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Study of Post-Operative Pain Scores Using Visual Analogue Scale in Robotic Assisted vs Traditional Laparoscopic Gynaecological Procedures at a Tertiary Hospital

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ABSTRACT

laparoscopic surgeries in Indian scenario. Hence, we undertook this prospective comparative study to compare length of hospital stay post-operatively in robotic assisted gynaecological procedures with traditional laparoscopic gynaecological procedures. Present study was single-center, Prospective comparative study, conducted patients of age between18-65 years, ASA physical status I-II, posted for elective Robotic and Laparoscopic Gynaecological Surgeries. There was no statistically significant difference in age, height, weight, BMI and ASA status of both the groups (p>0.05). There was no statistically significant variation in the systolic blood pressure, mean heart rate and oxygen saturation between the two groups. There was statistically significant variation in the diastolic blood pressure between the two groups 180 minutes of surgery with diastolic blood pressure high in laparoscopic group as compared to robotic group (88.2±4.658 vs 80.2±4.712, p=0.037). At all other times there is no statistically significant difference in DBP of both the groups. There was no statistically significant difference in the total fentanyl used intra operatively between both the groups. Blood loss was higher in the laparoscopic group as compared to robotic group (209.67±130.562 vs 102±57.225, p<0.001). The VAS score was consistently higher in laparoscopic group throughout the 48-hour period as compared to robotic group (p<0.05). There was statistically significant difference in the length of hospital stay with robotic group being discharged earlier than laparoscopic group (p=0.015). There was lesser intra operative blood loss, lesser pain and shorter length of hospital stay in patients who underwent robotic assisted laparoscopic hysterectomy as compared to those who underwent traditional laparoscopic hysterectomy.

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Key Words
Robotic assisted laparoscopic hysterectomy, traditional laparoscopic hysterectomy, post-operative outcomes, VAS score

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INTRODUCTION

Traditionally, hysterectomy has been performed abdominally through a laparotomy incision, vaginally, or laparoscopically. Over the past 25 years, technological advances, coupled with changes in practice patterns regarding route of hysterectomy, have led to an increase in minimally invasive options[1-4]. With recent advancements in surgical procedures, there is a greater emphasis on minimally invasive techniques with the goal of improving patient outcomes and satisfaction while decreasing surgical morbidity and mortality[5].

Advantages of laparoscopic hysterectomy over open abdominal hysterectomy are decreased postoperative pain, shorter hospital stay and quicker return to daily activities[2,3]. However, some of the challenges to widespread adoption of the laparoscopic approach are the steep learning curve, longer operating times, as well as counter-intuitive hand movement, two-dimensional visualization and limited instrument mobility[4]. Robotic assisted laparoscopic surgery was developed to overcome some of the limiting aspects of conventional laparoscopy. Advantages of the robotic platform include better ergonomics, wider range of motion and 3-dimensional stereo vision[6,7].

Not many studies are available in literature comparing outcomes of laparoscopic surgeries with robotically assisted laparoscopic surgeries in Indian scenario. Hence, we undertook this prospective comparative study to compare length of hospital stay post-operatively in robotic assisted gynaecological procedures with traditional laparoscopic gynaecological procedures, which in turn is decided by post-operative pain.

MATERIALS AND METHODS

Present study was single-center, Prospective comparative study, conducted in department of anaesthesiology, at Narayana Hrudayalaya Institute of Medical Sciences, Bommasandra, Bengaluru, India. Study duration was of 1 years (January 2018 to December 2018). Study approval was obtained from institutional ethical committee.

Inclusion Criteria:

- Age between18-65 years, ASA physical status I-II, posted for elective Robotic and Laparoscopic Gynaecological Surgeries, willing to participate in present study.

Exclusion Criteria:

- Robotic or laparoscopic cases which are converted to open surgeries.
- Pregnant women.

Study was explained to patients in local language and written consent was taken for participation and study. During pre-anaesthetic checkup, a detailed history of ischemic heart disease, co morbid conditions like diabetes mellitus, hypertension and previous surgeries is elicited. Any drug therapy and allergies are noted. Patients are explained regarding the surgery and VAS scores. General physical examination included weight, height, BMI, pulse rate and blood pressure. Airway, cardiovascular and respiratory systems are assessed. ECG, chest X ray and laboratory data is noted. Beta blockers / anti-hypertensive medications are continued peri-operatively. As per institutional protocol, tablet al. prazolam 0.25mg previous night and fasting guidelines for elective surgery are followed.

