Original Article

Spinal Anesthesia versus General Anesthesia for Open Cholecystectomy: Comparison of Postoperative Course

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ABSTRACT

Objective: To study the effectiveness of SA (Spinal anesthesia) for open cholecystectomy as compared to GA (General anesthesia) in terms of reducing post operative pain, analgesia requirement, respiratory complications and length of hospital stay.

Study Design: Quasi Experimental Study

Place and Duration: POF Hospital, Wah Cantt from January 2009 to December 2010

Materials and Methods: AII consented patients of ASA grade I and II of either sex scheduled for elective open cholecystectomy were randomly divided into two groups. SA Group received Spinal anesthesia (SA) with hyperbaric bupivacaine intrathecally and GA Group received General anesthesia (GA) with propofol, fentanyl, atracurium and sevoflurane during open cholecystectomy. The main end points of the study were post operative pain free interval, analgesia requirements, respiratory complications and length of hospital stay in both the groups.

Results: 102 patients were admitted with symptomatic cholelithiasis from January 2009 to December 2010. 2 patients preferred GA and 1 patient opted for SA by their choice so they were excluded from the study. Thus from a total of 99 patients, 49 patients under went open cholecystectomy under SA (SA Group) and 50 patients under GA (GA Group). The average time of first complaint of post operative pain in SA Group was 4 hours as compared to 30 minutes(P=<0.0001) in GA Group. 79% of the SA Group patients remained satisfied with inj. Diclofenac as compared to 17% in GA Group(P=<0.0001). 78% of patients in GA Group also required rescue analgesia in the form of IV ketorolac and 5% of patients received additional IV tramadol for pain relief. Only 5% of the patients in SA Group suffered significant respiratory problems as compared to 11% of patients in GA Group. Mean hospital stay in SA Group was 2.5 day as compared to 4 days in GA Group(P=<0.0001).

Conclusion: For patients undergoing uncomplicated open cholecystectomy, spinal anesthesia is not only safe but also more effective than general anesthesia in reducing post operative pain, analgesic requirement, respiratory problems and length of hospital stay.

Key words: anesthesia, spinal anesthesia, general anesthesia, open cholecystectomy, morbidity

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Introduction

Open cholecystectomy is a frequently performed procedure for symptomatic cholelithiasis, especially in developing countries either because of lack of laparoscopic equipment or expertise.[1] However, laparoscopic cholecystectomy remains the gold standard procedure for symptomatic gallstones due to short operative time, early mobilization, less postoperative pain, fast recovery, short hospital stay (LOS) and early return to work[2].

Both open and laparoscopic cholecystectomies have traditionally been performed under general anesthesia (GA). GA is generally favored because of its convenience, well studied and understood safety profile. However, general anesthesia can be extremely challenging for patients with difficult intubation, obstructive pulmonary and cardiaovascular diseases. GA with its adverse effects on pulmonary functions and associated post operative pain can lead to a prolonged hospital stay and hence affect the cost of hospital stay[3]. Recently, regional blocks such as low thoracic epidural[4,5], spinal [6,7], segmental thoracic spinal[8,9] and

combined spinal-epidural blocks[10,] have been used in laparoscopic cholecystectomy and found to be safe and effective alternate to GA with several advantages.

Spinal anesthesia (SA) as an alternate to GA was first used by Hamad MA et al[11] for laparoscopic cholecystectomy. Since all laparoscopic procedures are merely a change in access and still require the same anesthesia; hence the difference from conventional surgery is likely to be small. It is therefore expected that SA can be as effective in open cholecystectomy as in laparoscopic approach. In fact, SA with lesser effect on respiratory functions, better post operative pain control, reduced surgical stress response and lower incidence of deep venous thrombosis[12], can be a better choice than GA. Sinha R[13], in India demonstrated the safety profile of SA for laparoscopic cholecystectomy in 3492 patients during 12 years. However, the safety and efficacy of SA has not yet been studied for upper abdominal surgeries like open cholecystectomy.

