TOTAL LAPAROSCOPIC HYSTERECTOMY: COMPARISON BETWEEN CONVENTIONAL AND RETROPERITONEAL TECHNIQUE

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ABSTRACT

AIM OF STUDY: The study aims to know whether a retroperitoneal method of total laparoscopic hysterectomy is better than the conventional method of total laparoscopic hysterectomy. This was assessed by comparing both methods for intra-operative blood loss and urological complications.

METHODOLOGY: An observational study was done in patients planned for total laparoscopic hysterectomy (TLH) for benign pathologies who gave their consent to be included in the study. Patients were divided into two groups based on method of surgery. Group 1 included patients who underwent the conventional method of TLH while Group 2 included patients who underwent the retroperitoneal method of TLH. The groups were divided according to the doctor's efficiency in respective technique. The doctors who were comfortable in the conventional TLH were considered for Group 1 and authors conducted retroperitoneal TLH in Group 2. The data obtained from both groups were compared and then analyzed for the duration of surgery, blood loss and complications.

RESULTS: Out of 102 patients, 71 underwent the conventional method of TLH (group 1) and 31 underwent the retroperitoneal method of TLH (group 2). The mean duration of surgery was 132.0 ±39.3 minutes and 136.8 ±44.2 minutes in group 1 and group 2 respectively (p=0.643).The drop in haemoglobin level was 1.18 ±0.66g/dL and 1.11 ±0.45g/dL in group 1 and group 2 respectively (p=0.901). No significant complications like bladder, ureteric injury or excessive blood loss were observed in both the groups (p=1.000).

CONCLUSION: There was no statistically significant difference between the conventional method and retroperitoneal method of TLH in terms of blood loss and complications.

KEYWORDS: TLH, Retroperitoneal TLH, Complications of TLH, Uterine artery ligation in TLH, Ureteric injury

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INTRODUCTION

Hysterectomy is one of the major surgeries in gynecology performed for benign or malignant conditions of the genital tract. Benign conditions account for 90% of hysterectomies [1,2] These benign conditions are abnormal uterine bleeding due to endometriosis, adenomyosis, and pelvic organ prolapsed [3]. The route of approach in hysterectomy can be vaginal, abdominal, laparoscopic or robotic surgery. The selection of the route of hysterectomy depends on the size of the uterus, associated pathology, need for other surgeries during operation, training obtained by the surgeon, supporting equipments of the operating theatre, need for emergency or planned surgery and preference of the patient4. In laparoscopic techniques, there are more complications compared to open surgery with respect to injury to bladder and ureter.[5] There is an increased risk of ureteric injury leading to prolonged operative morbidity and litigation against medical fraternity [6,7].

Total Laparoscopic Hysterectomy (TLH) is a method of removal of the uterus by separating it from its supports and closure of vaginal cuff through laparoscopic route8. It has been widely accepted due to its better cosmetic results, decreased intra-operative blood loss and decreased duration of hospital stay [9,10].

In the conventional method of TLH, the uterine artery is ligated at the level of isthmus, near its approach to the uterus. In cases of enlarged myoma or adenomyosis, uterine vessels are seen to be dilated, extensively tortuous and lie very close to the ureters [11–13]. These vessels may not be coagulated completely by conventional method, leading to operative complications like increased intra-operative bleeding. In an attempt to coagulate the uterine artery there is always an increased chance of ureteric injury and a need for conversion to laparotomy.

The retroperitoneal method of uterine artery ligation in TLH involves the creation of retroperitoneal space to identify the ureter, internal iliac artery and uterine artery. This is followed by ligation and division of the uterine artery at its origin from the anterior division of internal iliac artery on both the sides. As the uterine artery is ligated at the initial part of the surgery and ureter is constantly visualised during operation, even at the point of uterine artery crossing at isthmus level, hence operative bleeding and ureteric injury is said to be lesser as compared to the conventional method of total laparoscopic hysterectomy.

Very few studies have been published comparing the conventional method with the retroperitoneal method of uterine artery ligation. Thus, this prospective observational study was conducted to compare the conventional technique to retroperitoneal technique of uterine artery ligation in total laparoscopic hysterectomies with their outcomes.

