Evaluation of the Results and Complications of Transabdominal Preperitoneal Laparoscopic Inguinal Hernia Repair in Patients with a History of Radical Prostatectomy

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ABSTRACT

Purpose: Radical prostatectomy is one of the most common urological surgeries. Inguinal hernia is a well-known complication of radical prostatectomy. There are many controversies about selection of surgical techniques for repair of inguinal hernia. Traditionally laparoscopic approach contraindicated for patients with history of lower abdominal surgery, but recent studies showed that it could be safe and successful and even has some advantages over open repair. In this prospective study we evaluated outcomes of laparoscopic hernia repair in patients who previously underwent radical prostatectomy.

Materials and Methods: In this prospective study, 34 consecutive patients diagnosed with inguinal hernia after radical retropubic prostatectomy underwent laparoscopic transabdominal inguinal repair and followed up for outcomes and complications.

Results: The surgery duration was 167.44 ± 52.85 min (75-230 min). No intraoperative complications occurred. Patients were discharged within 20.79 ± 4.76 hours (12-34 hours). 69.8% of cases (30 patients) needed analgesic administration. No conversion to open surgery occurred. There were 9.3% (4 hernias) hernia recurrences. We followed patients for 9.9 ± 5.33 months (2-19 months).

Conclusion: It is concluded that TAPP for inguinal hernia repair after radical prostatectomy has good results and is effective. But according to rate of recurrence, its safeness is conflicting. We notice no major complication in our patients during the time of follow up. This may be due to safety of the operation in the proposed patients. However, for a definite decision regarding recurrence rate or post-operative complications for long-term measurement have to be waited for.

INTRODUCTION

Prostate cancer (PC) is a major worldwide health problem especially among old men. The incidence of PC is increasing by age. Radical prostatectomy (RP) is the gold standard treatment for localized PC [1-4]. The 10-year cancer-specific survival rate for patients underwent Radical Retropubic Prostatectomy (RRP) is reported to be 96% [5]. However, some complications have been reported for RRP such as urinary incontinence, anastomotic stricture, erectile dysfunction, and impotence, and developing a recto urethral fistula [6-8].

Moreover, studies have reported that RRP increases the risk of postoperative inguinal hernia with reported incidence from 12.4% to 23.9%, depending on the institute's experience [9, 10] which occur between 6 months and 24 months after operation [11-13].

Several laparoscopic techniques have been described to manage inguinal hernia [14-17] such as Transabdominal Preperitoneal repair (TAPP) [18] and totally extra peritoneal (TEP) [19]. Different indications have been described for both procedures, however the TAPP technique has also been advocated in cases with recurrent and complicated inguinal hernia (such as sliding or incarcerated inguinal hernias) [20]. Moreover, several advantages have been reported for TAPP such as simpler procedure, larger working space and finally better intraoperative anatomical landmarks [21]. Furthermore, the learning curve of TAPP repair is shorter [20]. Given that inguinal hernia seen frequently following RRP, there are few studies evaluated the results of TAPP repair in patients with history of RP compared to those without previous RP [22]. As to best of our knowledge, there isn't enough prospective study about this issue, therefore, this study designed to evaluate the results and complications of laparoscopic inguinal herniorrhaphy in patients with a history of radical prostatectomy.

PATIENTS AND METHODS

Study design and patients

This prospective study was conducted in urology department of Isfahan- Alzahra Hospital, in period April 2015 to April 2018. The recurrence rate and other outcomes in patients underwent TAPP repair with history of RP were evaluated. The study received ethics approval from the Ethics Committee of Isfahan University of Medical Sciences (395657). 40 consecutive patients diagnosed with inguinal hernia after RRP enrolled in the study. (figure1)

Inclusion and exclusion criteria

Inclusion criteria consisted of patients with indication for inguinal herniorrhaphy referred to Alzahra Hospital, age between 50-80 years-old, history of RP, operated by same experienced surgeon and in the same method, and exclusion criteria consisted of subjects with age below 50 years or more than 85 years, not available for further postoperative follow up, or patients with incomplete medical data. The criteria for diagnosis of inguinal hernia after radical retro-pubic prostatectomy in this study was in line with the European Hernia Society guidelines, described previously [(23)].

