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A SEGMENTAL SPINAL VS GENERAL ANAESTHESIA IN PATIENTS UNDERGOING LAPAROSCOPY CHOLECYSTECTOMY: A COMPARATIVE STUDY

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ABSTRACT **Background:** Segmental anaesthesia is now being increasingly used for laparoscopic cholecystectomy surgeries. However, there is conflicting literature regarding its superiority over traditional general anaesthesia usage. **Materials And Methods:** Total 100 patients in ASA I and II categories who had to undergo laparoscopic cholecystectomy were selected and divided into two groups- a) Group A subjects (n=50): These patients were given segmental spinal anaesthesia using isobaric 0.5% Levobupivacaine and b) Group B (n=50): This group patients were operated with general anaesthesia by using anaesthetic agents- Midazolam, fentanyl, propofol or vecuronium. **Results:** On analyzing surgery duration, mean ± S.D. values of 37.23 ± 0.23 and 39.1 ± 0.92 minutes, respectively was obtained which had no statistical significance (P=0.86). The duration of rescue analgesia was noted as 23.4 ± 0.91 and 25.3 ± 0.12 in groups A and B, respectively with no statistically significant difference (P=0.381). The mean ± S.D. score of pain (VAS) were found to be statistically nonsignificant (P=0.64) after 24 hours follow-up i.e., 2.13 ± 0.12 and 2.67 ± 0.34 in group A and B, respectively. **Conclusion:** Present study found no statistically significant differences between spinal regional anaesthesia and general anaesthesia. However, a larger sample size would be more benefitted to provide representative findings.

KEYWORDS : spinal, segmental, anaesthesia, laparoscopic, cholecystectomy.

INTRODUCTION

'Segmental spinal anaesthesia' is a term synonymous with 'thoracic spinal anaesthesia'. It refers to "Blocking of a particular required dermatomes for performing any surgical procedure using low local anaesthetic drug dosage.

This allows puncture of dura at higher lumber or thoracic levels. Lower dose of local anaesthetic agent is more likely to produce 'true segmental spinal nerve block. [2]

3 major disadvantages associated with spinal block at unconventional drug levels are- 1) neuronal injury risk, 2) respiratory distress as a result of extensive blockage of thoracic nerves and 3) cephalad local anaesthetic drug spread resulting in high level or complete nerve block. [3]

Extensive blocking of thoracic nerves cause anterior abdominal wall muscle paralysis leading to forced expiration as well as coughing. Although, low drug dosages preserves ability to cough by minimal expiratory muscle motor weakness. [4]

Diaphragm, a major muscle for inspiration remains unaffected. There might be a decrease in heart rate due to higher neuraxial blockage of neural fibers originating from vertebra- T1 to T4. [4]

Segmental spinal nerve anaesthesia is used in morbid patients who are at high-risk for selective surgical procedures. [5] It has advantages such as- hemodynamics stability, minimal motor nerve block, fast sensory nerve recovery and early control of bladder. However, patients who are selected to be receiving spinal anaesthesia must undergo careful evaluation and this technique must be reserved only for experienced clinical practitioners. [6]

Almost all abdominal surgeries can be performed under segmental spinal or combination of spinal and epidural anaesthesia or continuous segmental spinal anaesthesia based up on category of surgery, hemodynamics and related co-morbid status, local anaesthesia dose and injection site and neuraxis. For any abdominal surgery, thoracic spinal anaesthesia above thoracic vertebra, T10 with adequate anaesthetic dosage is required. For this purpose, intervertebral disc space between T-10 and L-1 vertebrae is ideal site for anaesthesia for abdominal surgical procedures. Average drug dose between 7.5 to 10 mg i.e., 1.5 to 2 ml bupivacaine or levobupivacaine along with an additive such as- fentanyl or clonidine has been found to demonstrate effectiveness for a duration between 90-120 minutes. This anaesthetic dose is half of the total anaesthetic amount used in conventional spinal anaesthesia at lumber (T3-T4) level. [7]

MATERIALS AND METHODS

Study design and setting: This observational study was conducted in Department of Anaesthesiology , Dr Kiran C Patel Medical College and Research Institute , Bharuch .

Study participants and sampling: Total of 100 patients in ASA I and II categories who were scheduled for laparoscopic cholecystectomy were selected for the study.

