

# TRANSIENT NEUROLOGICAL SYMPTOMS FOLLOWING SPINAL ANESTHESIA FOR CESAREAN SECTION

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## Abstract

### *Background*

Transient neurological symptoms (TNS) are defined as symmetrical bilateral pain in the back or buttocks or pain radiating to the lower extremities after recovery from spinal anesthesia. About 80-85% of cesarean sections are performed under spinal anesthesia in our centre.

Our aim was to determine the incidence of TNS, risk factors and outcome of management in pregnant women undergoing cesarean section.

### *Patients and Methods*

Approval was obtained from the hospital ethic's committee, and consent from the patients. ASA 1 and 2 pregnant women undergoing cesarean section under spinal anesthesia formed the subjects of this prospective study. They were evaluated and pre-medicated by the attending anesthetists. Spinal anesthesia was performed at the L2-3 or L3-4 interspaces, using a 25G Quincke or 25G pencil point spinal needle with 0.5% heavy bupivacaine. The investigators interviewed the patients in the ward for three consecutive days, in order to identify those that developed TNS.

### *Results*

One hundred and twenty consecutive patients were studied. TNS were documented in 12 (10%) patients. Backache was recorded in 8 patients (6.6%), pain in the thighs in 2 (1.7%) and pain in the buttocks in 2 (1.7%). Onset time of symptoms was recorded as 6-12 hrs in 5 (4.2%) patients, 12-24 hrs in 5 (4.2%) and 24-48 hrs in 2 (1.6%). The patients that developed TNS were managed accordingly with satisfactory outcome.

### *Conclusion*

A follow-up for all patients that receive spinal anesthesia for cesarean section should constitute a standard practice.

**Key words:** Anesthetic technique: spinal anesthesia, anesthetics-local: bupivacaine, hyperbaric, surgery: cesarean section, complications: neurological.

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## Introduction

Transient neurological symptoms (TNS) are defined as symmetrical bilateral pain in the back or buttocks or pain radiating to the lower extremities after recovery from spinal anesthesia<sup>1</sup>. The first report of TNS with 5% lignocaine by Schneider and colleagues in 1993<sup>1</sup> was confirmed later by several other studies<sup>2-4</sup>. It is thought that a localized local anesthetic toxic effect may be an important contributing factor in the development of transient neurological symptoms after spinal anesthesia with concentrated solutions<sup>5,6</sup>. The occurrence of this complication is rare after the use of 0.5% bupivacaine for spinal anesthesia<sup>7,8</sup>. Hiller et al reported 3% incidence of TNS following the use of 0.5% bupivacaine against 30% after the use of mepivacaine<sup>9</sup>.

The aim of our study was to determine the incidence of transient neurological symptoms after spinal anesthesia for cesarean section, the risk factors and outcome of management.

## Patients and Methods

This was a prospective study carried out from February to October, 2007 after approval was obtained from the institutional Ethic's committee, and consent from the patients. One hundred and twenty consecutive, ASA 1 and 2 pregnant women who presented for cesarean section formed the subjects of study. Exclusion criteria were ASA 3 and above, patients with neurological diseases, presence of back ache and pain in the buttocks and legs (as a result of pressure from the fetal presentation). They were all seen, reviewed and pre-medicated by the anesthetists in attendance.

Premedication consisted of 30 ml of mixture magnesium trisilicate, intravenous metoclopramide, 10 mg and 50 mg Ranitidine.

In the theatre, multiparameter monitor was attached, after obtaining baseline vital signs (pulse rate, blood pressure and oxygen saturation), intravenous access was established with 18 gauge cannulae. Preloading of the circulation was achieved with 10-15 ml of 0.9% normal saline.

Spinal anesthesia was performed at the L2-3 or L3-4 interspace with the patient in the sitting position,

using a 25G Quincke spinal needle or 25G pencil point (SIMS Portex). 0.5% heavy bupivacaine, 2.2-2.5 ml was injected and patient repositioned supine with a 15° left lateral tilt and slight head up tilt. Vital signs were continuously monitored during the operation. After the delivery of the fetuses, the patients were repositioned supine. Intraoperative complications, such as hypotension, bradycardia, shivering were managed accordingly.

Standard questionnaire was used to document patients' characteristics, intraoperative clinical data, duration of anesthesia and surgery recovery room and complications in the ward, attempts at lumbar puncture. The type of spinal needle used was not by choice but was determined by what was available at the time of study.

The investigators were anesthetists not primarily responsible for the conduct of the anesthesia. They interviewed the patients in the ward 24 hrs postoperatively, again at 48 hrs and 72 hrs postoperatively to identify those patients that developed transient neurological symptoms, the location of pain, and onset of pain after recovery of block, duration of pain after recovery of block, management and its outcome.

## Results

One hundred and twenty patients were recruited in the study. Table 1 showed their demographic characteristics. Twelve (10%) patients complained of transient neurological symptoms. Variables of spinal anesthesia are shown in Table 2. Quincke spinal needle was used in 55 (45.8%) patients and pencil point in 65 (54.2%) patients. The mean dose of bupivacaine (ml) was 2.468 (0.29). The mean duration of surgery in minutes was 59.92 (21.86). Block height was T2-T10 with T6 as median range.

