International Journal of Biomedical Research

ISSN: 0976-9633 (Online)
Journal DOI:10.7439/ijbr
CODEN:IJBRFA

Research Article

Evaluation of the Learning curve in Total laparoscopic hysterectomy

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Abstract

Introduction: Laparoscopic hysterectomy is a minimally invasive surgery. Retrospective studies have demonstrated a number of advantages of laparoscopic hysterectomy. There is a lot of concern over the training period of it, as it is associated with higher complications during training period. Many studies suggest that complication rates are inversely proportional to the volume of surgical work load.

Objective: To assess the learning curve in Total laparoscopic hysterectomy.

Material and method: This study had included consecutive 140 cases of total laparoscopic hysterectomy for benign gynecological conditions were considered performed during the period May 2010 to April 2013. We had made first 70 cases as early group and later 70 cases as late group.

Results: The mean operating time in early group was 101min and in late group was 81min (P= 0.000). There were total of five complications, three in early group and two in late group. Mean Hb deficit in early was 1.83% as compared to 1.14% in late case which was statistically significant (0.00). Mean hospital stay was 3.31 day as compared to 2.14 day in late group.

Discussion: Reduction in operating time and perioperative complications are the two factors most often quoted in the medical literature. Our analysis showed statistically significant reduction in operating time, hemoglobin drop and hospital stay in late group as compared to early group. But the complication rates were not statistically significant. There was a positive association between the size of uterus and operating in both the group and overall as shown by correlation coefficient.

Conclusion: There need to be minimum number of 70 surgeries needs to be performed to improve the outcome significantly. Total laparoscopic surgeries can be performed safely during the learning curve.

Keywords: Total Laparoscopic hysterectomy, Learning curve, Bladder injuries, Ureteric injury

1. Introduction

Hysterectomy is one of the most commonly performed pelvic surgeries. It has been found that more than 80% of hysterectomies are done by abdominal method. Laparoscopic techniques have been reported as an alternative to abdominal hysterectomy.[1] Laparoscopic hysterectomy is a minimally invasive surgery. Retrospective studies have demonstrated a number of advantages of laparoscopic hysterectomy and these include reduced hospital stay, reduced pain, postoperative analgesic requirements and quicker resumption of activities.[1,2–5] Therefore it is getting wider acceptance in developed as well as developing countries as more and more surgeons are getting experience by training.

One of the main challenges of laparoscopic surgery is acquiring the surgical skill. There is a lot of concern over the training period of it, as it is associated with higher complications during training period. Many studies suggest that complication rates are inversely proportional to the volume of surgical work load[6]. There are only few studies studying the learning curve of Total laparoscopic hysterectomy. The development of surgical skill is a highly individualized process and can be assessed by drawing a learning curve.[7]

Total laparoscopic hysterectomy was introduced in the year 2010 in our Hospital. Since then our team is slowly developing the skill. We found that it was naturally getting easier as more number of cases we performed. In this study we have tried to find out factors of learning curve and its effect on the outcome of patients.

2. Method

Ethical committee clearance was taken before the start of the study. This study had included consecutive 140 cases of total laparoscopic hysterectomy for benign gynecological conditions were considered. They were performed by a single team of gynecologists during the period May 2010 to April 2013. In order to select homogeneous sample for the study if there was any associated removal of adnexa, other procedure and conversion to laparotomy were not considered. The patient characters like age, parity, BMI, operating time, uterine weight after the surgery, hemoglobin drop after surgery, duration of hospital stay, previous abdominal surgery, complications and indications were studied. All patients had normal Papanicolaou smear and endometrial aspiration before surgery.

Surgical technique: Patient was kept nil by mouth from 10 pm of previous night. Bowel was prepared by bisacodyl 20 mg, proctoclysis enema at 10 pm previous night. Prophylactic antibiotic cefazolin 1G 1 hour before surgery after test dose was given. Ryles tube number 14 was inserted before shifting the patient inside operation theatre. Patient was given general anaesthesia fallowed by Lithotomy. Primary trocar of 10mm was put in umbilical region for average size uterus, supra-umbilical region for more than 14 week size. Later 15 degree head low was given to push the intestine away from the pelvic organs. Two auxiliary ports of five mm size were inserted two cm lateral and medial to anterior iliac spine. Third auxiliary port of five mm was inserted below the umbilicus at the same level of other two auxiliary ports.

The surgery was began by release of adhesions and proper identification of pelvic organs, proceeded to round ligament, cornual pedicle, uterovesical fold of peritoneum, separation of bladder from cervix and upper part of vagina, uterine pedicle, uterosacral & transverse cervical ligament and fallowed by division of cervix from vagina. After the completion of hysterectomy specimen was removed through the vagina. Vaginal vault was closed by truglyde no 1. Abdomen and pelvis was washed with normal saline and hemostasis was achieved.

