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Oncologic, Functional, and Cost Analysis of Open, Laparoscopic, and Robotic Radical Prostatectomy

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Abstract

Context: Although open radical retropubic prostatectomy (ORRP) remains the gold standard, the past years have seen a rise in both laparoscopic radical prostatectomy (LRP) and robot-assisted radical prostatectomy (RARP), and many patients seem to prefer the so-called minimally invasive procedures despite insufficient data demonstrating superiority over the established standard (ORRP).
Objective: This article seeks to review the most recent data on a variety of aspects of the different techniques for performing prostatectomies, such as cost, oncologic outcomes, continence, quality of life, and marketing and propaganda as well as the learning curve for each.
Evidence acquisition: A search of the most recent literature was performed using PubMed, and data from lectures and presentations given at international conferences were used.
Evidence synthesis: The review showed that, overall, LRP and RARP outcomes have not proved superior to ORRP outcomes or resulted in anticipated benefits to patients. In addition, current data seem to suggest that results of any of the procedures depend more on the surgeon's ability than on the approach, with rates of blood loss, positive surgical margins, incontinence, and erectile dysfunction varying widely from surgeon to surgeon with all three techniques. The aggressive marketing associated with RARP has also led to significantly higher rates of dissatisfaction and regret in patients.
Conclusions: Considering the evidence, ORRP remains the gold standard in radical prostatectomies. Moreover, although the differences among major outcomes are minor and associated with shorter lengths of stay, the costs associated with LRP and RARP are significantly higher than with ORRP. In the absence of solid scientific evidence, patient education, and counselling are crucial parts of the decision-making process, during which patients will opt for one treatment over another.

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1. Introduction

Since the beginning of prostate-specific antigen (PSA) screening in the United States, the number of men diagnosed with and treated for localised prostate cancer (PCa) has increased sharply. In keeping with this rise, radical prostatectomy (RP) has become an increasingly performed procedure and has been the gold standard for the surgical approach in addition to other treatment options such as brachytherapy or external-beam radiation therapy (EBRT) with or without hormone therapy, cryotherapy, and high-intensity focused ultrasound. Although open radical retropubic prostatectomy (ORRP) has been the gold standard for surgical treatment, recent years have shown a rise in both laparoscopic RP (LRP) and robot-assisted RP (RARP), and these procedures have become the standard of care at centres worldwide. Many patients seem to prefer the so-called minimally invasive procedures despite insufficient data demonstrating superiority over the established standard (ORRP).

Over the past decade, there has been a significant amount of discussion on the available methods for treating locally confined PCa, resulting in a statement from the American Urological Association recommending that "patients with newly diagnosed, clinically localised prostate cancer should be informed of all commonly accepted treatment options" [1]. Although there have been several modifications and improvements in technique, the mainstay for the surgical treatment of PCa has been RP since Hugh Hampton Young performed the first perineal prostatectomy in 1905 [2]. However, the inconsistency in ORRP outcomes, the establishment of laparoscopy in the urologic armamentarium, and the growing success of less invasive treatment alternatives such as brachytherapy in PCa accelerated the development of LRP [3]. In addition to the conventional advantages of minimally invasive surgery, the LRP technique was believed to reduce blood loss as well as shorten operating room times and hospital stays while attaining oncologic and functional outcomes similar to ORRP. Despite these advantages, LRP proved to be a complex procedure constrained by two-dimensional visualisation, a counterintuitive nature that led to a steep learning curve, and limited ergonomics [4]. Moreover, LRP requires advanced laparoscopic skills to manoeuvre rigid laparoscopic instruments that are fixed at the skin level by trocars, resulting in an overall reduction in degrees of freedom for dissection and suturing compared to open surgery [5].

