ORIGINAL ARTICLE

The effect of early ambulation on the incidence of neurological complication after spinal anesthesia with lidocaine

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Background: Transient neurological symptoms (TNS), was described in patients recovering from spinal anesthesia with lidocaine but its etiology remains unknown this study was evaluated the influence of ambulation time on the occurrence of TNSs after spinal anesthesia with lidocaine 5%. **Materials and Methods:** This randomized clinical trial was conducted on 60 patients with American Society of Anesthesiologists Grades I and II, who were candidates for lower abdominal surgery in supine or lithotomy positions. Patients were randomly divided into early ambulation group (Group A) who were asked to start walking as soon as the anesthesia was diminished or to the late ambulation group (Group B) who walked after at least 12 h bedridden. Participants were contacted 2 days after spinal anesthesia to assess any type of pain at surgical or anesthesia injection site, muscle weakness, fatigue, vertigo, nausea, vomiting, headache, and difficult urination or defecation. **Results:** Four subjects (13.3%) in Group A and two patients (6.7%) in Group B had pain at anesthesia injection site (P = 0.019). Fourteen patients in Group A (46.7%) and six patients in Group B (20%) had post-dural puncture headache (P = 0.014). Participants in Group B reported difficult urination more than Group A (P = 0.002). there were not statistically significant differences between two groups regarding frequency of fatigue, muscle weakness, vertigo, nausea, vomiting, difficult defecation, paresthesia, and the mean of visual analogue scale at the surgical site. **Conclusion:** Early ambulation after spinal anesthesia with lidocaine did not increase the risk of neurologic complication.

Key words: Early ambulation, lidocaine, neurologic complication, spinal anesthesia

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INTRODUCTION

Spinal anesthesia has been considered an economical, frequent, safe, convenient, and effective method which provides rapid and reliable anesthesia. Various local anesthetic drugs often used for spinal anesthesia included lidocaine, bupivacaine, levobupivacaine, and ropivacaine.

Lidocaine was introduced in 1948 and has in the last 60 years been regarded as one of the most safe and effective local anesthetic drug used for spinal anesthesia.[1] Hence, lidocaine have been used for many years due to their short duration of action and is extremely associated with improvement of spinal anesthesia.

In 1993, the first reports of a new adverse effect defined as transient neurological symptoms (TNS), was described in patients recovering from spinal anesthesia with lidocaine. The symptoms consist of pain initiating in the gluteal region and radiating to both lower extremities that can emerge from a few hours until nearly 24 h after a full recovery from ordinary spinal anesthesia especially in patients who anesthetized with lidocaine[2]

In recent studies, the incidence of TNS varies from 4% to 37% although no neurological findings or sequelae were documented.[3,4] The etiology of TNS remains unknown, however possible causes of TNS include patient positioning such as lithotomy position, local anesthetic toxicity, needle trauma, neural ischemia, pooling of local anesthetics secondary to small gauge pencil-point needles, muscle spasm, myofascial trigger points, early mobilization.[2,5-7] It is believed that intrathecal administration of local anesthetics increase glutamate concentration in cerebrospinal fluid and histopathologic changes of motor neurons in the lumbar spinal cord, suggesting damage of dorsal and ventral roots. The pain can be treated successfully with paracetamol, and/or dextropropoxyphene or nonsteroidal anti-inflammatory drugs or other analgesics of similar potency, although transient neurologic syndrome is benign and self-limited that requires only conservative therapy and usually resolves within a couple of days without intervention.[8,9]

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As mention earlier, it has been proposed that early ambulation after spinal anesthesia contributes to the development of TNS. Therefore, the purpose of this study was to evaluate the influence of ambulation time on the occurrence of TNSs after spinal anesthesia with lidocaine 5%.

MATERIALS AND METHODS

After obtaining approval of the Ethics Committee for the study design and protocol (project number 385220), and obtaining written informed consent from patients, 60 Patients of American Society of Anesthesiologists Grades I and II between the ages of 18 and 45 years old, candidate of elective minor lower abdomen surgeries with no contraindication for spinal anesthesia were enrolled for this study [Figure 1]. This prospective randomized clinical trial was done over a period of 6 months (April-October 2013). The patients with neuromuscular disease, acute or chronic back pain, spinal canal stenosis, vertebral abnormality, surgery lasting more than 1-h, and major bleeding during operation were excluded from the study.