Fallowing the observation of Ghomi[8] study made first 70 cases as early group and later 70 cases as late group. Operating time is measured from incision for primary trocar to closure of primary trocar incision. Hemoglobin difference is change in hemoglobin from day previous surgery to one day after surgery. Uterine weight was measured immediately after the surgery.

Test of significance used for age, BMI and parity is std. error of difference between two means (Z test) and for previous abdominal Surgery it was Chi-square test for proportions. Probability is determined at 0.05 level of critical significance. Correlation coefficient(r) was used for comparision of operative time. Data was analyzed using SPSS Statistical software, version 20.0 (Chicago, inc, USA).

3. Results

Total of 140 patients were included in the study. Figure 1 shows there was decrease in the operating time as more and more number of surgeries were performed. The mean operating time in early group was 101min and in late group was 81min (P= 0.000).It was statistically There was no significant difference between early and late group in terms of demographic factors. (Table.1)

Total five complications were seen during the study, out of which three were present in early group and two were in late group. In the early group hemoperitoneum was found in fourth operated patient. In which 560 cc of hyperechoic collection was there behind the bladder on first post operative day. She was given two bags of blood transfusion and discharged on seventh postoperative day. After one month, ultrasonography showed complete resolution of hematoma. Next complication was complete transaction of ureter in seventh operated case. It was a case of DUB. Patient developed leakage of urine 20 days after the surgery. IVP showed the fistulous communication between distal end of right ureter with apex of vagina and left ureter was found normal. This uereterovaginal fistula of right side was repaired by Boari flap with psoas hitch. Last complication in the early group was in 39th case of fibroid uterus. Primary trocar was seen going in to the stomach. There was one cm rent seen on the anterior wall of stomach. The rent was repaired laparoscopically and later TLH was completed. Patient was kept nil by mouth with Ryle's tube aspiration for 48 hour. Patient was discharged on sixth postoperative day. In late group both 83rd and 112th were cases of two preveious cesarian section; bladder was opened during its separation from cervix. Both were repaired intraoperatively after the completion of TLH and achieving hemostasis of pedicles. Bladder was repaired with 4-0 Polyglactic acid in two layers. Both were discharged on 6th postoperative day.

Mean Hb deficit in early was 1.83% as compared to 1.14% in late case which was statistically significant (0.00). Mean hospital stay was 3.31 day as compared to 2.14 day in late group. (Table.2). Indications of surgery were comparable in both the group(Table.3).There was a linear correlation between operating time and uterine weight in early group, late group and overall though they were not statistically significant.(Table. 4).

Table -1: Patients demographic factors

Characters	Early	Late	P- value
Age (yrs)	37.58 ± 8.9	35.50 ± 8.20	0.15 (N.S.)
Body mass index	17.27 ± 0.81	17.41 ± 1.21	0.42 (N.S.)
Parity, mean (SEM)	2.08 ± 0.007	1.91 ± 0.01	0.07 (N.S.)
Previous abd. Surgery, n (%)	9 (12.87)	6 (8.57)	0.58 (N.S.)

N.S. Not significant

Table -2: Patients operative factors

Characters	Early	Late	P- value
Operating time (minutes)	101 ± 27.90	84.78 ± 11.90	0.000 ***
Uterine weight (g)	356.14 ± 27.90	381.42 ± 117.69	0.083 (N.S.)
Hemoglobin drop (g/dL)‡	1.83 ± 0.67	1.14 ± 0.44	0.000 ***
Hospital stay (days)	3.31 ± 0.86	2.14 ± 0.44	0.000 ***
Complications, n (%)	3 (4.2)	2 (2.85)	1.000 (N.S.)

