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Research Article

A Clinical Study of Comparison between General Anesthesia and Spinal Anesthesia for Lower Abdominal Laparoscopic Surgeries

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Abstract: Laparoscopic surgery has gained acceptance from both surgical fraternity and the patients. General anesthesia has been the main stay of management in Laparoscopic procedures. Altered respiratory physiology caused by Co2 insufflated pneumoperitoneum and patient positioning is a major concern in laparoscopy. The potentialities of intubation and ventilation related problems including an increase in mechanical ventilation exists in GA. Regional anesthesia offers several advantages like reduced spinal and epidural anesthesia time, quicker recovery, decreased postoperative nausea and vomiting (PONV) hemodynamic stability and reduced bleeding. But right shoulder tip pain is a significant intra operative problems in regional anesthesia. With this background this study in undertaken to compare spinal v/s general anesthesia for lower abdominal laparoscopic surgeries with an aim to compare intra-operative hemodynamic stability, intra and post-operative analgesia, incidence of PONV an right shoulder tip pain etc., 50 patients in age group ranging from 16-60 years of ASA physical status I/II posted for lower adnominal laparoscopic surgeries were randomized into two groups of which first was General Anesthesia (GA) group and second a Subarachnoid block (SA) group. Heart rate systolic and diastolic blood pressure, pain scoring incidence of PONV, shoulder pain were monitored results were statistically analyzed using sample 't' test, Fischer exact test and chi-square test. Spinal anesthesia is a feasible, safe and effective alternative for GA in lower abdominal laparoscopic surgeries as it offers stable hemodynamic status, good surgical recovery and relatively prolonged pain free period.
Keywords: Laparoscopy, General Anesthesia, subarachnoid block, PONV, Shoulder pain, hemodynamic stability

INTRODUCTION

The last decade of 20th century is known for the dawn of a new surgical modality. i.e., Endoscopic surgery. The number of minimally invasive surgeries has increased exponentially worldwide over the past few decades as it provides less postoperative pain, decreased hospital stay quicker resumption of normal activities and for cosmetic values [1]. The most commonly used endoscope is the laparoscope and the surgical procedure is called laparoscopic surgery.

New surgical procedures pose new challenges to the anesthesiologist. Pneumoperitoneum, patient positioning, hemodynamic disturbances and ventilator problems like increased PaCo2 and gas embolism are the issues the anesthesiologist has to deal with. The goal of anesthetic management in patients undergoing laparoscopic surgical procedures include management of pneumoperitoneum, achieving adequate level of sensory blockade, management of shoulder tip pain, provision of post-operative pain relief and early ambulation [2].

General anesthesia as the only suitable technique for laparoscopic surgeries needs a relook. Pressor response to endotracheal intubation, increased release of stress hormones, sore throat, post-operative pain, post-operative nausea and vomiting (PONV) are the disadvantages of using GA.

There is a growing evidence to suggest that regional anesthesia has an important role to play in the management of patients undergoing laparoscopic procedures. The benefits of regional anesthetic techniques (Epidural, sub-arachnoid block) are avoidance of intubation, decreased need for sedatives and narcotics, better muscle relaxation and decreased surgical stress response, decreased post-operative pain also cost effectiveness.

Our study is designed to evaluate the feasibility of spinal anesthesia in lower abdominal laparoscopic surgeries and to compare the intra operative surgical conditions, hemodynamic changes with general anesthesia and post-operative requirement of rescue analgesic, incidence of PONV.

MATERIALS AND METHODS

The study was conducted after approval from the hospital authorities. A written informed consent was obtained from all the patients before being included in the study. A total of 50 patients of ASA physical status I/II of age group 16-60 years, posted for elective lower abdominal laparoscopic surgeries like laparoscopic ovarian cystectomy, laparoscopic appendectomy and ovarian drilling etc., Contraindications for spinal were the exclusion criteria.

Patients were kept nil oral for 8 hours prior to surgery. All patients received diazepam 5mg on the night before surgery. They were randomly assigned to one of the two groups – Group A (GA) and group B (SA).