In our present study we compared the effectiveness of SA for open cholecystectomy versus GA in terms of reducing post operative pain, analgesia requirement, respiratory complications and length of hospital stay.

Materials and Methods

The Quasi Experimental study in POF Hospital, Wah Cantt, Patients admitted with the symptomatic gall stone disease were randomly divided into two groups. SA Group represents those patients randomized to open cholecystectomy under SA and GA Group having same surgery under GA. American Society of Anesthesiology (ASA) physical status (PS) I and II patients of either gender, aged between 30 to 60 years, undergoing un-complicated open cholecystectomy were included in the study. Patients with spinal problem such as backache, spinal deformity, back infection, bleeding or clotting disorders and those on NSAIDs or corticosteroids were excluded from the study. Hospital ethical committee granted permission for the study. Informed consent was taken from all participating patients. Pre operative preparation was same in both groups.

On patients' arrival in the operating room, noninvasive monitoring (electrocardiogram, heart rate, arterial blood pressure, respiratory rate and pulse oximetry) was established and 500 ml of Ringer solution was commenced intravenously.

Patients randomized to spinal anesthesia were injected with 3 ml of hyperbaric bupivacaine hydrochloride intrathecally at L3-L4 or L4-L5 intervertebral space under aseptic conditions. The patient was placed in trendelenburg position for 3 minutes in order to achieve high spinal anesthesia. In patients randomized to receive general anesthesia, induction was done with propofol (2-3 mg/kg), fentanyl citrate (5 µg/kg), and atracurium besylate (0.5 mg/kg). Balanced anesthesia was then continued with sevoflurane (1% to 2%), and propofol (2 mg/kg/h). All patients were hemodynamically monitored continuously during the operation. Residual neuromuscular block was antagonized with 25 mg of neostigmine methylsulfate and 1 mg of atropine sulfate at the end of surgery.

Open cholecystectomy was performed by right transverse or oblique incision. In one patient upper midline incision was utilized as he had concomitant epigastric hernia.

The main end points of the study were post op. pain free interval, analgesia requirements, respiratory complications and length of hospital stay in both the groups.

Post operative morbidity was assessed on a preformed proforma which was filled in by the senior nurse on duty and dually checked by the doctor on duty. The nurse on duty was kept unaware of the type of anesthesia given in order to avoid any possible bias.

Time of first complaint of post operative pain was noted and analgesia given in step ladder pattern starting from intramuscular diclofenac sodium, intravenous ketorolac and tramadol. Respiratory problems were recorded in both groups as presence of only cough, cough with clinical findings on chest examination and cough with clinical and radiological findings necessitating treatment in the form of intravenous antibiotics and hospitalization. The patients were allowed orally 8 hours post operatively and discharged from the hospital when they were fully mobilized, afebrile and taking soft diet.

Results

102 patients presented to POF hospital Wah Cantt. with symptomatic cholelithiasis from January 2009 to December 2010. 2 patients preferred GA and 1 patient opted for SA by their choice so they were excluded from the study. Thus from a total of 99 patients, 49 patients under went open cholecystectomy under SA (SA Group) and 50 patients under GA (GA Group).

Two patients in SA Group received additional ketamine in analgesic dose as they were complaining of dragging sensation during operation.

The average time of first complaint of post operative pain in SA Group was 4 hours as compared to 30 minutes in GA Group. 79% of the SA Group patients remained satisfied with inj. Diclofenac as compared to 17% in GA Group. 78% of patients in GA Group also required rescue analgesia in the form of IV ketorolac and 5% of patients received additional IV tramadol for pain relief (Table: I). Only 5% of the patients in SA Group suffered significant respiratory problems as compared to 11% of patients in GA Group. Mean hospital stay in SA Group was 2.5 day as compared to 4 days in GA Group.

Table I: Showing number of patients in terms of post operative pain free interval, analgesic requirement, respiratory problems and length of hospital stay.