N.S. Not significant

*** Statistically highly significant

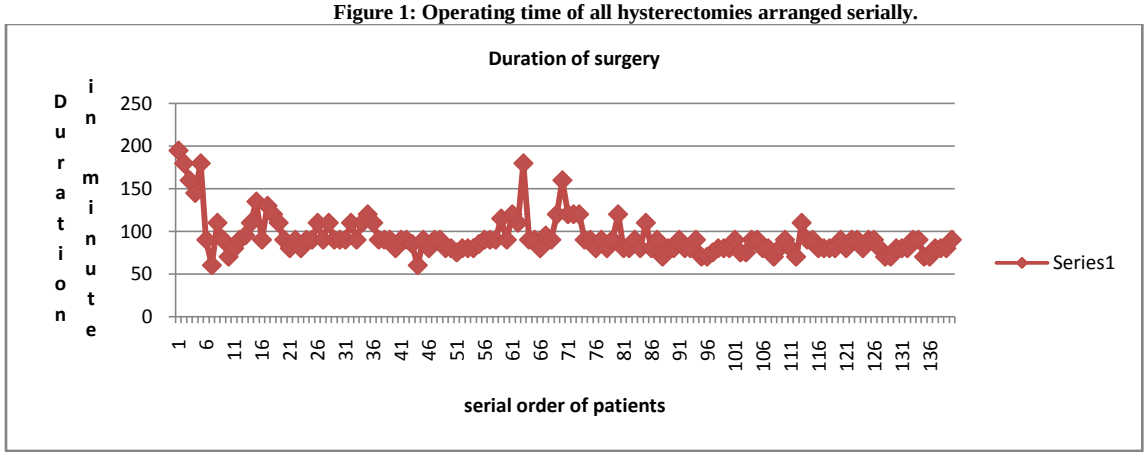
Table -3: Indications for hysterectomy

Indications	Early (n=70)	Late (n=70)	P- value
Endometriosis	03 (04.28 %)	05 (07.14 %)	0.72 (N.S.)
DUB	17 (24.28 %)	14 (20.00 %)	0.68 (N.S.)
Uterine fibroids	28 (40.00 %)	31 (44.28 %)	0.73 (N.S.)
Chronic pelvic inflammatory disease	11 (15.71 %)	07 (10.00 %)	0.45 (N.S.)
Adenomyosis	08 (11.42 %)	11 (15.71 %)	0.62 (N.S.)
CIN $_{II \& III}$	03 (02.86 %)	02 (02.58 %)	1.00 (N.S.)

Table 4: Correlation between Operating time and uterine weight

Groups	correlation coefficient (r)	P
Over all	0.08906	0.2954
Early	0.0286	0.8142
Late	0.11929	0.3253

Figure 1: Operating time of all hysterectomies arranged serially.



4. Discussion

The choice of the surgical approach in the end lies in the hands of the individual surgeon and is determined by personal preferences and experience, along with some patient related factors such as uterine size, a possible prolapse or other comorbitities such as endometrioses or ovarian pathology. There is increasing in trend of minimal access surgery. Which allows speedier recovery to our patients as it is known that the hospital stay is shorter and return to normal activities is faster after Vaginal hysterectomy and Laparoscopic hysterectomy compared with Abdominal hysterectomy[9].

The learning curve of Laparoscopic assisted vaginal hysterectomy; Laparoscopic supracervical hysterectomy, Robotic surgery and Total Laparoscopic hysterectomy for gynecological cancers have already been described. Reduction in operating time and perioperative complications are the two factors most often quoted in the medical literature[10]. We found only two studies on learning curve in Total Laparoscopic hysterectomy on benign conditions. One was a review article on learning curve on various types of hysterectomies[11]. In which they have mentioned that as there is no scoring system and acquiring the surgical skill is more complex so learning curve cannot be used to compare between the clinicians. Second study was a retrospective comparative study over eight year experience comparing early four year with later four year by Wattiez *et al*[12],they found significant decrease in the complications rate in later group. Similarly our study has shown significant decrease in operating time in late group as compared to early group which was statistically significant. Our study had three complications in early group and two in late group but they were not statistically significant. It may be because of small sample size in our study.

Makinen *et al*[13] reported on morbidity of 10,110 hysterectomies by type of approach. They concluded that surgeons who had performed more than 30 cases of laparoscopic hysterectomy (as described by Garry and Reich, 1993) had a significantly lower rate of intraoperative complications. Andrea[13] had analyzed 120 cases of Gynecological malignancies concluded that Laparoscopic hysterectomy in gynecological malignancies is feasible and Safe at tertiary gynecological cancer centre. So we had taken consecutive 140 TLH cases for our study and set early 7o cases as early group and late 70 cases as late group.

Demographic factors in both early and late groups were similar and they were not statistically significant. It shows that the TLH cases were comparable in both the groups. There was no statistically significant difference in the indications of surgery between early and late group. Uterine fibroids were the most common causes of Hysterectomy in both the groups.

Our analysis showed statistically significant reduction in operating time, hemoglobin drop and hospital stay in late group as compared to early group. This shows that there is a learning curve in TLH for statistically significant improvement in the outcome of patients. It is comparable to Adrena's[14] study where they had compared these outcomes in three groups with 40 as the number in each group. So our study shows that after performing 70 cases there is significant improvement in the outcome of surgery.

There was a positive association between the size of uterus and operating in both the group and overall as shown by correlation coefficient. It may be because of less intraoperative space available for manipulation of instruments, more number of vessels needs to be coagulated, and more time was taken to morcellate the bigger size uterus. Therefore there was linear correlation in bigger size uterus and operating time even in late cases and over all cases.

In our study there were five (3.5%) complications, three in early group and two in late group. They were not statistically significant. Others have shown a drop in the perioperative complications of laparoscopic hysterectomy as the learning curve is achieved.[15,16].But that difference was not seen in our study, may be because of small sample size in our study. But the prevalence of complications in our study was comparable to Bojar study[15].

Limitations of our study were small sample size, and were performed by single set of surgeons it may not be reproduced in other centers. There is need of larger randomized study before defining the minimum number of cases to be performed to improve the outcome of surgery.

5. Conclusion

There is a learning curve in Total laparoscopic surgery before obtaining the surgical competency. There need to be minimum number of 70 surgeries needs to be performed to improve the outcome significantly. Total laparoscopic surgeries can be performed safely during the learning curve.

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