On arrival in the operation room, monitors were attached and baseline parameters such as Heart Rate (HR), Blood pressure, ECG and peripheral oxygen saturation were noted down. An 18 G intravenous cannula was placed. Both the groups were preloaded with 10ml/kg of Ringer lactate. The patients under both the groups were premeditated with Inj. Ondansetron 4mg; Inj. Midazolam 0.05 mg/kg, Pentazocine 0.5mg/k intra venous. GA patients were induced with Thiopentone sodium $5mg^{-1}$ kg and succinyl chlorine $2mg\ kg^{-1}$, and intubated with suitable sized cuffed endotracheal tube. HR & BP were recorded at 1minute, 3 minute and 5minutes post-intubation and thereafter at 15 min interval. Anesthesia was maintained with oxygen nitrous oxide, and vecuronium bromide 0.1mg kg^{-1}, incremental doses of which were repeated every 20 minutes. Intermittent positive pressure ventilation was done to maintain end tidal carbon dioxide ($ETCO^2$) between 32 to 35mm Hg. Pneumoperitoneum was created by insufflations of carbon dioxide and maintained at 15mmHg. At the end of surgery residual neuromuscular block was reversed by neostigmine (0.05m/kg) and glycopyrrolate intravenously and patient was extubated and transferred to recovery room.

SA group patients were put to left lateral decubitus position. Under strict aseptic precaution lumbar puncture was performed using 26 gauge disposable quincke type spinal needle at L_{3-4} inter space by midline approach. After free flow of cerebrospinal fluid 3ml of bupivacaine hydrochloride heavy and 25 mcg of fentanyl was injected intrathecally and the time noted.

After the level of sensory blockade up to T_6 was achieved, surgery commenced using Co_2 insufflation with pressure 15mm Hg. Oxygen supplementation was given to all the patients at 5l/min through the face mask. During intra operative period Blood pressure nausea, vomiting, oxygen desaturation (SpO_2<90%) shoulder pain was monitored during the surgical procedure.

In both the groups, DBP, heart rate, SPO_2 and ECG were recorded at the following points of time.

- Prior to induction.
- At 1, 3, 5 minutes after subarachnoid block.
- Immediately after pneumo peritoneum and
- Every 15 minutes thereafter.

The intra operative conditions and muscle relaxation was assessed by asking the surgeon to grade them "not good/good/excellent.

In the post anesthesia care unit all the patients were monitored for evidence of complications or adverse events. Patients were enquired about nausea and vomiting, head ache, sore throat, transient neurological symptoms. Pain was analyzed using visual analogue scale (VAS) and assessed at 1, 3, 6 and 12 hours. Intensity of pain was assessed by using 10 pint VAS representing various intensity of pain from 'O' (no pain) to 10 (wont pain) Rescues analgesic inj. Diclofenac sodium 75 mg. I.v was given when VAS was >5. If any patient experienced nausea / vomiting, ondensetron 4 mg was intravenously given.

The results obtained in the study were presented in tabulated manner. Statistical analysis was done by student't' test. ANOVA and Chi- square test were performed for nonparametric values and corresponding. P value was computed using SPSS for windows (statistical presenting system software version 11.5) and P value<0.05 was considered to be statistically significant.

The two groups were comparable with each other. Basal heart rate, systolic and diastole pressure (SBP and DBP) were comparable between the two groups. (P>0.05) as depicted in Table1 below.

Table 1: Independent Sample t-test results of the present study

Variable	Group A	Group B	t-value	p-value	Significance
Age (yrs.)	35.68±9.304	35.92±9.128	0.092	0.927	NS
Weight (kg)	52.80±5.196	52.20±4.882	0.421	0.676	NS

Table 2: Sex Distribution

Sex	Group A	Group B
Male	09	8
Female	16	17
Total	25	25

X2: 0.08 P = 0.78 (Nonsignificant – NS)

Table 3: Showing the mean Heart Rate at different time intervals presented as mean ±SD

Heart Rate	Group A	Group B	t-value	p-value	Significance
Basal heart rate	81.64	82.20	0.457	0.65	NS
	±4.462	±4.203			
heart rate @1min	104.20	85.00	18.42	p<0.001	significant
	±3.663	±3.708			
heart rate @ 3 min	102.12	80.92	23.03	p<0.001	significant
	±3.563	±2.914			
heart rate @ 5min	96.20	72.84	17.66	p<0.001	significant
	±3.819	±5.398			
heart rate @pneumo	99.88	78.56	16.59	p<0.001	significant
	±4.206	±4.857			
heart rate @15min	96.56	78.04	15.197	p<0.001	significant
	±3.686	±4.852			
heart rate @30min	93.96	76.00	15.298	p<0.001	significant
	±2.937	±5.083			
heart rate @45min	92.60	75.84	15.017	p<0.001	significant
	±3.215	±4.561			
heart rate @60min	89.64	78.16	11.375	p<0.001	significant
	±2.378	±4.45			