METHOD AND MATERIALS

A prospective observational study was conducted in the department of Obstetrics and Gynaecology, IMS and SUM Hospital, Bhubaneswar, Odisha, India with clearance from the Institutional Ethical Committee (Ref. No. DMR/IMS. SH/SOA/180271). Patients planned for total laparoscopic hysterectomy (TLH) for benign uterine and adnexal pathologies were recruited in this study. Patients with malignant uterine or adnexal diseases were excluded from the study. The total number of participants in the study was 102. The duration of the study was one year from July 2019 to June 2020. Data collection. After taking informed consent, patients planned to undergo TLH for benign uterine and adnexal pathology were included in the study. History, clinical examination, and investigations done were recorded. The method of uterine artery ligation, duration of surgery, intra-operative and postoperative complications were recorded. Patients were followed up for one month post-surgery. The cases were divided into two groups. Group 1 included patients with the conventional method of TLH and Group 2 included patients with the retroperitoneal method of TLH. The groups were divided according to the doctor's efficiency in the

technique. The doctors who were competent in the conventional TLH were considered in Group 1 and authors conducted retroperitoneal TLH considered in Group 2. After thorough counselling, patients willing for retroperitoneal dissection were recruited for Group 2.

Operative procedure

After being anesthetized, patients were placed in dorsal lithotomy position and the abdominal cavity was entered through the 10 mm supraumbilical port with the direct trocar insertion. Through this port, the peritoneal cavity was visualized. The peritoneal cavity was distended with carbon dioxide. Under the vision, three accessory ports (5 or 7 mm) were given (two ports in left and one port in right iliac fossa). The patient was then placed in a steep Trendelenburg position.

Conventional method of total laparoscopic hysterectomy

After the port placement as mentioned above, the round ligament was coagulated and cut after stretching the pedicles by moving the uterus to the contralateral side with the help of Sukhadia type of uterine manipulator inserted through the vagina. In the next step, the utero-ovarian pedicles were coagulated slightly away from the cornua of the uterus. The Utero-vesical fold of the peritoneum opened and the bladder was pushed down. This is followed by coagulation and division of uterine vessels on both sides at the level of isthmus as it approaches to the uterus as it would have been done in total abdominal hysterectomy. The transverse cervical ligaments and uterosacral ligaments were also coagulated and cut. It was followed by the opening of the vagina using monopolar cautery guided by the uterine manipulator. Usually bilateral prophylactic salpingectomy was followed as per institutional protocol. The ovaries were also removed as per requirement. The specimens were retrieved vaginally or by morcellation through the abdominal ports in case of an enlarged uterus.

Retroperitoneal method of total laparoscopic hysterectomy

Following visual examination of the abdominal cavity, the round ligament of one side was held about 2 cm medially from the pelvic side wall, coagulated and dissected. The entry of the carbon dioxide gas through this helped in creating a retroperitoneal space. The usual surgical step is the isolation of the ureter and uterine artery. Hence broad ligament was stretched and an incision in the broad ligament was made where it overlies the iliac vessels, thus allowing entry into the retroperitoneum. Then the incision was extended in a cranial direction parallel to the infundibulopelvic ligament over the external iliac artery so that the medial flap of the peritoneum contained the ureter. The identification of the ureter was confirmed by its glistening white colour, vessels over its surface, and peristaltic movement. The ureter was pushed medially. The uterine artery was identified at its origin from anterior division of internal iliac artery, coagulated and dissected. The above step was repeated on the opposite side. The anterior fold of the peritoneum was opened in the direction of the uterovesical fold of the peritoneum following which the bladder peritoneum was elevated and the bladder dissected and pushed down to reveal the anterior vaginal wall. The fallopian tube and ovarian ligament were coagulated and cut close to the uterus. Both the folds of parametria along with uterine vessels were coagulated and cut alongside the uterus and cervix. Uterosacral and transverse cervical ligaments were coagulated and cut on both sides. Throughout the procedure ureter was visualized during coagulations of pedicles. The rest of the procedures were same as the conventional method.

In both the methods, the vaginal vault was closed by using delayed absorbable suture material polyglactin by laparoscopic suturing technique (end suturing). Port site cannula removal was done under the vision and port sites were closed by mattress sutures.