The study participants were divided into two groups- a) Group A subjects: These patients (n=50) received segmental spinal anaesthesia using isobaric 0.5% Levobupivacaine and b) Group B: This group had 50 patients operated with general anaesthesia by means of anaesthetic agents- Midazolam, fentanyl, propofol or vecuronium.

Patient details: Complete clinical history was obtained in all cases. Group A patients were informed regarding getting operated under general anaesthesia in case segmental spinal aneathesia was not achieved satisfactorily. Also, these patients were informed regarding the side-effects like- pain in shoulder and vomiting.

Pre-anaesthetic management in either study groups was identical. All patients received fentanyl, ranitidine and/or ondansetron before getting anaesthesia administered. Physical signs such as- heart rate, respiratory rate, arterial pressure and SPo2 were noted.

Group A patients were kept in left lateral decubitus position following that sub-arachnoid space puncture was performed between T9 and -10 vertebrae wherein 2 ml of Isobaric 0.5% Levobupivacaine with 25 micrograms of fentanyl was injected. Following anaesthetic injection, all patients were kept in supine position.

Intra-operative patient details: Effect of anaesthesia was then confirmed by pricking with a pin for sensory stimulation. While performing surgery, midazolam and fentanyl were injected intravenously while in group B subjects, anaesthesia was given using 2.0 mg per kg of propofol and 0.1 mg per kg vecuronium. Controlled ventilation of patients was done using oxygen, nitrous oxide and isoflurane. Anaesthesia was reversed using neostigmine and glycopyrrolate.

Post-operative data collection: After completion of surgery, patients were administered I.V. fluid for six hours. 75 milligrams diclofenac was administered by intravenous route for post-operative analgesia. 1mcg/kg dose of fentanyl was injected in case pain persisted.

Post-operative pain was observed at sixth, twelve and twenty four hours post-surgery by Visual analogue scale (VAS) Score.

Adverse effects like nausea, vomiting, urinary retention, headaches, pain in shoulder and/or neurological status were noted down and then comparison was made between both the study groups. All patients

were then discharged forty eight hours following surgery.

Mean ± S.D. time for anaesthesia, surgery duration, post-operative pain as well as complication, if any in both study groups were then compared.

Inclusion criteria for the study were- a) Patients scheduled for laparoscopic cholecystectomy; b) ASA I or II patients, c) above 18 years age, d) those who provided written informed consent.

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Exclusion criteria for subject participants were- a) those who did not consent to be included in the study, b) if there were contra-indications for spinal anaesthetic agent for example, bleeding, diathesis, local infection and c) severe chronic obstructive pulmonary disease.

Statistical analysis: SPSS version 22.0 was the statistical tool used. One-way ANOVA statistical test was used to determine study results' significance. P score lesser than 0.05 was considered as significant.

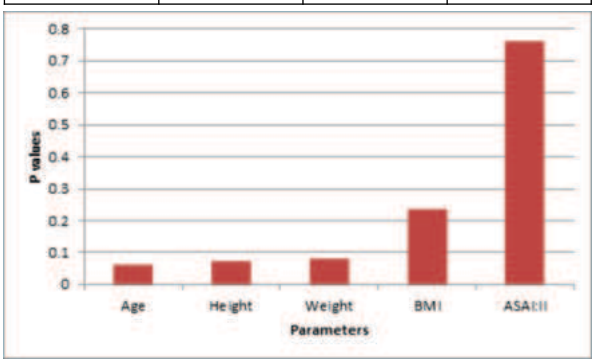
RESULTS AND OBSERVATIONS

Demographic characteristics: On analyzing the data, the mean age of group A patients was found to be 47.182 ± 0.45 years while in group B, it was found to be 45.023 ± 0.981 years. This was found to have no statistical significance (P=0.06). On analyzing gender related data, 35 were males and 15 patients were females in group A whereas in Group B, 46 were male patients while 04 were female patients.

On comparing height, weight, body mass indices and ASA I:II features, P values of 0.072 (no significance), 0.082 (not significant), 0.237 (no significance) and 0.761 respectively were obtained (table 1 and graph 1).

