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# Incidence of Perioperative Arrhythmias among females having Lower Segment Caesarean Section under Spinal Anaesthesia- A descriptive crosses sectional study

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**ABSTRACT**

**Background**: The most frequent emergency or elective cases we encounter are lower segment caesarean sections (LSCS). In the majority of these cases, regional anaesthesia is used. Due to the altered physiology of pregnancy and anaesthesia, perioperative cardiac arrhythmias are frequent in these situations. Most of these arrhythmias are benign, which is significant. When under spinal anaesthesia, some arrhythmias, however, can result in a rapid vascular collapse and raise peri-partum morbidity and fatality rates. Although there are few case reports, the frequency of intraoperative arrhythmias is not fully known. Thus it was decided to conduct this study on the prevalence of arrhythmias in LSCS patients during spinal anaesthesia.

**Methodology**: We carried out this prospective study between January 2022 and December 2022, over a one-year span. In this one year, 1260 individuals had LSCS while under spinal anaesthesia. Ninety patients were left out because they had issues unrelated to pregnancy. Also omitted were 260 patients who had gestational diabetes mellitus, gestational hypertension, eclampsia, or pre-eclampsia. 20 instances were turned over to general anaesthesia after being disqualified due to insufficient block. Included in the study group were 890 patients.

**Results**: In the present study, out of 890 patients, 115 individuals (12.9%) experienced arrhythmias following surgery. Bradycardia was observed in 45 (5.06% of the patients), and ventricular ectopics were observed in 35 (3.93%). There were 18 [2.02%] patients with supra ventricular tachycardia, 12 [1.35%] with atrio-ventricular blocks, 8 [0.89%] with atrial ectopic, and 3 [0.34%] with atrial fibrillation.

**Conclusion**: During anaesthesia, arrhythmias are rather typical. The majority of these perioperative arrhythmias spontaneously return. Most of them have stable hemodynamics, and only a small percentage of them require treatment. The anesthesiologists should exercise caution, and the surgeons should be more gentle. The patient must be closely watched and continuously monitored.

**Keywords:** *Lower Segment Caesarean Section; Perioperative Arrhythmias; Spinal Anaesthesia*

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## INTRODUCTION

The most frequent emergency or elective cases we encounter are lower segment caesarean sections (LSCS). In the majority of these cases, regional anaesthesia is used. Due to the altered physiology of pregnancy and anaesthesia, perioperative cardiac arrhythmias are frequent in these situations.

Anesthesiologists commonly deal with arrhythmias during anaesthesia. Life-threatening arrhythmias are less frequent, though. During arrhythmias, adverse cardiovascular events can happen. Intraoperative dysrhythmias do happen in non-cardiac patients undergoing non-cardiac surgery, despite the frequency being higher during cardiac surgery and in cardiac patients. Compared to spinal anaesthesia, general anaesthesia has a higher incidence. Arrhythmia-induced, relatively small variations in hemodynamic parameters cannot lead to severe long-term comorbidity. Major intraoperative dysrhythmias, however, have the potential to trigger a rapid circulatory collapse and affect the perfusion of crucial organs like the kidneys, heart, and brain[1-3].

Lower segment caesarean sections (LSCS) do not have a well-established incidence of perioperative arrhythmias. During the perioperative phase, a wide variety of cardiac arrhythmias can be seen, and they typically have multifactorial origins. Most of these perioperative arrhythmias can be successfully controlled since they have stable hemodynamics. These perioperative arrhythmias are most frequently brought on by electrolyte imbalance, hypercapnia, hypoxia, hypothermia, and hypotension[1-3].

**Material & Methodology**

Between January 2022 and December 2022, this prospective study was carried out in a tertiary care hospital's Department of Anaesthesiology. The study protocol received approval from the hospital's ethical council. All of the patients who were enrolled in the trial provided written informed consent. Pre-anaesthetic check-ups included a thorough review of the patient's medical history, a general and systemic examination, an airway assessment, and a spinal column examination as needed. Hemoglobin, urine analysis, blood sugar, blood grouping, and Rh typing were among the lab tests performed. The study included ASA I and II emergency and elective LSCS patients who underwent spinal anaesthesia.

