Review Article

The role of robot-assisted radical prostatectomy in high-risk organ-confined prostate cancer

Mohamad Waseem Salkini

Department of Urology, West Virginia University, Morgantown, West Virginia, USA

Abstract

The traditional open retropubic radical prostatectomy has an established role in the treatment of prostate cancer. However, it is well known to be morbid procedure with high complication rate. This bad reputation prevented utilizing it on a large scale for high risk prostate cancer. Utilizing the da Vinci® to preform radical prostatectomy decreased the morbidity of the procedure. Since the introduction of robotic prostatectomy, there have been hot debates on its role in the treatment of high risk disease. In this article we reviewed the current evidence on utilizing the surgical system in treating high risk organ confined prostate cancer.

Keywords: Complication, high risk, lymph node, dissection, organ confined, prostate cancer, robotic

Address for correspondence: Prof. Mohamad Waseem Salkini, Department of Urology, West Virginia University, Morgantown, West Virginia, USA.
E-mail: mhdwasal@hotmail.com

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Prostate cancer (PCa) is the most common nonskin malignancy diagnosed in the Western Hemisphere. One in every seven patients with PCa will eventually die from the disease. PCa is stratified into different risk categories based on the patient's prognosis. High-risk disease was formerly characterized by an increased risk of metastasis and lethality, requiring complex treatments. At least 15%–20% of PCa patients present with high-risk organ-confined disease. The treatment of organ-confined high-risk PCa (OCHRPCa) is challenging. The introduction of robotic surgery represents a breakthrough in the surgical treatment of PCa. Robotic technique is proved to be of lower morbidity and mortality when compared to the traditional open retropubic surgical approach. In this editorial, we review the role of robot-assisted radical prostatectomy (RARP) in the treatment of OCHRPCa.

With close to 250,000 new cases annually and 35,000 deaths, PCa represents the most commonly diagnosed noncutaneous malignancy and the second leading cancer-related death in the United States.[1] Many patients present with organ-confined disease, yet 15%–20% of them die due to the progression of the PCa, and that is the representation of real high-risk organ-confined disease.[1,2] The American Urological Association (AUA) adopted D'Amico criteria to define high-risk PCa. This classification uses an endpoint of prostate-specific antigen (PSA) failure after treatment and leads to the defining "high-risk" as a clinical T stage ≥ cT2c, a Gleason score ≥8, or a PSA >20 ng/mL. The extent of tumor in the biopsy specimens (the percentage of core involvement and the ratio of involved cores) was found to be associated with PCa–specific mortality and was additionally adopted by the National Comprehensive Cancer Network for risk classification.[3] The biologic behavior of OCHRPCa varies, and current diagnostic tools lack staging accuracy. Most of the regulation authorities agree to define OCHRPCa

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as PCa with one or more of the following characteristics, PSA >20 ng/mL, Gleason ≥8, T2c, or >40% involvement on the biopsy and that should be associated with lack of negative workup. Negative workup is defined as a bone scan that does not show bone metastasis and computerized tomographic study that does not show insolvent of lymph node or surrounding organs.[1-4]

Surgery and radiation with androgen deprivation (ADT) are commonly offered to men OCHRPCa. The treatment for high-risk localized PCa has evolved, based on evidence from clinical trials that have established important principles of management. According to the AUA guidelines, the treatment of OCHRPCa can be radiation therapy and androgen deprivation therapy or surgery.[2] The European Association of Urology guidelines now support the role for radical prostatectomy (RP) in selected OCHRPCa patients as a treatment option.[4]

The adoption of RP as a treatment option for OCHRPCa was due to the reported 5-year PSA relapse-free survival rates ranging from 55% to 71% and 10-year PCa-specific survival rates from 72% to 92%.[4,5] We should stress the importance of associating RP with extended pelvic node dissection (ePLND). This means that the surgeon should remove all the pelvic lymph node that accompanies the iliac vessels to the bifurcation of the aorta.[6] The justification for ePLND in OCHRPCa is that nodal spread can occur in up to 40% of patients making such a wide dissection essential for three reasons: the therapeutic benefit, the more accurate staging to estimate prognosis, and to inform the need for subsequent therapy.[7]

The big question remains whether RP is superior to radiotherapy combined with ADT. Indeed, no prospective randomized study addressed this question; however, several studies have retrospectively compared RP with radiotherapy. A retrospective study compared the outcome of RP with radiation and ADT in patients with OCHRPCa found equal 10 years cancer-free survival in both groups. However, the risk of all-cause mortality was greater after radiotherapy with ADT when compared to RP.[8] Although a retrospective randomized study from Memorial Sloan Kettering Cancer Center found similar cancer-free survival in OCHRPCa patients after RP when compared to radiation and ADT, an absolute benefit of 7.8% in distant metastasis-free survival was suggested favoring RP.[9] RP turns to be superior to radiation combined with ADT in healthy patients with long life expectancy. However, the traditional open retropubic RP is known to be a morbid operation that was difficult to master.[10]

