*Original Article*

# Impact of spinal anesthesia on cesarean section outcome in Omdurman maternity hospital - Sudan 2011

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**Abstract:**

**Background:** The cesarean section is indicated when vaginal delivery is not safe for the mother or the baby.

**Objective:** A descriptive study done in Omdurman maternity hospital–OMH to assess the impact of spinal anesthesia (SA) on cesarean section(C/S), including, intra and post operative maternal complications, neonatal outcome and patients' satisfaction in 2011.

**Methodology:** Women delivered by C/S under SA were included in the study after an informed consent. All women in the study were operated on by trained registrars or obstetricians, under SA given, either by anesthetist or assistant anesthetist under supervision with similar conditions and were followed till discharge from hospital.

**Results:** Total number of deliveries at OMH in 2011 were 30397, 21677 (71.3%) delivered vaginally, 8720 (28.7%) delivered by C/S, only 24 women (0.3%) delivered under general anaethesia- GA. Women included in the study were 1029, 517 (50.2%) were elective and 512 (49.8%) were emergency C/S. Intra- operatively, 79 women (7.7%) developed hypotension, their BP dropped by more than 30 mmHg, four women developed severe shivering for which they received intravenous 25 mg pethedine, and 44 neonates received oxygen by mask and only one needed endotranchial intubation. Post operatively, only two women had disabling headache, 24 women (2.4%) had episodes of vomiting and 199 (19.3%) had pain in their lower limbs, buttock and thigh, it disappeared completely before discharge. In this study, 880 women (85.5%) were satisfied with SA, while 149 (14.5%) were not satisfied due to pain at the time of puncture, headache, or transient lower limb pain after operation.

**Conclusion:**Spinal anesthesia is increasingly used for C/S in this hospital, with excellent patients' satisfaction, without increase in maternal and neonatal mortality or morbidity.

**Key words**: spinal anesthesia, Cesarean section, Sudan.

The cesarean section is indicated when vaginal delivery is not safe for the mother or the baby. Maternal mortality (MMR) and morbidity associated with C/S are twice that associated with vaginal delivery, where 30-60% are directly related to the procedure itself[1]. It became safe after the introduction of antibiotics, blood banks, anesthesia and improved surgical techniques with significant reduction in mortality and morbidity of both mother and fetus[2].

The type of anesthesia used, general or spinal, is an important determinant of C/S outcome. General anesthesia (GA) is associated with failed intubation, aspiration of stomach contents, increased risk of blood loss and respiratory problems for both mother and baby when compared to regional anesthesia, however, it is more quickly administered procedure[3]. Spinal anesthesia (SA) (subarachnoid) is a form of regional anesthesia involving injection of local anesthetics into the cerebrospinal fluid through a fine needle in the lower back of the patient, where the drug has closed proximity to site of action[3]. It is useful in patients having irritable airways, anatomical abnormalities, respiratory diseases, diabetes

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mellitus (DM), borderline hypertension and or any surgical intervention below the umbilicus[4].

Spinal anesthesia became the anesthetic technique of choice and has emerged as a safe alternative even for emergency C/S, except when speed is needed or the patient is bleeding[4]. Its advantages include a reduction in the occurrence of complications associated with GA, decreased blood loss, good muscle relaxation, early bonding between mother and baby, good post operative analgesia, which permits early mobilization, reduced deep venous thrombosis- DVT, pulmonary embolism (PE), good bowel movements return and shorter hospital stay. It has a faster onset of action and requires fewer drugs, cost-effective, associated with decreased maternal mortality and morbidity, better Apgar Scores and neonatal outcome inspite of the increased C/S rates[4].

Spinal anesthesia causes substantial drop in maternal blood pressure followed by nausea and vomiting which may affect both mother and fetus. It may cause severe post dural puncture headache (PDPH), which can be reduced with the use of a special needle. It is contra-indicated in patients with coagulation disorder, local infection or sepsis at the side of lumber puncture, space occupying lesions of the brain, maternal hypotension and lack of informed consent. Inspite of widely used SA in C/S, there is no much documentation or reports on impact of SA on C/S in this hospital or other hospitals in Sudan. This study aims at assessing impact of spinal anesthesia on C/S, including intra and postoperative maternal complications, neonatal outcome and patient's satisfaction.

