International Surgery Journal
Yassin HR et al. Int Surg J. 2018 May;5(5):1657-1662
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: http://dx.doi.org/10.18203/2349-2902.isj20181583

Original Research Article

Comparative study between open and laparoscopic lymphadenectomy (pelvic and para-aortic) in gynecological malignancies

Hytham R. Yassin[1]*, Soliman ALShakhs[2], Mohammed Hamed[3], Adel Karam[4], Mohammed Mouneer[5]

[1]Department of Surgical Oncology, Matarya Teaching Hospital, Cairo, Egypt
[2,3]Department of General Surgery, Menoufia Univeristy Hospital, Menoufia, Egypt
[4,5]Department of Surgical Oncology, Matarya Teaching Hospital, Cairo, Egypt

Received: 03 April 2018
Accepted: 10 April 2018

***Correspondence:**
Dr. Hytham R. Yassin,
E-mail: dr.h.yassin87@gmail.com

ABSTRACT

Background: Objective of present study was to compare the results of lymphaenectomy (pelvic and para-aortic) between laparoscopy and laparotomy in gynecological malignancies.
Methods: Authors analyze the results of 30 patients suffering from gynecological malignancies (Enometrial, Ovarian and cervical) submitted to surgery as apart of treatment. Patients were classified in Two Groups Group (1) included15 patients were submitted to open radical surgery and group (2) included 15 patients Were submitted to laparoscopic radical surgery between May 2016 and October 2017.
Results: In present comparative study, there was significant difference regarding intra operative blood loss, operative time and post operative hospital stay (P<0.001) and there was no significant difference regarding intra-operative complications, post-operative complications, total number of lymph node harvested, number of positive lymphnodes (P>0.05).
Conclusions: Laparoscopic lymphadenectomy is a technically feasible and safe procedure. Authors recommend further study in large number of patients with longer duration and follow up period for assessment of oncological out-come.

Keywords: Gyecological malignancies, Laparoscopic lymphadenectomy, Pelvic/Para-aortic lymphadenectomy

INTRODUCTION

Over the past 3 decades the incidence of cervical carcinoma in the United States has declined by almost one third, mostly due to a decrease in squamous cell carcinoma (SCC). In 2008, there were 11,270 new cases and 4,070 deaths due to cervical cancer. Despite the decrease in incidence, cervical cancer is the second leading cause of mortality in women aged 21-39 in the United States.[1] Endometrial carcinoma is the most common invasive neoplasm of the female genital tract and the fourth most frequently diagnosed cancer in women in the USA. In2008, it is estimated there will have been 40,100 new cases and7,470 deaths resulting from this neoplasm.[2]

Ovarian cancer is the fifth most common type of cancer in women and the fourth most common cause of cancer death in women. Ovarian cancer is predominantly a disease of older, postmenopausal women with the majority (>80%) of cases being diagnosed in women over 50 years. The estimated number of new ovarian cancer cases in Europe in 2012 was 65538 with 42704 deaths. In

the USA, there were 20400 newly diagnosed cases and 14400 deaths in 2009.[3]

Evaluation of lymphnode state (pelvicandpara-aortic) is a major component of the surgical staging procedure in several gynecological malignancies such as endometrial carcinoma and ovarian carcinoma. Cervical cancer is clinically staged, but assessment of pelvic and paraaortic lymph nodes is performed with lymphadenectomy and/or imaging.[4]

All Gynecological Malignancies was thought to be performed only via laparotomy. In current practice the full staging procedure including hystrectomy, bilateral salpingo-oophorectomy or cytoreduction may be performed via laparoscopy or usual laparotomy. Laparoscopic lymphadenectomy is an evolving technique that plays an increasingly important role in the management of gynecologic malignancies.[4,5]

METHODS

After approval from General Surgery Department and Informed consent was taken from all patients. This Comparative study was conducted on 30 patients. all enrolled patients were presented to Menoufia University Hospital and Matarya Teaching Hospital with Gynecological malignancies and submitted for surgery as a part of their management plan. Patients were classified in Two groups, group

- included 15 patients were submitted to open radical surgery and group
- included 15 patients were submitted to laparoscopic radical surgery between May 2016 and October 2017.

Exclusion criteria

High-risk chronic pulmonary and cardiovascular disease, distant metastasis, and the presence of other malignancies >70ys.