Procedures

The procedure performed under general anesthesia in all patients. First of all urinary catheter inserted and patients placed in Trendelenburg position. Then a 10-mm Trocar was created exactly above the umbilicus, so that the 0-degree scope was inserted. Afterwards, two other 5-mm Trocars were inserted from the left and right side on the midclavicular line. The surgical procedure started with examining the anatomical conditions inside the abdomen and the defect side, the peritoneum opening position was from the anterior superior iliac spine to the medial umbilical fold. After that, peritoneal flap developed by sharp and blunt dissection to reach the psoas muscle and after complete reduction of the hernia sac and dissection continued inferomedially to pubic symphysis. Thereafter, a mesh size of 12 * 15 cm reconfigured and placed in a way that overlaps around the inguinal ring with at least 3 cm distance and fixed with 2-3 non absorbable or absorbable tackers. At the end, the peritoneal flap was closed by running 2-0 prolene sutures. All patients received Antibiotic (ceftriaxone 1gr intravenous) and analgesic agents (pethidine and Apotel) were prescribed on demand after surgery.

Evaluations

Different variables were evaluated in patients including age, previous history of smoking, history of previous inguinal hernia, hernia side and classification based on Nyhus Criteria, described previously [(24)] and variables during surgery such as damage to the bladder and viscera, respiratory failure, stroke, damage to the bowel, damage to the lower epigastric vessels, duration of surgery, conversion to open approach. The severity of postoperative pain was measured by the

Visual Analogue Scale (VAS) (0 = painless and = 10 worst pain during life), which is measured 6 and 24 hours and 2 weeks after surgery. Hematuria, seroma and hematoma, hospital discharge time, orchitis, testis atrophy, urinary tract infection, surgical site infection, examination of hernia recurrence based on physical examination, hernia type and location in cases of recurrence, time to detect hernia recurrence and other complications after surgery. All outcomes were measured at baseline, 2 weeks, 3 months, 6 months, and 1 year postoperatively and at the end of study or when they were clinically symptomatic or reported by patients. As several studies demonstrated, most IHs develop during the first 3–4 years after radical retro pubic prostatectomy (RRP) [(31)], therefore all hernias were considered due to Prostatectomy in our follow up. Two weeks after operation, patients were allowed to have their routine occupational activity.

Statistical Analysis

Statistical analysis of data was performed using SPSS version 24 software. Kolmogorov-Smirnov test was used in order to evaluate the normal distribution quantitative variables. Independent t-test was used for variables with normal distribution and Mann-Whitney test for non-normal distribution variables. Chi-square test was used to compare qualitative variables between groups. Two tailed p-value less than .05 were considered significant.

RESULTS

Thirty-four patients with mean age of 65.97 ± 8.16 years (51-80 years) prospectively entered the study. The duration between RP and laparoscopic herniorrhaphy (LH) was 22.41 ± 12.42 months (6-60 months). Most of cases (15/43, 44.1%) were on the right side. Moreover, 30.2 % of subjects were type IIIB inguinal hernia (13/43), 25.6 % (11/43) type II and IIIA respectively and 18.6% (8/43) were type IV inguinal hernia bases on Nyhus Criteria. We found that 30.2% of cases had history of smoking.

The mean operative time was 167.44 ± 52.85 min (75-230 min) and hospitalization time was 20.79 ± 4.76 hours (12-34 hours). There was no conversion to open surgery. Moreover, the mean pain score based on VAS in 6, 24 hours and 2 weeks after surgery were 4.41, 1.48, and 0.2, respectively. Thirty cases (69.8 %) (Based on hernia) needed analgesic administration. No intraoperative complications occurred. We followed patients for 9.9 ± 5.33 months (2-19 months) and found that 3 cases (6.97%) showed post-operative complications including seroma,

hematuria due to difficult and traumatic urethral catheterization and superficial surgical site infection. Moreover, 4 cases (9.3%) had hernia recurrence. The duration between LH and hernia recurrence was 0.55 ± 1.84 months (0-7 months). (Table1). We evaluated different factors affecting the hernia recurrence rate. We found that history of smoking was significantly higher in cases with hernia recurrence (75% vs. 25.6%, $P = .041$). On the other hand, we found that hospitalization time was significantly higher in cases with later hernia recurrence (26.5 ±5 vs. 20.2 ±4.39 hours, $P = .024$). (Table 2)

We evaluated pain score based on VAS and we did not observed significant differences in VAS score during follow up ($P > .05$). But by evaluating pain changes during 2 weeks follow up, we found that reduction in pain score in cases with hernia recurrence was lower as compared to other patients especially in first 6 and 24 hours after surgery. ($P < .001$). History of lymphadenectomy in previous radical prostatectomy and pathological evaluation of the specimens was not available.

