Research Article

The Effect of American Society of Anesthesiology Scores on Radical Prostatectomy Complications

Yikilmaz TN¹* and Toksöz S²

¹Department of Urology, Ankara Dr. Abdurrahman Yurtaslan Oncology Training and Research Hospital, Turkey
²Department of Urology, Samandağ State Hospital, Turkey

*Corresponding author: Yikilmaz TN, Department of Urology, Ankara Dr. Abdurrahman Yurtaslan Oncology Training and Research Hospital, Mehmet Akif Ersoy District 13.St. No:56, Yenimahalle, 06200, Ankara, Turkey

Abstract

Objective: The objective of this study was to evaluate the effect of American society of Anesthesiology (ASA) scores on radical prostate ectomy complications

Methods: We retrospectively included 225 patients undergoing radical prostatectomy from 1999 to 2015. Patients were divided into a low-risk group with ASA of 1 or 2 and high risk group of ASA 3 or 4. Perioperative and postoperative complications were recorded using the modified clavien classification system.

Results: Following radical retropubicprostatectomy, there were 73 complications in 225 patients, with an overall complication rate of 32.4%. The most complication in all groups was blood transfusion in 31 patients (13.7%), and the most important complications were rectal injuries during RRP, with 4 patients (1.9%). Statistically significant difference was observed between the complication rates of the groups (25.4% versus 53.5%, p<0.05 respectively).

Conclusion: The expected results in the frequency of complication were not increased in patients with high Anesthesia (ASA) risk group. Systemic complications such as deep vein thrombosis, pulmonary embolism and infections often observed in the high ASA risk patients, surgery-related complications (such as bleeding with requiring blood transfusions, incontinence, urethral structure) are shown in both of groups. Therefore modified Clavien classification system and ASA score is not independently for each other. Using the two systems will be more accurate together. However, the failure to develop a standardized system for the classification of undesirable side effects, the Clavien system is still the most appropriate method despite all the short comings in urological surgery.

Introduction

Prostate Cancer (PC) represents a global health problem and the most frequently diagnosed cancer in men with 233000 new cases and 29480 cancer- specific deaths estimated for year 2014 in United States [1]. There are different treatment methods of prostate cancer. Radical prostatectomy and radiotherapy are considered as comparable treatments for localized PC [2]. Radical prostatectomy defined by Walsh and Donker, remains the most effective and widely used surgical intervention for localized prostate cancer and is considered the gold stand art treatment [3]. Radical prostatectomy administered by open (retropubic or perineal), laparoscopic or robotic approach.

Although improvements in surgical technique, peri and postperative management have reduced the complications of surgery, we can see complications because of the complexity of surgery. The Clavien classification system has been proposed as a mean of quantifying the complication of surgery, developed by Clavien and colleagues in 1992 and updated in 2004 [4]. It has been recently modified and named Modified Clavien Classification System (CCS) (Table 1) [5].

We evaluated risk of surgery, the American Society of Anesthesiologists (ASA) has established the ASA score, depending on patients' comorbidity and physical status [6]. An ASA class of 4 carries an odds risk ratio of 4.2 for perioperative complications, while an ASA class 3 an odds risk of 2.2, respectively (Table 2) [7]. Aim of study to investigate the effect of ASA scores on RP and classify the complications with used to CCS.

Materials and Methods

Patients

A retrospective study of medical records from 1999 to 2015 was performed to identify all patients who underwent radical prostatectomy for localized prostate cancer. After reviewing medical records, we identified a total of 225 patients with detailed admission and clinical information. Patient age, duration of hospitalization, ASA score, pathological tumor stage and complications were evaluated. The ASA scores were determined by anesthesiologists, independently of surgeon. Tumor was staged according to the American Joint Committee on Cancer (AJCC) in 2002 [8].

Surgical preparation and procedures

Mechanical bowel preparation was performed with XM solutions and patients drugs except anticoagulants continued until the day of surgery. All patients used routinely compression leg stockings. Postoperatively, antibiotic prophylaxis with a third generation cephalosporin was intravenously administered to all patients for 3 days.

In order to reduce potential bias, radical prostatectomy was

Table 1: Modified Clavien classification system for surgical complications.