To overcome some of these limitations, the da Vinci Surgical System (Intuitive Surgical, Sunnyvale, CA, USA) was introduced to facilitate a laparoscopic approach to RP. In early 2000, the first RARP procedure was performed using the da Vinci Surgical System [3]. Using this technology, which provides a three-dimensional view of the operative field and jointed laparoscopic instruments that mimic the movements and dexterity of the human wrist and hand, it was hoped that the robot could achieve further reductions in operating time and hospital stay. Notably, the emergence of RARP made laparoscopic dissection technically easier, shortening learning curves and creating widespread patient and surgeon interest in minimally invasive prostatectomy. Accordingly, robot-assisted surgery rapidly gained popularity among urologists. Lee states that approximately 60% of all RPs performed in the United States in 2007 were performed using robotic assistance [6]. Each year, a greater number of urologists in both academic and private practice settings seeks to obtain robotic training.

Regardless of these advances, there remains minimal consensus regarding the optimal treatment for men with localised PCa. This review summarises the prominent features of each surgical approach to RP in the hopes of better defining the management of localised PCa for both patient and surgeon-specific care.

2. Cost

Although the incidence of PCa has steadied in the PSA era, the costs associated with treatment have been escalating, making the comparison of the different approaches to RP a relevant point of discussion. Considering all costs involved in surgery, including possible shorter hospital stays, RARP is far more expensive than traditional ORRP [7]. Purchasing and start-up costs for the da Vinci Surgical System are significantly greater than for any other form of RP [4] and remain more expensive because of the need for maintenance and operative equipment [2]. Although shorter stays could slightly offset these figures, it is the supply costs that drive up the cost of RARP, making up a difference of more than $3000 between ORRP and RARP [8]. For robotic cases, these figures include the costs of *reposables* (ie, instruments with a fixed number of uses set by the manufacturer), which tend to remain low in ORRP because there is less usage of disposable or reposable equipment. At the cost of $1.2 million per robot, a yearly maintenance fee of $100 000, and a $1500 per-patient cost in disposable robotic instruments per operation, the financial responsibilities for starting and maintaining a robotic practice can be intimidating [2]. The average total cost of RARP amounts to around $5410, compared to $3876 for LRP and $1870 for RARP [8], making RARP the most expensive surgery by nearly 300%.

Recent cost analyses of RARP have indicated that cost equivalence between standard ORRP and RARP may be achieved at high-volume prostatectomy centres in which RARP is performed on the order of $\geq$10 cases per week [9]. In upcoming years and decades, as experience with LRP and RARP increases, as the early training of new generations of surgeons involves robotics, and as the costs of robotic technologies decrease, cost equivalence among open, laparoscopic, and robotic surgeries may be achieved [5].

3. Operative outcomes

There is general agreement that the goals of RP are (in order of importance) to cure cancer, to maintain urinary continence, to maintain erectile function, and to minimise complications as well as perioperative suffering [10]. The indications for ORRP, LRP, and RARP are identical: localised disease (stage cT2 or less) without evidence of clinical or

Table 1 – Operative outcomes of open radical prostatectomy (RP), laparoscopic RP, and robot-assisted RP from selected single-institution series

Institution	Technique	No of patients	OR time, min	EBL, cm^3	LOS, d	Length of catheterisation, d	Complication rate, %
NYU [28]	ORRP	500	143	820	2.11	8	0.2
Ruhr University [18]	ORRP	62	161	790	11	10	N/A
Luigi Sacco [16]	LRP	80	218	376	4.5	10	22.5
Montefiore [30]	LRP	75	232	311	3.4	N/A	14.7
Montsouris [31]	LRP	350	170	290	5	4.2	N/A
Vattikuti [22]	RARP	2766	154	142	1.14	10	12.2
Montefiore [30]	RARP	75	199	230	1.95	N/A	10.7

RP = radical prostatectomy; OR = operating room; EBL = estimated blood loss; LOS = length of stay; NYU = New York University; ORRP = open retropubic radical prostatectomy; N/A = not available; LRP = laparoscopic radical prostatectomy; RARP = robot-assisted radical prostatectomy.

radiographic metastatic disease. In particular, contraindications to minimally invasive laparoscopic prostatectomy include uncorrectable bleeding diatheses or the inability to undergo general anaesthesia because of severe cardiopulmonary compromise [2] (Table 1).