Surgical technique

Pre operative plophylactic anti coagulant as clexane 40 (sub cutaneous), prophylactic antibiotic as cefobide (1 gm through intravenous infusion) were given.

After completion of hystrectomy either open or laparoscopic, trans peritoneal lymphadenectomy is carried out with the following steps.

Systematic open pelvic lymphadenectomy

The retro peritoneum was accessed by incising the peritoneum along the psoas muscle lateral to the level of the iliac vessels. On the left side, any adhesions of the sigmoid colon were divided sharply. The pararectal and para vesical spaces were developed with a combination of sharp and blunt dissection. The ureter was identified along the medial peritoneal fold and retracted medially during the entire procedure.

The pararectal space was developed in the area between the ureter medially and the origin of the hypogastric vessels laterally. The pelvic lymph node dissection was then initiated by dissecting the lateral nodal tissue away from the psoas muscle. Care was taken to identify and isolate the genitofemoral nerve. The external iliac vessels were gently retracted medially; the space between the vessels and the psoas muscle is developed. As the dissection is carried caudally, the assistant placed are tractor into the para vesical space for medial retraction. The dissection continued until the circumflex iliac vein is clearly visualized.

At this point, the fibrofatty tissue surrounding the external iliac vessels was elevated. The fibrous sheath overlying the external iliac artery was incised to mobilize the specimen. The surgeon graspsed the specimen and retracted it medially.

Any adhesions to the medial portion of the external iliac artery were incised. The space between the external iliac artery and vein was sharply and bluntly developed. Next, the tissue adherent to the external iliac vein was gently dissected free. The surgeon then dissected within the obturator fossa. The fibrofatty tissue of the lymph node bundle was retracted medially, and a plane was created underneath the external iliac vein. Sharp and blunt dissection was performed within the fossa until the obturator nerve was visualized and isolated along its entire course within the obturator fossa. Accessory vessels in this space were clipped or cauterized only after the obturator nerve was clearly delineated and the ureter was safely retracted out of the field of dissection.

Systematic open para-aortic lymphadenectomy

The peritoneum was incised in front of the aorta down to the common iliac arteries. A plane developed between peritone and great vesseles (Aorta and IVC) and was extended laterally to ureters on each side.

The node-beating areolar tissue in front of the aorta was incised. The limits of the dissection were the bifurcation of the aorta inferiorly, the proximal part of the common iliac artery infero laterally and the ureters laterally.

The superior extent of the dissection was renal vein. The nodal tissue was mobilized en bloc from the front of the aorta and upper part of the common iliac artery and extended as far laterally as possible.

Cautious dissection below the elevated tissue was done to enter the caval sheath and the incision was extended proximally to the duodenum and inferiorly to the level of the right common lilac artery.

Laparoscopic lymphadenectomy

Tran peritoneal pelvic and para aortiv lymphadenectomy was performed with the patient put in 30-40 degree Trendelenburg position for better exposure of the retero peritoneum by retaining the small bowel in mid and upper abdomen by mean of gravity and gentle usage of bowel grasper.

The following trocar placement was used: ba 10 mm port was placed supra- umbilically. Two 5 mm trocares were placed on either side of the rectus muscles just above a line joining the anterior superior iliac spines and 12mm trocare placed at lt upper abdomen was placed. For pelvic lymphadenectomy, the surgeon stands on the patient's left; for aortic lymphadenectomy the surgeon stands on the patient's right.

Laparoscopic aortic lymphadenectomy

Surgeon operated standing on the patient rt side using both hands and the assistant holded the camera and grasper from the patient lt side. Zero degree laparoscope was placed in suprapubic region, monitors were moved to cephalic direction.

For rt side para aortic lymphadenectomy, incision was made over rt common iliac artery avoiding the rt ureter. The incision was extended cephalic direction over the underlying inferior vena cava and lower abdominal aorta to the level of the duodenum, exposing ureters, gonadal vessels and inferior messentricaretery.

With these structures under direct supervision, paracaval and para aortic nodal dissection was performed. The left para aortic nodal tissue was approached via the sam incision by extending the inferior part of the incision over sacrum caudally and superior part of the incision horizontally below the dudenum. The inferior messentric artery, lt ureter, lt gonadal vessels were identified and the nodal tissue over the lt aortic region was removed.