I	Any pharmacological, surgical, endoscopic and radiological study does not require, include abnormal changes in the postoperative period. Diuretics, antiemetics, antipyretics, anti-inflammatories drugs and physiotherapies can be used in Grade 1
II	Grade 1 side effects requiring pharmacological treatment such as Parenteral Total Nutrition (TPN), blood transfusions or other antihypertensive medications.
III	Complications needing surgical, endoscopic or radiological intervention
	Intervention not under general anesthesia
	Intervention under general anesthesia
IV	Life- threatening complications needing ICU (Intensive care unit) management
	Single organ dysfunction (including dialysis)
	Multiple organ dysfunction
V	Death of the patient
	'd' If the patient has complication at the time of discharge, the suffix 'd' is added to the respective of complication

Table 2: ASA (American Society of Anesthesiologists) scoring system.

ASA-I:	A completely healthy patient
ASA II:	A slight disturbance such as diabetes and hypertension, but this patients lives function doesn't effect
ASA-III:	Failure of vital functions such as heart failure, breathing failure and that is not incapacitating
ASA–IV:	Severe systemic disease like heart, liver, kidney and respiratory failure and that is a constant threat to life.
ASA-V:	The patients will die for 24 hours with or without surgery. Example: ruptured abdominal aneurysm, massive pulmonary embolism
E:	Emergency operation. If the patients are taken to the emergency operations in the classification above, will be added to the end of the letter E (such as 2e)

performed through a midline incision. The obliterated hypogastric arteries were ligated. Fibro adipose tissue is teased from the anterior surface of the prostate and the endopelvic fascia is opened. Puboprostatic ligaments are cut, dorsal venous complex was ligated and the urethra was divided at the apex of the prostate. Lateral pelvic fascia, lateral pediculus, seminal vesicles and bladder neck are divided and the whole specimen removed. A tennis- racket closure of the bladder neck is preformed, after the catheter placement full thickness sutures are placed 4 or 5 points to anastomosis. A standard bilateral lymphadenectomy was performed in all patients after removal of the prostate [8].

Grouping

All complications were classified according to modified CCS (Table 1) [4,5]. In the practice of anesthesia is routinely used the patient classification system has been described by Saklad M. in 1941. Then this system is modified and called American Society of Anesthesiologists (ASA) classification (Table 2) [7,9]. American Society of Anesthesiologists classification is used to predict perioperative risk to categorize the surgery candidates according to their physical condition. In this study patients were divided into two groups according to ASA risk scoring: ASA 1-2 was the low risk, ASA 3-4 was the high- risk group. Low risk groups patients with mild systemic disease and high risk groups disease effect vital functions.

Statistical analysis

We used SPSS (version 19.0; SPSS Inc., Chicago, IL, USA) for statistically analysis. The data was evaluated with Mann-Whitney U and Kruskal-Wallis nonparametric comparison tests. $p < 0.05$ was considered statistically significant.

Results

The demographical and clinical data are shown in (Table 3). Two hundred and twenty five patients with a median age of 60.8 years

(range: 48-78) were enrolled. In total, operative time ranged from 95 to 205 minutes (median: 129 min.) and postoperative hospital stay day ranged from 3 to 13 days (median: 5.7). Average of PSA levels 7.2 ng/ml (2.4-21.3 ranges). The patients were divided into two groups, low risk and high risk according to ASA scores. Seventy one patients had ASA1 and 98 patients had ASA2 in the low risk group, in the high risk group had 56 patients in ASA3. We have no ASA 4 patients.

Patients who have low-risk group had younger (56.4 years versus 63.2 years, $p < 0.05$) and fit (body mass indexes were 27.9 and 28.6 respectively). The average PSA levels and Gleason scores in the low-risk group was 9.4ng/ml, Gleason 7 and it was 8.6ng/ml, Gleason 7 in the high risk group. Pathological examination showed T2a in 71 patients, pT2b in 66 patients, pT3a in 60 patients, pT3bin 12 patients, pT3c in 13 patients and pT4 in the remaining 3 patients. The number of lymph nodes removed ranged from 4 to 12 (median 7), compared with two groups had no relation. Preoperative blood transfusions were needed in 3 patients with hemoglobin levels of < 10g/dl. Hemoglobin values in the low and high risk groups were 13.6 versus 12.3 g/dl before surgery and 11.5 versus 10.7 after surgery, respectively.

