Spinal Anesthesia versus General Anesthesia for open cholecystectomy: 
Comparison of PERI-operative and post-operative events

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Abstract
Objective: To study perioperative and postoperative events as well as feasibility, effectiveness, safety of 
patient and surgeons satisfaction for open cholecystectomy under spinal anesthesia (SA) compared to 
General Anesthesia (GA).
Material and Methods: All admitted and consented patients of grade ASA I and ASA II of either sex with 
diagnosed cholelithiasis for elective open cholecystectomy randomly divided into 2 groups SA group 
received spinal anesthesia (SA) using 3.00 ml to 3.5 ml of 0.5% hyperbaric Bupivacane intrathecally and 
GA group received propofol, Fentanyl Citrate, Atracurium and Halothane during open Cholecystectomy. 
Other drugs used only to manage anxiety, pain, nausea and vomiting, respiratory complication and for 
haemodynamic stability. All open cholecystectomy performed by right oblique incision. Intraoperative and 
postoperative events were observed for 2 days. Main points of study were. Intraoperative complications 
(Hypotension, bradycardia, Nausea/Vomiting Breathing Difficulty, Patients and Surgeons satisfactions), 
Post-operative painfree interval, PONV and requirement of analgesia.
Result: 200 patients with diagnosed cholelithiasis for open cholecystectomy admitted from july2016 to 
December 2017 in which 150 patients received adequate spinal anesthesia and 50 patients were preferred 
for GA. INTRA-OPERATIVELY in SA group 18 patients suffered from respiratory difficulty which was relieved by 100% O2 with 
ventimask, 39 patients presented with hypotension managed by given injection Mephenetmitine, only 2 patients received injection Ephidrine, 12 patients presented with nausea and vomiting treated with antiemetic(Injection Ondensetron), 22 experienced pain, injection tramadol was given 
for pain relief. POST-OPERATIVELY: Both groups of patients were observed for pain free interval and PONV.
Conclusion: Patients undergoing for uncomplicated open Cholecystectomy under spinal-anesthesia is safe and 
effective technique than G.A. interms of intraoperative events, post-operative analgesia, PONV, cost 
effective and in view of surgeons and patients satisfaction.
Introduction
Traditionally for cholelithisis, open cholecystectomy is frequently performed procedure. Specially in India may be due lake of laparoscopic experience and equipments under Spinal Anesthesia (SA). Is an efficient, safe and cost effective alternative to General Anesthesia (GA). In our study we evaluate the intra-operative feasibility, effectiveness, safety of Spinal Anesthesia and post-operative painfree interval, fast recovery, early mobilization and PONV in conducting open Cholecystectomy.

Though GA is a gold standard but it can be extremely cost effective and challenging for patients with difficult intubation, recently low thoracic epidural block and combind spinal epidural block have been used frequently in cholecystectomy and found to be safe and effective alternative to GA. With several advantage, infact SA is better choice than GA as patient has lesser effect on respiratory functions, better post operative pain control minimal PONV and lower incidence of deep vein thrombosis.

Material and Methods
After the institutional ethics and permission of Authority, study was conducted in Malkhan Singh District Hospital, Aligarh, Uttar Pradesh from July 2016 to December 2017, patients admitted with diagnosed Gallstone/Cholelithiasis for open cholecystectomy of physical status PS I and PS II of either gender between 18 to 60 years of age divided into 2 groups, excluded patients were with acute pancreatitis, cholecystitis, spinal deformity, infection bleeding disorder, and the presence of any condition contra indicating to SA & GA.

After informed consent taken by Nursing Staff/ Anaestheologist from all the patients undergone for open cholecystectomy, all patients explained properly and standered pre-operative precaution used by given Tablet Diazepam 5mg and Tablet Alprex 0.5mg night before surgery to relieve discomfort and anxiety.

In the pre-operative room 500ml Ringer Lactate Solution (RL Solution) was commenced intravenously and Injection Ranitidine, inj. Perinorm and one dose antibiotics of 3rd generation of Cepherosporine administrated pre-operatively to prevent the infection.

After shifting in operative room non-invasive monitoring (Heart rate, Blood pressure, Pulse oximeterly was established and patients were catheterized with Folly’s catheter.