For many operations, one of the advantages of a laparoscopic approach is the less invasive aspect compared with an open surgical incision. It follows that for laparoscopy, minimally invasive incisions may create less postoperative pain and may decrease the analgesic requirement. Importantly, minimising the amount of perioperative narcotic use can significantly affect several measures of postoperative morbidity, such as pulmonary function and ileus duration [11]. However, because of the involvement of the upper abdomen with respiration, upper abdominal incisions are generally more painful than those in the lower abdomen; lower abdominal wall muscles are also less likely to be disrupted during ORRP [12]. Thus, unlike the situation with nephrectomy in which a generous upper abdominal incision is required for an open surgical approach, there is less opportunity for considerable improvement in postoperative pain with LRP [13]. Similarly, a prospective study conducted at Vanderbilt University by Smith and colleagues did not find a significant difference in postoperative pain in the first 14 d after surgery when comparing open and robotic RP [13]. Moreover, Webster et al evaluated 314 patients undergoing open RP and 154 men undergoing RARP by the same surgeon. This study revealed that perioperative narcotic use and patient-reported pain were similar regardless of surgical approach (Fig. 1) [11].

It is now apparent that the small abdominal incision involved in all surgical approaches to RP translates to low pain scores. ORRP is performed through an 8–10-cm lower abdominal incision. This relatively small incision is usually sufficient to expose the preperitoneal space and allow access to the prostate and pelvic sidewalls for lymphadenectomy. Both LRP and RARP make use of small incisions. Lepor, however, remarked that the total longitudinal length of the surgical incisions during RARP is around 6–8 in, while ORRP is routinely performed with a 4-in incision [14]. In addition, the largest incision is generally at the periumbilical site, where the incision is extended enough to allow for extraction of the prostate and is often hidden by the umbilical crease.

Two more advantages of the laparoscopic approach to prostatectomy are advocated to be improved visualisation and the positive pressure created by the carbon dioxide pneumoperitoneum used for insufflation. Pneumoperitoneum reduces the pressure gradient between the blood vessels and the remainder of the operative field, resulting in less venous and capillary bleeding during the operation [2]. The meta-analysis by Parsons and Bennett exposed five studies (n = 672 patients) that evaluated operative blood loss [15]. Compared with the ORRP group, the LRP/RARP group was associated with significantly less operative blood loss.

Beyond reducing blood loss, minimally invasive surgery has been reported to decrease postoperative morbidity and length of stay (LOS) for a number of surgical procedures. Patel et al [9] studied 374 patients who underwent ORRP and 629 patients who underwent RARP. Mean LOS for their patients was 1.23 d for ORRP, with 94.3% of these patients discharged on or before postoperative day 1, and 1.17 d for RARP, with 97.5% of these patients discharged on or before postoperative day 1, showing similar rates of discharge. Joseph et al reports slightly longer stays of 64.5 h for ORRP patients versus 25.4 h and <24 h for LRP and RARP, respectively [8]. Nevertheless, both studies demonstrate that comparable results can be achieved with ORRP. However, unlike these two comparable techniques, Gregori et al report a mean hospital stay of 4.5 d in their LRP series [16].

Finally, another factor supporting the benefit of the intuitive nature of the robotic technique is the rate of

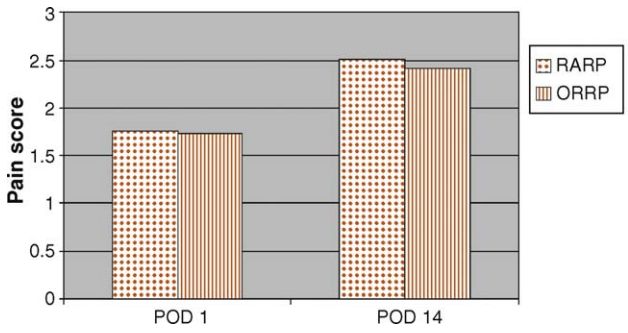

Fig. 1 – Mean pain scores after robot-assisted radical prostatectomy and open radical prostatectomy at Vanderbilt University [11].
RARP = robot-assisted radical prostatectomy; ORRP = open retropubic radical prostatectomy.

conversion to open surgery. When LRP/RARP surgeons are in trouble, they may need to convert emergently to an open procedure to control life-threatening bleeding. Most studies report conversion rates for LRP of 2–8%, compared with 0–1% for RARP [4]. Likewise, major complications appear to be only marginally lower after LRP and RARP, once the learning curve is completed, as opposed to ORRP [3,17].