**Methodology:**

This is descriptive, observational hospital based study, conducted in OMH. All patients planned for C/S, elective or emergency, with no contra-indications for SA, consoled to be included in the study and an informed consent was obtained. Those who refused were excluded from the study, without affecting management they received. An ethical clearance was obtained from hospital ethical review committee. In theater, a wide bore canula was fixed and an intravenous infusion of one liter normal saline over 10-20 minutes was started before the operation and continued intra-operatively. Patients were routinely monitored with automated arterial pressure measurement and pulse oximetry. Spinal analgesia was performed with the patient in the sitting position, the skin of the back was prepared with a 10% solution of povidone-iodine and a surgical drape was placed at L3-L4 interspace, a 25 gauge single orifice quincke cutting type needle was inserted. Free flow of cerebro-spinal fluid was verified and hyperbaric marcaine anaesthetic (0.5% heavy bupivaciane hydrochloride) was injected over 20-30 seconds. Patients were immediately turned to the supine position head rested on a pillow with a slight left lateral tilt. During spinal anesthesia hypotension was treated by speeding of intravenous flow, left lateral tilting of the patient and 5 or 10mg increments of ephedrine. Bradycardia was treated with atropine 0.5mg. Modified Bromage scale was performed for testing motor block at 3 minutes before surgery started. Patients were monitored during operation and were closely followed during first 24 hours till time of discharge. All women were operated on by a registrar or a consultant, through transverse abdominal incisions. All were advised to have skin- to- skin contact with their babies and to start breast feeding as soon as possible.

Post operatively, patients received approximately 3-4 liters of intravenous fluid, with suitable analgesia, non- steroidal anti-inflammatory drugs, given rectally, immediately following C/S and repeated after 12 hours during the 1$^{st}$ 24 hours. Patients were interviewed on the 2$^{nd}$ day with the use of a standardized symptoms checklist, assessing whether they had experienced any of the expected symptoms: headache, backache, pain and/or parathesia in the area of buttocks, thighs or lower limb, sensory disturbances, change in muscle strength, difficulties in voiding or nausea and vomiting. Women started oral intake as soon as they could tolerated it and were encouraged early

mobilization. Second or third generation cephalosporins were used at start of C/S. Patients were monitored up till discharge and contacted follow-up at two weeks, through the telephone, then follow-up visit after six weeks. They were advised on how to recognize symptoms and signs of complications of SA and to contact investigators whenever needed. Patients' satisfaction was assessed with willingness to repeat or recommend the technique. A structured questionnaire was used for all cases. Data were collected by trained group of registrars and health care providers. Data editing and analysis were done by a trained computer technician using a microcomputer SPSS program, version 18.

**Results:**

The total number of deliveries at OMH in 2011 were 30397, 21577 (71.3%) delivered vaginally, 8720 (28.7%) delivered by C/S, 24 cases (0.3%) were done under general anaethesia. Women included in the study were 1029, 517 (50.2%) were elective and 512 (49.8%) were emergency C/S. All were completed under SA, none were converted to GA for failure or difficult performance.

Women aged, 20- 30 years were 540 (52.4%), 31- 40 year were 364 (35.4%), more than 40 years 37 (3.6%) and 88 women (8.6%) were teenagers. House wives were 848 (82.4%), 116 (11.3%) were professionals and 65 women (06.3%) were laborers. Only 111 women (10.8%) were illitrate, 643 (62.5%) completed their primary or secondary school and 275 (26.7%) were university students or graduates. They were generally multiparous 700 (68.0%), 208 (20.2%) primigravidae and 121 (11.8%) were grandmultiparae. Three hundred and three (29.4%) were primary C/S, the rest 726 (70.6%) had one or more previous scars. Most of them were operated on by registrars 948 (92.1%), the rest by obstetricians 81 (7.9%). At term, (37-42 weeks) were 967 (94.0%), 43 cases (4.2%) were preterm and 19 cases (1.8%) were post term.

