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SPINAL ANESTHESIA A BETTER AND EFFECTIVE ALTERNATIVE TO GENERAL ANEASTHESIA IN SPINE SURGERIES: A PROSPECTIVE OPEN LABEL SINGLE ARM STUDY

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ABSTRACT: INTRODUCTION: In all practical purposes various thoraco lumbar and lumbar surgeries like discectomy, laminectomy and spinal fusion procedures are usually performed under general anesthesia (GA). Our aim of this study is to assess whether spinal anesthesia is a better and effective alternative to general anesthesia in terms of economic advantage and functional recovery with both intra and post-operative hemodynamic stability. **METHODS:** In our study hundred patients with age group 25-45 yrs within the ASA criteria of class I-III were enrolled. All patients were randomly selected based on age, sex, ASA criteria, duration of surgery, heart rate (HR), mean arterial pressure (MAP), blood loss, previous history of risk factors and co morbidities. The severity of postoperative pain based on visual analogue scale (VAS) and use of analgesics post operatively, were recorded. **RESULTS:** There were 41 males and 59 females. The mean age of the patient was 39.28±9.27 yrs. Six patients had hypertension, 11 with diabetes. Patients with ASA Grade I and II and III were 60, 34 and 6 respectively. There were no episodes of air way compromises, 2 patients had spinal anesthesia failures, no incidence of post dural puncture headache, 3 patients had mean blood pressure fluctuations among them, one patient had post-operative paraparesis due to hematoma treated by immediate decompression, and 13 patients had usage of propofol sedation in terms of comfort. The duration of surgery (range) was 77.25±22.44 min (40-120) Severity of postoperative pain after four hours of surgery on VAS was 3.24±0.46. Twenty two patients (22%) required analgesics. Two patients had post-operative vomiting. **CONCLUSIONS:** In our study we have considered that spinal anesthesia for advantages such as less blood loss, intra operative blood pressure and heart rate changes, postoperative pain, quick functional recovery and lower incidence of pulmonary complications. Additionally, during spinal anesthesia patient extremities and chest can be reposition as needed, to avoid nerve injury, brachial plexus palsy or pressure necrosis to either the face or chest wall and finally the most important being an economical advantage and patient and surgeons satisfaction. We showed that spinal anesthesia is better and effective alternative to GA in providing postoperative analgesia and decreasing blood loss with both intra and post-operative hemodynamic stability without increasing adverse side effects.

KEYWORDS: spine surgeries; discectomy; general anaesthesia (GA); spinal anaesthesia (SA); Visual Analogue Scale (VAS)

INTRODUCTION: Surgery on the lower thoracic and lumbar spine can be safely performed under general or regional anesthesia. Patient's satisfaction and the ability to carry out prolonged operations in the prone position without airway compromise are of advantages of using general anesthesia.⁽¹⁻²⁾

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In the clinical experience, that patients who underwent thoraco lumbar and lumbar Spine surgeries with SA have more satisfaction with lower adverse effect compared with those with GA⁽³⁾ The surgical management of a prolapsed lumbar disc, lumbar canal stenosis, various spinal fusion procedures are commonly performed under spinal anaesthesia leading to reduced recovery time and early discharge from the hospital, which also leads to financial considerations in terms of cost. Scott et al showed, pulmonary complications were more common in patients with GA compared with regional anesthesia. Two retrospective studies shown that SA resulted in better outcome compared with GA in patients who underwent spine surgeries.⁽⁴⁻⁵⁾

General anesthesia may be preferred because it is seen in the routine accepted practice, because of greater patient acceptance and the ability to perform longer operations, or because the anesthesiologist feels more comfortable seeing that the airway is secured before placing the patient in the prone position. However, SA has demonstrated to be as good, if not better than GA in terms of pain during the surgery, postoperative pain, functional recovery, patient satisfaction, and hemodynamic stability. This study was conducted to assess the notion that spinal anesthesia can be both safe and efficacious in the treatment of patients undergoing thoraco lumbar and lumbar spinal surgeries.