The operation time of high risk group was 17 minutes longer than low-risk group (149 minutes versus 132 minutes p>0.05) Discharge time of low risk group is earlier than the high risk group (4.8 days versus 7.8 days, $p < 0.05$).

No statistical significance in patient age, operation time, PSA levels, clinical and pathological stage, Gleason scores were observed among the patients receiving low and hish risk group.

According to the revised Clavien classification, there were 73 complications in 225 patients, with an overall complication rate of 32.4%. Table 3 shows the complication rates for each groups. Statistically significant difference was observed between the

Table 3: Results of the study according to groups.

	All patients	Low risk group ASA 1-2	High risk group ASA 3	p
Patients	225	169	56	
Age (years)	60.8 (48-78)	56.4±2.3	63.2±5.7	0.005
BMI	28.1 (22-33)	27.9	28.6	0.23
PSA (ng/ml)	7.2 (2.4-21.3)	9.4	8.6	0.4
Gleason scores	7.3 (5-9)	7.4	6.9	0.2
Operation time (min)	129 (95-205)	132	149	0.03
Hospitalization days	5.7 (3-13)	4.8	7.8	0.001
Hb levels				
Preoperative levels (g/dl)	13.2	13.6	12.3	0.7
Postoperative levels (g/dl)	11.3	11.5	10.7	0.1

complication rates of the groups (25.4% versus 53.5%, p<0.05). All complication rates for each group were similar but metabolic complication rates like infections, venous trombosis and pulmonary embolism were most common in high risk group. The most complication in all groups was blood transfusion in 31 patients (13.7%), due to intraoperative bleeding. The most important complications were rectal injuries during RRP, with 4 patients (1.9%) that were repaired with a two layer suture. In all, 4 patients (1.9%) sustained a wound infection and 4 patients documented with urinary tract infections, treated successfully with antibiotic; 5 patients (2.1%) had a anastomotic leakage and treated by long bladder drainage (>15 days). DVT was diagnosed in 6 patients (2.4%). Anastomotic strictures were diagnosed in 5 patients (2.1%) and treated by endoscopic incision. Five patients had persistent asymptomatic lymphorrhoea following lymphadenectomy.

No significant difference in surgical complication rates was observed between low and high risk group but metabolic complications have significant difference each group. Patients with high risk group have more metabolic complications such as infections and DVT (p<0.05).

Discussion

Retropubic Radical Prostatectomy (RRP) was first reported by Millin [10] in 1947 and in the early 1980s Walsh laid the foundations of anatomic RRP with better understanding of anatomy and neurovascular bundle [11]. The RRP is the standard treatment of localized prostate cancer. These operations have some complications due to patients with elderly age and comorbidities so these are difficult operations. Age, comorbidities and high ASA scores often render these patients very poor candidates for radical surgery. In this study, we compare the complications in radical prostatectomy according to the ASA scores.

Complications are perceived differently by each surgeon. For this reason a standardization is needed while evaluating complications and informing patients. A classification system that tries to standardize and compare complications are that reported by Clavien et al. in 1992 and it was first described in cholecystectomy [4]. Then it has been updated by Dindo et al. in 2004 and is named Modified Clavien Classification System (CCS). It was applied in 6336 patients, resulting in the validation of its reproducibility and credibility [5].

Clavien classification system was used previously by general surgery operations and some urologic operations such as laparoscopic surgery, percutaneous nephrolithotomy and transurethral prostate resection [12,13]. Some of the studies about complications in radical prostatectomy, authors compare the surgical technique with regard to complications.

According to Ryu major complication rates for RRP and its Laparoscopic surrogate (LRP) are similar (7.6% *vs*. 3.4%, p=0.006 respectively) [14]. Laparoscopic technique is associated with a lower complication rate than RRP but there is no significant difference. Touijer reported 3.6% complication rate in RRP and 34% in LRP [15]. Artibani [16] and Touijer concluded LRP does not provide significantly advantages in terms of morbidity over the RRP, whereas Remzi reported the opposite [17]. A study in Greece, authors evaluated 995 RRP patients and complication rates were estimated as 26.9% [12]. In our study there were 73 complications in 225 patients, with an overall complication rate of 32.4%.