Statistical analysis

Data collected from 102 cases was entered into IBM Statistics SPSS 24.0, SPSS South Asia Pvt. Ltd. The statistical analysis was done following the statistical procedure as given below. The distribution of patients into two groups was done according to

the method of TLH performed. This was tabulated using the frequency distribution procedure. Categorical variables like age group, chief complaint, co-morbidity, clinical diagnosis, surgery performed, complications, and final diagnosis in both the two groups were noted by using cross-tabulation procedure and their association was studied by using the Chi-square test of independence and Fisher's exact 'p' value. Non-parametric Mann-Whitney U 'p' value test was used for comparison of total duration of surgery, pre-operative and post-operative haemoglobin between two groups. The 'p' value < 0.05 has been taken as test of significance.

RESULTS

A total of 102 cases were included in this study. Group 1 had 71 cases while Group 2 had 31 cases. These two groups were compared concerning the following aspects.

Table 1 shows the distribution of cases according to clinical diagnosis in both the groups. There was no statistically significant difference in clinical diagnosis between the two groups (p=0.679).

Table 1: Distribution of clinical diagnosis

Clinical diagnosis	Method of Surgery				Total		Fisher's Exact 'p' value
	Conventional		Retroperitoneal				
	No.	%	No.	%	No.	%	
AUB-A*	11	15.5	8	25.8	19	18.6	
AUB-E**	6	8.5	3	9.7	9	8.8	
AUB-L***	33	46.5	12	38.7	45	44.1	
AUB-M****	5	7	2	6.5	7	6.9	
AUB-P*****	0	0	1	3.2	1	1	
Pelvic endometriosis	1	1.4	0	0	1	1	
AUB-A* with right ovarian cyst	2	2.8	0	0	2	2	
Fibroid uterus with pyometra	1	1.4	0	0	1	1	
AUB-L*** with ovarian endometriosis	0	0	1	3.2	1	1	
Unhealthy cervix	1	1.4	0	0	1	1	
Fibroid uterus and UTI#	1	1.4	0	0	1	1	
AUB –A* and unhealthy cervix	1	1.4	0	0	1	1	0.679
Submucous fibroid	1	1.4	0	0	1	1	
Multiple fibroid and LUTS##	1	1.4	0	0	1	1	
Right ovarian mass	0	0	1	3.2	1	1	
BRCA### 1 mutation`	1	1.4	0	0	1	1	
Fibroid uterus	0	0	1	3.2	1	1	
AUB with chronic PID####	1	1.4	0	0	1	1	
Bilateral ovarian endometriosis	1	1.4	0	0	1	1	
Adenomyosis	1	1.4	0	0	1	1	
Endometriosis	1	1.4	0	0	1	1	
AUB-L*** with left ovarian endometriosis	1	1.4	0	0	1	1	
Elongated cervix	0	0	1	3.2	1	1	
Right ovarian endometriosis	1	1.4	0	0	1	1	
Fibroid uterus and left ovarian cyst	0	0	1	3.2	1	1	
Total	71	100	31	100	102	100	

*Abnormal uterine bleeding-Adenomyosis **Abnormal uterine bleeding-Endometrial ***Abnormal uterine bleeding-Leiomyoma
****Abnormal uterine bleeding-Malignancy *****Abnormal uterine bleeding-Polyp #Urinary tract infection
Lower urinary tract symptoms ### BRCA ####Pelvic inflammatory disease

Table 2 shows the distribution of cases according to co-morbidities in both groups. There was no statistically significant difference (p = 0.990) in co-morbidities between the two groups.

Table 2: Distribution of co-morbidity between the two groups

Co-morbidity	Method of Surgery				Total		Fisher's Exact 'p' value
	Conventional		Retroperitoneal				
	No.	%	No.	%	No.	%	
– No co-morbidity	46	64.8	22	71	68	66.7	
Anaemia	4	5.6	1	3.2	5	4.9	
Hypertension	4	5.6	1	3.2	5	4.9	
Hypothyroidism	3	4.2	1	3.2	4	3.9	
Type2DM*	6	8.5	5	16.1	11	10.8	
Hypertension# and asthma	1	1.4	0	0	1	1	
Typei2DM*and Hypertension	1	1.4	1	3.2	2	2	0.990
Post DVR**status	1	1.4	0	0	1	1	
Typei2iDM*and bronchial asthma	1	1.4	0	0	1	1	
Typei2DM*Hypertension and sickle cell trait	1	1.4	0	0	1	1	
Type2DM*,Hypertension and hypothyroidism	1	1.4	0	0	1	1	
Hypothyroidism and Hypertension 1	1.4	0	0	1	1		
Anaemia, paradoxical septal movement and type 2DM*	1	1.4	0	0	1	1	
TOTAL	71	100	31	100	102	100	

*Diabetes Mellitus; ** Double valve replacement;

Table 3 shows the distribution of various surgeries performed between the two groups. There is no statistically significant difference (p=0.263) between the two groups concerning the surgery performed on patients.

