Robot-assisted radical prostatectomy in obese patients

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Objectives: *Few centers perform extraperitoneal robot assisted radical prostatectomy. The average patient weight is increasing to the mildly obese. Little is known as to the difficulty-impact, obesity may have on robot-assisted extraperitoneal prostatectomy (RAP). We assess our own experience with obese patients undergoing RAP.*

Materials and methods: *Information on 375 consecutive patients undergoing robot-assisted extraperitoneal prostatectomy by a single surgeon was gathered. Obesity is defined as having a body mass index (BMI) greater than 30 kg/m^2. Patients with BMI ≥ 30 were compared to those with BMI < 30. Specific comparators between the groups were: age, total operating time, estimated blood loss, total prostate specific antigen (PSA), specimen weight, pathological stage, grade and margin, complications, and functional outcomes.*

Results: *Sixty-seven men were identified as obese. When comparing the two groups, no statistically significant difference (p > .05) was noted in operative time (229 versus 217 min), blood loss (205 versus 175 ml), PSA, clinical and pathologic stages, specimen weight, and complications. 15% of non-obese patients had a positive margin compared to 12% of obese patients (p > .05). The 6-month continence rate in patients with a BMI ≥ 30 was 92% versus 97% in patients with a BMI < 30.*

Conclusions: *The extraperitoneal approach to performing a robot-assisted prostatectomy is not associated with increased morbidity in the obese patient. There were no statistically significant differences noted in oncological or functional outcomes between the two groups.*

Key Words: BMI, robot, prostatectomy

Introduction

Obesity is now categorized as an epidemic in the United States. Over the last decade, the prevalence of obesity in the US population has increased from 22.9% to 30.5%.[1] Obesity is fast becoming a disease of significant public health burden, given its association with a number of diseases. In addition to its impact on lifestyle, it is a major risk factor for hypertension, cardiovascular disease, respiratory disorders, arthritis, diabetes, gallstones, among other diseases.[2] A number of studies have also shown strong correlation between the prevalence of obesity and the rising incidence of cancer.[3-4] With regard to prostate cancer, the most common non cutaneous malignancy, correlation

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between disease aggressiveness, prostate cancer mortality, and obesity have been reported.[4-5]

Over the last several years, the impact of obesity on clinical outcomes in radical prostatectomy has been evaluated. Although all the studies agree to an increased complexity in operating on obese patients, outcomes data have been conflicting.[6-10] The addition of newer technology and minimally invasive techniques to aid in performing prostatectomy has not rendered the procedure easier in obese patients. In standard laparoscopic prostatectomy or robot-assisted prostatectomy, obesity is often listed as a contraindication. While this may be due to the novelty of such procedures or a reflection of surgeon's experience, anatomical limitations and lack of proper instrumentation have resulted in poorer outcomes in obese patients undergoing laparoscopic or robot-assisted prostatectomy.[11] We have previously reported on perineal prostatectomy as an excellent option in obese patients with significant truncal obesity.[6] Other approaches to prostate removal, including open retropubic, laparoscopic, and robotic, remain a challenge. Few reports have documented a higher complication rate, longer operative time, or longer convalescence in obese patients undergoing transperitoneal laparoscopic or robot-assisted prostatectomy.[11-13] Herein we report our experience with obese patients undergoing extraperitoneal robot-assisted prostatectomy (RAP).

Materials and methods

Between January 2004 and July 2005, 375 consecutive men underwent robot-assisted radical prostatectomy by a single surgeon (JJ) through an extraperitoneal approach as previously described.[14] Patients who underwent pelvic lymphadenectomy were included in the study. Pelvic lymphadenectomy was performed in patients with Gleason score 7 or above or prostate specific antigen (PSA) 10 or greater. No procedures were converted to an open technique.

Obesity was defined as having a body mass index (BMI) greater than 30 kg/m^2.[1] Patients with BMI ≥ 30 were compared to those with BMI < 30. Additional parameters evaluated included age, prostate weight, total operating time, estimated blood loss, PSA, clinical stage, pathological stage and Gleason grade, intraoperative and perioperative complications, surgical margin status, lymph node status, and functional outcomes.

Operating time was calculated from the time of skin incision to completion of skin closure. Information regarding continence was collected on a prospective basis through a validated self-administered patient questionnaire on follow-up office visits. A patient was considered continent if he did not leak and did not require pad usage.

Data was statistically analyzed for the above parameters using Microsoft Excel XP (Microsoft Corp., Redmond, USA). Comparative analysis was done using the student T-test with a $p < 0.05$ considered statistically significant.

