Comparison of Straight Versus Flexed Back in Combined Spinal Epidural Anesthesia for Gynecological Procedure

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ABSTRACT
The success of subarachnoid or epidural anesthesia is influenced by the quality of patient’s anatomical landmarks, the adequacy of patient positioning, and the provider’s level of experience. Incorrect posture resulting in multiple attempts, cause patient discomfort (thus rendering the technique unpleasant to the patient), post-dural puncture headache, and trauma to neural structures. Indeed, there are patients who are unable to adopt the ideal flexed posture due to arthritis, spondylosis, or pain due to limb trauma. It may be uncomfortable for some patients to assume a flexed posture. Hence, we worked on the above issues to determine the patient’s preferred posture and success of block performed in flexed posture and straight posture. Effect on hemodynamic parameters, attempts required, number of patients requiring manipulation of needle, number of patients requiring epidural supplementation. CSEA can be performed with equal ease in a seated patient regardless of the posture of the back being in a flexed or in a straight posture. CSEA block combines the rapidity, density and reliability of spinal block with the ability of continuous epidural to extend the duration of analgesia. It has been used in thousands of patients without any reports of major problems.

KEY WORDS: anesthesia, combined spinal-epidural, position, sitting flexed, sitting straight

INTRODUCTION:
Soresi[1] in 1937 was first described the combined spinal epidural anesthesia (CSEA) in the United States and it was first performed by Curelaru[2] in 1979. It has been used as both double[3] and single[4] inter-space technique. The CSEA technique has many advantages over continuous epidural or spinal anesthesia alone which includes a reduction in drug dosage, the ability to eliminate motor blockade and to achieve highly selective sensory blockade and optimize analgesia. It has been popular over the last 15 years and being used successfully in gynecologic surgeries, as labor analgesia, for cesarean section, general surgical, orthopedic, urologic procedures. CSEA is being increasingly recognized as another important addition to the armamentarium of the anesthesiologist. For CSEA sitting or a lateral position, patients place with their back flexed. Flexed back is considered necessary because of widening of the interspinous space. It may be uncomfortable for some patients to assume a flexed posture. Straight back is a suboptimal posture to perform spinal block. There are only few studies carried out to compare the success of lumbar puncture associated with these postures, it is difficult to predict the outcome of each.

In this prospective, observational study, we worked on the above issues to determine the patient’s preferred posture and success of block performed in flexed posture and straight posture. Effect on hemodynamic parameters, attempts required, number of patients requiring manipulation of needle, number of patients requiring epidural supplementation. Post op complications if any.

MATERIALS AND METHODS:
After obtaining approval from the Ethical Committee of College and written informed consent from patients, 60 adult patients of the age group of
20-60 years belonging to ASA grade 1 and 2, scheduled for gynecological surgeries like total abdominal hysterectomy, vaginal hysterectomy, oophorectomy, laparoscopic procedures, reconstructive gynecological procedures and traumatic perineal repair under combined spinal epidural anesthesia (CSEA) were included in the study. Patients with anatomical spinal deformity, previous back surgery, neurological disease, coagulation disorders, local infection and unstable hemodynamic were excluded from the study.

Combined spinal epidural anesthesia (CSEA) block was performed in the sitting position. Patients were divided into two groups of 30 patients each based on a computer-generated randomization system. Sitting position with straight spine (SS) and sitting position with flexed spine (SF). During the pre-anesthetic meeting on the evening before surgery, patients were explained about the proposed postures for the procedure according to the randomization table.

Patients were pre-medicated with tablet alprazolam 0.5 mg the night before surgery. Preloading was done with 10 ml/kg of Ringers lactate solution through IV cannula before CSEA. After reaching the operation theatre, baseline recordings of pulse, non-invasive blood pressure, electrocardiogram, and oxygen saturation were monitored and patients were appropriately positioned according to the groups allocated. An assistant helped in positioning of the patients. For the sitting position, the legs were placed over the edge of the operating table and the feet supported, a pillow was placed on patients lap, and the arms wrapped around the pillow, resting on the flexed lower extremity.

