

## LUMBAR SPINAL SUBARACHNOID BLOCK FOR CAESAREAN SECTION-A REVIEW OF 200 CASES

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*Lumbar spinal subarachnoid block is simple, cheap and effective method of anaesthesia for infraumbilical surgical procedures. In the present atmosphere of cost consciousness, spinal subarachnoid block is cost effective and can be of advantage in the developing countries like ours, where the medical gases and expert anesthesiologists are the rare commodities and deficiently available in the remote areas. Subarachnoid analgesia is entering into its centennial anniversary; this year as the first successful block was performed by August Bier in 1899 in Germany. In the present study the management of 200 cases of lower segment caesarian section under spinal subarachnoid block is presented and the advantages discussed. There was a low incidence of vomiting (9%) and no chances of aspiration even in the emergency nature of caesarian section. Cardiovascular side effects can be avoided by routine preloading with I. V fluids and the incidence of headache and backache can be reduced by using a small gauge L/P needle as is manifest in the present study. Spinal subarachnoid block has the advantage of the prolonged postoperative analgesia which can be prolonged further by adding narcotic analgesic to the local drug. In the present study, authors used hyperbaric local analgesic Cinchocaine (1:200 in 6 % glucose) which has a definite spread of analgesia. Spinal analgesia has the additional advantage of very low chances of foetal depression and the 84.47c babies born after caesarian section under spinal block has normal Apgar score. The authors would recommend lumbar spinal subarachnoid block with all its advantages both on the maternal side as well as on the foetal side.*

### INTRODUCTION

Being a safe, simple and effective method of regional analgesia, Lumbar Spinal Subarachnoid block has a definite role to play in the developing countries where the modern hospital facilities in rural areas are not very adequate. It requires minimal equipment and is necessarily more economical.

Common use of spinal block faded away after the advent of muscle relaxants and newer monitoring devices in anaesthetic practice. But with the recent introduction of new local anaesthetic agents and opioids, micro size and unidirectional needles, and intrathecal agents providing long lasting post-operative analgesia has given the spinal block a wide acceptance in recent years.

Subarachnoid block is preferable for caesarean to overcome the problems of aspiration of vomitus and foetal depression under general anaesthesia. It remains safe for mother and neonate especially in the conditions prevailing in our country where there is a shortage of experienced staff and facilities. According to John Richard<sup>1</sup> 95% of caesarean sections were done under spinal anaesthesia in 1997 as compared to 1987 where 95% caesareans were performed under Epidural in Australia.

What follows is our experience of 200 caesarean sections done under spinal subarachnoid block at District Head Quarter Hospital in the remote area of our country (Mirpur AJK) during the year 1995-96.

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The authors feel proud and involved in presenting this study on the eve of centennial anniversary of the first Spinal Anaesthesia in 1998 to pay a tribute to August Bier<sup>2</sup> who administered the first successful clinical spinal anaesthesia in August 1898 in Kiel Germany.

### MATERIALS AND METHODS

This study comprises of 200 female patients undergoing both elective and emergency caesarean sections with the age ranging between 18 and 47 years.

The patients were thoroughly examined and a detailed history was taken during the pre anaesthetic preparation. Routine laboratory investigations, for example Hb estimations and urine analysis were done. Blood grouping and cross matching was performed and blood was arranged for the patients with Hb 9 gm %. On the table an IV cannula was passed in every case and IV infusion started with Lactated Ringer or Dextrose Saline. Almost all the cases were given 1000 ml of the infusion during surgery excluding Toxemia of pregnancy which had 500 - 800 ml of 5% Dextrose water. 24 cases having varying degree of anaemia or blood loss preoperative or during the operation were given blood transfusion. Twenty-four cases were infused with 500 ml of colloid solution (Gelatine/HES).

The procedure of Lumbar puncture was done in lateral or sitting position through L2/L3 - L3/L4 interspace using 21/22-gauge Lumbar puncture needle after observing strict aseptic precautions. The drug administered was 1.4-1.6 ml of hyperbaric Cinchocaine (1: 200 with 6% glucose). After lumbar puncture the patient was turned on her back on the table with slight head down tilt with a wedge under the right hip and shoulder to remove the pressure of gravid uterus on the vena cava (uterine displacement).

Effect of anaesthetic technique was assessed on mother in terms of changes in pulse rate and blood pressure, vomiting, induction delivery time, discomfort / restlessness. Maternal hypotension was considered to be present when systolic pressure reached 80% of original levels or decreased to less than 100 mm Hg. This was treated by increasing the rate of IV fluid, maximizing the left uterine displacement [and giving some press or drugs] and oxygen given by mask.

Neonates were evaluated in terms of Apgar score at 1 minute and 5 minutes and neonatal mortality and morbidity.