Standard monitors including electrocardiography, noninvasive blood pressure measurement, and pulse oximetry were used. Preoperatively, an infusion of 500cc lactated Ringer's solution was administered. Spinal puncture was performed at the L3-L4 interspace using a 23-G Quincke needle with patients in sitting position by the same anesthesiologist. After confirming free flow of clear cerebrospinal fluid, 1.5cc lidocaine 5% (Orion Corporation, Espoo, Finland) was injected over approximately 60 s. After the intrathecal injection, the patient was returned to the supine position with a slight head-up, and received 1-2 mg midazolam 1-min after lidocaine administration.

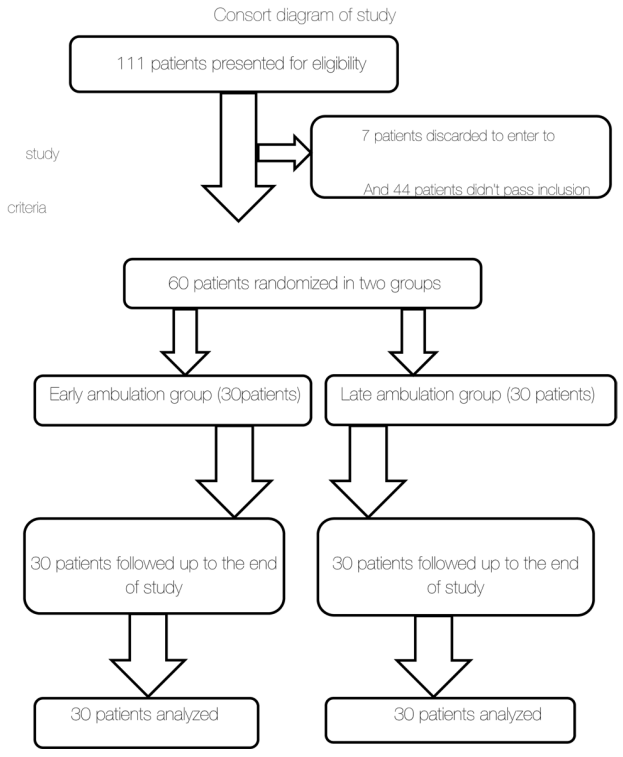

Figure 1: Consort diagram of study

On arrival in the recovery rooms, patients were randomly assigned into two groups: (Group A) early ambulation group, ambulation was allowed as early as possible after regression of spinal block and in the (Group B) late ambulation group, patients remained in bed for approximately 12 h after the block.

Two days after surgery patients were contacted by a blinded observer and interviewed of TNS using a standardized questionnaire. The patients were asked about symptoms of muscle weakness, fatigue, vertigo, nausea, vomiting, headache, and difficult urination or defecation, pain at anesthesia injection site and at the operation area and asked to grade the complaints after a verbal analog score from 0 (no pain) to 10 (worst pain imaginable).[10]

Statistical Package for Social Science version 20 (IBM Corporation, Chicago, USA) for windows were used for analyzes of data. Chi-square analysis was used to determine significance of the qualitative variable (sex, headache, muscle weakness, fatigue, vertigo, nausea, vomiting, headache, and difficult urination or defecation). Student's *t*-test was used to compare two groups' age, height, weight, and the mean of visual analog scale (VAS). Statistical significance was defined as $P < 0.05$.

To detect a difference between two groups, at the 95% level of significance ($\alpha = 0.05$), with 80% power ($\beta = 0.2$), 30 patients were assigned to each group.

RESULTS

A total of 60 patients, consisting of 41 women and 19 men, were included in this study. Demographic characteristics and important risk factors, especially position of the patients during the surgery, age, and sex were not significantly different between the two groups [Table 1]. There were no problems with the anesthetic technique, no bleeding through the needle or paresthesia was observed. There was difference between the two groups regarding VAS scores of pain at injection site ($P = 0.019$). Four subjects (13.3%) in Group A and two patients (6.7%) in Group B had pain at anesthesia injection site. Fourteen patients in Group A (46.7%) and six patients in Group B (20%) had post-dural puncture headache, the differences was statically significant ($P = 0.014$) participants in Group B reported difficult urination more than Group A ($P = 0.002$). There were not statically significant differences between two groups

regarding frequency of fatigue, muscle weakness, vertigo, nausea, vomiting, difficult defecation, paresthesia, and the mean of VAS at surgical site [Table 2].