Laparoscopic Pelvic lymphadenectomy

Started by incision the retero peritoneum over the poas muscle and identifying the external iliac vessels and ureter. after development of Para vesical space, para rectal space and obturator space.

The surgical limits of the dissection were delineated, the common iliac artery proximally, the psoas muscle laterally, the circumflex iliac vein and pubic bone distally, the umbilical ligament medially, and the obturator fossa inferiorly.

Separation of the external iliac vessels from the psoas muscle was done by dissection of the dense areolar tissue that attaches the external iliac artery and vein to the psoas muscle superficially from the common iliac artery all the way down to the circumflex iliac vein and small blood vessels in this area were coagulated. Then external iliac vein was freed from lymphoid tissue all around by using Harmonic technology.

The fibo-fatty tissue in front of the poas muscle and external iliac vessels was grasped by spoon forceps and removed by selling.

Retraction of external iliac vessels upwards and laterally was done and obturator nerve was identified and dissected in the most lower parts of obturator nodal tissue.

Once the nerve was freed, the distal attachment of the nodal tissue were freed from pubic bone by dividing them with cutting current to seal lymphatic vessels.

The nodal tissue was then grasped with spoon forceps, elevated and placed on tension and teased off its most venral attachment below obturator nerve. All nodal tissue was removed in cephalic direction, residual attachment to external iliac vein was freed.

The external iliac aretery was reached and nodal tissue anterior, lateral and mediac to it was freed in continuity with obturator fossa nodal tissue. With further dissection in cephalic direction, bifurcation of common iliac artery was reached and all nodal tissue in front of lower part of common iliac artery was removed. Finally, external iliac vessels were retracted medially and residual nodal tissue lying in most proximal part of obturator fossa and between obturator nerve and psoas mucsle was removed.

Operating time was defined as the time from abdominal incision to completion of abdominal closure. Mortality was defined as postoperative death due to any cause within 30 days of the procedure. The anesthesiologist estimated blood loss by observation of the suction catheter and sponges at the completion of the operation.

RESULTS

The studied group of patients were classified into two groups (group 1); patients submitted to open radical surgery (15 cases=50%) and (group 2); patients submitted to laparoscopic radical surgery (15 cases=50%). The median age was 55.4 years (range, 15-71). The majority of patients had stage II disease (53.3%) and highly differentiated cancer (46.6%). Endometrial carcinoma represents (30%) of the studied group (9 cases) cervical carcinoma 3 case (10 %) and ovarian carcinoma represent 18 case (60%). Patients suffering from bilateral ovarian carcinoma were 5 patients (16.7), patient with rt ovarian carcinomas were 7 patients (23.3%) while patients with lt ovarian carcinoma were 6 patients (20%). The staging was analyzed as follows: stage I (10 cases with percentage 33.3%), stage II (16 cases with percentage 53.3%) and stage III (4 cases with percentage 13.3%) (Table 1).

Table 1: Characteristics of the studied group.

Item	Frequency (no=30)	%
Type of operation		
laparoscopic surgery	15	50
open surgery	15	50
Age (mean±sd)	55.4±12.7	
Type of primary tumor		
bilateral ovarian	5	16.7
cervical cancer	3	10
endometrial carcinoma	9	30
right ovarian	7	23.3
left ovarian	6	20
Figo staging		
stag 1	10	33.3
stage 2	16	53.3
stage 3	4	13.3
Figo grade		
high grade	14	46.6
moderate grade	8	26.7
low grade	8	26.7

There was significant difference between the two group regarding mean operative time in minutes (P=0.00**<0.001), the mean operative time in group (1) was (176.5±6.4) while in group (2) was (189.3±10.5) (Table 2).

Table 2: Operative time in minutes in both groups.

Item	Open surgery (group 1)	Laparoscopic surgery (group 2)	Test of significance and P value
Operative time (mean±SD)	176.5±6.4	189.3±10.5	t=4.02 P=0.00** (<0.001)

There was significant difference between the two group regarding mean estimated blood loss in (ml) [group (1) :(576.7), group (2) :(350)] (P=0.00**(<0.001)) and mean blood transfusion in (unites) [group (1) :(1.6), group (2) :(1.0)] (P=0.001**(<0.001)) (Table 3).

Table 3: Estimated blood loss in ml and blood transfusion in unites.