Before surgery, patients were fasted for 8 hours. In the operation theatre, a good peripheral intravenous access is secured with an 18G cannula. 5 lead electrocardiogram (ECG), pulse oximeter, capnography, core body temperature and non-invasive blood pressure were connected and baseline vitals were recorded for all patients. General anaesthesia is induced with 0.05 mg/kg Midazolam, 2 mcg/kg Fentanyl, 2mg/kg of Propofol, 0.1 mg/kg cisatracurium. Patient is intubated and maintenance established with isoflurane at 1-2% end tidal concentration.

Mechanical ventilation is controlled using a ventilator and respiratory parameters are adjusted to keep the EtCO2 at 35-45 mm Hg. The OT temperature is set at 20°C and patients are kept warm using forced warm air device. All the pressure points are adequately padded with gel pads and the patient is strapped to the table and positioned in lithotomy with steep head low (steep Trendelenburg) position. Systolic and diastolic blood pressures, heart rate and oxygen saturation (SpO2) are recorded from the moment the patient was taken to the operating room till the end of the operation (at baseline, 10-minutes, 30-minutes, followed by 30-minute intervals during the rest of the operation).

At the end of surgery, residual neuromuscular blockade was reversed with neostigmine 0.05 mg/kg, glycopyrrolate 0.01 mg/kg and tracheal extubation performed once clinical signs of reversal and a TOF ratio of 0.9 is achieved. All patients received 4 mg Ondansetron i.v. at the end of surgery to prevent PONV. Postoperatively, pain was managed with IV Paracetamol 1000 mg every 8th hourly.

The postoperative pain was measured using VAS scores at12 hour intervals after the patient was shifted to the post anaesthesia care unit till 48 hours. Patients were encouraged to ambulate as soon as possible. The total dose of rescue analgesia with bolus doses of fentanyl and any adverse effects like excessive sedation, nausea, vomiting and any other complaints from the

patient were noted and treated appropriately. Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Frequency, percentage, means and standard deviations (SD) was calculated for the continuous variables, while ratios and proportions were calculated for the categorical variables. Difference of proportions between qualitative variables were tested using chi-square test or Fisher exact test as applicable. P<0.5 was considered as statistically significant.

RESULTS AND DISCUSSIONS

The study group comprised of patients between the ages 18-65 years. The mean age of participants was comparable and was of no statistical significance (p=0.215). The height of patients in both the groups were comparable and statistically non-significant (p=0.689). The weight of patients in both the groups was comparable (p=0.158). There was no statistically significant difference in BMI of both the groups (p=0.113). Only ASA I and ASA II patients were included in our study.

Table 1: General Characteristics

	Laparoscopic	Robotic	p-value
Age groups (in years)	47.7 ± 9.422	44.65 ± 6.572	0.215
Height (cms)	160.43 ± 5.624	159.85 ± 3.91	0.689
Weight (Kg)	64.08 ± 10.9985	68.54 ± 10.41	0.158
BMI	24.92 ± 4.23	26.78 ± 3.58	0.113
ASA Grade			0.345
1	6 (20 %)		2 (10 %)
2	24 (80 %)		18 (90 %)

There was no statistically significant variation in the systolic blood pressure between the two groups.

Table 2: Systolic Blood Pressure

Systolic Blood Pressure	Laparoscopic	Robotic	p-value
BASAL	130.17 ± 14.235	136.1 ± 16.367	0.18
10 Min	126.67 ± 12.672	128.55 ± 14.288	0.627
30 Min	123.7 ± 12.866	129.1 ± 12.707	0.151
60 Min	128.27 ± 13.814	132.4 ± 11.655	0.276
90 Min	129.17 ± 11.576	128.6 ± 11.673	0.485
120 Min	132.08 ± 11.401	131.67 ± 11.4	0.912
150 Min	134.64 ± 10.426	136.5 ± 9.607	0.684
180 Min	143 ± 6.557	132.8 ± 13.312	0.177
210 Min	147 ± 8.888	132.67 ± 4.163	0.065

There was statistically significant variation in the diastolic blood pressure between the two groups 180 minutes of surgery with diastolic blood pressure high in laparoscopic group as compared to robotic group (88.2±4.658 vs 80.2±4.712, p=0.037). At all other times there is no statistically significant difference in DBP of both the groups.