METHODOLOGY: This is a single Centre, prospective, study conducted by the department of orthopedics and anesthesiology of Narayana Medical College, Andhra Pradesh. Total of 100 patients aged between 25 to 45 years undergoing various spinal surgeries under spinal anesthesia participated in the study. Institutional Ethics Committee approved the study protocol and written informed consent from these patients. Each patient underwent a thorough pre-anesthetic checkup prior to the procedure. Patients who were unwilling, posted for emergency surgeries, any significant medical history, otherwise contraindicated for spinal anesthesia, those allergic to amide local anesthetic or any other drug, ones with a history of drug or alcohol abuse were excluded from the study. Patients with hepatic or renal disease, severe cardiac disease, or bleeding abnormalities that would require a nonstandard anesthetic technique and those undergoing revision surgeries, ASA type 4, were also excluded from study. All procedures were performed by same surgeon and all data were collected, collated and analyzed by an independent observer.

Before the commencement of anesthesia, patients were informed about the procedure. An 18 gauge IV cannula was cited in the non-dominant hand and 500 ml of Ringer's lactate solution was given as a preload after that the patient in the sitting position, with all aseptic precautions spinal needle was inserted in the L₁-L₂ space under local infiltration of 2% lignocaine and epidural space identified by loss of resistance technique. Then 3 ml of bupivacaine 0.5% was given in L1-L2 interspace by using 23G spinal needle with patient in sitting position. After a satisfactory effect had come, surgery was allowed and routine monitoring undertaken. Oxygen was administered by a nasal cannula at 2 L.min⁻¹. The patients were returned to the supine position and as soon as there was clear evidence of subarachnoid block at T₁₂ or above, the patients were turned to the prone position. Before shifting the patients to postoperative ward again pulse and blood pressure were recorded and patients were instructed to report immediately if they have started feeling of pain postoperatively.

VISUAL ANALOGUE SCALE (VAS): A ten cm visual scale was used for assessment of pain post operatively in this study. The patients were asked to grade the severity of their pain using this scale in which the point 10 corresponded with the most extreme pain the patient can imagine and point 0 with no pain at all.

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STATISTICAL ANALYSIS: Data was entered into excel spread sheet 2007 and was presented as mean \pm SD or number (percent). Statistical analysis was performed using Graphpad Prism version-4 USA.

RESULTS: The mean age of the patient was 39.28 ± 9.27 yrs. There were 41 males and 59 females. Six patients had hypertension, 11 suffering with diabetes. Patients with ASA Grade I and II and III were 60, 34 and 6 respectively. There were no episodes of air way compromises, 2 patients had spinal failures, no incidence of post dural puncture headache, 3 patients had mean blood pressure fluctuations among them, one patient had post-operative paraparesis due to hematoma treated by immediate decompression, and patients had usage of propofol sedation in terms of comfort. The duration of surgery (range) was 77.25 ± 22.44 min (40-120) Severity of postoperative pain after four hours of surgery on VAS was 3.24 ± 0.46 . Twenty two patients (22%) required analgesics. Two patients had post-operative vomiting.

DISCUSSION: Traditionally, general anesthesia is used in lumbar surgery; nevertheless, regional anesthesia, either spinal or epidural, has been a successful alternative in spine surgeries. Spinal anesthesia has previously been reported for lumbar spine surgeries and is mentioned in anesthetic textbooks, it is unclear exactly how widely the technique has been practiced. McLain et al in a case-controlled study in 400 patients underwent either spinal anesthesia or general anesthesia for performing lumbar surgeries, showed that SA was as effective as GA⁽⁶⁾ In general, spinal anesthesia has been shown to carry a very low risk of serious complications.

Spinal anesthesia advantages include patients self-positioning, so that they could regulate the respiratory functions and it also has the advantage of decreasing intraoperative bleeding by decreasing peripheral venous pressure. The reduced bleeding reported in previous studies may also be due to relatively fewer episodes of intraoperative hypertension because a spinal anesthetic inhibits surgically induced stress levels to a greater degree than general anesthesia. The reduce blood loss was due to a combination of sympathetic blockade (producing vasodilation and relative hypotension) and lowered intrathoracic pressure experienced when patients are allowed to breath spontaneously, as during procedures when a spinal anesthetic is administered.