The procedure was performed under all aseptic precaution at L3-4 intervertebral space after local infiltration of 2% lignocaine by one of the consultant having more than three years of experience of giving CSEA. The technique used for CSEA is single space dual needle technique (SDT). The primary endpoint is correct epidural catheter and spinal needle placement. The combined spinal epidural CSEA performed with 18 G Touhy needle in the epidural space using the loss of resistance technique. Hanging drop technique was used for identification of epidural space. Once the epidural space was identified, the epidural catheter (18G, 0.45 mm) was threaded in the cephalad direction to lie 4-5 cm inside the epidural space. Then, a test dose containing 2 ml of 2% xylocaine with 1:200,000 adrenaline was given epidurally to check for any inadvertent vascular placement recognized by tachycardia or subdural or intrathecal placement recognized by increasing motor blockade. Spinal needle of 25 G was used for spinal anesthesia and after getting free flow of the cerebrospinal fluid 3.5 ml of 0.5% bupivacaine heavy was injected intrathecally, after which the catheter was securely fixed. Immediately following administration of local anesthetic, patients were positioned supine and adequacy of blockade was confirmed after 10 min.

The sensory block was tested by the loss of sensation to cotton wool touch. Motor blockade was assessed by modified Bromage scale (0 = no motor paralysis; 1 = unable to raise extended legs but able to flex knee and ankles; 2 = unable to raise extended legs and flex the knees but able to move feet; 3 = not able to flex ankles or feet). The number of patients requiring epidural supplementation was also recorded. If the sensory block level up to T6 dermatome level was not reached within 15 min, 5 ml of 0.25% plain bupivacaine was injected epidurally over 1-2 min. The time taken from the intrathecal injection to sensory blockade up to T6 dermatome was recorded. Intraoperative hemodynamic changes were recorded every 5 min for first half an hour and then every 10 min till the end of surgery. Any fall in systolic blood pressure > 30% of the baseline or SBP < 90 mm Hg during intraoperative period was labeled as hypotension and corrected by giving vasopressors.

The following parameters will be recorded for data analysis: Overall success, attempts required, number of patients requiring manipulation, epidural supplementation required, and hemodynamic changes. Other post-operative complications like headache and backache noted by the performer after the operation. The results obtained from the study were statistically analyzed using Chi-square test for categorical data using IBM SPSS version 20 (SPSS 20.0, Rel. 16.0.2007, Chicago: SPSS Inc.). A p value of <0.05 was considered significant.

RESULTS:

In this randomized prospective observational study 60 patients were grouped into two groups, Graph 1 depicts the age of patients and table 2 depicts the ASA grading of the patients recruited. The two groups were found to be statistically comparable.
Graph 1: Showing the age distribution between SF and SS groups.

Table 1: Showing BMI distribution in different age groups

<table>
<thead>
<tr>
<th>Age</th>
<th>SF</th>
<th>SS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BMI (Kg/ M²)</td>
<td>BMI (Kg/ M²)</td>
</tr>
<tr>
<td></td>
<td>(mean±SD)</td>
<td>(mean±SD)</td>
</tr>
<tr>
<td>18-29</td>
<td>22.9±2.57</td>
<td>23.9±2.22</td>
</tr>
<tr>
<td>30-49</td>
<td>23.6±1.47</td>
<td>22.8±2.54</td>
</tr>
<tr>
<td>50-60</td>
<td>22.7±2.56</td>
<td>23.3±1.97</td>
</tr>
</tbody>
</table>

Table 2: Showing ASA Grading in SF and SS groups.

<table>
<thead>
<tr>
<th>ASA Grading</th>
<th>Posture for CSEA</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sitting Flexed (SF)</td>
<td>Straight Sitting (SS)</td>
</tr>
<tr>
<td>ASA Grade I</td>
<td>14(49%)</td>
<td>15(50%)</td>
</tr>
<tr>
<td>ASA Grade II</td>
<td>16(51%)</td>
<td>15(50%)</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>30</td>
</tr>
</tbody>
</table>

p value = 0.5 (not significant)

Table 3: Showing number of attempts required.