DISCUSSION

The main aim of this study was to evaluate the effect of early ambulation (patients ambulated before 12 h) on occurrence of TNSs after spinal anesthesia by lidocaine 5%. It clarified that complications such as headache, pain at injection site and paresthesia were more prevalent in patients mobilize early after spinal anesthesia. We also found that patients walked after 12 h recumbency had more difficulty in urination than those ambulated before 12 h.

The lithotomy position, ambulatory surgical status, arthroscopic knee surgery, and obesity have all been determined to be important predictors of the development of TNS.[1,3,7,11]

Few studies have investigated the effect of patients' bed rest duration on neurological complication after spinal anesthesia.[12-15] Lindh *et al*. assessed the effect of early ambulation on transient lumbar pain (TLP) after spinal anesthesia. The participants were 107 patients scheduled for inguinal hernia repair under spinal anesthesia with hyperbaric lidocaine. The subjects were randomized to either early (as early as possible after spinal block regression) or late ambulation (bedridden for more than 12 h). They concluded that early ambulation did not increase the risk of TLP.[16] Silvanto *et al*. studied the influence of ambulation time on the occurrence of TNSs after spinal anesthesia with 2% plain lidocaine for knee arthroscopy. The results showed that early ambulation was not a risk factor for TNS.[17] Furthermore, Cramer study revealed that there was no correlation between the incidence of TNS and the time of ambulation after spinal anesthesia with lidocaine.[18] On the other side, the epidemiological study conducted by Freedman *et al*. found ambulatory status a risk factor for TNSs.[7] However, confounding factors were not controlled because of study design. Our study had some limitation. First, the relatively low sample size that made it difficult to generalize our results. Second, we studied the patients with different chief complaint and disease condition that might affect the conclusion.

Table 1: Patients characteristics and surgical data

Variable	Early mobilization (*n* = 30) (%)	Late mobilization group (*n* = 30) (%)	*P*
Age (years)	42±15	43±12	NS
Weight (kg)	75±10	74±16	NS
Height (cm)	170±2	168±4	NS
Sex (female/male)	21 (70)/9 (30)	20 (67)/10 (33)	NS
ASA (I/II)	18/12	21/9	NS
Position (supine/lithotomy)	17/13	22/11	NS

The data are mean ± SD or absolute numbers with relative frequencies. NS = Not significant; ASA = American society of anesthesiologists; SD = Standard deviation

Table 2: The prevalence of symptom of two groups

Symptoms	Group A (*n* = 30) (%)	Group B (*n* = 30) (%)	*P*
Fatigue	12 (40)	8 (26.7)	0.14
Vertigo	8 (26.7)	8 (26.7)	0.5
Nausea/vomiting	8 (26.7)	4 (13.3)	0.2
Headache	14 (46.7)	6 (20)	0.014
Difficult defecation	2 (6.7)	2 (6.7)	0.5
Difficult urination	4 (13.3)	14 (46.7)	0.002
Muscle weakness	2 (6.7)	2 (6.7)	0.5
Pain at injection site	4 (13.3)	2 (6.7)	0.019
Pain at surgical site	6 (53.3)	16 (53.3)	0.5
Paresthesia	10 (33.3)	2 (6.7)	0.005

The data are absolute numbers with relative frequencies

CONCLUSION

This prospective, randomized study has shown that early ambulation does not seem to increase the risk of developing TNSs after spinal anesthesia with lidocaine 5%, in patients undergoing lower abdomen surgery. Further studies on larger sample size and other types of patient population to confirm our results are recommended.

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AUTHOR'S CONTRIBUTION

RT contributed in the conception of the work, conducting the study, acquisition of data, revising the draft, approval of the final version of the manuscript, and agreed for all aspects of the work.

MG contributed in the conception of the work, analysis and interpretation of data, drafting and revising the draft, approval of the final version of the manuscript, and agreed for all aspects of the work.

RA acquisition of data, revising the draft, approval of the final version of the manuscript, and agreed for all aspects of the work.

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