*Table 1*  
*Demographic Characteristics*  
Mean/Sd

	Mean/Sd
Age (yrs)	33.08 (3.94)
Weight (kg)	76.5 (9.76)
Height (cm)	160.172 (3.49)

Table 2  
Variables of Spinal Anaesthesia

Needle type/size	No of patients
Quincke/25	55
Pencil point/ 25	65
Mean duration of Surgery (minutes)	-59.92 (21.86)
Mean Volume of 0.5% Heavy bupivacaine (mls)	-2.468 (0.29)

Two attempts were made in 9 (75%) patients. Three attempts were made in two (16.7%) patients that reported severe pain. Ten (67%) out of the twelve patients complained of mild to moderate pain while 2 (33%) complained of severe pain.

Table 3 shows onset of pain after recovery of block while Table 4 shows sites of symptoms.

Table 3  
Onset of pain after recovery of block (hr)

6-12 hrs-5 (41.7%) patients
12-24 hrs-5 (41.7%)
24-48 hrs-2 (16.6%)

Table 4  
Location of pain

Buttocks-2 (16.7%)
Thighs-2 (16.7%)
Back ache-8 (66.6%)
Total-12 (100%)

Quincke needle was used in ten (83%) of the patients that complained of symptoms against 2 (17%) in the pencil point group. The difference was considered statistically significant using Fisher's exact test  $P=0.0116$ , 95% CI: 1.462 to 33.513. With regard to the grade of the anesthetists who performed the block, 11 (91.7%) were done by residents (registrar and senior registrars) while one (8.3%) was performed by a consultant. The difference was statistically significant,  $P=0.0253$ , 95% CI: 0.01009 to 0.8192. The duration of pain in the thighs and back lasted for 24-72 hours and the pain in the buttocks lasted for 96 hrs.

The risk factors for the development of TNS were the use of cutting spinal needle (Quincke),

number of attempts at lumbar puncture and the grade of anesthetist. Six (50%) patients were managed with non-steroidal anti-inflammatory drug, Ketorolac 30 mg 6 hourly while 3 (25%) were given opioid, tramadol hydrochloride 100mg, 8 hourly. Both drugs were administered intramuscularly. Three (25%) patients required no analgesics. The outcome of management was satisfactory.

## Discussion

Although spinal anesthesia offers many advantages for cesarean section, it is not without complications, including transient neurological deficits. Previous control trials have reported a low incidence of 0-8% TNS in women undergoing cesarean section<sup>10</sup> or postpartum tubal ligation (3%)<sup>11</sup>. Our study showed a slightly higher incidence of 10% TNS. In Great Britain, a number of high profile legal cases in the 1950s concerning complications of neuraxial techniques led to its decline for more than two decades<sup>12</sup>. Albert Woolley and Cecil Roe were healthy, middle aged men who became paraplegic after spinal anesthesia for minor surgery in 1947 in Britain. Phenol, in which the ampoules of local anesthetic had been immersed, had contaminated the local anesthetic through invisible cracks<sup>13</sup>.

Transient neurological symptoms were also described as conditions characterized by back pain radiating to the lower extremities without sensory or motor deficits, which resolved spontaneously<sup>14,15</sup>. Injury may result from direct needle trauma to nervous tissues at the level of the spinal cord, nerve root or peripheral nerve, from spinal cord ischemia, from accidental injection of neurotoxic drugs or chemicals, from introduction of bacteria into the subarachnoid or epidural space or rarely from epidural hematoma<sup>16-18</sup> and positioning (lithotomy). Avidan and colleagues, reported details of magnetic resonance imaging of a patient with TNS after spinal lidocaine. It indicated a local inflammatory process as the possible etiology for the symptoms, and concluded that TNS in some cases results in permanent neurological deficit<sup>19</sup>. In many cases, deficits are the results of administration of neurotoxic doses of local anesthetic or result from trauma after multiple attempts necessary to establish a technically difficult block<sup>10,20</sup>.

The risk factors for the development of TNS, identified in this study were the use of cutting spinal needle (Quincke), number of attempts at lumbar puncture and the grade of anesthetists who performed the block. A greater occurrence of neurological symptoms was associated with the use of cutting spinal needles. Three attempts were made in two patients that reported severe pain. Our findings showed that spinal anesthesia was performed by a registrar grade level in eight patients that complained of TNS. Although neurological complications may be secondary to the labour and delivery process, the neural block is usually considered causative until proven otherwise<sup>21</sup>.

Auroy et al prospectively monitored neurologic complications in more than 103,000 regional anesthesia, all deficits were present within 48 hours after anesthesia. Most were transient with recovery occurring between two days and three months<sup>16</sup>.

In a similar study involving 123,000 regional anesthetics in parturients, 46 cases of single nerve root neuropathies were reported (3.7/10,000) with complete recovery in all patients by three months<sup>22</sup>. Most of our patients reported an onset time of 12 to 24 hours after cesarean section and recovery lasted for two to four days. This is in agreement with previous study<sup>16</sup>.

There is a suggestion that certain patients may have a predisposition to developing neurological deficit after spinal anesthesia<sup>23</sup>. It is best to avoid the technique in such cases as recommended nearly half a

century ago<sup>24</sup>.

Current therapeutic options include opioids, non-steroidal anti-inflammatory drugs (NSAID), muscle relaxants and, symptomatic therapy<sup>25</sup>. One of the most successful classes of drugs for treating TNS has been the NSAID. Ibuprofen, naproxen and ketorolac have all been used successfully. Significant muscle spasm can be relieved with muscle relaxant, such as cyclobenzaprine. Symptomatic therapy, including leg elevation on pillows and heating pads, may provide an additional measure of patients' comfort<sup>25</sup>. The patients that complained of transient neurological symptoms in our study were treated with NSAID and opioid with satisfactory outcome.

## Conclusion

A follow-up for all patients that receive spinal anesthesia for cesarean section should constitute a standard practice in order to identify and manage associated complications.

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