Table 3 Distribution of the surgeries performed

Surgery Performed	Method of Surgery				Total		Fisher's Exact 'p' value
	Conventional		Retroperitoneal				
	No.	%	No.	%	No.	%	
TLH+BS*	46	64.8	16	51.6	62	60.8	
TLH+BSO**	19	26.8	9	29	28	27.5	
TLH+RS+LSO***	4	5.6	2	6.5	6	5.9	0.263
TLH+LS+RSO#	2	2.8	2	6.5	4	3.9	
TLH+RS##	0	0	1	3.2	1	1	
TLH+BSO+ADHESIOLYSIS	0	0	1	3.2	1	1	
TOTAL	71	100	31	100	102	100	

* Total laparoscopic hysterectomy with bilateral salpingectomy
**Total laparoscopic hysterectomy with bilateral salpingo-oophorectomy
***Total laparoscopic hysterectomy with right salpingectomy and left salpingo-oophorectomy
#Total laparoscopic hysterectomy with left salpingectomy and right salpingo-oophorectomy
##Total laparoscopic hysterectomy with right salpingectomy

Table 4 shows comparison of the total duration of surgery between the two groups. There was no statistically significant difference in both groups (p=0.643).

Table 4: Comparison of Total duration of surgery (in minutes) between the two methods

Descriptive statistics	Method of Surgery	
	Conventional (n=71)	Retroperitoneal (n=31)
Mean	132.0	136.8
Standard deviation(SD)	39.3	44.2
Q1 (1st Quartile)	105	110
Q2 (Median)	120	120
Q3 (3rd Quartile)	155	170
Mann-Whitney U 'p' value	0.643	

Table 5 represents comparison of preoperative haemoglobin (Hb) and postoperative hemoglobin between the two groups. There was no significant difference in the pre-operative Hb and post-operative Hb between the two groups.

Table 6 a represents comparison of fall in Hb levels between the two groups. There was no significant difference in mean falls in Hb levels between the two methods (p=0.901).

Table 6 Comparison of fall in Haemoglobin (Hb) levels (g/dL) between the two groups

Fall in Hb levels (g/dL)	Method of Surgery	
	Conventional (n=71)	Retroperitoneal (n=31)
Mean	1.18	1.11
Standard deviation(SD)	0.66	0.45
Q1 (1st Quartile)	0.80	0.80
Q2 (Median)	1.10	1.00
Q3 (3rd Quartile)	1.30	1.30
Mann-Whitney U 'p' value	0.901	

Table 5: Comparison of pre-operative and post-operative Hb* (g/dL)

Hb* (g/dL)	Method of surgery						Mann-Whitney U 'p' value
	Conventional (n=71)			Retroperitoneal (n=31)			
	Mean	SD	Median (IQR)	Mean	SD	Median (IQR)	
Pre-operative	11.0	1.4	10.8(9.9,11.9)	11.0	1.3	11.1(10.1,12.0)	0.861
Post-operative	9.8	1.3	9.7(8.7,10.8)	9.9	1.4	9.6(8.9,11.3)	0.634

***Haemoglobin**

Table 7 represents the association of complications with the method of surgery .A single case of post-operative uretero-vaginal fistula due to ureteric injury and one case of post-surgical bleeding p/v were observed in conventional group, whereas no such complications were observed in retroperitoneal group which is not statistically significant(p=1.000).