Some authors present their complication rates according to the grades in RRP. Constantinides et al. in a study with 995 patients, recorded 7.3% and 12.8% of Grade 1 and 2 complications, respectively [12]. Guilloneau and Conzalgo were also reported similar results for Grade 2 (16.19%, 8.1% respectively) [18,19]. In our study, grade 1and grade 2complication rate of 9.8% and 16.1% respectively. When we compared according to the group, a significant difference wasn't observed.

Menon et al reported that 17% cases had blood transfusion that underwent RRP in study with comparing open RRP and robotic approach [20]. In a similar study, Ficerr and colleagues compared open RRP and laparoscopic prostatectomy, showed that transfusion requirement was 14% of patients who underwent open surgery [21]. In our study the most complication following RRP was blood transfusion and this rate was 13.7% like literatures.

Wound infection was seen rate of 1.9% patients in our study. Ryan et al. was observed 10% who underwent RRP. The rate was 0.3% in the US and 3.2% in Europe and Japan is grown upto 6% [22,23].

Clavien 3 and 4 complications were observed 6.5% of our patients and similar results were reported in the literature [12,14].

Some authors were observed significant association with ASA score and complications [24]. Patients with high ASA scores, they need to higher transfusion requirements because of low preoperative Hematocrit values due to concomitant chronic diseases [9]. In addition, these patients are more vulnerable to infection because they have broken their general condition and elderly. Postoperative hospital stay is prolonged by the complications, especially in this case appears to be more pronounced in intra-abdominal organ injury or vascular damage. In our study no significant difference in complication rates was observed between low and high risk group just urinary tract infections, wound infections and deep venous trombosis were seen much more in high risk group.

Indeed, surgeon experience is a predictor of the severity of complications as suggested by Hu et al [25,26].

There are several limitations of this study to be considered. This study was retrospective, the patients were not operated by same

surgeon and same techniques. And high risk group was relatively small. Our study focused on the post-prostatectomy complications in the early stage.

Conclusion

The Clavien classification systems have some limitations. Firstly, it can't determine the long term aspects of the trisect (e.g. continence, potency and oncological features) and secondly it doesn't include the comorbidity of the patient. Complications are affected comorbidities, patient features such as prostate size, body mass index, interval between prostate biopsy and RRP and ASA scores. But Clavien doesn't include anything so this system shows insignificant events after surgery like vomit, fewer. A future modification of the Clavien system should include these issues and correct these possible drawbacks. In our study we investigated these issues and determined the association between patients and complications. To our knowledge, this is the first study to use the Clavien classification system to compare the ASA scores of RRP.

In conclusion, no significant difference in surgical complication rates was observed between low and high risk group but metabolic complications have significant difference each group.

References

1. Siegel R, Ma J, Zou Z, Jemal A. Cancer statistics. CA Cancer J Clin. 2014; 64: 9-29.

2. Mao Q, Lin Y, Chen H, Bai Y, Qin J, Zheng X, et al. Preoperative risk factors for early postoperative urinary continence recovery after non-nerve-sparing radical prostatectomy in Chinese patients: a single institute retrospective analysis. Int J Clin Exp Med. 2015; 8: 14105-14109.

3. Punnen S, Cowan JE, Chan JM, Carroll PR, Cooperberg MR. Long-term health-related quality of life after primary treatment for localized prostate cancer: Results from the CaPSURE Registry. Eur Urol. 2015; 68: 600–608.

4. Clavien PA, Sanabria JR, Strasberg SM. Proposed classification of complications of surgery with examples of utility in cholecystectomy. Surgery. 1992; 111: 518-526.

5. Dindo D, Demartines N, Clavien PA. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. Ann Surg. 2004; 240: 205-213.

6. Hoffmann H, Kettelhack C. Fast-track surgery--conditions and challenges in postsurgical treatment: a review of elements of translational research in enhanced recovery after surgery. Eur Surg Res. 2012; 49: 24-34.

7. Wolters U, Wolf T, Stützer H, Schröder T. ASA classification and perioperative variables as predictors of postoperative outcome. Br J Anaesth. 1996; 77: 217-222.

8. Walsh PC. Anatomic radical prostatektomy: evaluation of the surgical technique. J Urol. 1998; 160: 2418-2424.

9. Han KR, Kim HL, Pantuck AJ, Dorey FJ, Figlin RA, Belldegrun AS. Use of American Society of Anesthesiologists physical status classification to assess perioperative risk in patients undergoing radical nephrectomy for renal cell carcinoma. Urology. 2004; 63: 841-846.