Table 4: Changes in systolic Blood Pressure presented as Mean ±SD

Sys Bp	Group A	Group B	t-value	p-value	Significance
Basal Sys Bp	120.92	120.60	0.175	0.862	NS
	±6.708	±6.185			
Sys Bp@1min	142.96	118.28	14.289	p<0.001	significant
	±5.799	±6.4			
Sys Bp@3min	139.88	112.64	17.191	p<0.001	significant
	±4.961	±6.177			
Sys Bp@5min	136.72	109.36	16.231	p<0.001	significant
	±4.354	±7.216			
Sys Bp@Pneumo	148.88	117.80	19.587	p<0.001	significant
	±4.91	±6.232			
Sys Bp@15min	139.48	114.44	15.135	p<0.001	significant
	±5.987	±5.709			
Sys Bp@30min	133.44	110.80	15.321	p<0.001	significant
	±4.184	±6.09			
Sys Bp@45min	126.68	107.24	12.246	p<0.001	significant
	±5.031	±6.139			
Sys Bp@60min	128.88	108.32	14.032	p<0.001	significant
	±4.711	±5.61			

Table 5: Changes in Diastolic B.P presented as Mean ±SD

Dia Bp	Group A	Group B	t-value	p-value	Significance
Basal Dia Bp	79.64	79.60	0.024	0.981	NS
	±5.873	±5.781			
Dia Bp @1min	97.00	75.16	11.754	p<0.001	significant
	±7.234	±5.829			
Dia Bp @3min	94.64	70.20	14.615	p<0.001	significant
	±6.794	±4.873			
Dia Bp @5min	91.20	67.84	13.98	p<0.001	significant
	±6.589	±5.137			
Dia Bp @ Pneumo	101.44	74.04	16.628	p<0.001	significant
	±6.971	±4.392			
Dia Bp @15min	95.16	72.40	14.228	p<0.001	significant
	±5.482	±5.824			
Dia Bp @30min	89.48	73.64	10.355	p<0.001	significant
	±4.942	±5.837			
Dia Bp @45min	84.04	74.84	6.837	p<0.001	significant
	±4.138	±5.305			
Dia Bp @60min	89.20	75.40	10.574	p<0.001	significant
	±4.123	±5.058			

Table 3 shows intra operative comparison of mean heart rate in A and B groups. Group A shows more tachycardia at all levels (except basal level) during the study period. The difference in heart rate is highly significant (p<0.001). Table 4 (SBP) and Table 5(DBP) show comparative intraoperative changes in mean systolic blood pressure and mean diastolic pressure respectively. Mean systolic and diastolic pressure of patients in the GA group was found to be higher at all levels except basal level. Comparison between the groups was found to be statistically highly significant (p <0.001) except the base line value.

Table 6: Incidence of Intra operative shoulder pain in study population

Fisher's Exact test					
			Group		**Total**
			Group A	**Group B**	
Pain	Yes	Count	0	6	6
		%	0.0%	24.0%	12.0%
	No	Count	25	19	44
		%	100.0%	76.0%	88.0%
Total		**Count**	**25**	**25**	**50**
					p-value = 0.02

Since p-value is less than 0.05. There is significant difference between the groups.

Chi-square test					
			Group		**Total**
			Group A	**Group B**	
Post-operative nausea and vomiting	Yes	Count	8	2	10
		%	32.0%	8.0%	20.0%
	No	Count	17	23	40
		%	68.0%	92.0%	80.0%
Chi-square = 4.5	Df=1				**p-value = 0.03**

Since p-value is less than 0.05. There is significant difference between the groups.

VAS Scores in both Groups Mean VAS Score

Time Interval	A Mean SD	B Mean SD	T	P	Significant
1 hr	7.1 ±0.7	0.1 ±0.3	40.11	0.01	S
3 hrs	5.9 ±0.7	2.1 ±0.8	17.59	0.009	S
6 hrs	5.1 ±0.6	4.9 ±0.9	0.54	0.59	NS
9 hrs	5.3 ±1.5	4.6 ±1.0	1.85	0.07	NS
12 hrs	4.8 ±1.0	4.1 ±1.9	1.83	0.07	NS

	GROUP A	GROUP B
HR<60	-	3 (12.1)
Hypotension	-	6(24.1)
Pruritus	-	3 (12.1)
Sore throat	3.12	-
Head ache		-

Demographic Data expressed as Mean ±SD

Group	A	B	t	p-value	Significant
Age (Years)	35.36 9.304	35.92 9.128	0.092	0.097	NS
Sex (M/F)	8/17	9/16	0.08	0.78	NS
Weight (kgs)	52.80 5.196	52.20 4.882	0.421	0.676	NS
	20/5	21/4	X^2=0.14	0.71	NS

RESULTS

- Intra operative shoulder pain**:** Pain or discomfort in right shoulder was noted intraoperatively in 6 cases in the group B which amounted to 24% in the group A which were managed with inj. Propofol 1mg/kg. The remaining patients did not require any additional medication. None of patients in group B required conversion into general anesthesia.