Anesthesia was conducted or supervised by anesthetist in 523 (50.8%) and 506 (49.2%) were done unsupervised, but by trained assistant anesthetist. Pulse rate at the start of the block, measured by pulse oximetry was 60-90 beats per minute –bpm in 576 (56.0%), more than 90 bpm in 391 (38.0%) and less than 60 bpm in 62 (6.0%). Diastolic blood pressure (DBP) at the start of the block was less than 90 mmHg in 566 (55.0%), 90- 110 mmHg in 416 (40.4%) and more than 110 in 47 cases (4.6%). Blood pressure dropped by less than 15 mmHg in 725 (70.5%), among them 21 received two or more liters of blood during the operation. Drop by 15-30 mmHg was seen in 225 (21.8%), one patient received more than two liters of blood. Drop of more than 30 mmHg was seen in 79 (7.7%), they received ephedrine, speeding of fluid flow and tilting of the patient, five of them received two liters of blood. Intra-operative oxygen saturation was more than 90% in 946 (91.9%), 80-90% in 68 (6.6%) and 15 cases (1.5%) had an oxygen saturation of less than 80%. Thirty seven cases (3.6%) were transfused during operation, 32 cases (3.1%) by two liters and only five cases (0.5%) by more than two liters.

During the operation, 1002 women (97.4%) breathed spontaneously, 27 women (2.6%) developed difficulties in breathing requiring assisted ventilation, although were not converted to general anesthesia. Intra-operatively, 229 (22.2) had mild shivering which needed no medication, only four women (0.4%) had severe shivering for which they received 25 mg I/V pethedine, the majority 796 (77.4%) did not develop shivering at all. Only 52 women (5.1%) developed itching or skin rashes during operation, the rest 977 (94.9%) did not experience any allergic symptoms. Forty five (4.4%) of the neonates were given oxygen by mask, only one (0.1%) needed endotranchial intubation, the rest of the neonates 983 (95.5%) were well, breathed spontaneously, with an Apgar score of 10 at 5 minutes in 966(93.9%), seven cases (0.7%) had an Apgar score of zero at five minutes, the rest 56 (5.4%) had an Apgar score between 5-9 at five minutes.

Post operatively, 491 (47.7%) developed mild

post dural puncture headache (PDPH), which responded to bed rest or simple analgesia, only two cases (0.2%) developed disabling headache for which they received pethedine with NSAID, the rest 536 ( 52.1%) did not develop headache at all. Most of the women under study received only NSAID and 16 (1.6%) received pethedine with NSAID. Oral intake started within 6-12 hours in 960 (93.3%), 53 (5.2%) after 12 hours and 16 cases (1.6%) started to take orally immediately after being transferred to the ward, 1005 (97.7%) did not complain of vomiting. The majority started to mobilize within 6-12 hours, 905 (87.9%), while 124 (12.1%) started after 12 hours. Eight hundred and thirty women (80.7%) did not complain of transient pain or numbness after SA, however, 149 (14.5%) had pain in the legs, 50 (4.8%) in the thigh, back and buttocks, which was relieved by NSAID and disappearing completely. Three hundred and sixty women (35%) were discharged within 48 hours, the rest 669 (65%) were discharged on the third day, none stayed for more than three days and no one was readmitted after discharge. In this group, 880 women (85.5%) were satisfied with SA, while 149 (14.5%) were not satisfied due to either pain at the time of puncture, post operative headache or transient pain in lower limbs after operation.

**Discussion:**

Spinal anesthesia (SA)has become the preferred technique for operative delivery in El C/S and it is an integral part of practice for most anesthesiologist[5]. With the advances in anaethetic services and improved surgical techniques, mortality and morbidity associated with C/S has fallen considerably[2].