10. Millin T. Retropubic urinary surgery. Baltimore: Williams & Wilcins Co. 1947.

11. Walsh PC, Lepor H, Eggleston JC. Radical prostatectomy with preservation of sexual function: anatomic and pathological considerations. Prostate. 1983; 4: 43-85.

12. Constantinides CA, Tyritzis SI, Skolarikos A, Liatsikos E, Zervas A, Deliveliotis C. Short and long-term complications of open radical prostatectomy according to the Clavien classification system. BJU Int. 2009; 103: 336-340.

13. Mamoulakis C, Efthimiou I, Kazoulis S, Christoulakis I, Sofras F. The modified Clavien classification system: a standardized platform for reporting complications in transurethral resection of the prostate. World J Urol. 2011; 29: 205-210.

14. Ryu J, Kwon T, Kyung YS, Hong S, You D, Jeong IG, et al. Retropubic versus robot-assisted laparoscopic prostatectomy for prostate cancer: a comparative study of postoperative complications. Korean J Urol. 2013; 54: 756-761.

15. Touijer K, Guillonneau B. Laparoscopic radical prostatectomy: a critical analysis of surgical quality. Eur Urol. 2006; 49: 625-632.

16. Artibani W, Grosso G, Novara G, Pecoraro G, Sidoti O, Sarti A, et al. Is laparoscopic radical prostatectomy better than traditional retropubic radical prostatectomy? An analysis of peri-operative morbidity in two contemporary series in Italy. Eur Urol. 2003; 44: 401-406.

17. Remzi M, Klingler HC, Tinzl MV, Fong YK, Lodde M, Kiss B, et al. Morbidity of laparoscopic extraperitoneal versus transperitoneal radical prostatectomy versus open retropubic radical prostatectomy. Eur Urol. 2005; 48: 83-89.

18. Guillonneau B, Rozet F, Cathelineau X, Lay F, Barret E, Doublet JD, et al. Perioperative complications of laparoscopic radical prostatectomy: the Montsouris3-yearexperience. J Urol. 2002; 167: 51-56.

19. Gonzalgo ML, Pavlovich CP, Trock BJ, Link RE, Sullivan W, Su LM. Classification and trends of perioperative morbidities following laparoscopic radical prostatectomy. J Urol. 2005; 174: 135–139.

20. Menon M, Tewari A, Baize B, Guillonneau B, Vallancien G. Prospective comparison of radical retropubic prostatectomy and robot-assisted anatomic prostatectomy: the Vattikuti Urology Institute experience. Urology. 2002; 60: 864-868.

21. Ficarra V, Novara G, Fracalanza S, D'Elia C, Secco S, Iafrate M, et al. A prospective, non-randomized trial comparing robot-assisted laparoscopic and retropubic radical prostatectomy in one European institution. BJU Int. 2009; 104: 534–539.

22. Kirsh EJ, Worwag EM, Sinner M, Chodak GW. Using outcome data and patient satisfaction surveys to develop policies regarding minimum length of hospitalization after radical prostatectomy. Urology. 2000; 56: 101–106.

23. Yamamoto S, Kunishima Y, Kanamaru S, Ito N, Kinoshita H, Kamoto T, et al. A multi-center prospective study for antibiotic prophylaxis to prevent perioperative infections in urologic surgery. Hinyokika Kiyo. 2004; 50: 673–683.

24. Permpongkosol S, Link RE, Su LM, Romero FR, Bagga HS, Pavlovich CP, et al. Complications of 2,775 urological laparoscopic procedures: 1993 to 2005. J Urol. 2007; 177: 580-585.

25. Hu JC, Elkin EP, Pasta DJ, Lubeck DP, Kattan MW, Carroll PR, et al. Predicting quality of life after radical prostatectomy Results from CaPSURE. J Urol. 2004; 171: 703–708.

26. Stolzenburg JU, Rabenalt R, Do M, Lee B, Truss MC, Schwaibold H, et al. Categorisation of complications of endoscopic extraperitoneal and laparoscopic transperitoneal radical prostatectomy. World J Urol. 2006; 24: 88-93.