- Post-operative Nausea and Vomiting (PONV) Group A had 32% (n=8) patients with PONV while the group B had 8% (n=1) patients with PONV and it was statistically significant (x^2=4.5 and p=0.03)

- Analgesia: Intensity of pain was less in group B as compared to Group A during early post-operative period. (till 6 hours) But scores were similar statistically at 9 hours.

- Hypotnsion: In group B hypotension (>20% fall in BP) was noted in 6 cases (24%) which was managed with I.V fluids and inj. Mephentermine 6mg ... Hypotension was not seen in any patient in group A

- Bradycardia: 3 patients is group B developed bradycardia which was treated with inj. Glyroyrolate 0.2mg I.V while in group A there was no bradycardia.

- 3 patients (12%) had sore throat in group A.

- 3 patients had pruritus in group B.

- No patient had headache post operatively.

DISCUSSION

General anesthesia has remained the most accepted modality of anesthesia as it provides analgesia unconsciousness and relaxation and better airway control. Reduction in lung capacities, basal atelectasis, and increased airway pressure, rise in CO_2, increased incidence of PONV. Higher incidence of pain etc., to name a few. The need for alternative modality of anesthesia definitely exists. Spinal and Epidural anesthesia are being used as alternatives successfully.

All risks of spinal aesthesia are still present such as bradycardia hypotension, PDPH (Post Dural puncture head ache)...etc.

All these risks are there in their usual rates. The right shoulder pain is most common complaint in these patients.

Our study compared GA with spinal anesthesia. GA patients showed tachycardia. Mean HR was higher in GA group. Bradycardia was noted in 3 cases in SA group (12%) which was treated with the inj. Glycopyroate. Mehta PJ *et al*. [3] Gautham B [4] have found no evidence of bradycardia. Hypotension (> 20%

fall in BP) was noted in 6 cases of SA group (24%) which was managed with I.V.fluids. and mephentaramine. Sinha *et al*. [5] reported hypotension in18.21% of cases in their study. Mehta PJ *et al*. [3] reported hypotension in 30% of cases in their study. Bernd *et al*. [6] have reported an incidence of 5.4%., Palchewa [7] reported 15.7% while. Thrognumchai [8] reported an incidence of 20.2%. Incidence of hypotension is in no way different whether it was laparoscopic or open surgery done with SAB.

Mean systolic and diastolic pressure was found to be higher in group GA compared to SAB group. Where surgical bleeding is less. The main debatable point in laparoscopic surgery is the status of respiratory parameters. It is said that spontaneous physiological respiration during SAB would be better than controlled ventilation as in GA [9]. Pulmonary function [10] takes 24 hours to return to normal after laparoscopic surgery performed under GA. Nishio et al [11] documented a greater increase in $PaCO^2$ after CO_2 pneumoperitoneum when the patient was under GA .Chiu *et al*. [12] reported significant artificial blood gas alterations during epidural anesthesia.

Ciofolo *et al*. [13] concluded that epidural anesthesia for laparoscopy does not cause ventilator depression. We found that 6 patients (24% of the group) experienced right shoulder pain, which was managed by i.v. propofol. Other options available for management to shoulder tip pain are use of intrathecal clonidine [14]. Additional dose of sedatives and also interscalene block. The incidence of shoulder pain (24% in our study) corresponds with the observation by Van Zandart AAJ *et al*. [15] who reported 25% such incidence during laparoscopic cholecystectomy under SAB. Tzovaras G et al [16] reported shoulder pain in 43% of patients. But those patients underwent laparoscopic cholecystectomy under SAB. Perioperative shoulder pain never persisted in the post-operative period. In fact, restlessness is commonly seen after GA. A specific advantage of SAB seems to be the decrease in the requirement of postoperative analgesia. Rescue analgesic needs in the early post-operative period is more in GA than in SA group. Intensity of pain was less in SA group till first 6 hours of post-operative period. There was no significant difference between the groups after this period. The addition of 25 mcg fentanyl offers obvious benefit. Administration of low dose local anaesthetic with opioid adjuvant (Selective spinal anesthesia) provides satisfactory surgical conditions for short duration gynecological laparoscopy [17]. We had in our study 32% PONV in GA as compared with 8% in SAB Surgical Conditions; surgeons were asked to comment on surgical conditions whether it was not good/good/excellent. Surgeons did not find any difference in operating conditions [17].