Results

Of the 243 patients that BMI data was available for, 67 men were categorized as obese. Patient demographics and preoperative data are shown in Table 1. One hundred seventy six patients had a BMI < 30 (group 1) and 67 patients had a BMI ≥ 30

TABLE 1. **Patient demographics and preoperative data**

BMI	**< 30**		**≥ 30**		
	Mean	**Range**	**Mean**	**Range**	**P value**
BMI kg/m^2	26	17-29	34	30-53	< .05
Age, yrs	60	42-78	58	44-74	< .05
Weight, gms	53	21-130	53	21-135	> .05
PSA, ng/dl	7	.06-39	8	1.2-35	> .05
Gleason score	6	4-8	6	5-9	> .05
Clinical stage					
T1c	138 (78%)		52 (77%)		> .05
T2a	30 (17%)		13 (19%)		> .05
T2b	2 (1%)		0 (0%)		> .05
T2c	6 (3%)		2 (3%)		> .05

TABLE 2. **Intraoperative and perioperative complications**

BMI < 30	BMI ≥ 30
Urinary retention post catheter removal (5)	Bladder neck contracture (3)
Urine leak (3)	Lymphocele (2)
UTI (3)	UTI (2)
Nocturia (2)	Urinary urgency (2)
Urinary urgency (2)	Myocardial infarction (1)
Bladder neck contracture (2)	C. difficile diarrhea (1)
Deep vein thrombosis (2)	Inguinal hernia (1)
Atrial fibrillation (1)	
C. difficile diarrhea (1)	
Rectal injury (1)	
Urinoma (1)	
Myocardial infarction (1)	
Epididymitis (1)	
Left hand paresthesia (1)	
Inguinal hernia (1)	
Perirectal abscess (1)	

(group 2). The average and range of BMIs for the two groups were 26, 17-29 and 34, 30-53, respectively. When comparing the two groups (< 30 versus ≥ 30), age was the only parameter with a statistical difference ($p < .05$). The average age of patients in group 1 was 60 while in group 2, it was 58. There were no statistically significant differences ($p > .05$) in PSA (7 ng/ml versus 8 ng/ml), specimen weight (53 gms versus 53 gms), preop Gleason score (6 versus 6), clinical T stage, and pathologic Gleason score (7 versus 7).

Estimated blood loss (175 ml versus 205 ml) and total operating time (217 min versus 229 min) were similar ($p > .05$) in both groups. One patient (0.5%) in group 1 and two patients (2.9%) in group 2 required transfusions ($p > .05$). All intraoperative and perioperative complications (even if not directly related to the surgery) are listed in Table 2. No significant difference were noted in urinary complications, including bladder neck contracture (1% versus 4%), urinary tract infection (1.7% versus 2.9%), and urinary retention after catheter removal (2.8% versus 0%). The 6 month continence rate in non-obese men was 95% and not significantly greater than the 91.6% of obese men who regained their continence.

Pathologic Gleason grade score was equivalent between the 2 groups (7). Total positive margin rates were not statistically different. Table 3 shows the correlation of pathologic stage to margin location and

TABLE 3. **Pathology stage and margins/locations**

Stage	< 30 BMI Number	True positive margins	Location	> 30 BMI Number	True positive margins	Location
2a	30	1 (3%)	1 Apex 1 CI Post	9	0 (0%)	
2b	3	0 (0%)		6	0 (0%)	
2c	112	11 (10%)	7 Apex 1 Ant 5 Postlat 1 CI Apex 3 CI Post 1 CI Ant	41	5 (12%)	4 Apex 1 Ant
3a	21	6 (28%)	3 Apex 2 Ant 2 Postlat	7	1 (14%)	1 Ant
3b	8	3 (37%)	3 Apex 1 BlNeck	4	1 (25%)	1 Base

CI=capsular incision; Postlat=posteriorlateral; Post=posterior; Ant=anterior; BlNeck=bladder neck number. In group 1, 60% of patients had bilateral nerve sparing procedures, 35% had unilateral nerve sparing, and 5% had non-nerve sparing. In group 2, 66% of patients had bilateral nerve sparing procedures, 24% had unilateral nerve sparing, and 9% had non-nerve sparing. Of the 69 patients in group 1 who underwent a pelvic lymphadenectomy (39%), only one had metastatic disease in the nodes. No lymph node metastases were noted in group 2 patients. Fifteen percent of non-obese patients had a positive margin compared 12% of obese patients.