4. Oncologic outcomes

The primary goal of PCa surgery is to provide satisfactory oncologic outcomes. Biochemical progression and margin positivity are the two commonly used indices to assess oncologic outcomes following RP [3]. An increasing PSA level is an early sign of biochemical progression and PCa recurrence, yet recent screening studies have shown that there are still questions as to the accuracy of PSA screening in preventing mortality [19]. A positive surgical margin (PSM), however, meaning cancer cells at the inked margin of resection, has been associated with up to a four-fold increased risk of biochemical recurrence (BCR) after adjusting for other known risk factors [20]. Although ORRP provides long-term oncologic control for up to 15 yr, limited follow-up is available for the minimally invasive approaches.

Nelson promotes that rates for 5-yr freedom from PSA failure are 80%, roughly 75%, and 91.6% for open, laparoscopic, and robotic approaches, respectively [10]. Similarly, Touijer et al showed that LRP effectively controlled the disease in 78% of men with PCa at 5 yr after surgery at Memorial Sloan-Kettering Cancer Centre (MSKCC) [21]. At MSKCC, the agreed-upon definition of BCR is 0.1 ng/ml confirmed by a subsequent rising PSA level. Another MSKCC group that used the open surgical approach experienced 82% freedom from progression at 5 yr after surgery. In this line, open surgeons argue that their oncologic approach is favoured because of the ability to alter surgical technique in real time based on intraoperative visual and tactile assessment of tumour stage [10]. Badani and colleagues [22] reported on one of the largest RARP series at a median follow-up of 22 mo. There was a 7.2% PSA recurrence rate, with a 5-yr actuarial biochemical-free survival of 84% in this series. Additional figures support the theory that men with ORRP, RARP, and LRP have similar rates of additional cancer therapy [23]. Despite these differences, given the relatively short-term follow-up for the minimally invasive techniques and the varying definitions of BCR, it is difficult to state which approach has superior outcomes.

Margin status is an important independent predictor of disease recurrence after RP and, therefore, a measure of treatment efficacy. DiMarco et al note PSM rates of 18.6% for ORRP and 16.5% for RARP [24]. The PSM rate was 20% for ORRP versus 16.7% for RARP in another study by Ahlering et al [25]. Smith and colleagues retrospectively reviewed 200 procedures from each approach [13]. The overall incidence of PSM was significantly lower among the RARP cohort compared to open RARP cases (15% vs 35%; $p < 0.001$). In particular, RARP had a statistically lower PSM rate in the T2 stage and Gleason score $\leq$6 specimen groups. Menon reported an 11% PSM rate in his RARP series [26]; comparatively, Lepor [27] reported an 8% PSM rate in his ORRP experience with 500 patients. In surgeons reporting $>$100 LRPs, PSM rates ranged from 16% to 27% [10]. Based on such published results, LRP may be perceived to compromise the oncologic goals of RP [21]. Meanwhile, the generally similar risks of a PSM in RARP and RARP indicate analogous cancer-specific survival rates across these approaches to surgery [15]. Still, more definitive conclusions will require the accumulation of long-term survival data for LRP and RARP.

5. Functional outcomes

Schroek and colleagues [28] explain that treatment satisfaction is mainly derived from perceived differences between expectations and experience. Urinary incontinence and erectile dysfunction (ED) are the two major concerns for patients after RP. In fact, poor general health in addition to bother from urinary dysfunction and sexual dysfunction has been found to be an independent predictor for regret after primary treatment [28]. The often-indolent nature of PCa makes health-related quality of life (HRQoL) and satisfaction with treatment increasingly important both for patients and for providers.

6. Continence

Most recent data suggest that ORRP is associated with higher rates of continence than both RARP and LRP. Hu et al [23] reported that the diagnosis for incontinence was lower for ORRP patients than for RARP and LRP patients—12.2 versus 15.9 per 100 person-years, even after adjusting for baseline rates.

