

# Effects of Total Abdominal Hysterectomy and Total Laparoscopic Hysterectomy on Urinary Tract Dysfunction

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## Abstract

**Objectives:** The aim of this study is to compare the urinary tract dysfunction rates of total abdominal hysterectomy (TAH) and total laparoscopic hysterectomy.

**Materials and Methods:** Turkish patients who underwent TAH and laparoscopic hysterectomy were invited to participate in this study. In this study, 140 patients were examined who underwent hysterectomy in gynecology clinic between 2013 and 2018. The post residual urine volumes of patients were measured in the preoperative period and 8<sup>th</sup> week of the postoperative period as urodynamic evaluation (with office cystometry and Q tip test). Statistical analysis was performed using Kruskal–Wallis Mann–Whitney U test by using SPSS 22.0 statistical program.

**Results:** No statistical significance ( $P > 0.05$ ) was found between age, parity, menopause, and obesity in our patients who underwent TAH and laparoscopic hysterectomy with high postvoid residual values in the postoperative period.

**Conclusion:** In this study, no statistical significance was found between the hysterectomy techniques on urinary tract dysfunction. It can be said that laparoscopy should be more preferable in correctly selected patients for minimal dysfunctional complications.

**Keywords:** Hysterectomy, menopause, postvoid residual volume, urinary dysfunction

## INTRODUCTION

Hysterectomy is a continually performed gynecological operation; however, there is a controversial situation about how to perform it abdominally, vaginally, or laparoscopically.<sup>[1]</sup> Although many studies were published on hysterectomy operations, these studies are not sufficient to make a final decision for the best technique and more studies are needed to shed light on this issue. Risks and complications of the operations can vary depending on the patient's parity, preferred surgical technique, health status and surgeon's skills, etc., Since abdominal practice is a longer and better-known method, total abdominal hysterectomy (TAH) is the more common approach worldwide for hysterectomy.<sup>[2]</sup>

Abdominal hysterectomy is adopted for surgical treatment of indications such as abnormal uterine bleeding, endometriosis, and tumors.<sup>[3,4]</sup> Typical complications of this operation are hemorrhage, ureteral damage, bladder damage, urinary dysfunction due to denervation, thromboembolism, cuff prolapse, and abdominal adhesions.<sup>[5]</sup> However, currently, total laparoscopic hysterectomy (TLH) is a rapidly spreading technique applied. If TLH is compared with abdominal hysterectomy, in laparoscopic hysterectomy, the lowest complication rate, less blood loss, with less postoperative pain, short healing period are observed.<sup>[6]</sup>

Urinary tract dysfunction is a health problem that has a negative impact on patients' life quality. The consequences of hysterectomy have been the subject of debate, with

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detrimental effects on the urinary sexual function being of the most concern. Hysterectomy has been associated with an increased risk of urinary tract sequela. The risk of urinary incontinence in patients with a history of hysterectomy increases significantly.<sup>[7]</sup> Elevated residual urine volume may be the predisposing factor for all symptomatic conditions such as intermittent urination, difficulty in urination, feeling of fullness, urinary infection, overflow, and stress incontinence. Furthermore, previous studies reported the beneficial effects of simple (nonradical) hysterectomy on urinary functions being of most concern.<sup>[8,9]</sup>

The purpose of this retrospective cohort study was to evaluate the effect of TAH and TLH urinary dysfunction in the preoperative period and at the 8<sup>th</sup> week of the postoperative period.

## MATERIALS AND METHODS

### Preoperative assessment

This retrospective cohort study was conducted at the gynecology clinic between 2013 and 2018. Data from 140 patients who underwent TAH (*n*: 86) or total laparoscopic approach (*n*: 54) were reviewed retrospectively. The patients who underwent subtotal abdominal, vaginal and laparoscopic-assisted vaginal hysterectomy were excluded from the study. The study's ethics committee approval was obtained from Kocaeli, Derince Training and Research Hospital (approval no: 2019-14). All patients were provided with details of the study in advance of their admission and gave written informed consent for recruitment.