Item	Open surgery (group 1)	Laparoscopic surgery (group 2)	Test of significance and P value
Estimated blood loss in ml (mean±SD)	576.7±156.8	350±59.8	t=5.2 P=0.00** (<0.001)
Blood transfusion in units (mean±SD)	1.6±0.63	1.0±0.0	Mann Whitney U=3.2 P=0.001** (<0.001)

There was significant difference between the two groups regarding mean post operative hospital stay in (days) [group (1): (4.6±1.2), group (2): (2.3±1.0)] (P=0.00**(<0.001) (Table 4).

Table 4: Post operative hospital stay in days.

Item	Open surgery (group 1)	Laparoscopic surgery (group 2)	Test of significance and P value
Post-Operative hospital stay in days (mean±SD)	4.6±1.2	2.3±1.0	t=7.1 P=0.00** (<0.001)

There was no significant difference between the two groups regarding number of L.Ns harvested [(group 1): 18.1,(group 2): 21.6] (P=0.22(>0.05)) and mean number of positive L.Ns [(group 1): 3.5, (group 2): 2.3] (P=0.78(>0.05)) (Table 5).

Table 5: Number of L.N.S harvested and number of positive L.N.S.

Item	Open surgery group (1)	Laparoscopic Surgery group (2)	Test of significance and P value
L.N. number (mean±SD)	18.1±10.4	21.6±6.3	Mann Whitney U=1.2 P=0.22 (>0.05)
Positive L.N. (mean±SD)	3.5±5.8	2.3±3.2	Mann Whitney U=0.75 P=0.78 (>0.05)

There was no significant difference between the two groups regarding intra operative complications as vessel injury [no reported cases in both groups], ureteric injury [a reported case in group 1 (6.7%)] and intestinal injury (group (1):1 case (6.7%), group (2) :1 case (6.7%)] (Table 6).

Table 6: Intra-operative complications.

Item	Open surgery group (1)	Laparoscopic surgery group (2)	Test of significance and P value
Vessel injury			Fisher's Exact=---- P=-------
Yes	0 (0%)	0 (0%)	
No	15 (100%)	15 (100%)	
Ureter injury			Fisher's Exact=1.03 P=0.99(>0.05)
Yes	1 (6.7%)	0 (0%)	
No	14 (93.3%)	15 (100%)	
Intestinal injury			Fisher's Exact=---- P=-------
Yes	1 (6.7%)	1 (6.7%)	
No	14 (93.3%)	14 (93.3%)	

There was no significant difference P=0.48 (>0.05) between the two groups regarding post- operative complications as lymphocele [2 reported cases in group (1) (13.3%)], DVT (deep venous thrombosis) [2 reported cases in group (1) (13.3%), and were treated by complete bed rest and start of full LMW heparin as clexane with concomitant intake of oral anti coagulant till INR reached 2-3 value], wound infection [3 reported cases in group (1) (20%), and were treated by the appropriate antibiotic given according to culture and sensitivity], incisional hernia [2 reported cases in group (1) (13.3%) were treated by mesh hernioplasty], intestinal obstruction [no reported cases in both groups] and uretero-vaginal fistula [a reported case in group(2) (6.7%), which was referred to usurgical urology department for management (Table 7).

Table 7: Post-operative complications.

Item	Open surgery group (1)	Laparoscopic surgery group (2)	Test of significance and P value
Lymphocele			Fisher's Exact=2.1 P=0.48(>0.05)
Yes	2 (13.3%)	0 (0%)	
No	13 (86.7%)	15 (100%)	
DVT			Fisher's Exact=2.1 P=0.48(>0.05)
Yes	2 (13.3%)	0 (0%)	
No	13 (86.7%)	15 (100%)	
Wound infection			Fisher's Exact=3.3 P=0.22(>0.05)
Yes	3 (20%)	0 (0%)	
No	12 (80%)	15 (100%)	
Incisional hernia			Fisher's Exact=2.1 P=0.48(>0.05)
Yes	2 (13.3%)	0 (0%)	
No	13 (86.7%)	15 (100%)	
Intestinal obstruction			Fisher's Exact=---- P=-----
Yes	0 (0%)	0 (0%)	
No	15 (100%)	15 (100%)	
Uretero-vaginal fistula			Fisher's Exact=1.03 P=0.99(>0.05)
Yes	0 (0%)	1 (6.7%)	
No	15 (100%)	14 (93.3%)	