Variables	Spinal Anesthesia (SA Group) (49 Pts.)	General anesthesia (GA Group) (50 Pts.)	P value
Average Pain free interval (Hrs)	04	1/2	P=<0.0001
Analgesia required:			
Diclofenac Ketorolac Tramadol	78% 20% 2%	16% 78% 6%	P=<0.0001 P=<0.0001 P=<0.317
Significant respiratory problems	5%	11%	P=<0.251
Mean Length of Hospital stay (Days)	2.5	4	P=<.0001

Discussion

General Anesthesia is usually employed for open cholecystectomy as it provides adequate muscle relaxation for the surgery. However, it is associated with a number of complications especially if the patient is suffering from co-morbid conditions. Tracheal intubation may trigger life threatening spasms in patients of bronchial asthma that may result in need of postoperative ventilation considerably increasing LOS hence the cost of hospital stay. Oral and teeth injury during laryngoscopy, sore throat and stomach inflation as a result of mask ventilation are other hazards that might also be avoided in a regional anesthetic setting[14].

Pain following surgery is a universal phenomenon; it is often underestimated and undertreated[15]. Post operative pain is very important in open cholecystectomy keeping in view of the post operative respiratory problems. Firstly, because of the strategic location of incision for open cholecystectomy which hampers the patient's respiratory movement causing poor cough reflex which leads to atelactasis and pneumonia. Secondly, intubation not only traumatize the airway leading to edema and fluid exudation, but also it is a potential risk factor for introducing pathogen in the lower airway making the patient more prone to respiratory infections.

In this study we noted that open cholecystectomy not only can be done very conveniently under SA but it also has advantage over GA in controlling post operative pain as the time for first demand of analgesia was prolonged as well as requirement for opiods was comparatively reduced. This may be because of interplay of various factors: firstly the avoidance of endotracheal intubation–related discomfort; secondly the presence of adequate levels of residual analgesia for the first few hours after the completion of the surgical procedure. Thirdly, minimal stress response associated with spinal anesthesia as compared to GA. Finally during this pain free period the patients gain confidence and attain high pain threshold so they become satisfied with simple analgesics. In 5 cases no pain killer was given for 12-16 hrs as the patients did not complain of pain.

Similar to some comparative studies of SA vs. GA in Laparoscopic Cholecystectomy[9,13,16], postoperative pain was significantly reduced in SA group patients and first complaint of post operative pain was significantly prolonged as compared to GA group (4 hours versus 30 minutes, P=<0.0001). Our data showed that the analgesic requirement was also reduced in SA group Vs GA group (P=<0.0001). The main analgesia used in SA group was intramuscular diclofenac, whereas more than 80% of the GA group patients became pain free only after receiving top up intravenous ketorolac and 5% needed intravenous opiod analgesia in addition.

In SA group, postoperative urinary retention developed in 10% patients from the spinal anesthesia (4 female and 1 male patients). Headache was another side effect noted in 5% patients which was experienced 2-3 days post operatively. 2 patients in SA group received ketamine in analgesic doses as they complained of dragging sensation because of stretch on mesentery during operation. Respiratory problems (5%) were almost negligible in the SA group.

Our SA group patients had early discharge and reduced average length of hospital stay as compared to GA group (2.5 days Vs 4 days, P=<.0001) which is in line with the study by Yousef[9] however, Tzovaras[16] did not find any difference between two groups.

One of the most important problems of open cholecystectomy under regional anesthesia is inadequate relaxation of abdominal musculature causing difficulties in performing the operation[3]. Similar to studies by Lee[17] and Tzovaras[16] on laparoscopic cholecystectomy, our surgical team

was quite satisfied with the technique and claimed that the relaxation was sufficient enough to perform the operation.

At 2 week's follow-up, the vast majority of patients from both groups reported satisfaction with both the anesthetic approach and experienced equally good recovery. 53% patients in the SA group claimed that they were scared of the procedure at start but later on they became friendlier.

Conclusion

For patients undergoing open cholecystectomy, spinal anesthesia is not only safe but also more effective than general anesthesia in reducing post operative pain, analgesic requirement, respiratory problems and length of hospital stay.

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