## RESULTS

### Age distribution:

All the cases ranged between 18 and 47 years. Maximum cases were young (20-30 years) and mean age was 30.9 years. (See table 1).

### Duration of operation

The mean duration of operation was 60 minutes with a range from 40 to 90 minutes.

**Table-1: Demographic data of patients.**

No.	Variable	Range	Mean
1	Age in years	18-47	30.91
2	Weight in Kgs	44-78	66.67

**Table-2: Principal indications for caesarean section.**

No.	Indication
1	Foetal distress.
2	Previous caesarean.
3	Antipartum haemorrhage.
4	Cephalopelvic disproportion.
5	Malpresentation.
6	Post maturity.
7	Preeclamptic toxemia.
8	Poor obstetric history.

**Table-3: Changes in blood pressure.**

No.	Changes (mm Hg.)	Cases (n)	%
1	No change/Fall by 0-10	10	5
2	Fall by 11-20	150	75
3	Fall by 21-50	35	17.5
4	Precipitous fall	5	2.5

**Table-4: Changes in pulse rate.**

No.	1	2			3	
Citing	None	Decrease (beats/min.)			Increase (beats/min)	
		10-11	11-20	21-10	<10	11-20
cases(n)	35	55	45	10	35	20
%	17.5	27.5	22.5	5	17.5	10

**Table-5: Other complications.**

S.No.	Observation	Cases (n)	%
1.	Vomiting	18	9
2.	Headache	10	5
3.	Backache	15	7.5
4.	Awake awareness	10	5

### Induction delivery time:

The mean induction delivery time was 7.27 minutes with a range from 5 to 20 minutes.

### Indications of surgery:

The principal indications for caesarean section are listed in table II. Twenty-four patients had previous caesarean section.

### Foetal assessment:

There was one twin and two still births. Of 199 babies, 84.42% had Apgar score between 7 to 10 at 1 minute while, 15.58% had Apgar score below 7. All the babies were vigorous at 5 minute and there was no significant difference between the incidence of low Apgar among hypotensive and non-hypotensive groups.

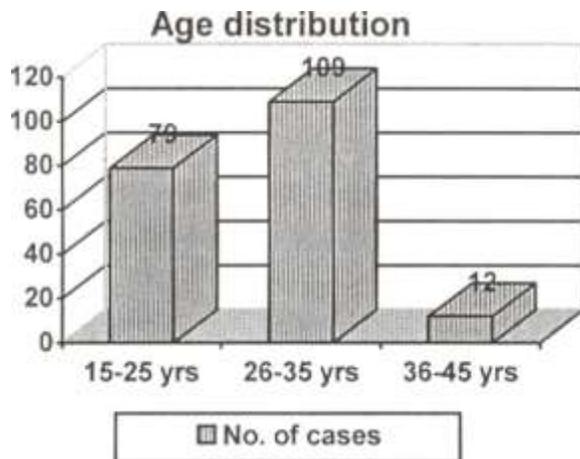
### Maternal assessment:

- Changes in blood pressure:* Hypotension occurred in 95% cases. A sudden fall of BP below or around 70 mm Hg was usually accompanied by bradycardia and was corrected by injection Atropine intravenously, a "fluid challenge" and presser drugs. (See table-3)
- Changes in pulse rate:* Decrease in pulse rate by 20 beats/min. occurred in 50% cases and 27.5% cases had a rise in pulse rate. (See table-4)
- Awake awareness:* Supplemental General Anaesthesia was required in 10 cases.
- Vomiting:* Vomiting occurred in 9% cases and was treated by Antiemetic.
- Headache:* Headache was observed in 5% cases. All of them were hypotension type and were managed by analgesics and IV fluids. No meningeal irritation was observed in any cases.
- Backache:* 7.5% of the cases had backache and is attributed to difficult lumbar puncture. (See table - 5)

## DISCUSSION

The role of simple regional techniques like Spinal Subarachnoid Analgesia cannot be undermined in developing country like ours because of a dearth of modern hospital facilities, particularly in far flung remote areas, overall shortage of qualified anesthesiologists and non-availability of modern equipment for General Anaesthesia with frequent abrupt shortage of compressed medical gases. The use of subarachnoid block, if employed skillfully and with proper care, forms one of the major tools for anesthesiologists. Spinal anaesthesia is the most

commonly used technique for caesarean section in developed countries like USA, Europe and Australia.



#### **Foetal assessment:**

The regional block has been favored as the procedure of choice for the wellbeing of the infants delivered through caesarean section<sup>3</sup>. To overcome the major problems in anaesthesia for caesarean section viz. aspiration of vomitus and foetal depression Spinal Anaesthesia is preferred to General Anaesthesia. Many of these patients come in emergency which invariably presents the problem of full stomach, and the risk of vomiting and regurgitation is always present. Lock and Greiss<sup>4</sup> reported aspiration as the cause of death in 28.9% of maternal mortality under general anaesthesia.