Individuals having a history of valvular heart disease and other cardiac disorders, as well as arrhythmias, epilepsy, asthma, hypertension, diabetes mellitus, thyroid dysfunction, and other conditions were excluded from the study. Those who had general anaesthesia were also excluded from the trial if the spinal anaesthesia failed or for any other reason. The study group also excluded patients with pregnancy-related problems such eclampsia, pre-eclampsia, gestational hypertension, and gestational diabetes mellitus.

With an 18g cannula, the IV line within the OT was secured. Blood pressure, SpO2, the pulse, and the ECG were all recorded on a regular basis. Spinal anaesthesia was injected using a 25-G Quincke spinal needle between the L3-L4 intervertebral area while taking all necessary aseptic precautions after preloading with 500 mL of lactated Ringer's solution. Upon confirmation of free CSF flow, 2 mL of 0.5% hyperbaric bupivacaine was administered intrathecally in the lateral position. Throughout the perioperative period, oxygen was supplied at a rate of 4 L/min through a basic face mask. All patients had a right lateral wedge. Electrocardiography (ECG) with five leads (lead II), pulse oximetry (SpO2), and noninvasive blood pressure (NIBP) were all used for intra operative monitoring.

Any variation from the expected rhythm and rate was recorded and classified as an arrhythmia. Every time an arrhythmia occurred, the ECG was carefully watched and recorded. All patients received 5 units of oxytocin in each bottle of intravenous fluids following infant extraction. When necessary, ergometrine was injected intramuscularly. Prostodin (15-methyl PG F2-alpha) is a second-line treatment for postpartum uterine atony that is resistant to oxytocin/ergometrine and functions as a smooth muscle stimulant. It is administered intramuscularly as needed.

Hypotension was characterised as mean arterial pressure that was 20% or less of the initial value. When hypotension occurred, crystalloids and 6 mg of ephedrine were injected intravenously. When the heart rate dropped below 50 beats per minute, 0.6 mg of atropine was injected intravenously. When the rate exceeded 160/min, Xylocard 1mg/kg was administered. For tachycardia greater than 160 beats per minute, carotid massage was also performed on one side. Results are presented as mean (SD), and percentages are used to represent proportions.

**Results**

From January 2022 and December 2022, 1260 individuals underwent LSCS while under spinal anaesthesia. Patients' mean age was 27.5±6.2 years.

Ninety patients out of the total were excluded because they had problems unrelated to pregnancy. Also excluded were 260 patients who had eclampsia, pre-eclampsia, gestational diabetes mellitus, or gestational hypertension related to pregnancy. 20 cases got excluded as they had inadequate block so converted to GA. So, in the study group a total of 890 patients were included.

115 patients (12.9%) of them experienced arrhythmias following LSCS. Bradycardia was noted in 45 individuals (5.06%), and ventricular ectopics in 35 patients (3.93%). There were 18 [2.02%] patients with supra ventricular tachycardia, 12 [1.35%] with atrio-ventricular blocks, 8 [0.89%] with atrial ectopic, and 3 [0.34%] with atrial fibrillation. [Table-1, Figure-1]

**Table 1:** Peri-operative incidence of arrhythmias

| | **Number of pt** | **Percentage** |
|---|---|---|
| Bradycardia | 45 | 5.06 |
| Ventricular ectopic | 35 | 3.93 |
| Supraventricular tachycardia | 18 | 2.02 |
| Atrio-ventricular blocks | 12 | 1.35 |
| Atrial ectopic | 8 | 0.89 |
| Atrial fibrillation | 3 | 0.34 |
| Total | 115 | 12.9% |