DISCUSSION

Laparoscopic lymphadenectomy, which was introduced in the early 1990s, is a remarkable surgical technique that paved the way for new treatment modalities in the area of gynecologic oncology. After Childers et al reported the use of LASS in patients with endometrial cancer, several studies have demonstrated that laparoscopic lymphadenectomy is a safe and effective technique for the surgical treatment of cervical and endometrial cancers.[6] Para-aortic lymphadenectomy is essential for the accurate staging of cancer and aids in determining the appropriate treatment and possible therapeutic benefits in patients with gynecologic malignancies.[7,8]

Our results regarding operative time (the mean operative time in group (1) was (176.5±6.4) while in group (2) was (189.3±10.5)) goes with the results of Guangyi et al who reported 90 patients who underwent TLRH and 35 patients who underwent ARH as control group.[9] In the TLRH group, the mean operating time increased statistically significantly (262.99 vs. 217.2 min). Despite pelvic and para aortic lymphadenectomy were done for all patients enrolled in our study were ,our results regarding operative time (group (1) was (176.5±6.4) while in group (2) was (189.3±10.5) also goes with results of The Gynecologic Oncology Group's LAP 2 study, which was a multicenter randomized trial comparing treatment of endometrial cancer performed by laparoscopy versus laparotomy.[10] In this study, both pelvic lymphadenectomy and para-aortic lymphadenectomy were performed in 91.5% of laparoscopy patients and in 95.8% of laparotomy patients. The median operation time was 204 minutes for laparoscopy and 130 minutes for laparotomy. And there was a significant difference (P=0.00**(<0.001) in favour of group (1): open radical surgery group.

But in comparison of Guangyi et al study, we disagree with his study regarding intra operative blood loss as he stated that no significant difference was found between his studied groups and mean blood loss during operation (369.78 vs. 455.14 ml), while in our study there was asignificant differences (P<0.001) and mean estimated blood loss in (ml) was in group(1) :(576.7), group (2) :(350).[9]

In a recent report, Frumovitz et al compared the out-comes of 35 women who underwent TLRH (Total laparoscopic radical hysterctomy) with 54 women who underwent ARH (Abdominal radical hystrectomy) and pelvic lymphadenectomy for Gynecological malignancies.[11] Mean blood loss was 319 ml for TLRH compared with 548 ml for ARH. Mean operative time was 307 min for the ARH group compared with 344 min for the TLRH group. In comparison to our study, our results goes with his results regarding intra operative blood loss with significant difference in favor of laparoscopic group, but also regarding operative time we had a shorter duration in both groups where mean of operative time in minutes for laparoscopic surgery group was (189.3±10.5) while in open surgery group it was (176.5±6.4).

Results regarding mean number of lymph nodes harvested (group 1): 18.1, (group 2): 21.6 also goes with Guangyi et al study in which he stated that, there was no significant difference regarding mean number of lymph nodes harvested (21.28 in TLRH group vs 18.77 in ARH group).[9] Abu-Rustum et al reported a retro- spective review of 19 patients with Gynecological cancers who underwent a total laparoscopic approach for definitive surgical treatment.[12] A comparison was made to a cohort of 195 patients who were treated with laparotomy. Mean lymph node count was (25.5) in laparoscopic group (19.3) in laparotomy group and our results goes with this study as mean lymph node count in group (2): laparoscopic surgery group was (21.6±6.3) and group (1): open surgery group was (18.1±10.4).

In comparison with Obermair A et al who state that study of 212 patients had reported a (3.3%) rate of intra operative urinary tract injury (in the form of ureteric injury or bladder injury) in patients undergoing laparoscopic radical hysterectomy, and a (6%) rate of blood vessel injury.[13] In our study, no patient had discovered intra operative injury to the urinary tract in the laparoscopic group, but there was a case reported as post operative complication having uretero-vaginal fistula and was referred to urosurgery department for management. And the rate of vessel injury in both groups was (0.0%).

Sami G et al reported acase of trocare site hernia following a laparoscopic hysyrectomy surgery through 8mm trocare in his study and recorded it as a case report.[14] But in our study there was no reported cases of port site hernia in laparoscopic group.