<table>
<thead>
<tr>
<th>Attempt</th>
<th>Posture For CSEA</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sitting Flexed (SF)</td>
<td>Straight Sitting (SS)</td>
</tr>
<tr>
<td>Single attempt</td>
<td>29(89%)</td>
<td>18(54%)</td>
</tr>
<tr>
<td>Second attempt</td>
<td>1(11%)</td>
<td>12(36%)</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>30</td>
</tr>
</tbody>
</table>

p value 0.001(Significant)

Table 4: Showing Epidural Supplementation in SF and SS groups.

<table>
<thead>
<tr>
<th>Epidural Supplementation</th>
<th>Posture for CSEA</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sitting Flexed (SF)</td>
<td>Straight Sitting (SS)</td>
</tr>
<tr>
<td>Require</td>
<td>1(11%)</td>
<td>5(15%)</td>
</tr>
<tr>
<td>Not required</td>
<td>29(89%)</td>
<td>25(75%)</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>30</td>
</tr>
</tbody>
</table>

p value 0.097 (not significant)

The $p$-value=0.34 (not significant)

Intraoperative hemodynamics changes (heart rate and SBP) are shown in (Graph 2, Graph 3 & 4).

The changes in the heart-rate follow the same trend without significant difference (Graph 3) However, SBP decreased significantly ($p = 0.001$) to a minimum by 10min in both groups and thereafter, increased slowly towards the baseline although the differences remain significant up to the50 min observation. The SBP there were no significant differences between Group SS and Group SF ($t = 0.03; p = 0.98$).

Patients preferred straight posture more compare to flexed one. As experienced by patients flexed posture (SF) often associated with discomfort to neck, the position given by assistant in which patients were asked to bend forward neck and arch out back maximally, flexed back is considered mandatory because of widening of the interspinous space, discomfort to neck can be prevented by flexing the back and keeping the neck in neutral position, and pain over abdomen as well as in knee joint. It may be perceived that an achieved flex posture of longer duration is more complex and uncomfortable than the straight posture. Because of this, probably most patients preferred the straight posture.

**DISCUSSION:**

In our study Comparison of Straight versus flexed back in combine spinal epidural anesthesia for Gynecological procedure we observed that the overall success rate is 100%in both the groups i.e. sitting flexed(SF) and sitting straight(SS).First attempt success rate is 89% in sitting flexed group compared to 54% in sitting straight group. First attempt success rate in our study are superior to the reported success rate of 61.5% in the adult population.[7] In another
This may be due to strict exclusion criteria plus experienced person performing the procedure.

Number of attempts required in sitting straight group is significantly higher as compared to sitting flexed this may be due to midline assessment of spinous process is difficult with straight back posture. Simultaneously the requirements of epidural supplementation is more 16.7% with sitting straight (SS) group as compared to 11% of Sitting flexed.

Spinal block success rate with the 25 G spinal Quincke spinal needle as high as 97% in adults and 100% in the pediatric population. In the sitting state, significantly more number of patients with straight back position (SS) required needle redirections than patients with flexed back (SF).

In our study posture preferred by most of the patients is straight. As told by patients, flex posture was often associated with discomfort to neck. It may be perceived that an achieved flex posture of longer duration is more complex and uncomfortable than the straight posture. Because of this, probably most patients preferred the straight posture.

As there are only few studies which shows different aspects of positional parameters associated with combined spinal epidural anaesthesia, our study has studied the different aspects of the technical parameters associated with CSEA performed on patients with different postures. In our study we have found that in spite of occurrence of negotiable technical difficulties the overall success is similar in both groups whether it may be straight posture or flex posture. But still we are of the opinion that we should start training with the conventional posture to new students, but experienced operators may not insist on unnecessary flex posture in easy patients.

This study was carried out only to find out the success of CSEA in patients with suboptimal posture or in patients who cannot have their back adequately flexed for spinal anesthesia like spondylosis, arthritis, limb trauma.

Though we are not challenging the superiority...
of the flex posture, but our idea was to find out the feasibility of spinal block in patients with suboptimal postures. As we included patients with BMI<30, results may differ in patients with higher BMI.

CONCLUSION:
CSEA can be performed with equal ease in a seated patient regardless of the posture of the back being in a flexed or in a straight posture, provided the landmarks are clear. Most of the patients prefer straight back to the flexed back posture because of the discomfort associated with the latter state.

REFERENCES:

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