In the Prostate Cancer Outcomes Study, Penson et al [29] demonstrated continence rates of 90% at 24-mo follow-up and 86% at 60-mo follow-up in 1288 men who underwent ORRP [2]. In the world's largest reported ORRP series, with 3477 patients, Dr Frota had an 93% overall continence rate [3]. Similarly, in a series of 621 patients who underwent ORRP, Lepor and colleagues [27] reported that 74.4%, 89.6%, 92.4%, and 97.1% of men considered themselves continent at 3, 6, 12, and 24 mo, respectively (Fig. 2). Stolzenburg et al demonstrated a continence rate of 84% at 6-mo follow-up and a 92% continence rate at 1-yr follow-up in 700 extraperitoneal LRPs. At Montefiore, Hakimi and colleagues [30] experienced a continence rate of 89.3% in LRP patients and 93.3% in RARP patients at 12 mo. Although they did not note a significant difference between LRP and RARP, a trend towards a faster return of continence and potency was experienced in favour of RARP at 3, 6, and 12 mo postoperatively [30]. With RARP, Ahlering et al [4] reported a 98% continence rate at 12-mo follow-up in their initial series of 200 patients. In addition, Menon et al [26] reported a continence rate of 96% in a series of $>$1100 RARP procedures. At Vanderbilt University, Smith and colleagues [13] reported continence at 12 mo (defined as one or no pads) as 97% for RARP and 94% for ORRP.

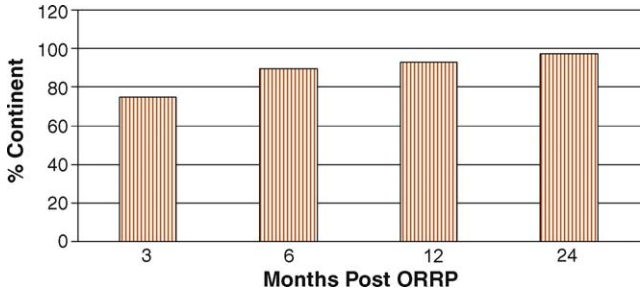

Fig. 2 – Patient assessment of urinary continence after open retropubic radical prostatectomy [27].
ORRP = open retropubic radical prostatectomy.

Dr Guillonneau [31] presented a single-institution, nonrandomised study from MSKCC about recovery of continence following ORRP and LRP. Using the definition of continence as no pads, 257 LRP patients were compared with 298 ORRP patients. At every measured time point, ORRP had better recovery of continence and was significantly better than LRP across the study [31]. Finally, at last reported follow-up, 97% of ORRP patients were free of pads compared with 69% of LRP patients. Evidently, ORRP has superior results to LRP and comparable results to RARP in regards to urinary continence.

7. Preservation of nerves

The current literature concerning preservation of the neurovascular bundles and sexual function after RARP and ORRP suggest that the results are so far inconclusive. Data indicate that 95% of men in their 40s who undergo traditional nerve sparing in ORRP will regain sexual function adequate for intercourse, while only 50% of men in their 70s will regain the same function, still maintaining single-digit rates of PSM [2].

The US National Institutes of Health (NIH) recently published a study with the highest level of medical evidence (so far) comparing potency with the different prostatectomy techniques [32], with 602 men undergoing ORRP, RARP, and LRP completing the University of California, Los Angeles (UCLA) Prostate Cancer Index at baseline and a number of times postoperatively. The results showed that the overall scores were best for ORRP, although the differences among the three groups were not shown to be statistically significant. Another recent study performed by Schwab et al [33] at Eastern Virginia Medical College using the same UCLA index showed similar results: Sexual function scores were highest in the ORRP group, although, as with the NIH, the results were not statistically significant. A recent randomised study from the New York University Langone Medical Centre (NYULMC) and Georgetown University Hospital showed the same pattern: Erective function at year 1 did not differ significantly between those patients who underwent ORRP and RARP [34].