Table 1: Table Showing Patient Characteristics In Studied Groups

Characteristics	Group A	Group B	P values
Age	47.182 ± 0.45	45.023 ± 0.981	0.061
Height	157.1 ± 17.21	153.2 ± 14.12	0.072
Weight	67.34 ± 0.12	66.12 ± 1.2	0.082
BMI	25.12 ± 2.54	25.67 ± 1.56	0.237
ASAI:II	24:8	19:08	0.761



Graph 1: Graph depicting P values of different patients' characteristics

Most common reasons for performing cholecystectomy were found to be- cholelithiasis, cholecystitis and neoplasms in 84.2%, 10.2% and 6.6% patients, respectively. On analyzing duration of surgery in both the groups, mean ± S.D. duration were found as 37.23 ± 0.23 and 39.1 ± 0.92 minutes, respectively. This was found to have no statistical significance (P=0.86). The duration of rescue analgesic use was found to be 23.4 ± 0.91 and 25.3 ± 0.12 in groups A and B, respectively with no statistically significant difference (P=0.381). The mean ± S.D. score of pain (VAS) were found to be statistically nonsignificant (P=0.64) between both the groups after 24 hours follow-up i.e., 2.13 ± 0.12 and 2.67 ± 0.34 in group A and B, respectively.

DISCUSSION

Regional spinal anaesthesia administration for laparoscopic cholecystectomy has been found to reduce stress following any surgery. In this anaesthetic procedure, no instrumentation of respiratory airways is done and there are very less chances of developing deep vein thrombosis. However, , there still remains a scope for inadequate airway ventilation as the result of thoracic nerve block. Diaphragm is a major respiratory muscle that remains unaffected due to its cervical innervation. However, forced expiration as well as coughing is affected as these reflexes are generated by anterior abdominal wall muscles that have supply from thoracic nerves. [9]

Large local anaesthetic dose can result in complications in patients suffering from chronic obstructive respiratory disease. Hence, amount of neural block as well as weakness of muscle can be minimized by adequate local anaesthetic dose. Also, pneumoperitoneum CO2 pressure during surgery cause stimulation of vagus nerve resulting in bradycardia. [10]

Regional anaesthesia can be an alternative for general anaesthesia for performing laparoscopic cholecystectomy surgeries in those patients who suffer from cardiopulmonary disease.[11] van Zundert et al 2006) opined that surgeries using segmental spinal anaesthetic procedure can be performed on patients having impairment of organ functions. [12] Similarly, Lau et al (2005) also reported that regional spinal anaesthesia can be successfully used for conducting laparoscopic cholecystectomy. [13] Also, Yi et al (2009) successfully used this anaesthetic procedure on patients who had had previously undergone right pneumonectomy and had moderate pulmonary obstructive disease. [14]

In present study, no statistically significant difference (P=0.86) was obtained between total duration of surgeries which were performed under general or regional spinal anaesthesia. Also, no statistically significant difference between duration of rescue analgesia in post-operative period between both the study groups (P=0.381). No statistically significant difference (P=0.64) was found in visual analogue scale (VAS) pain scores in subjects who were operated either by general or regional spinal anaesthesia. Similar to that of our study findings, Mehta et al (2010) reported no statistically significant differences between post-operative complications, length of hospital stay, period for recovery and satisfaction between patients who were operated under either general anaesthesia or regional segmental spinal anaesthesia. [15]

However, in contrast to our study observations, Ellakany M (2013) found better pain scores and lesser time for discharge with regional spinal anaesthesia than general anaesthesia. [16]

Similarly, Mahasivabhattu et al (2023) in their study found lesser hemodynamic variations, greater post- operative analgesic duration, greater 1st rescue analgesia duration in patients who received regional spinal anaesthesia in comparison with those operated under general anaesthesia who had higher hemodynamic variation, response to intubation, higher use of intra-operative opioids, lesser post-operative analgesia and less time in requirement of first rescue analgesia. [17]

Spinal anaesthesia is regional nerve block, hence, it is associated with lesser procedural cost and length of stay in hospital due to reduced post-operative discomfort, pain as well as complications.

CONCLUSION

Regional spinal anaesthesia is now being increasingly advocated for performing laparoscopic cholecystectomies than general anaesthesia due to reduced post-operative pain, recovery and other related complications. Our study did not find any significant differences between both the anaesthetic procedures. This could be attributed to lesser sample size. An extended study on larger study sample would be more conclusive in nature and provide representative data.

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