### Surgical approaches

THL defined as TLH and all surgery was performed entirely through the laparoscopic ports.<sup>[10]</sup> All the information about the procedures was given to the patients and their informed consent were taken for laparoscopic hysterectomy; to the patient under anesthesia a Verres needle was drilled in lithotomy position with 1 cm incision. CO<sub>2</sub> insufflation was performed until the intraabdominal pressure reached to 14 mm/Hg. Trocar of 10 mm and ligasure from the left lower quadrant, Trocar of 5 mm from the lower right quadrant and dissector was entered. Bilateral ligament was grabbed with rotundum ligasure (Covidien, California, USA); it was cut and cauterized. Bilateral lig. ovari proprium was grabbed, cut, and cauterized. Bilateral ureter was observed. Bilateral a. uterine, cardinal ligaments, sacrouterine ligaments were grabbed on proximal, cut, and ligated, respectively. An appropriate laparoscopic total hysterectomy was performed.

TAH is defined as an abdominal hysterectomy with a 10–15 cm vertical incision in the abdominal wall, through which the standard operation is carried out.<sup>[11]</sup> In a TAH operation, bilateral ligamentum rotundum was grabbed,

cut and ligated. Bilateral infundibulopelvic ligament was grabbed, cut, and ligated. Bilateral a. uterina, cardinal ligaments, and sacrouterine ligaments were grabbed cut and ligated, respectively. An appropriate TAH + bilateral salpingo-oophorectomy was performed. Vajen cuff no. 1 vicryl and two (2) Richardson and one (1) figure off eight sutures were closed. Cardinal ligament was fixed. Following intraabdominal cleaning and bleeding control abdominal layers were closed according to its anatomy (with fascia no: 1 vicryl).

The post residual urine volumes of patients were measured in the preoperative period and at the 8<sup>th</sup> week of the postoperative period as urodynamic evaluation (with office cystometry and Q-tip tests). The lower threshold defining abnormal residual urine volume was accepted as 100 mL. Having studied the significance of the values of the One-Sample Kolmogorov-Smirnov test for testing the compatibility of data to the normal distribution, statistical analysis was performed using Kruskal-Wallis Mann-Whitney U test. Statistical analysis between the two groups was carried out using SPSS 22 (SPSS Inc., Chicago, IL, USA) statistical program.

## RESULTS

The hysterectomy indications of the patients are comparatively shown in Table 1. According to the table, the distribution of patients with abnormal uterine bleeding, endometrial hyperplasia, adenomyosis, adnexal mass, and uterine myoma is similar in both groups. Besides, 86 of the patients were underwent the TAH while 50 of them were in menopause. Fifty-four of the patients were operated via total laparoscopic approach and 33 of them were in menopause.

Age, parity distribution, and body mass index (BMI) distribution are presented, respectively, in Tables 2-4. The mean age of TAH group is 56.58 ± standard deviation (SD): 6.93 and the mean age of the total laparoscopic group is 52.59 ± SD: 5.87. The age and BMI distribution of the patients in both groups were not statistically different from each other (*P* > 0.05). When the distribution of parity status of the patients who underwent abdominal hysterectomy and laparoscopic hysterectomy were examined; majority of both groups are seen in parity 2 about 52%. The TLH group has three patients in Parity-5, while there were no patients in the parity 5 of the TAH group. The parity distribution is shown in Table 3. Sixty-three patients (63.3%) in TAH group and 43 patients (79.6%) in TLH group were 18.5–24.9 BMI. Eighteen patients in TAH group and nine patients in the TLH group were 25–29 BMI values.