Since its introduction by Dr. Menon, the role of RARP in the treatment of PCa has been investigated thoroughly. Indeed, RARP was associated with lower blood loss and transfusion rate and much greater functional outcomes in contrast to the traditional RP.[11] RARP was advantaged in terms of perioperative and oncologic outcomes.[11,12] The impact of switching from traditional open RP to robot-assisted laparoscopic prostatectomy in the treatment of OCHRPCa is still under investigation. No large series of RARP in OCHRPCa patients or randomized trials comparing RARP with other treatments have been reported. Recent literature shows better oncologic outcome for RARP when compared to open RP, the positive margin and biochemical recurrence indeed were in favor of RARP[13] reduced blood loss and need for blood transfusion[14] as well as potential benefits to continence and erectile function recovery.[14]

Yuh *et al.* found in their review of the surgical outcome of RARP in OCHRPCa that the mean operative time was 168 min, and estimated blood loss was 189 ml. The mean length of hospital stay and catheterization time were 3.2 and 7.8 days, respectively. The average rate of organ-confined disease was 35% (range: 7%–48%), and the positive margin rate was 35% (range: 12%–53%). Finally, their 3-year biochemical recurrence-free survival ranged from 45% to 86% and the overall complication rates ranged from 3% to 30%. Unfortunately, many of the studied series did not fulfill the Martin criteria for complication reporting, and thus events may be underreported.[15] The available scientific evidence appears to favor RP as the initial approach of choice to treat patients with OCHRPCa. Because RARP has lower morbidity than traditional open approach, it makes sense to utilize this approach to treat OCHRPCa instead of the open traditional technique.

Many factors were studied and found to be surrogate with better oncologic outcome and cure. Zugor *et al.*, in their analysis of their own data, found RARP to be safe and effective in the treatment of OCHRPCa. The group, also, highlighted the fact that a higher PSA (>20 ng/ml) is more likely to be associated with nonorgan-confined disease, lymph node positivity, and positive surgical margins in patients who underwent RARP.[16] Pelvic node dissection is considered the best method for lymph node staging, with potential curative. The risk of biochemical recurrence and cancer-related death for each positive lymph node resected increases.[17] A median yield ranging from 7 to 24 lymph nodes resected when performing RARP was accompanied with increased PSA-free survival.[17,18] In a large multi-institutional study, only 37% of patients with OCHRPCa needed adjuvant treatment after RARP.

The observed 5-year biochemical recurrence-free and cancer-free survival was as high as 50% and 87%, respectively, after RARP for OCHRPCa patients.[18] Age should not be the only exclusion factor when considering RARP in the presence of OCHRPCa due to the risk of urinary incontinence. Nyarangi-Dix *et al.* found out that it takes longer time for incontinence to recover in older patients. It healthy 70-year-old patient may gain continence back up to 1 year after the surgery. The group concluded that age should not be considered alone as deterring factor to treat OCHRPCa with RARP.[19]

It is common for PCa to recur after radiation even in organ-confined disease and risk of recurrence even multiplies in OCHRPCa.[4,5] PCa is considered high risk if it recurs after radiation. Open salvage RP after radiation failure is considered the standard of care in the absence of nodal and distant metastases.[19,20] Indeed, current literature supports treating patients with RARP even after radiation failure. Boris *et al.* demonstrated the feasibility and durability of salvage RARP after failed radiation. The group proved that functional and oncologic outcomes are not inferior to open RP.[20]

In summary and whenever feasible, RARP should be considered for patients with OCHRPCa whenever the patient is at acceptable surgical risk. Salvage RARP is good option to treat patients with OCHRPCa after failed radiation.