Discussion

Obesity continues to be a significant public health concern affecting over a third of the American population.[1] Although it is inconclusive that obesity increases the incidence of prostate cancer,[3,4,15] it is responsible for an increase in prostate cancer treatment morbidity.[4-5] Radical prostatectomy remains the gold standard for treatment of localized prostate cancer. Over the last decade, a number of new surgical modifications and techniques have surfaced with the goal of decreasing the morbidity associated with radical prostatectomy procedures. Regardless of the techniques, anatomical limitations in obese patients make radical prostatectomy challenging. The transperitoneal laparoscopic prostatectomy technique has evolved, and has been the main approach used worldwide for either standard laparoscopy or robot-assisted prostatectomy. Only a few centers routinely perform laparoscopic prostatectomy using an extraperitoneal approach, as is done for the standard open retropubic prostatectomy. The criticism for this approach has been the generally perceived decreased working space, compounded with a large abdominal cavity, reducing the space further. Our study is the first to evaluate an extraperitoneal RAP approach in the obese patient.

In reviewing our data, the two groups came from a similar cancer cohort. There were no statistically significant differences in variables such as PSA, specimen weight, biopsy Gleason score, clinical stage, and pathologic Gleason score. Although operating on an obese patient is technically more challenging, it did not affect overall operative outcome. Parameters such as estimated blood loss, operating time, length of hospital stay and overall complication rates were similar between the two groups. We also found no difference in functional urinary outcome. The slightly lower 6 month urinary continence rate seen in the obese patients was previously suggested to relate to body habitus.[6] Ahlering et al[11] found that obese men had lower baseline urinary function that impacts postoperative continence. The 91.6% 6 month urinary continence rate in the obese group in our study using the extraperitoneal approach is similar to published continence rates in non-obese patients who underwent radical prostatectomy.[16]

In the only other study evaluating the impact of obesity on outcomes of robotic prostatectomy, Ahlering et al[11] concluded that obese patients were at an increased risk for operative complications. In addition to increased operative time, he also reported that obese patients took longer to recover urinary function and return to their baseline activity level.[11] It is important to note that this study was only on 19 obese patients. They did not remark on which approach was used in performing the prostatectomy. Our study exclusively evaluated the extraperitoneal approach that we feel may be more suitable for this patient group. The longer operative time and increased complication rate that was noted in their study may be related specifically to the transperitoneal approach, rather than being robot-related. It takes longer to reach the space of Retzius in the transperitoneal approach as opposed to the extraperitoneal approach and the bladder takedown may contribute significantly to the length of the procedure in the obese population.

With regards to laparoscopic prostatectomy, Singh[12] and Brown[13] assessed the impact of obesity. Brown et al[13] reported increased operative time as noted by Ahlering.[11] Neither study reported an increase in morbidity or operative complications. Obesity has also been studied in patients undergoing open retropubic and perineal prostatectomy. Hsu et al[8] found no increased risk with the open retropubic approach. However, that study used body weight rather than body mass index to define obesity. Boczko and Melman[6] reported no significant impact of obesity on outcomes after radical perineal prostatectomy. This differs from Dahm et al[7] who concluded that radical perineal prostatectomy was associated with increased morbidity. The conflicting results between these two perineal prostatectomy series may be attributed to the latter study restricting their evaluation to the morbidly obese, defined as having a BMI ≥ 40 kg/m^2.

Until now, the perineal technique has been the preferred method in the morbidly obese as it avoids the hindrance of an abdominal pannus. The extraperitoneal robotic approach may be particularly advantageous in obese patients as it requires a less steep Trendelenberg position, thus decreasing airway pressures, airway swelling, and possible prolonged intubation. This should result in a more rapid return to ambulatory status and baseline function.

Whether or not obesity increases the incidence of prostate cancer is controversial. There is however, mounting evidence that obesity increases a man's risk of dying of prostate cancer.[4-5] Therefore, it is important to evaluate whether a newer surgical technique can effectively cure these patients, which is the underlying goal of all of the techniques discussed above. We found no statistically significant difference in total positive margin rates between the obese and non-obese groups using the extraperitoneal approach. However, in patients with stage 3 disease and a BMI > 30, lower positive margin rates were noted. Our study only examined the robotic extraperitoneal approach. A prospective randomized study is needed to ascertain whether the extraperitoneal approach should be favored over the transperitoneal route in obese patients undergoing robotic prostatectomy. In addition, our follow-up is short with a median of 1 year. Additional study is necessary to assess PSA progression, erectile function, and long-term treatment outcomes in obese patients after undergoing RAP.

Conclusion

In our experience, the extraperitoneal approach is not associated with increased morbidity in the obese population. Obese patients may actually benefit from this approach from an anesthetic standpoint given that the decreased Trendelenberg position and lower intra-abdominal pressure may overall decrease ventilatory requirements and reduce potential anesthetic complications. There were no statistically significant differences noted in oncological or functional outcomes between the two groups. Long-term follow-up is necessary to further evaluate the role of RAP in obese patients. □

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