Patients with postvoid residual (PVR) volumes higher than 100 mL are shown in Tables 5 and 6. At 14 (16.3%) of the 86 patients who underwent abdominal hysterectomy,

**Table 1: The primary hysterectomy indications in the patients' groups**

Indication	TAH group (n=86)	TLH group (n=54)
Abnormal uterine bleeding	14	10
Endometrial hyperplasia	18	13
Adenomyosis	3	2
Adnexal mass	14	7
Uterine myoma	25	18
Others*	12	4

\*Failed endometrial ablation, ovarian cysts, premenstrual syndrome and pelvic pain. TAH: Total abdominal hysterectomy, TLH: Total laparoscopic hysterectomy

**Table 2: Age distribution in the patients' groups**

Age group	TAH group (n=86), n (%)	TLH group (n=54), n (%)
40-50	20 (23.2)	24 (44.45)
51-60	42 (48.9)	22 (40.75)
61-70	23 (26.7)	8 (14.8)
71-80	1 (1.2)	-

TAH: Total abdominal hysterectomy, TLH: Total laparoscopic hysterectomy

**Table 3: Parity distribution in the patients' groups**

Parity	TAH group (n=86), n (%)	TLH group (n=54), n (%)
0	3 (3.4)	2 (3.7)
1	5 (6)	5 (9.2)
2	45 (52.3)	28 (51.9)
3	27 (31.3)	11 (20.4)
4	6 (7)	5 (9.2)
5	-	3 (5.6)

TAH: Total abdominal hysterectomy, TLH: Total laparoscopic hysterectomy

postoperative PVR values were over 100 mL. Seven of these 14 patients were in menopause. Six of them also were taking hormone replacement therapy. One of the patients receiving hormone replacement therapy was in the obesity group (Body mass index >30). The number of patients who did not receive hormone replacement therapy was 8 in TAH group. At 6 (%11.1) of 54 patients who underwent TLH, postoperative PVR values were over 100 mL. All patients were in menopause. They were all taking hormone replacement therapy.

After statistical analysis, we found that there is no significant effect of age, parity, BMI, and menopause on the value higher than 100 mL of PVR values (p>0.05). Age of patients with high PVR values was 53.93 ± 5.21 and 56.5 ± 7.74 for TAH and TLH, respectively.

## DISCUSSION

In the postoperative period after hysterectomy (first week) common urodynamic bladder obstruction or temporary partial denervation can be observed. This is associated with

**Table 4: Body mass index distribution in the patients' groups**

BMI	TAH group (n=86), n (%)	TLH group (n=54), n (%)
<18.5	2 (2.3)	1 (1.9)
18.5-24.9	63 (73.3)	43 (79.6)
25-29	18 (20.9)	9 (16.6)
>30	3 (3.5)	1 (1.9)

TAH: Total abdominal hysterectomy, TLH: Total laparoscopic hysterectomy, BMI: Body mass index

**Table 5: Age, parity and body mass index of patients in total abdominal hysterectomy group's patients with postvoid residual >100**

Patient	Age	Parity	BMI	Menopause	Hormone replacement
1	45	4	21	-	-
2	47	2	25	+	+
3	50	2	19	-	-
4	50	2	19	-	-
5	51	2	19	+	+
6	54	1	30	-	-
7	54	2	26	-	-
8	54	4	18	+	+
9	55	3	22	-	-
10	56	3	19	-	-
11	56	1	29	+	+
12	58	2	31	+	+
13	60	4	20	+	-
14	65	2	26	+	+

BMI: Body mass index. +: The situation is positive, -: The situation is negative

**Table 6: Age, parity, and body mass index of patients in laparoscopic hysterectomy group's patients with postvoid residual >100**

Patient	Age	Parity	BMI	Menopause	Hormone replacement
1	47	2	21	+	+
2	48	5	25	+	+
3	55	3	24	+	+
4	61	3	24	+	+
5	63	5	22	+	+
6	65	3	20	+	+

BMI: Body mass index. +: The situation is positive, -: The situation is negative

local trauma and edema of the changes at the end of a period connected with 4–6 week and it returns to normal.<sup>[12]</sup> In our study, similar processes were observed.