Also our results doesn't go with the results of The Gynecologic Oncology Group's LAP 2 study regarding post operative hospital stay in which they had no significant difference in post operative hospital stay between laparoscopic group and laparotomy group, as we had a significant difference (P=<0.001) in favor of laparoscopic group where mean of post operative hospital stay in days was in group (1): (4.6±1.2), group (2): (2.3±1.0).[10]

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Ferlay J, Shin HR, Bray F. GLOBOCAN (2008): Cancer incidence and mortality Worldwide: IARC Cancer Base No. 10. Lyon, France: International Agency for Research on Cancer [on-line] 2010. Available at http://globocan.iarc.fr.
2. Siegel RL, Miller KD, Jemal A. Cancer Statistics, 2016: CA Cancer J Clin. 2016;66:7-30.
3. Ferlay J, Soerjomataram I, Dikshit R, Eser S, Mathers C, Rebelo M et al. Cancer incidence and mortality worldwide: sources, methods and major patterns in GLOBOCAN 2012: Int J Cancer. 2015 Mar;136(5):E359-86.
4. Papadia A, Remorgida V, Salom EM, Ragni N. Laparoscopic pelvic and paraaortic lymphadenectomy in gynecologic oncology. J Am Assoc Gynecol Laparosc. 2004 Aug;11(3):297-306.
5. Schlaerth JB, Spirtos NM, Carlson LF, Boike G, Adamec T, Stonebraker B. Laparoscopic retroperitoneal lymphadenectomy followed by immediate laparotomy in women with cervical cancer: a Gynecologic Oncology Group study. Gynecol Oncol. 2002;85:81-8.
6. Childers JM, Hatch K, Surwit EA. The role of laparoscopic lymphadenectomy in the management of cervical carcinoma. Gynecol Oncol. 1992;47:38-43.
7. Kohler C, Klemm P, Schau A, Possover M, Krause N, Tozzi R, Schneider A. Introduction of transperitoneal lymphadenectomy in a gynecologic oncology center: analysis of 650 laparoscopic pelvic and/or paraaortic transperitoneal lymphadenectomies. Gynecol Oncol. 2004;95:52-61.
8. Todo Y, Kato H, Kaneuchi M, Watari H, Takeda M, Sakuragi N. Survival effect of para-aortic lymphadenectomy in endometrial cancer (SEPAL study): a retrospective cohort analysis. Lancet 2010;375:1165-72.
9. Li G, Yan X, Shang H, Wang G, Chen L, Han Y. A comparison of laparoscopic radical hysterectomy and pelvic lymphadenectomy and laparotomy in the treatment of Ib-IIa cervical cancer. Gynecol oncol. 2007 Apr;105(1):176-80.
10. Walker JL, Piedmonte MR, Spirtos NM, Eisenkop SM, Schlaerth JB et al. Laparoscopy compared with laparotomy for comprehensive surgical staging of uterine cancer: Gynecologic Oncology Group Study LAP2. J Clin Oncol. 2009 Nov 10; 27(32): 5331-6.
11. Frumovitz M, Dos Reis R, Sun CC, Milam MR, Bevers MW, Brown J et al. Comparison of total laparoscopic and abdominal radical hysterectomy for patients with early-stage cervical cancer. Obstet Gynecol. 2007 Jul 1;110(1):96-102.
12. Abu-Rustum NR, Chi DS, Sonoda Y, DiClemente MJ, Bekker G, Gemignani M et al. Transperitoneal laparoscopic pelvic and para-aortic lymph node dissection using the argon-beam coagulator and monopolar instruments: an 8-year study and description of technique. Gynecologic Oncol. 2003 Jun;89(3):504-13.
13. Obermair A, Janda M, Baker J, Kondalsamy-Chennakesavan S, Brand A, Hogg R et al. Improved surgical safety after laparoscopic compared to open surgery for apparent early stage endometrial cancer: Results from a randomised controlled trial. Euro J Cancer. 2012;48:1147-53.
14. Kilic GS, Moore G, Elbatanony A, Radecki C, Phelps JY, Borahay MA. Comparison of perioperative outcomes of total laparoscopic and robotically assisted hysterectomy for benign pathology during introduction of a robotic program. Obstet Gynecol Int. 2011;2011.

Cite this article as: Yassin HR, AlShakhs S, Hamed M, Karam A, Mouneer M. Comparative study between open and laparoscopic lymphadenectomy (pelvic and para-aortic) in gynecological malignancies. Int Surg J 2018;5:1657-62.