Table 7 Association of complications with the method of surgery

Complication	Method of Surgery				Total		Fisher's Exact p' value
	Conventional(n=71)		Retroperitoneal(n=31)		'		
	N	%	N	%	N	%	
No complication	69	97.2	31	100	100	98	1.000
Post-operative uretero-vaginal fistula	1	1.4	0	0	1	1	
Post-surgical bleeding p/v	1	1.4	0	0	1	1	
Total	71	100	31	100	102	100	

DISCUSSION

A total of 102 cases were included in this study. The women included in this study were compared concerning age, presenting complaints, and clinical diagnosis. No statistically significant difference was seen between the two groups. A wide range of clinical diagnoses was seen among the patients. In patients with anaemia, blood transfusion was done pre-operatively to correct the anemia and hemoglobin levels were brought up to 10 g/dl and above. The study group was divided into two groups named Goup 1 (conventional method) and Group 2 (retroperitoneal method). The distribution of co-morbidities was similar in both groups (p=0.990). As shown in Table 3, type of surgeries performed in both groups are near comparable (p =0.263)

Out of the total cases in group 1, most of them 69 (97.2%) did not encounter any complications. Only one case of ureteric injury occurred in the conventional method of uterine artery ligation in TLH. The patient presented on postoperative day 8 with the complaint of continuous vaginal discharge and a diagnosis of right side ureterovaginal fistula was made with the help of CT- KUB scan. The patient underwent ureteric re-implantation and double J stent placement. One case of postoperative vault bleeding was observed in conventional group which was probably due to the increased INR value as she was on warfarin prophylaxis for post double valve replacement (DVR) surgery. The patient was transfused with 4 units of fresh frozen plasma and re-exploration was done to seal the bleeding site from the vaginal vault. The patient's postoperative period was uneventful and discharged on day 6 of the postoperative day. No complications were encountered in the group where retroperitoneal ligation of the uterine artery was done in TLH. The differences between the two groups were not statistically significant concerning fall in hemoglobin level, complications and duration of surgery.

Sinha R et al.14compared the two procedures of TLH where in one group, TLH was started with ligation of both the uterine arteries (ascending branch) at isthmus followed by division of corneal structures (group A) while in another group, division of corneal structures was done first followed by uterine pedicles and utero-sacral ligaments (group B). This study revealed that there was a statistically significant decrease in blood loss and duration of surgery when uterine artery ligation was done before the division of corneal structure. No major complications occurred during this study.

A study by Poojari V G et al.15 had compared conventional TLH and TLH with prior uterine artery ligation (ascending branch of the uterine artery near isthmus was ligated before the division of corneal structures in this study). There was a statistically significant reduced blood loss and duration of surgery as well as the complications in the TLH group with prior uterine artery ligation as compared to conventional TLH .

The blood loss during TLH was calculated by suction apparatus (in ml) in these two studies while in our study we used the fall in hemoglobin levels on the 2nd postoperative day as a method to indirectly evaluate the total blood loss that might have occurred during the surgery. When the amount of blood loss is calculated only by using the suction apparatus, the total amount of blood loss incurred by the patient might not be reflected well by it. The fall in hemoglobin would be a better indicator as it can be used to decide whether there is any need for post-operative blood transfusion.

In our study one case of ureteric injury was seen in the conventional method of TLH. During conventional TLH, the risk of ureteric injury is increased because the ureter passes very close to the uterus in large uterine tumors. In distorted anatomy, the difficulty is encountered during uterine artery coagulation. In retroperitoneal dissection, ureters are constantly visualized during the surgery and prior uterine artery ligation causes transient uterine ischemia which leads to decreased blood loss during surgery. Hence we believe that the main step in hysterectomy is securing the uterine vascular pedicle and prevention of ureteric injury

by constant visualization of the ureter through it entire course. Both of these steps are achieved in the retroperitoneal method of TLH.

LIMITATIONS

The sample size of the study is not large enough to derive the conclusion of whether the conventional or retroperitoneal method of uterine artery ligation during TLH is preferable over the other. A lesser number of TLH was done with the retroperitoneal method of uterine artery ligation as compared to the conventional method during the study period. There was no randomization of the patients into the above two groups because this study was only an observational study. Multiple surgeons were included in the study and could have affected the results of the study group due to varied surgical techniques, experience and expertise.

CONCLUSION

This study showed no significant difference between the two techniques concerning mean fall in hemoglobin, mean duration of surgery and complications in total laparoscopic hysterectomy. No complications were noted in the group of the retroperitoneal method of uterine artery ligation. However one case of ureteric injury was observed in conventional TLH group at the site of bladder insertion. It was a thermal burn and occurred during coagulation of uterine artery.. More studies in this area would help us in a better understanding of the techniques and their complications.

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CONFLICT OF INTEREST

The authors have no conflict of interest.

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