgery.

The neurovascular bundle is not easily controlled in RALP. The study by Carlsson *et al.* [7]. showed that RALP is associated with not only less blood loss and a smaller decrease in hematocrit but also with a decreased need for transfusion. Our study also had a similar result although the success of RLRP was still based on initial training. Although our catheterization's duration and hospital stay were the same. It is feasible that the better result of robotic surgery will be achieved. Robot-assisted radical prostatectomy offered the benefits of a minimally invasive operation with less blood loss, shorter catheter time and hospital stay, and earlier continence [9]. In Long-term results of retropubic radical prostatectomy, the total, corrected and relapse-free 5 and 10 years survival was 90%, 95%, 65% and 84%, 91%, 55% respectively [10]. On the other hand, the 3-year biochemical recurrence-free survival rate was similar in both groups [11].

In conclusion, data of our initial experience with robotic laparoscopic radical prostatectomy were encouraging. However, much more experience was needed to decrease the caveats. RLRP offers the benefits of a minimally invasive operation with less blood loss, shorter catheter time and hospital stays, and earlier continence. Therefore, it has become the preferred surgical option in some institution. In

some countries, the patient paid less in robotic surgery but they have to wait on schedule at a long time. Different countries have different medical insurance schemes and policies. Because of the high costs involved in using robotic machines, it is too early to say that robot-assisted radical prostatectomy will replace the MRP in our hospital. Most importantly, the decision to conduct any surgical technique should be based on each patient's modalities and the policy of the country. Although many series are mature, enough to demonstrate the safety, efficiency and reproducibility of the procedure, as well as oncological and functional outcomes comparable to its open counterpart, further retrospective non-randomized studies comparing both surgical techniques are required in order to impart more conclusions that are definitive.

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