Using a robotic approach, Menon began to dissect a plane on the anterior-lateral portion of the prostate largely ignored during standard open or laparoscopic RP, preserving the veil of Aphrodite of periprostatic fascia [26]. Histologic analysis of this tissue plane demonstrated nerves coursing through. In a report on 154 consecutive patients in whom this tissue was preserved along with the more widely recognised neurovascular bundles, Menon reported a 96% intercourse rate and a 69% normal erection rate at 12 mo after surgery. Moreover, using two studies included in the Parsons and Bennett [15] meta-analysis, there was an insignificant trend towards increased potency for the laparoscopic/robot-assisted group. At Montefiore, of the patients who underwent a bilateral nerve-sparing procedure, 71% of LRP patients and 76.5% of RARP patients were potent at 12 mo postoperatively [30]. Although these data may suggest that RARP has some advantages in recovery of potency, the data do not clearly support one technique as superior to the other approaches to RP.

8. Quality of life

When Hara et al compared quality of life (QoL) between patients undergoing laparoscopic versus open RP, no significant differences were found in any of the items of general health before or after surgery [35]. They observed no significant differences in functional status, urologic symptoms, physical comfort, psychological distress, or social activity before or after surgery. Sexual life was significantly impaired by surgery, with no difference between the laparoscopic and open RP groups. This result was confirmed by the International Index of Erectile Function (IIEF) data, with the IIEF score significantly decreasing after surgery. Following surgery, QoL resulting from incontinence symptoms deteriorated, whereas QoL resulting from voiding symptoms was improved by surgery [35]. With regard to satisfaction with urination, a slight but insignificant improvement was reported after surgery. Interestingly, these measures were comparable between the laparoscopic and open RP groups.

9. Medical marketing

The marketing of robotic surgeries in general has been remarkably aggressive in the past decade, with direct-to-consumer advertisements and marketed benefits of RARP in particular that may promote bias against studies challenging these notions [23]. Men of higher socioeconomic status (those with 90% high school graduation rates and median household income of at least $60 000) particularly seem to favour RARP, possibly a reflection of a population and care system enamoured with new "innovative" technology despite insufficient data demonstrating superiority over classic methods [23].

Although public demand for RARP has been rising, recent reports show that satisfaction scores for RARP are consistently lower than for ORRP. Schroek et al [28] showed that of the men in their study, only 12.9% of patients were dissatisfied after ORRP compared to 19.9% who underwent RARP, and only 14.9% of the ORRP patients regretted the procedure compared to 24.1% of those who underwent

RARP. In addition, these results demonstrate significantly more frequent dissatisfaction for RARP patients after adjusting for multiple sociodemographic variables and Expanded Prostate Cancer Index Composite (EPIC) domain scores: Patients undergoing RARP were approximately three to four times as likely to be dissatisfied and regretful as patients undergoing ORRP. Schroek and colleagues postulate that patients who chose the "innovative," less invasive RARP may have higher expectations for their postoperative HRQoL compared to patients who choose more traditional surgery. Consequently, even though RARP achieved similar function and bother scores compared to patients who underwent ORRP, those patients still experienced a higher level of dissatisfaction and regret [28]. An additional study at Duke Medical Centre [28] between 2000 and 2007 had 615 men complete a Likert scale after surgery. The corrected satisfaction rates were 440% higher for ORRP patients than for RARP patients, and the regret rates were 302% percent lower, showing a statistically significant difference in scores between the two techniques.

10. Learning curve

It is known that LRP and RARP are technically demanding and require a significant learning curve. Various authors have concluded that to become proficient at LRP or RARP—defined as achieving outcomes comparable to their open surgical experience—a surgeon must perform anywhere from 8–12 cases to as many as 200 cases [3]. Patel et al [9] advocate that for a laparoscopically naïve yet experienced open surgeon, open surgical skills can be successfully transferred to a laparoscopic environment in 8–12 cases using a robotic interface. In addition, several programmes have reported that surgeons with minimal or no laparoscopic experience mastered the learning curve using the da Vinci Surgical System after 10–20 cases [4].

In contrast, Guillonneau and associates have noted that it takes 40–60 cases for experienced laparoscopists to master the learning curve, mainly attributed to the counterintuitive nature of dissection and the difficult urethrovesical anastomosis [31]. Both Patel and Guillonneau and their colleagues note that for the laparoscopically naïve surgeon, 80–100 cases are probably required to attain proficiency [4,9,31]. Thus, the development of a robotic interface significantly shortens the LRP learning curve for an experienced open yet laparoscopically naive surgeon.