In retrospective chart review, Tetzlaff et al investigated the outcomes of a large series of elective lumbar spine surgical procedures which performed under SA or GA. They concluded that SA can consider as an effective alternative to GA for lumbar spine surgery as it had lower incidence of minor complications.⁽⁷⁾ As previous studies showed, SA reduced blood loss for lower limb orthopedic and vascular surgeries compared to GA.⁽⁸⁻¹¹⁾

The decreased blood loss during spinal anesthesia likely contributed to the lower surgical time, and less bleeding would facilitate dissection and result in less time needed to effect hemostasis prior to surgical closure. Reduced rate of bleeding within the wound has been suggested as one factor that may contribute to a shorter surgical time in spinal anesthesia. In addition, although surgeons are interested in spinal anesthesia as a more reliable method, experience shows the prolonged operation performed in the prone position under spinal anesthesia increases the surgeon's stress and anxiety.

Post-operative pain and gastro intestinal dysfunction such as nausea, vomiting, postoperative ileus, constipation, anorexia, are not seen in spinal anesthesia. Local infiltration of xylocaine at wound site at the time of recovery which we normally advise in GA patients is not needed. GA Complications after recovery such as gastro intestinal. Excessive sedation, respiratory depression, poor incidental pain relief can be avoided by spinal anesthesia. Peri operative surgical stress response, peri operative tachycardia, peri operative stroke, post-operative hyperglycaemia and insulin resistance due to per

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operative surgical stress are minimal with spinal anaesthesia. Residual narcotics and muscle relaxants used at the time of recovery which has major role in hypoventilation and apnea are not there in spinal anaesthesia, Intraoperative irritation of sympathetic splanchnic nerves being a cause for paralytic bowel dysfunction can be made worse by activation of sympathetic system by the use of more amounts of opioids in GA.

The increased cardiovascular stability has allowed us to extend patient selection and the surgical procedure. Our findings may be explained by the fact that our spinal anesthesia-induced patients required lower doses of opioid medications.

In this study no neuroaxial opioids were used and our findings may be explained by the facts that our spinal anesthesia technique used no subarachnoid opioids among the anesthetic agents and that these spinal anesthesia patients required lower doses of opioid medication for analgesia during the recovery period.

Patients receiving a spinal anesthetic experienced less postoperative pain. Suggests that the direct block of sensory function by the spinal anesthetic patients even after transfer to the postoperative ICU and for a further period after recovery from motor blockade.

In spite of all these advantages, Spinal anesthesia also has some complications such as headache due to cerebrospinal fluid leakage and meningitis which we fortunately did not experience in our study. It must be remembered that immediately postoperatively it is not possible to assess the patient's neurological status to detect spinal cord injury or evolving cord compression. In our study Post-operative paraparesis was encountered in one patient due to epidural hematoma which was managed by immediate laminectomy and decompression. Urinary retention has also been shown to be associated more with spinal rather than general anesthesia.

Although anesthesiologists are interested in spinal anesthesia as a more reliable method, experience shows the prolonged operations performed in the prone position under spinal anesthesia increases anesthesiologist's stress. Especially, the managing an apneic patient, providing an airway access and placing an endotracheal tube in the prone position are difficult.

In conclusion, spinal anesthesia is a suitable alternative to general anesthesia in the care of patients undergoing lumbar and thoraco lumbar spine surgeries.

CONCLUSIONS: Our study showed that SA can be considered as an effective alternative to GA in providing postoperative analgesia and better perioperative hemodynamic stability without increasing adverse side effects.

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Age (yrs)	39.28±9.27
Gender (M/F)	41/59
ASA Criterion	Type-I-68 Type-II-22 Type-III-10
Diagnosis	Disectomy:58 Microdesectomy:22 De compressive laminectomy:8 Spodylolisthesis: 2 Thoracolumbar and lumbar injuries:7 Potts spine:3
Hypertension	6
Diabetes	11
Duration of surgery (Range) (min)	77.25±22.44 (40-120)
Severity of postoperative pain after four hours of surgery on VAS	3.24±2.12
Consumption of analgesics	22 (22%)
Spinal Failures	6
Episodes of airway compromise	Nil
Post-operative dural puncture headache	4
Mean blood pressure fluctuations	3
Post-operative paraparesis due to haematoma	1
Usage of propofol sedation	5
Post-operative vomiting	2
Volume of blood loss (mL)	124.82±82.64

Table-1 Patient Clinical Characteristics undergoing various spinal surgeries under spinal anesthesia

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