

## Post-spinal Headache after Caesarean Section – Effect of Approach Into Dura-Arachnoid Sac

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### Summary:

**Introduction :** Spinal anaesthesia is the technique of choice for caesarian section. But post-spinal headache (PSH) is still a 'headache' for the anaesthesiologist even after using modern spinocaine needles. **Objective :** This study was performed to compare the incidence of PSH between midline and lateral approach when caesarian sections were done by spinal anaesthesia. **Methods :** After ethical clearance this study was done in Chittagong Medical College Hospital. Two hundred pregnant women of American Society of Anesthesiologists (ASA) physical status I & II who underwent caesarian section were included and randomized into 2 groups. After informed

consent spinal needle were inserted by midline approach in Group A patients and by lateral approach in Group B patients. After appearance of free flow of CSF 0.5% hyperbaric bupivacaine 10 mg was injected to each patient. PSH and other complications were evaluated. **Results :** Incidence of PSH was significantly higher in Group A patients. **Conclusion :** Lateral approach during spinal anaesthesia is better than midline approach in preventing PSH.

**Key words :** Lateral approach, Post spinal headache, Spinal anaesthesia.

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### Introduction

Popularity of spinal anaesthesia for caesarean section is increasing day by day due to better understanding of the physiological changes associated with spinal anaesthesia and proper appreciation of its advantages and limitations.<sup>1,2</sup> Spinal anaesthesia has a very rapid onset and provides a dense neural block which can produce highly effective analgesia during operation and may decrease patient morbidity after surgery, moreover, failures are very infrequent.<sup>3,4</sup> But it has also some disadvantages and side effects.

Among the side effects post spinal headache (PSH) is most common and also disgusting for the patients and embarrassing for the anaesthesiologists.<sup>3,4</sup> It could

increase the hospital stay, workload of physicians, warrant additional investigations that required significant financial repercussions potentially.<sup>5</sup> Many factors are reported to influence the incidence of PSH were : age, sex, pregnancy, previous history of post spinal headache, needle size, design of the needle tip, bevel orientation to the dural fibres, lumbar puncture attempts, type of local anesthetic agent and clinical experience of the anesthetist.<sup>6-12</sup>

Actual mechanism of post-spinal headache is unclear but loss of CSF through dural puncture site and lowering of CSF pressure still regarded as the main cause. Dural punctures causes uncontrollable CSF loss until pressure equilibrium develops between the positive subarachnoid and negative epidural compartments. Anesthetists have been active in attempting to reduce the incidence and treat PSH by three ways – either by using a smaller or higher-tech needle, makes a smaller hole and less CSF leaks out, so headache will be milder or less prevalent. Or hydrate the patient after surgery to help production of CSF and thereby re-balance the fluid pressure, relieving headache soon. Lastly by using a 'blood patch' to plug the needle hole to prevent CSF leakage.

Reducing the size of spinal needle has a significant impact on the incidence of PSH. The incidence is 40% with 22G needles, 2-12% with 26 G Quincke needle and < 2% with 29G needles. But technical difficulties leading to failure of the spinal anaesthesia are common

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with 29G or smaller needle.<sup>13</sup> Even with costly pencil-point needle incidence of PSH is 3-4% and paraesthesia has been observed with this needle.<sup>14</sup> So, we can say that, with small needle and pencil-point needle the incidence of PSH can be decreased but not to zero.

The importance of needle entry angle has been shown by Ready et. al in 1989.<sup>15</sup> In 1995 Bela i.Halfalvi showed that if a beveled needle is inserted by lateral approach (bevel end of needle facing skin 2 cm lateral from the midline, 25-30 degree angle with skin) the bevel end of the needle will cut the dura inward and creates a flap which will close behind the needle as it is withdrawn due to increased pressure on the valvular flap by CSF and or ambulation, cough, stress etc. The dural hole is self-sealing, CSF leakage is minimized and headache is almost prevented.<sup>16</sup> This complication needs further research into development of alternative method.

Our clinical study was performed to compare the incidence of post-spinal headache between midline approach and lateral approach when caesarean sections were done by spinal anaesthesia in sitting posture with 25 G Quincke needle, which is cheap, available and commonly used in Bangladesh.