While a surgeon is learning a new technique, numerous patients may achieve outcomes inferior to what they might otherwise have obtained with an experienced surgeon. Klein et al [17] reveal that cancer control after RP improves with increasing surgeon experience regardless of preoperative risk group. This study's overall cohort experienced an absolute decrease in the risk of recurrence at 5 yr in a patient seeing an experienced rather than an inexperienced surgeon between 6.6% and 12%, depending on risk group. Also, Badani and colleagues [22] demonstrate that with continuous quality improvement and technical refinement during their RARP series, they improved outcomes well after the initial learning curve, which they stated to be approximately 18 cases. In fact, the mean console time decreased by 19% between the first 200 and the last 200 patients [21].

Some surgeons do not have the patient volume to ever complete their learning curves [20]. To investigate the impact of variations in patient volume, Begg et al evaluated health-related outcomes after RP using the US National Cancer Institute Surveillance, Epidemiology and End Results database. Postoperative morbidity was lower in very high-volume hospitals than in low-volume hospitals (27% vs 32%, $p = 0.03$) [20]. Also, morbidity was lower when the RP was performed by very high-volume surgeons as opposed to low-volume surgeons (26% vs 32%, $p < 0.001$). A similar pattern was found in the rate of late urinary complications. These findings suggest that the incidence of early postoperative morbidity and urinary complications are lower among surgeons who perform a high volume of RP [20]. The variability in outcome among surgeons with the highest volume of RP strongly suggests that variations in surgical proficiency have a significant effect on results.

Moreover, in a detailed analysis, clinical outcomes were examined among the 159 surgeons who performed a high or very high volume of procedures. This evaluation revealed wide surgeon-to-surgeon variation, greatly exceeding any that could be predicted based on chance or variations in the case mix [20]. It follows that the success of RP and the incidence of complications fluctuate not only among surgeons with distinct levels of experience but also among the subset of highly experienced surgeons. Few surgeons are proficient in more than one surgical approach to RP, let alone willing to offer two different options randomly [21]. Therefore, inherent limitations are present in studies because individual surgeon experiences and training have varied for both the minimally invasive and the open RP groups.

11. Conclusion

When confronted with the diagnosis of localised PCa, patients have to opt for one treatment over another in the absence of solid scientific evidence favouring a specific treatment. In this setting, pretreatment patient education and counselling are crucial parts of the decision-making process. The results of this analysis should be helpful in counselling patients about therapy decisions for newly diagnosed localised PCa. Urologists must carefully depict the risks and benefits of recent technologies during preoperative counselling to minimise regret and maximise satisfaction [29].

The surgical removal of localised PCa continues to be the most definitive treatment for the disease [10]. In the hands of an experienced surgeon, the standard represented by ORRP is very high. Besides reductions in blood loss, many results of LRP and RARP at centres of excellence are comparable to those after ORRP; however, they have not proved superior to ORRP outcomes or resulted in anticipated benefits to patients [20]. Therefore, considering the nonsuperiority of the other techniques, the shorter learning

curves, and the available long-term outcome data, the open technique remains the gold standard.

Moreover, although the differences in major outcomes are minor, the difference in cost is significant. Although they are associated with shorter LOS, the costs associated with LRP and RARP are significantly higher than those of ORRP. This is of major importance with the current health care system. Of course, offering new technologies has its costs and its benefits. It is clear that medical device cost deserves further study.

Nonetheless, current data suggest that results ultimately depend more on surgical technique than on surgical approach. Dissimilarity in outcomes among high-volume surgeons points towards distinctions in quality of care that are probably related to variations in surgical technique. Furthermore, rates of blood loss, PSMs, incontinence, and ED vary widely from surgeon to surgeon [20]. It has become clear that the best chance for cure rests in the most experienced hands for patients in all risk groups [17]. As Nelson eloquently states, "The difference between Tiger Woods and the local club champion is not in the putter, the irons, or the woods, it is in skill and consistency" [10].

Conflicts of interest

The authors have nothing to disclose.

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