Randomized Spinal Anesthesia (SAB) was given with full aseptic precaution in sitting position in L2-L3 space with 26 gauge spinal needle with 3.00, 3.5ml of 0.5% hyperbaric Bupivacaine intrachecally after conforming free flow of cerebrospinalfluid(CSF). The patients was placed in trendelenburg position for 3 to 5 minutes or till the level of sensory block of T4 was achieved, the level of sensory block was assessed with pinprick stimulus. In patients received general anesthesia(GA) injection Atropine or Injection Glycopyrolate+ fentanyl + Midazolam was given in pre-medication, induction was done after pre-oxygenation for 2-3 mintue with injection Propofol 2 mg/kg. Injection Succinylcholine 1 to 2 mg/kg and OT intubation was done with PVC ETT after checked and fixed ETT, balanced Anaesthesia/ Maintenance Anaesthesia was continued with IPPV+N2O+O2+ Intermitted halothane+ Atracurium. Neuromuscular block was antagonized with Injection Neostigmine 5ml+Injection Atropine Sulphate after the end of surgery.

Open Cholecystectomy was performed by right oblique incision. All patients were monitered haemodynamically and for any complain of pain, vomiting, and respiratory distress throughout the procedure under SA.

Defined hypotension less than 20% of pro-operative MAP was treated with injection Mephentermine 6mg I/V and repeated as per need. Heart rate of less than 60 per minute was treated with 0.6mg Atropine, for complain of Hypoxia oxygen(O2) was administered by ventimask at a flow rate of 2 to 4 lt/min and patients were
advised to report events such as discomfort, abdominal pain, headache nausea/vomiting. each events was treated accordingly.

There was no case of open cholecystectomy under SA with any specific region converted to GA. Operating surgeon were requested for any technical difficulty associated with procedure during the operation. In post-operative period I/V crystalloid fluid was given for the next 24 hours and all patients were monitored for respiratory distress, heart rate, B.P., Urine output, Pain and PONV. On complain of post-operative pain analgesia was provided with intramuscular Diclofenac Sodium, post-operative pain was assessed by visual analog scale (VAS=0, No pain) VAS 1-3=Mild Pain, VAS 4-5= Moderate Pain and VAS 6-10= Severe Pain) If patient could not felt pain relief & persisted for 30 minutes with VAS score more than 3, intravenous Tramadole was given. For severe pain (VAS>6) Injection Butorphanol Tartrate was used intravenously.

The catheter removed and patients were allowed orally for liquid and soft diet the day after surgery. Patients from our hospital usually discharged after removal of stratches on 8th day but on request overall 20-30% patients discharged from the hospital on the 4th day.

The patients discharged within satisfactory condition without any mortality and mobility at the time of discharge.

Result
200 patients with diagnosed Cholelithiasi of grade ASA I & ASA II. Out of these 200 patients, 150 patients under went open Cholecystectomy under SAB(SA Group) and 50 patients preferred GA(GA Group) under spinal anaesthesia was performed without any significant difficulty in all patients except only 3 patients in SA group supplemented with Injection Ketamine+Injection Medazolam+Injection Glycopyrolate. As they complaint of dragging sensation during intra-abdominal packing and liver retraction.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Intra-Operative events in SA Group</th>
<th>No. of Patients</th>
<th>Percentage of events</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Hypotension</td>
<td>39</td>
<td>26%</td>
</tr>
<tr>
<td>02</td>
<td>Abdominal Pain</td>
<td>22</td>
<td>15%</td>
</tr>
<tr>
<td>03</td>
<td>Breathing Difficulty</td>
<td>18</td>
<td>12%</td>
</tr>
<tr>
<td>04</td>
<td>Breadycardiya</td>
<td>21</td>
<td>14%</td>
</tr>
<tr>
<td>05</td>
<td>Nausea/Vomiting</td>
<td>12</td>
<td>8%</td>
</tr>
<tr>
<td>Total No. of Patients</td>
<td>112</td>
<td>75%</td>
<td></td>
</tr>
<tr>
<td>Total No. of Patients in SA group</td>
<td>150</td>
<td>25% uneventful</td>
<td></td>
</tr>
</tbody>
</table>

25% patients remain un-eventfull in SA group post-operatively painfree interval was more than 3 Hours in SA group as compared to 1 Hour in GA group.