Apgar score, if done properly, is still the most useful guide to neonatal wellbeing and resuscitation. The one minute Apgar score correlates well with both acidosis and survival. Apgar et al<sup>5</sup> and Philips<sup>6</sup> state that the incidence of delayed respiration is six times more under general anaesthesia than under spinal analgesia. Apgar was the first to point out that the babies delivered by caesarean section under Spinal Block were more vigorous at birth than those whose mothers had general (cyclopropane) anaesthesia. A collaborative project (a research study involving 15 medical centres) found that in 405 normal gravidas undergoing elective repeat caesarean sections more than five times as many neonates were depressed at 1 minute (Apgar 0-3) when deliveries occurred under general anaesthesia as compared to regional anaesthesia<sup>7</sup>. Evaluation of neonatal activity by modern NACS (Neurological and Adaptive Capacity Scoring System)<sup>8</sup> also reveals that spinal anaesthesia does not result in neonatal depression. Kamra<sup>9</sup> also maintains that of all anaesthetic agents available, spinal anaesthesia remains safe for the mother and neonate, especially in the conditions prevailing in our countries.

No significant correlation between Induction-Delivery interval and Apgar score has been documented<sup>10</sup>. It has been demonstrated, however, that prolonged uterine incision-delivery time during caesarean section can have profound effect upon the

infant. Interval that exceeds three minutes is likely to be followed by respiratory depression, secondary to asphyxia. In our study the operating obstetricians were mostly recently trained, less experienced doctors, the I-D time was prolonged and that may explain the depressed Apgar score in a relatively higher number of cases. Closure of uterus and abdomen after delivery of baby would take longer time in most of our cases, so the spinal anaesthesia was a better choice. In a study of forceps delivery 22.74% cases had low Apgar scores (below 7) at one minute<sup>11</sup> while Dierker et al<sup>12</sup> has given 18% incidence of low Apgar score. This study shows a comparatively lesser neonatal depression even after caesarean section under Spinal subarachnoid block.

#### **Maternal assessment**

##### **a) Cardiovascular complications:**

Arterial hypotension is the most common complication of spinal anaesthesia. This is because of physiological effects of spinal blockade<sup>13</sup>. Majority of cases require immediate therapy of restoration of adequate circulation. It has been documented that maternal hypotension during spinal anaesthesia, when promptly and properly treated, does not result in neonatal depression as ascertained by the new NACS system<sup>8</sup>. As prevention is better than cure most of the workers have tried various drugs and techniques to reduce the incidence of severe hypotension. Injection Ephedrine has been used to prevent hypotension<sup>8,14,15</sup> Qadri and Maheshver<sup>16</sup> have made use of the protective effect offered by IV injection Methergin (0.4 mg) against spinal hypotension in three hundred female patients.

The degree of hypotension depends upon the height of analgesia and is the established accompaniment of sympathetic interruption due to spinal anaesthesia. Green<sup>17</sup> has described that sympathetic block occurs a few segments higher than sensory block. In the present study hypotension was easily corrected by IV fluids and maximizing the left uterine displacement and in five cases by using Vasopressors. No significant correlation was found between the dose of spinal analgesic drug and the maximal measured Haemodynamic depression by Liu et al<sup>18</sup>. They postulated that Haemodynamic depression depends on the extent and intensity of the block of sympathetic nervous system. Recent studies indicate that high thoracic levels of spinal anaesthesia in healthy volunteers results in incomplete sympathetic block and correspondingly little effect on haemodynamics<sup>19</sup>.

The exaggerated hypotensive response to spinal anaesthesia in pregnant women can be attributed to diminished venous return due to caval compression, exaggerated spread of nerve blockade and greater sensitivity to blockade. A possible role of hormone of pregnancy (progesterone) in exaggerated hypotensive response has been suggested by Jayaram<sup>20</sup> in an animal study. The less frequent incidence of hypotension in patients in labour is possibly due to higher levels of catecholamines which help maintain

blood pressure<sup>21</sup>. An interesting report from Clark and his colleagues<sup>22</sup> relate that incidence of hypotension among patients undergoing elective caesarean section who were provided with no prophylactic measures was 92% while in patients with early labour it was 50%. Preloading with left uterine displacement during caesarean section under spinal anaesthesia reduced the incidence to 53% in elective cases and to 15% in patients in labour.