#### **Methods:**

After approval of institutional ethical committee this prospective study was conducted in the Chittagong Medical College Hospital from January 2005 to December 2005. Two hundred pregnant women of American Society of Anesthesiologists (ASA) physical status I and II who were undergoing caesarean section under spinal anaesthesia were enrolled in this study after explaining the procedure & complications of spinal anaesthesia and obtaining written consents. Patients with a previous history of any kind of headache were excluded.

Patients were divided into two groups by simple random sampling with lottery method (draw without replacement until desired sample size arrived).<sup>17</sup> There were hundred patients in each group. In Group-A (n=100) patients spinal needle were inserted by midline approach and in Group-B (n=100) by lateral approach.

On arrival at operation theatre baseline pre-induction heart rate, blood pressure and oxygen saturation of each patient were recorded. No pre-medication were given. Preload were given to all patients with Ringer's lactate

(10-15 ml/kg) rapidly through an indwelling 18G IV cannula 15 minutes before anesthetic induction. Patients were positioned in sitting position and 25G Quincke needle were inserted at L3-4 inter-space by midline approach (plane of the back of patient is perpendicular to that of the floor and needle was introduced in the midline directed slightly cephalad) or lateral approach (2 cm lateral to midline with bevel end facing skin) with all aseptic precaution.<sup>18</sup>

During insertion of needle followings were observed: Ease of insertion of needle – described as smooth or difficult. Number of attempts required for successful insertion of needle. After appearance of free flow of CSF local anesthetic solution (0.5% hyperbaric bupivacaine 10mg) was injected through spinal needle over a period of 15-20 second. After withdrawal of needle, punctured site was covered by sterile gauze. Then the patient were turned supine position with a wedge under right buttock. After assuming the supine position, level of block was evaluated. Sensory block was evaluated by using pinprick and chlorhexidine soaked swab by wiping it from inguinal region to nipple in mid clavicular line.<sup>19</sup> Motor block was assessed by Bromage scale.<sup>20</sup>

After operation analgesia and oral intake of plenty of water (at least 3 liters per day) was ensured till discharge. Post spinal headache (headache which is throbbing in nature, eases quickly on lying down and returns on standing and is unusual to present more than 48 hours after lumbar puncture) was evaluated by visiting the patient after 12 hours, 24 hours, 48 hours, 72 hours after operation and prior to discharge.<sup>21</sup> Each patient was asked a set of predefined questions regarding headache and other complications. Conservative management (bed rest, NSAIDs and fluid) was given to patients with PSH and cured.

Statistical analysis was done by using unpaired 't' test and chi-square test as

applicable.  $P < 0.05$  was considered as significant.

#### **Results:**

The results of the study are described in terms of demographic characteristics, physical status, performance of procedure, level of sensory and motor block, incidence of post-spinal headache and complications other than PSH.

There was no significant difference between group-A and group-B regarding age and physical status (Table-I).

**Table-I**

<i>Characteristics of the patients</i>			
	Group A	Group B	P value
Age	24.64 ± 0.35	25.24 ± 0.47	0.311
ASAI	88	90	0.111
ASA II	12	10	

The performance of procedure was compared in terms of attempts required for insertion of needle (Table- II).

**Table-II**

<i>Attempts required for insertion of needle</i>			
Attempt	Group A	Group B	P value
1	72	58	0.054
2	28	42	

Insertion of needle was possible with 1<sup>st</sup> attempt in 72 cases of group-A and 58 cases of group-B. Insertion with 2<sup>nd</sup> attempt was possible in 28 cases group-A and 42 cases of group-B. There was no significant difference between two groups (P=0.054).

There was no significant difference between group-A and group-B regarding sensory block (Table-III) and motor block (Table-IV).

**Table-III**

<i>Level of sensory block</i>			
Level of block	Group A	Group B	P value
T 4	3	3	0.097
T 5	0	0	
T 6	88	84	
T 7	8	10	
T 8	1	3	

**Table-IV**

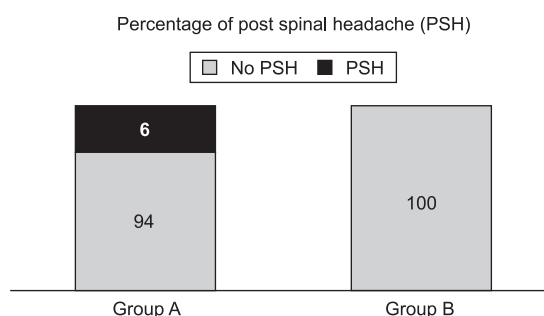
<i>Level of motor block</i>			
Bromage scale	Group A	Group B	P value
0	0	0	0.515
1	0	0	
2	11	13	
3	89	87	