DISCUSSION

We evaluated 43 hernias from 34 cases and we followed patients for mean of 9.9 ± 5.33 months (2-19 months) and found that 6.97% of cases showed post-operative complication and 9.3% had hernia recurrence. Recurrences were seen more in cases with history of smoking, higher hospitalization duration and lower pain reduction during first 24 hours.

In study performed by Claus CM et al., mean operative time was reported 67.5 min and 5% of cases had intraoperative minor complication, without major postoperative complications. Moreover, after 24 hours and on the seventh day after surgery, 85% and 90% of patients had no pain, respectively. Forty five percent of subjects did not need any analgesics postoperatively. There was no conversion to open surgery. After a mean follow-up of 14 months, no recurrence was observed [25]. The results of this study were not similar to the results of our study. We did not observed intraoperative complication, while 6.97% of cases showed post-operative complication. Moreover, we found that 9.3% had hernia recurrence. These differences may due to different sample size, different types and sizes of hernia, different inclusion and exclusion criteria, and surgeon experience. Also, two patients which had hernia recurrence in our study had history of previous surgeries including appendectomy and herniorrhaphy. In another study, performed by Hawn et al, rate of recurrence after inguinal herniorrhaphy was 6.5% and 21.3% of

patients had complications at 2 years. The authors stated that most of recurrences occur in first year [32]. The laparoscopic inguinal herniorrhaphy after pelvic or abdominal surgeries is a time consuming procedure because releasing lateral adhesions of bladder to pelvic wall and dissecting free the peritoneal flap is technically challenging compared to those patients without history of surgery. Our study showed higher rate of recurrence and longer operative time. Our patients underwent herniorrhaphy with a mean time of 22 months after radical prostatectomy with a range between 6-60 months. Postponing the treatment of inguinal hernia after radical prostatectomy may result in increasing the size of defect or sac and also more adhesions make subsequent dissection more difficult with higher rates of recurrences. As shown in table-2 patients with subsequent recurrences have significant delay in diagnosis and or treatment of inguinal hernia (23 versus 8 months).So it seems that patients with radical prostatectomy diagnosed with inguinal hernias should be treated as soon as possible in follow-up

Moreover, Dulucq JL et al. reported that laparoscopic TEP for inguinal hernia repair in patients with previous low abdominal surgery (such as radical prostatectomy) has good results, similar to those without previous surgery (such as major intraoperative complications, hospital stay, and recurrence rate). However, a longer operative time was observed in patients with previous low abdominal surgery. Finally they concluded that TEP repairs can be performed efficiently and safely in patients after radical prostatectomy by skilled and experienced laparoscopic surgeons [26]. Although the design of the study was not the same as our study, but the results of this study were similar to the results of our study, however, we found that 9.3% of cases had hernia recurrence. It seems history of smoking increases intra-abdominal pressure and higher duration between radical prostatectomy and TAPP cause more adhesive bands and make operation more difficult with less surgical maneuver. In follow up patients were allowed to have activity about 2 weeks after surgery but all recurrences occurred in patient with back to activity less than one week.

In the procedure of operation, the peritoneum opening position was from the anterior superior iliac spine to the medial umbilical fold, as described in Dorga et al study [27]. Sakon M et al. in 2017 showed that the mean operation time in patients who had previously undergone robot-assisted laparoscopic radical prostatectomy was 99.5 ± 38.0 min. The volume of blood loss was small intraoperatively, and the hospitalization duration was 2.0 ± 0.5 days. No major intraoperative or postoperative complications occurred. During the average 11.2-month follow-

up period, no recurrence was observed [28]. Wauschkuhn CA et al. reported that patients with history of prostatectomy were older, had higher duration of operation and higher morbidity (5.7 vs. 2.8%), but recurrence rate was similar (0.8 vs. 0.7%) as compared to group without history of prostatectomy. Finally, they concluded that, even if TAPP after prostatectomy is a difficult operation it can be done efficiently and safely [29]. In other study AF Atmaca et al. showed mean operation time in patient with concurrent repair of inguinal hernia with mesh application during transperitoneal robotic assisted radical prostatectomy was 139 ± 21 minutes. The mean time of hospitalization was 4 ± 0.9 days (range: 2-7). No intra-operative complication was seen. Mean follow up time was 13 months and they did not observe hernia recurrence or mesh infection [33].