Despite a 1.5 litre crystalloid preloading the blood volume was increased only by 5% in the study by Ueyama<sup>23</sup>. Their result suggests that a rapid preloading cannot be expected to prevent spinal hypotension at caesarean section. The higher incidence of hypotension despite fluid loading before spinal anaesthesia in caesarean section is mediated by increased plasma concentration of Atrial Natriuretic Peptide (ANP) in parturient<sup>14</sup>. It was hypothesized that preload augmentation would further increase plasma ANP and the spinal anaesthesia in the presence of ANP would counteract the beneficial effect of volume loading. In the present study preload had a clinically significant role to avoid severe hypotension during Spinal Subarachnoid Block.

Bradycardia (Pulse rate below<sup>7</sup> 50/min.) was corrected by IV injection of atropine and this determines that Bradycardia was because of blockade of sympathetic fibers to heart leaving Vagus unopposed.

#### **a) Nausea and Vomiting:**

Spinal Subarachnoid Anaesthesia does not give a guarantee against vomiting<sup>24</sup>. Even under spinal anaesthesia vomiting may occur due to hypoxia and hypotension, but in these cases vomiting does not always produce aspiration. In this study, no aspiration was observed in any cases and reduced incidence of vomiting could be due to prevention of hypotension and adequate oxygenation of the patients. Variation in the spinal technique has an impact on the frequency of nausea/vomiting during caesarean section. Overall nausea incidence increased 10% by exteriorizing the uterus in the study of Landa<sup>23</sup>. The stimulus associated with returning the uterus to the peritoneal cavity may trigger nausea. Peritoneal closure also causes an increase in nausea/vomiting. Vomiting was doubled in patients that had peritoneum closed as a separate layer. Avoidance of uterine exteriorization and peritoneal closure may result in greater patient satisfaction and a smoother surgical course. Our observations support these findings.

#### **b) Headache:**

Results of a retrospective review of 4767 single dose spinal anaesthesia for neurologic complications demonstrate the continued safety of spinal anaesthesia<sup>26</sup>. Only 2.2% patients had complaints of positional headache postoperatively and 2% had inadequate anaesthesia. In the present study, ten patients with post spinal headache were easily managed by analgesics and intravenous fluids. Overall incidence of post spinal headache in the series of Rajuria et al<sup>27</sup> has been

6.04%' while, Navaneetham et al<sup>28</sup> have placed it as 6.6% and Saxena et al<sup>29</sup> has reported a 7.1 % incidence. The reduced incidence of post spinal headache was attributed to adequate hydration, use of small gauge needle, prevention of undue loss of CSF and maintenance of trendelenbergs position for 12 hours after spinal anaesthesia.

#### **Local Analgesic Agent**

Commonly available drug - Cinchocaine was the local analgesic agent used in this study because heavy lignocaine is not available in our country and spinal bupicaine was not yet marketed in Pakistan. Cinchocaine (Nupercaine) is not a cocaine derivative but it is allied to quinoline. It has slower onset but lasts longer and may give analgesia for two to three hours. The 3 ml ampoule containing 1 in 200 cinchocaine with 6% glucose with a specific gravity of 1024 at 37 °C is hyperbaric solution.

The density of spinal anaesthetic solution relative to human CSF (Baricity) is an important determinant of the extent of subarachnoid block<sup>30</sup>. The mean CSF densities in man, postmenopausal women and non-pregnant women (1.00049 gm/ml) were significantly greater than in term-pregnant women (1.00030±0.00004 gm/ml)<sup>31</sup>. Small differences in density (0.00060 gm/ml) influence the intrathecal distribution of local anaesthetic solution both clinically<sup>32</sup> and in vitro model. In the present study hyperbaric solution was found to be better choice because of its availability, definite spread and extent of analgesia. Although dermatome level of spinal anaesthesia has been reported similar between the hyperbaric and hypobaric groups, analgesia provided by hypobaric drug was inadequate in a study by Carter<sup>33</sup>. There was no difference in changes in hemodynamics, ephedrine use and mean nausea vomiting scores between the two groups undergoing caesarean section<sup>34</sup>.

#### **CONCLUSION**

Lumbar spinal subarachnoid analgesia can safely be given for caesarean section and is preferred when the patient is full stomach and wants to remain awake. It is cheap, safe and effective. It is the procedure of choice for the wellbeing of the infant. It's prolonged analgesic effect covers the postoperative period. Intrathecal route can be made use of in administering the drugs (like Neostigmine) for post caesarean section analgesia and has been reported to reduce the cumulative morphine requirement postoperatively<sup>3\</sup> Spinal anaesthesia still holds a wide acceptance on its centennial anniversary in 1998.

#### **ACKNOWLEDGEMENTS**

The authors are grateful to the staff of operation theatre and obstetrics ward of DHQ Hospital, Mirpur for their co-operation. The authors also express the gratitude to Dr. M. Akram Khan presently Director Health Services AJK for his constant encouragement and guidance during the pursuit of the study. Special

thanks are due to Imtiaz Gilani for his patient sittings during typing of this manuscript.

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