REFERENCES

1. Cooperberg MR, Broering JM, Carroll PR. Time trends and local variation in primary treatment of localized prostate cancer. J Clin Oncol 2010;28:1117-23.
2. Thompson I, Thrasher JB, Aus G, Burnett AL, Canby-Hagino ED, Cookson MS, *et al.* Guideline for the management of clinically localized prostate cancer: 2007 update. J Urol 2007;177:2106-31.
3. Huang J, Vicini FA, Williams SG, Ye H, McGrath S, Ghilezan M, *et al.* Percentage of positive biopsy cores: A better risk stratification model for prostate cancer? Int J Radiat Oncol Biol Phys 2012;83:1141-8.
4. Zwergel U, Suttmann H, Schroeder T, Siemer S, Wullich B, Kamradt J, *et al.* Outcome of prostate cancer patients with initial PSA> or=20 ng/ml undergoing radical prostatectomy. Eur Urol 2007;52:1058-65.
5. Stephenson AJ, Kattan MW, Eastham JA, Bianco FJ Jr., Yossepowitch O, Vickers AJ, *et al.* Prostate cancer-specific mortality after radical prostatectomy for patients treated in the prostate-specific antigen era. J Clin Oncol 2009;27:4300-5.
6. Briganti A, Blute ML, Eastham JH, Graefen M, Heidenreich A, Karnes JR, *et al.* Pelvic lymph node dissection in prostate cancer. Eur Urol 2009;55:1251-65.
7. Heidenreich A, Ohlmann CH, Polyakov S. Anatomical extent of pelvic lymphadenectomy in patients undergoing radical prostatectomy. Eur Urol 2007;52:29-37.
8. Boorjian SA, Karnes RJ, Viterbo R, Rangel LJ, Bergstralh EJ, Horwitz EM, *et al.* Long-term survival after radical prostatectomy versus external-beam radiotherapy for patients with high-risk prostate cancer. Cancer 2011;117:2883-91.
9. Zelefsky MJ, Eastham JA, Cronin AM, Fuks Z, Zhang Z, Yamada Y, *et al.* Metastasis after radical prostatectomy or external beam radiotherapy for patients with clinically localized prostate cancer: A comparison of clinical cohorts adjusted for case mix. J Clin Oncol 2010;28:1508-13.
10. İnkaya A, Tahra A, Sobay R, Kumcu A, Küçük EV, Boylu U. Comparison of surgical, oncological, and functional outcomes of robot-assisted and laparoscopic radical prostatectomy in patients with prostate cancer. Turk J Urol 2019;45:410-7.
11. Huang X, Wang L, Zheng X, Wang X. Robot-assisted and laparoscopic vs open radical prostatectomy in clinically localized prostate cancer: Perioperative, functional, and oncological outcomes: A systematic review and meta-analysis. Medicine (Baltimore) 2019;98:e15770.
12. Liss MA, Lusch A, Morales B, Beheshti N, Skarecky D, Narula N, *et al.* Robot-assisted radical prostatectomy: 5-year oncological and biochemical outcomes. J Urol 2012;188:2205-10.
13. Smith JA Jr., Chan RC, Chang SS, Herrell SD, Clark PE, Baumgartner R, *et al.* A comparison of the incidence and location of positive surgical margins in robotic assisted laparoscopic radical prostatectomy and open retropubic radical prostatectomy. J Urol 2007;178:2385-9.
14. Ficarra V, Novara G, Ahlering TE, Costello A, Eastham JA, Graefen M, *et al.* Systematic review and meta-analysis of studies reporting potency rates after robot-assisted radical prostatectomy. Eur Urol 2012;62:418-30.
15. Yuh B, Artibani W, Heidenreich A, Kimm S, Menon M, Novara G, *et al.* The role of robot-assisted radical prostatectomy and pelvic lymph node dissection in the management of high-risk prostate cancer: A systematic review. Eur Urol 2014;65:918-27.
16. Zugor V, Witt JH, Heidenreich A, Porres D, Labanaris AP. Surgical and oncological outcomes in patients with preoperative PSA> 20 ng/ml undergoing robot-assisted radical prostatectomy. Anticancer Res 2012;32:2091-5.
17. Ploussard G, Briganti A, de la Taille A, Haese A, Heidenreich A, Menon M, *et al.* Pelvic lymph node dissection during robot-assisted radical prostatectomy: Efficacy, limitations, and complications-a systematic review of the literature. Eur Urol 2014;65:7-16.
18. Abdollah F, Sood A, Sammon JD, Hsu L, Beyer B, Moschini M, *et al.* Long-term cancer control outcomes in patients with clinically high-risk prostate cancer treated with robot-assisted radical prostatectomy: Results from a multi-institutional study of 1100 patients. Eur Urol 2015;68:497-505.
19. Nyarangi-Dix JN, Tosev G, Damgov I, Reimold P, Aksoy C, Hatiboglu G, *et al.* Recovery of pad-free continence in elderly men does not differ from younger men undergoing robot-assisted radical prostatectomy for aggressive prostate cancer. World J Urol 2019. doi: 10.1007/s00345-019-02797-5.
20. Boris RS, Bhandari A, Krane LS, Eun D, Kaul S, Peabody JO. Salvage robotic-assisted radical prostatectomy: Initial results and early report of outcomes. BJU Int 2009;103:952-6.