Table 3: Diastolic Blood Pressure

Diastolic Blood Pressure	Laparoscopic	Robotic	p-value
BASAL	80.27 ± 9.791	79.2 ± 9.65	0.706
10 Min	78.07 ± 9.002	76.65 ± 8.94	0.587
30 Min	77.37 ± 8.369	77.95 ± 7.112	0.799
60 Min	79.3 ± 8.687	78.85 ± 6.808	0.846
90 Min	80.67 ± 9.286	80.61 ± 8.283	0.983
120 Min	81.04 ± 9.562	80 ± 5.169	0.662
150 Min	82.86 ± 7.882	80.5 ± 5.503	0.465
180 Min	88.2 ± 4.658	80.8 ± 4.712	0.037
210 Min	91.33 ± 6.429	79 ± 11	0.169

There was no statistically significant difference in the mean heart rate at all times in both the groups.

Table 4: Comparison of Heart Rate

Heart Rate	Laparoscopic	Robotic	p-value
BASAL	82.96 ± 12.057	82.55 ± 10.107	0.901
10 Min	81.29 ± 6.954	82.95 ± 9.214	0.479
30 Min	81.54 ± 6.818	79.2 ± 8.224	0.289
60 Min	82.21 ± 7.781	80.3 ± 8.374	0.42
90 Min	81.43 ± 6.529	82.33 ± 7.244	0.662
120 Min	83.57 ± 5.203	81.87 ± 6.034	0.362
150 Min	82.77 ± 4.438	84.63 ± 5.423	0.403
180 Min	83.29 ± 2.215	87.67 ± 4.163	0.055
210 Min	89.67 ± 5.132	79 ± 11	0.203

There was no statistically significant difference in the oxygen saturation between the two groups.

Table 5: Oxygen Saturation

Oxygen Saturation	Laparoscopic	Robotic	p-value
BASAL	97.9 ± 0.712	97.9 ± 0.553	1
10 Min	98.3 ± 0.651	98.2 ± 0.696	0.607
30 Min	98.47 ± 0.629	98.45 ± 0.605	0.926
60 Min	98.67 ± 0.547	98.55 ± 0.887	0.603
90 Min	98.83 ± 0.759	98.67 ± 0.686	0.468
120 Min	99 ± 0.59	99.13 ± 0.64	0.51
150 Min	99.14 ± 0.663	99 ± 1.069	0.701
180 Min	98.8 ± 0.447	99.2 ± 0.837	0.373
210 Min	99.67 ± 0.577	99.33 ± 0.577	0.519

There was no statistically significant difference in the total fentanyl used intra operatively between both the groups. Blood loss was higher in the laparoscopic group as compared to robotic group (209.67±130.562 vs 102±57.225, p<0.001).

Table 6- Operative Characteristics

	Laparoscopic	Robotic	p-value
Total Fentanyl Used	215.83 ± 43.788	212.5 ± 55.31	0.813
Blood loss (ml)	209.67 ± 130.562	102 ± 57.225	<0.001

The VAS score was consistently higher in laparoscopic group throughout the 48- hour period as compared to robotic group (p < 0.05).

Table 7: Post-Operative VAS Scores

Post-Operative VAS Scores	Laparoscopic	Robotic	p-value
0 HR	3.03 ± 0.964	2.1 ±1.021	0.002
12 HR	2.53 ±1.137	1.6 ±1.095	0.006
24 HR	1.97 ±1.033	1.05 ±0.887	0.002
36 HR	1.4 ±0.968	0.55 ±0.686	0.001
48 HR	0.77 ±0.858	0.16 ± 0.501	0.003

There was statistically significant difference in the length of hospital stay with robotic group being discharged earlier than laparoscopic group (p = 0.015).

Table 8: Hospital Stay

Discharge Day	Laparoscopic	Robotic	p-value
POD 1	0	2 (10 %)	0.015
POD 2	17 (80 %)	23 (90 %)	
POD 3	6 (20 %)	0	
POD 4	2 (80 %)	0	

Numerous studies have been conducted so far comparing robotic assisted laparoscopic surgeries with traditional laparoscopic surgeries, but most of them were retrospective studies. In Indian scenario very, few

studies were reported comparing these two procedures and no data regarding the vital parameters, narcotic usage and postoperative outcomes was put forth. Shashoua[6], compared the outcomes of robotic-assisted total laparoscopic hysterectomy with conventional total laparoscopic hysterectomy.