Table: 2 SA Group

<table>
<thead>
<tr>
<th>Time Interval of pain complaint (In Min.)</th>
<th>No. of Patients with complaint of pain</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>180-210 min</td>
<td>42</td>
<td>28.00%</td>
</tr>
<tr>
<td>211-240 min</td>
<td>76</td>
<td>50.66%</td>
</tr>
<tr>
<td>241-271 min</td>
<td>18</td>
<td>12.00%</td>
</tr>
<tr>
<td>271-300 min</td>
<td>14</td>
<td>9.33%</td>
</tr>
<tr>
<td>Total Patients</td>
<td>150</td>
<td></td>
</tr>
</tbody>
</table>

226.2±26.5  +=31% p<.001

Table: 3 GA Group

<table>
<thead>
<tr>
<th>Time Interval of Pain complaint (In Min.)</th>
<th>No. of Patients</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>60-90 min</td>
<td>26</td>
<td>52%</td>
</tr>
<tr>
<td>91-120 min</td>
<td>17</td>
<td>34%</td>
</tr>
<tr>
<td>121-150 min</td>
<td>04</td>
<td>8.0%</td>
</tr>
<tr>
<td>151-180 min</td>
<td>03</td>
<td>6.0%</td>
</tr>
<tr>
<td>Total Patients</td>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>

95.6±25.9 p

Mean and standard deviation is 226.2±26.5 in SA group and for GA group it is 95.6±25.9 and it is tested by t-test and it is highly significant and p<0.001
Table 4: PONV in SA & GA group

<table>
<thead>
<tr>
<th></th>
<th>PONV</th>
<th>No PONV</th>
<th>Total No. of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spinal (SA) group</td>
<td>12</td>
<td>138</td>
<td>150</td>
</tr>
<tr>
<td>GA group</td>
<td>16</td>
<td>34</td>
<td>50</td>
</tr>
<tr>
<td>Total No. of Patients</td>
<td>28</td>
<td>172</td>
<td>200</td>
</tr>
</tbody>
</table>

$X^2 = 17.9$

It has been tested by chi square test and it is highly significant and $p < 0.001$

Post-operative PONV was 8% in SA group while it was 30% in GA Group. Overall surgeons were satisfied and preferred SA approach for open cholecystectomy.

**Discussion**

Open Cholecystectomy in District hospitals is still preferred and very common under SA compared to laparoscopic Cholecystectomy where expertise and technologies required which are limited\textsuperscript{3,18}. Inadequate muscle relaxation is one of the most important problem of open cholecystectomy under regional anesthesia causing difficulty in operation\textsuperscript{19}. General anesthesia for open cholecystectomy provides adequate muscle relaxation for surgery. Though it may be associated with so many complications as difficulty in intubation traumatize the airway leading to edema and fluid exudation. Introduction of pathogens may leading to respiratory problems. If patient is suffering from co-morbid conditions which may be increase the cost of operation and hospital stay. GA is usually preffered due to adequate muscle relaxation for open cholecystectomy in comparision with spinal anesthesia but an advantage over GA for it can avoid oral and teeth injury, sore throat during laryngoscopy and other hazards\textsuperscript{13} and can be used safely in patients with cardiorespiratory co-morbid conditions.\textsuperscript{7,14}

Intraoperative hemodynamic changes are common undesired consequences of SA. In our study (26%) patients suffered from intra operative hypotension and (14%) from bradycardia. Occuring hypotension and bradycardia in our patients was easily treated with Inj. Mephentermine and Atropine I/V respectively. In our study no patient has significant pre-existing respiratory disease hence only (12%) patient complained of mild breathing difficulty may be due to surgical manipulation which was easily managed with oxygen supplement. Intraoperatively (15%) patients had abdominal pain while it was (20%) in Laoutid J et al may be due to stretch on mesentery during intraabdominal packing and liver traction, which was managed with gentle retraction of liver and I/V analgesic Inj. Tramadol. In our study the result was compared to Jaouad Laoutid\textsuperscript{5} and khan at al\textsuperscript{8} where they also reported longer average Post Operative painfree interval for open cholecystectomy under SA. They managed majority of the patients in SA group by NSAID.\textsuperscript{11,12} In our study Inj. Diclofenac sodium was often sufficient to use.

PONV was rarely present (8%) in SA group. While it was reported (30%) under GA group. Open cholecystectomy in distric hospital is preferred and very common under SA may be because of feasibility, safety, cost effective, longer post operative painfree interval and minimal post operative nausea and vomiting PONV (8%) in SA group in compared to GA. As it is more costly, post operative painfree interval is short and reported PONV was (30%) in GA group. While Laoutid Jet al PONV was reported 10% in SA group and 50-70% under GA group, especially in laparoscopic cholecystectomy\textsuperscript{4,19}. It was the most important that surgical team was very satisfied with the sufficient abdominal relaxation during the operation.\textsuperscript{11,12}

**Conclusion**

In conclusion conducting elective open Cholecystectomy under SA is not only safe and effective but also provide prolonged post-operative analgesia without respiratory problems and PONV.

**References**

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18. Talpur KA, Malik AM, Memon AI, Leghari AA, Qureshi JN, Comparative