Bromage Scale :

- 0 - No motor block
- 1 - Inability to move extended leg but able to move knees and feet.
- 2 - Inability to raise extended leg and move knee but able to move feet.
- 3 - Complete motor block

Incidence of Post Spinal Headache was found in 6 cases of Group-A and 0 cases in

Group-B (Figure -1) which is significant (P=0.029).



**Fig-1: Incidence of Post Spinal Headache (PSH)**

Mean time of onset of headache in group A patients was 28.00 ± 5.06 hours after operation and headache completely cured 15.00 ± 1.09 hours after onset of headache. Headache was moderate in 4 patients and mild in 2 patients. Headache was throbbing and fronto-occipital in all 6 patients and associated with nausea in 4 patients and with photophobia in 2 patients. Headache aggravated by sitting or standing and relieved by lying flat in all 6 patients.

Complications other than PSH summarized in table – V. There was no significant difference between the two groups. (P=0.541)

**Table-V**

<i>Complications other than PSH</i>			
Variables	Group A	Group B	P value
Backache	6	3	0.541
Headache other than PSH	0	1	

**Discussion**

Spinal anesthesia seems to be well suited for patients undergoing caesarian section because of the short

interval from injection to surgical anesthesia.<sup>22</sup> By using spinal anaesthesia it is possible to avoid some complications of general anaesthesia. But PSH is a well-known complication of spinal anaesthesia.<sup>3,4</sup> Incidence of post-spinal headache is higher in young age, female and pregnancy.<sup>23,24</sup> So, obstetric patients undergoing caesarian section under spinal anaesthesia are very prone to develop post-spinal headache.

With the invention of modern needles incidence of post spinal headache gradually decreases. But post spinal headache is still a headache for anesthesiologists even after using 25G Quincke needle (incidence of PSH is 7%) and pencil point needle (incidence of PSH is 3-4%).<sup>14</sup> The present work was designated to make a comparison between midline approach and lateral approach by using commonly used 25G Quincke needle in spinal anaesthesia during caesarean section.

There are few studies showing effect of different approaches during anaesthesia. In the present study regarding the performance of different approaches it was found that ease of insertions was smooth in most cases (78%) of group-A subjects but it was 70% in group-B subjects. So it was not significantly different in terms of ease of insertion. Regarding the number of attempts of insertion between two approaches were statistically not significant. We had no failure to puncture the dura in both approach.

In our opinion the difficulty and need for multiple attempt in group-B was due to unfamiliarity with this approach of spinal anaesthesia.

When spinal needle inserted by lateral approach it enters into subarachnoid space by cutting dura matter in a friendly way but mechanism of action, absorption, distribution of local anesthetic agent remain same as in midline approach and thus level of anaesthesia and analgesia is also same. In traditional midline approach during spinal anaesthesia beveled tip of needle makes a perpendicular puncture at dura, then a 'saloon door' like opening is created, which can open in either direction and allow spinal fluid to flow out of the subarachnoid space causing post-spinal headache.

The incidence of post-spinal headache was found nil among group-B subjects while 6% was observed in group-A subjects in our study. Almost similar findings were also observed with 20G sharp beveled needles with the lateral approach in 4465 patients.<sup>22</sup> Incidence of

PSH in that and our study is same – one possible explanation would be that the paramedian approach decreased the loss of CSF resulting from perforation of the dura matter and the arachnoid at different angles, produced avalvular mechanism that prevented a greater CSF flow to the epidural space causing no post-spinal headache.<sup>25,26,27</sup> In another investigation by Ali Jabbari et.al a significant association between the angle of approach and incidence of post spinal headache was also found.<sup>5</sup>

### Conclusion and Recommendation:

The study shows that, lateral approach with 25G Quincke needle for spinal anaesthesia was significantly better than midline approach in terms of occurrence of post spinal headache after caesarian section. This also shows the importance of practice and familiarity of the anesthetist with the lateral approach in order to perform it more efficiently. Further studies with lateral approach by using different size and type of needle are recommended.

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