A total of 50 cases were studied. Intraoperative vitals, blood loss was noted and post operatively VAS scores were recorded for 48-hour period. The operative procedure was completed successfully in both the groups without conversion into open procedure. In one laparoscopic case more than anticipated blood loss occurred requiring blood transfusion which may be attributed to larger uterine size and adhesions from previous surgeries leading to poor visualization of the surgical field[8,9,10]

Both groups' patients had similar baseline characteristics and indications of surgery similar to previous study6. There was no requirement of rescue analgesia with fentanyl in both the groups. Both the groups shared a similar age distribution (47.7±9.422 in laparoscopic group and 44.65±6.572 in robotic group, p=0.215). The mean age in both the groups was fourth decade. This is in concordance with the age groups of previous study[6].

In laparoscopic group 5 (20%) patients were ASA I and the rest 20 (80%) were ASA II. In robotic group 3 (12%) were ASA I and the rest 22 (88%) were ASA II (p=0.345). Statistically, there was no significant difference in the distribution of the two grades of patients within the groups, as well as between the two study groups.

There was no statistically significant difference in the vital parameters, which included heart rate, SBP, DBP and oxygen saturation. Maximum mean heart rate recorded in laparoscopic and robotic groups were 89.67 and 87.67 respectively. Maximum mean SBP recorded in laparoscopic and robotic groups were 147 and 136.5 respectively. Maximum mean DBP recorded in laparoscopic and robotic groups were 91.33 and 80.8 respectively. Maximum mean oxygen saturation recorded in laparoscopic and robotic groups were 99.67 and 99.33 respectively.

There was no statistically significant difference in the intra operative fentanyl usage in both the groups in our study. However, Shashoua[6] demonstrated a significant decrease in narcotic use in robotic group as compared to laparoscopic group. This may be attributed to the demographic variations.

We have observed a statistically significant difference in blood loss intraoperatively with higher blood loss recorded in the laparoscopic group as compared to robotic group (209.67±130.562 ml in laparoscopic group vs 102±57.225 ml in robotic group, p<0.001). This is in concordance with previous studies. Shashoua[6] observed less estimated blood loss with robotic group as compared to laparoscopic group in their study (131.5 ml in robotic group vs 207.7 ml in laparoscopic group, p=0.015). Payne[7] demonstrated that mean blood loss in laparoscopic cohort is twice that of robotic cohort (113 ml in laparoscopic group vs 61.1 ml in robotic group, p<0.0001).

The VAS score was statistically significant, with a p value<0.001, at all time frames recorded from arrival to postoperative ward till 48 in the post-operative period., suggesting lesser pain in robotic group as compared to laparoscopic group. The highest mean VAS score in laparoscopic group noted over the 48-hour time frames monitored was 3.03±0.964, which was the baseline value post-surgery, as compared to the mean VAS in robotic group, which was 2.1±1.021, the pain score in laparoscopic group was significantly higher.

Statistically significant difference was observed in the length of hospital stay with early discharge in robotic group as compared to laparoscopic group with p=0.015. Early discharge in robotic group may be attributed to intricate tissue dissection leading to lesser pain scores. Shashoua[6] and Payne[7] demonstrated that the mean length of hospital stay is longer in laparoscopic group than in the robotic group (1.0 days vs 1.4 days, p=0.011) and (1.6 days vs 1.1 days, p<0.007) respectively as observed in our study.

Our study has the limitations associated with the results being derived from a single institution with less sample size. Prospective multicenter randomized studies are needed to definitively delineate the role of robotic surgery in the field of operative gynecology. Ideally, each surgeon should be familiar with both the total laparoscopic and robotic techniques for hysterectomy and perform the procedure for which the surgeon has the most experience.

CONCLUSION

There was lesser intra operative blood loss, lesser pain and shorter length of hospital stay in patients who underwent robotic assisted laparoscopic hysterectomy as compared to those who underwent traditional laparoscopic hysterectomy. This may be attributed to a more precise tissue dissection with robotic surgeries, which minimizes the tissue destruction leading to improved post-operative outcomes.

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