In the present study, patients experienced inguinal hernia repair (IMHR) with mesh placement. In a similar study performed by Hocaoglu et al, patients with previous IMHR were compared with patients without previous mesh implantation (nMI) who underwent open radical prostatectomy. Results showed that there was no significant difference between functional outcomes of open radical prostatectomy in study groups [30]. One of the limitations of the study was the small size of study population and therefore the limited power to reflect statistical differences.

CONCLUSIONS

It is concluded that TAPP for inguinal hernia repair after radical prostatectomy has good results and is effective. But according to rate of recurrence, its safeness is conflicting. We notice no major complication in our patients during the time of follow up. This may be due to safety of the operation in the proposed patients. Moreover, we found that 9.3% of cases had hernia recurrence which depends on different factors such as history of smoking, higher duration between radical prostatectomy and TAPP, higher hospitalization stay and with lower pain reduction during first 24 hours. Therefore, according to the risk factors related to higher incidence of hernia recurrence, we can predicts high risk patients to provide preventive options such as performing by skilled and experienced laparoscopic surgeons. This may decrease the rate of hernia recurrence. However, for a definite decision regarding recurrence rate or post-operative complications for long-term measurement have to be waited for.

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CONFLICT OF INTEREST

The authors have indicated that they have no conflicts of interests regarding the content of this article.

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Figure 1.Patients' enrollment algorithm.