**Table1:** Summary of intra and post operative complications of spinal anesthesia during cesarean section in OMH 2011.

| Complications | Developed | | Did not developed | |
|---|---|---|---|---|
| Tachycardia HR > 90 bpm | 391 | 38.0% | 638 | 62.0% |
| Hypotension drop of BP > 30 mmHg | 079 | 07.7% | 950 | 92.3% |
| Oxygen saturation <80 | 015 | 01.5% | 1014 | 98.5% |
| Shivering | 233 | 22.4% | 796 | 77.6% |
| Itching, allergy | 052 | 05.1% | 977 | 94.9% |
| Need of assisted ventilation | 027 | 02.6% | 1002 | 97.4% |
| NN resuscitation | 046 | 04.5% | 983 | 95.5% |
| Headache | 493 | 47.9% | 536 | 52.1% |
| Vomiting | 024 | 02.4% | 1005 | 97.6% |
| Transient paresis- at thigh, buttock, legs and feet | 199 | 19.3% | 830 | 80.7% |

Confidential enquiry into maternal death (CEMD) in the United Kingdom has demonstrated a steady decline in anesthesia related maternal death (MD), in spite of the increased C/S rate[4]. Compared to GA, SA is associated with reduced maternal mortality, the need for fewer drugs, faster neonatal – maternal bonding and decreased blood loss with excellent post operative pain control[6]. This MMR reduction associated with SA may be due to improved procedure technique, involvement of the senior staff or concomitant improvement in obstetric care.

In this study all cases were completed under SA, none were converted to GA, indicating excellent success rate under trained personnel. This excellent successful change from GA to SA is due to consultant lead procedure, good communications with obstetricians or surgeons, well trained, well supervised staff and a sustained supply of appropriate drugs and needles[7]. This shows that SA in expert hands is effective for C/S, elective or emergency, as judged in terms of failure rate and need for another technique during operation. In this study, 506 (49.2%) were

done unsupervised by assistant anesthetists, in spite of that, there were no reported cases of failure or anesthesia related maternal death indicating the good level of trained personnel in this hospital for conducting SA for elective or emergency C/S.

SA had been done similarly for both elective and emergency C/S in this study, with no intra-operative or post operative observed complications between the two. GA for emergency C/S, non-fasting and unprepared patients, is more risky and can lead to gastric aspiration and has a high rate of difficult intubation. It is even more risky in patients with respiratory disease, whereas SA produces few effects on them. SA is suitable for diabetic patients, especially unrecognized hypoglycemia and patients can return to their normal food and pre-pregnancy dose of insulin soon after surgery, as they will experience less sedation and few side effects of nausea and vomiting in addition to a less bloody operation compared to GA, due to the effect of hypotension[6].

Anesthesia- related complications are the sixth leading cause of maternal mortality in the US[8]. Many patients may develop some fall in diastolic blood pressure indicating successful block, however, maternal hypotension is the most occurring complication of SA in C/S and is often associated with nausea and vomiting affecting the mother's well being and ability to breast feed the baby[9]. However, in this study, SA in C/S is associated with decreased morbidity and better neonatal outcome, with good Apgar Scores, which is consistent with that found in Cochrane data base[6]. All attempts to prevent maternal hypotension should be made before administering SA, as hypotension can adversely affect the baby and the mother. Many strategies have been adopted to prevent hypotension, such as preloading with crystalloid or colloid fluids if available, tilting of the patient or giving a diluted bolus dose of intra-venous ephedrine or infusion if hypotension occurred[10,11].

In this study mild PDPH occurred in 47.7% patients, and severe PDPH in 0.2% ones. This is consistent to other studies, where mild PDPH is around 40% and the severe is 2% , which may explain the mild onset of nausea and vomiting[12]. Usually transient neurogenic symptoms (TNS) occur after recovery from SA in 14% of patients with lidocaine with very little incidence with pubivacaine or marcaine.

In this study, 880 (85.5%) were satisfied with SA. This is consistent with the result of a study done in Spain 1997, where satisfaction from SA was 76% compared to 24% for GA[13]. Spinal anaethesia has high level of patient satisfaction, particularly with sharing the moment of baby's 1st cry and immediate bonding[13]. SA is cost effective, easy to perform in expert hands, providing excellent operating conditions with good patient, surgeon and anesthetist satisfaction. When SA is used with perfectly performed C/S, the majority of patients will be happy with the technique, rapid recovery, absence of side effects, sharing the moment of baby's first cry and immediate bonding[14]. In a study done in Pakistan, patient's satisfaction with SA was 189/247 (76.5%), compared to 58/247 (23.5%) with GA, with greater willingness to repeat or recommend the procedure[15].

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