PDPH (Post Dural puncture head ache) was not seen in our study. The incidence of spinal headache has been quoted as 3.3% by Nathanson LK *et al*. [18]. Sore throat, relaxant induced muscle pain can prolong the hospital stay of GA cases.

Even with newer agents like propofol, isoflurane, incidence of PONV is as high as 30% which substantially increases cost of Anesthesia [19]. Successful performance of Laparoscopic surgery under spinal anesthesia requires skilled surgeon and an experienced anesthesiologist. We concluded that procedure is technically safe and feasible with excellent recovery and high degree of satisfaction in selected patients. SAB offers good surgical conditions, stable hemodynamics, pain free post-operative period and minimal post-operative sequalae. It is safer and better alternative in patients where GA is contra indicated.

Conflicts of Interest: None

REFERENCES

1. Sood J, Jain AK; Anaesthesia for Laparoscopic surgery. 1st edition, Jaypee Publication, 2009.
2. Cruzicr TA; Anesthesia for minimally invasive surgery. Cambridge Publication, 2010.
3. Mehta PJ, ChavedaHR, Wadwana AP; Comparative analysis of spinal vs general anaesthesia for laparoscopic cholecystectomy; A controlled prospective randomized trial. Anaes Essays Res., 2010; 4(2): 91-95.
4. Gautam B; Spinal anaesthesia for laparoscopic cholecystectomy; A feasibility and safety study. Kathmandu University Medical Journal, 2009; 7(28): 360-368.
5. Sinha R, Gurwara AK, Guptha SC; Laparoscopic surgery using spinal Anesthesis. J of society of Laparoendoscopic Surgeons, 2008; 12(2):133-138.
6. Bernd H, Axel J, Joachim K; The incidence and risk factors for hypotension after spinal anesthesia induction; an analysis with automated data collection. Anesth Analg., 2002; 94;152;159
7. Palachawa K, Chau-in W, Naewthong P Uppan K, Kamhon R; Complications of spinal anesthesia at Stinagarind Hospital. Thai J Anesth., 2001; 27: 7-12.
8. Throngnumchai R, Sanghirun D, Traluzxamee K, Kamhom R; Complication of spinal anesthesia at Lerdsin Hospital, Thai J Anesth., 1999; 25; 24-27.
9. Pursanani KG, Bazzay, Calleja M, Mughal MM; Laparoscopic cholecystectomy under epidural anesthesia in patients with chronic respiratory disease. Surg Endosc., 1998; 12(8): 1082-1084.
10. Putensen-Himmer G, Putensen CH, Lammer H, HaisjackI M; Comparison of post operative lung function in patient undergoing laparotomy or Laparoscopy for cholecystectomy. Am Rev Resp Dis., 1992; 145: A-156.
11. Nishio I, Naguchi J, Konishi M, Ochiai R Takeda J, Fukumshima K; The effect of anesthetic techniques and insufflatory gases on ventilation during

laparoscopy (in Japanes). Masui, 1993; 42(6): 862-866.
12. Chiu AW, Huang WJ, Chen KK, Chang LS; Laparoscopic ligation of bilateral spermatic varices under epidural anesthesia. Urol Int., 1996; 57(2): 80-84.
13. Ciofolo MJ, Clergue F, Seebacher J, Lefebvre G, Viars P; Ventilatory effects of laparoscopy under epidural anesthesia. Anaes Analg., 1990; 70(4): 357-361.
14. Ghodki PS, Sardesai SP, Thombre SK; Evaluation of intrathecal clonidine to decrease shoulder tip pain in Laparoscopy under spinal anesthesia, 2010; 54(3): 231-234.
15. Van Zundart AAJ, Stultiends G, Jakimowiez JJ, Peak DL; Laparoscopic cholecystectomy under segmental thoracicl anesthesia & feasibility study. BJA, 2007;98: 682-686.
16. Tzovaras G, Fafonlakis F, Prastas K; Spinal V/s General Anesthesia for Laparoscopic cholecystectomy : Interim analysis of a control randomized trial. Arch Surg, 2008; 143(5) 497-501.
17. Pamela HL, Vagadia H, Cynthia H Lynn M, Mitchell G, WE; Small dose SSA for short duration outpatients laparoscopy – recovery characteristics compared to desflurance anesthesia. Anaesthesia. Analgesia, 2002; 94(2): 346-350.
18. Nathanson LK, Shimi S, Cuschieri A; Laparoscopic cholecystectomy. The Dundee technique. Br Journal of Surgery, 1991; 78(2): 155-159.
19. Malins AF, Field JM, Nesting PM, Cooper GM; Nausea and vomiting oral ondansetron, Metaclopramide and placebo, Br J Anaes., 1994; 72: 231-233.