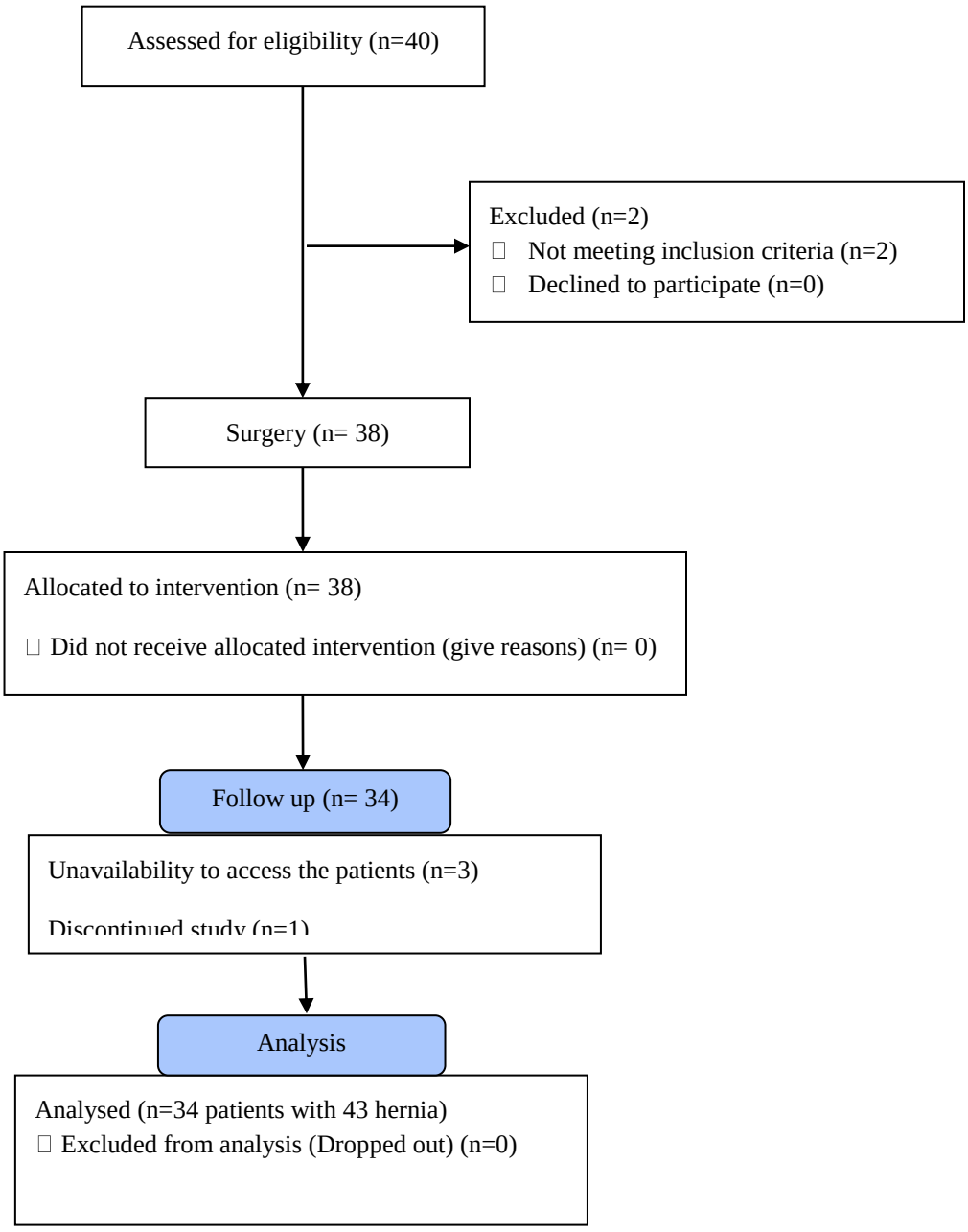

Table 1: Studied variables before and after surgery

Variables		**No. (%)**	**Minimum**	**Maximum**	**Mean**	**SD.**
Age (year)		-	51	80	65.97	8.16
Smoking		13 (30.2%)	-	-	-	-
Duration between RP and LH (month)		-	6	60	22.41	12.42
Side	Right	15 (44.1%)	-	-	-	-
	Left	10 (29.4%)	-	-	-	-
	Bilateral	9 (26.5%)	-	-	-	-
Nyhus Criteria	II	11 (25.6%)	-	-	-	-
	IIIA	11 (25.6%)	-	-	-	-
	IIIB	13 (30.2%)	-	-	-	-
	IV	8 (18.6%)	-	-	-	-
Surgery duration (min)		-	75	230	167.44	52.85
Hospitalization duration (hour)		-	12	34	20.79	4.76
VAS score	After 6 hours	-	2	6	4.41	1.11
	After 24 hours	-	0	4	1.48	0.93
	After 2 weeks	-	0	2	0.2	0.46
Analgesic administration		30 (69.8%)	-	-	-	-
Follow up (month)		-	2	19	9.9	5.33
Post-operative complication	Seroma	1 (2.3%)	-	-	-	-
	Infection	1 (2.3%)	-	-	-	-
	Hematuria	1 (2.3%)	-	-	-	-

Hernia recurrence	4 (9.3%)	-	-	-	-
Duration between LH and hernia recurrence (month)	-	0	7	0.55	1.84

Abbreviations: RP, radical prostatectomy; LH, laparoscopic herniorrhaphy

Table 2: Studied variables before and after surgery based on recurrence

Recurrence / **Variables**		**Negative (n=39)**	**Positive (n=4)**	**P-value**
Age (year) ; mean ± SD (range)		65.51 ±8.27	70.5 ±5.97	.249
Smoking		10 (25.6%)	3 (75%)	.041
Duration between RP and LH (month)		8.5±3.69	23.84 ±12.12	<0.001
Side	Right	14 (45.2%)	1 (33.3%)	.922
	Left	9 (29%)	1 (33.3%)	
	Bilateral	8 (25.8%)	1 (33.3%)	
Nyhus Criteria	II	10 (25.6%)	1 (25%)	.616
	IIIA	11 (28.2%)	0	
	IIIB	11 (28.2%)	2 (50%)	
	IV	7 (17.9%)	1 (25%)	
Surgery duration (min)		164.61 ±54.07	195 ±30.82	.299
Hospitalization duration (hour)		20.2 ±4.39	26.5 ±5	.024
VAS score ; mean ± SD (range)	After 6 hours	4.53 ±1.02	3.25 ±1.5	.091
	After 24 hours	1.43 ±0.88	2 ±1.41	.557
	After 2 weeks	0.15 ±0.36	0.75 ±0.95	.227

VAS differences ; mean ± SD (range)	Between 24 and 6 hours	-3.1 ±0.64	-1.25 ±0.5	<0.001
	Between 2 weeks and 6 hours	-4.38 ±0.98	-2.5 ±0.57	.001
	Between 24 hours and 2 weeks	-1.28 ±0.85	-1.25 ±0.5	.888
Analgesic administration		26 (66.7%)	4 (100%)	.167
Follow up (month) ; mean ± SD (range)		9.66 ±5.31	12.25 ±5.67	.479
Post-operative complication		2 (5.1%)	1 (25%)	.259

Abbreviations: TUL, transurethral lithotripsy; RP, radical prostatectomy; LH, laparoscopic herniorrhaphy