Since the presence of vesicoureteral dysfunction is not known before the surgery, it is suggested not to rely on the data obtained by the examination of the changes after hysterectomy.<sup>[13-16]</sup> In this study, the relationship between urinary system dysfunction and hysterectomy technique was evaluated. For this purpose, in the preoperative period and in

the 8<sup>th</sup> week of the postoperative period, the amount of post residual urine in the bladder was measured. As infections could have similar symptoms, we evaluated urinary tract infections with urine culture.

In this study, PVR values were normal in the preoperative period of abdominal hysterectomy group and in the postoperative period. After the operation, PVR values were over 100 in some patients and this was associated with urinary tract dysfunction. The contribution of high levels of PVR to urinary dysfunction is obvious. Depending on PVR values, possible urinary dysfunction can be predicted. Although the gold standard is urodynamic, in terms of application difficulty and cost, the postoperative PVR values can be more cost-effective. Urodynamic tests are used to identify urinary system dysfunction. With urodynamic tests, bladder and ureter anatomy evaluated with both bladder and ureter response to filling, storing and emptying.

In this study, no statistical significance ( $P > 0.05$ ) was detected between age, parity, menopause, and obesity in our patients who underwent TAH and laparoscopic hysterectomy with high PVR values in the postoperative period. Similarly, Miller *et al.* reported no relationship between hysterectomy and the risk of stress urinary incontinence.<sup>[17]</sup>

In the same way, all of the six patients with PVR were in menopause in the TLH group, 7 of the 14 patients with PVR were in the TAH group were in control, and 7 of the laparoscopic patients with PVR were in control. The incidence of urinary dysfunction in perimenopausal women is very high and the age of hysterectomy also coincides with this period. Therefore, all postoperative urinary symptoms cannot be attributed to gynecological surgery.<sup>[17]</sup>

In this study, the mean age of patients ( $n: 14$ ) with high PVR after abdominal hysterectomy is slightly higher according to all patients ( $n: 86$ ) in these group 54 patients who underwent TLH had the opposite situation. However, these changes were not statistically significant ( $P > 0.05$ ). Besides, it is determined that all patients undergoing hormone replacement were in menopause.

During hysterectomy, as cardinal ligaments are separated and the main branches of the plexus passing under the uterine arteries, vesical innervation during uterine and cervical dissection of the bladder, pelvic neurons during the extended dissection of the paravaginal tissue, and nerve structures near the cervix can be damaged while the cervix is being removed.<sup>[16-18]</sup> As the dissection is performed more proximally to the uterosacral ligament in laparoscopic hysterectomy, the anatomic support of the vagina and its adjacent bladder is preserved, and significant differences can be observed in the related parameters. Hence in terms of endopelvic fascia

and pelvic anatomic support, laparoscopic surgery is more advantageous.

In most studies, laparoscopic hysterectomy is a better choice than abdominal hysterectomy for more favorable causes such as less blood loss, less hospitalization, and healing period and also less postoperative pain.<sup>[4-13,16-20]</sup> In addition, laparoscopic hysterectomy techniques differ a little from conventional techniques. Endopelvic fascia and other supporter tissue of the bladder are more intact because the uterosacral ligament is more proximally resected. With this technical advantage and increased experience, laparoscopic hysterectomy may have favorable outcomes.

## CONCLUSION

We did not find any relationship between routes of hysterectomy and high PVR values in the postoperative period. It can be concluded that the laparoscopic approach to correctly selected patients would contribute to the reduction of postoperative urinary system dysfunction. All patients should be informed on associated risks related to hysterectomy techniques, and other treatment options should be considered before surgery. It provides patients some advantages such as less peri-operative morbidity, better life quality, shorter hospitalization time, and faster return to their daily activities. Nevertheless, the need for randomized long-term prospective studies with larger patient series is obvious.

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## Conflicts of interest

There are no conflicts of interest.

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