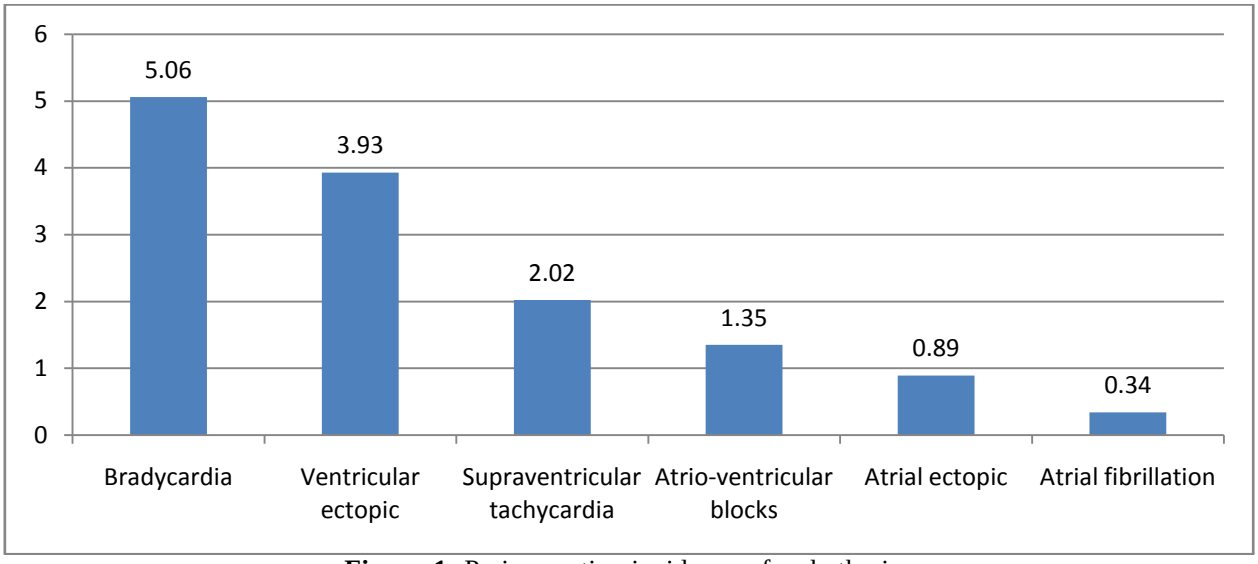


**Figure-1:** Peri-operative incidence of arrhythmias

**DISCUSSION**

For LSCS, spinal anaesthesia is thought to be the most secure regional anaesthetic approach. The incidence of perioperative arrhythmias, or arrhythmias during spinal anaesthesia, is not well known. In the literature, there are hardly any research and extremely few case reports.

The occurrence of arrhythmias during spinal anaesthesia in LSCS patients was examined in this prospective study. In our study, 115 incidences of arrhythmias under spinal anaesthesia for caesarean section accounted for 12.9% of the total. The majority of them were bradycardia, followed by supra ventricular tachycardia and ventricular ectopics. Few of these arrhythmias required medication, despite the fact that they were temporary and resolved on their own, and they responded to therapy.

Of of these, 45 individuals experienced bradycardia, 20 of which occurred during baby extraction when the uterus was compressed from above and quickly resolved without medical intervention. 11 occasions when the patient was turned supine immediately following spinal anaesthesia and was given an injection of atropine. We only treated 4 of the 8 cases of bradycardia that occurred during tubectomy; the other 4 cases resolved on their own. The other 3 cases developed when inj Prostodin was given, which returned back without treatment. Three cases in which the uterus was externalised for massage required inj atropine.

While most of the ventricular ectopics were hemodynamically stable and occurred less than six times per minute, we chose not to treat the 25 patients who acquired ventricular ectopics when the uterus was externalised for suturing out of 35 patients. During tubectomy, bradycardia was a problem in 4 patients and was managed with atropine. Six occurrences occurred while manually extracting the placenta.

18 patients had supra ventricular tachycardia, with 12 cases occurring after methyrin injection and 6 cases following atropine injection. In 12 patients, atrioventricular block was linked to bradycardia; two patients had ventricular ectopic beats; and one patient's A-V block persisted despite treatment. Cardiologists were consulted in these three situations for additional care.

The majority of our patients maintained hemodynamic stability. Hypoxia, hypercarbia, electrolyte abnormalities, acid-base imbalance, stress, and pain have all been ruled out as potential causes of perioperative cardiac arrhythmias during anaesthesia in our cases. By using a mask to administer oxygen, all patients' blood pressure was kept within the normal range. Arrhythmias in individuals may be primarily caused by changes in cardiac output, infant extraction, placental expulsion, and drugs.

Sympathetic outflow is reduced as a result of sympathetic block brought on by spinal anaesthesia. Blood pressure decreases and peripheral vasodilation are the results of this. The cardiac output decreases as a result. At this point, the patient's bradycardia will cause the cardiac output to further decline, which will cause ischemia. This requires quick action and urgent treatment. These individuals will experience electrolyte imbalances and metabolic acidosis, which can

trigger arrhythmias and further cause hemodynamic instability and cardiac arrest. Perioperative arrhythmias can result from surgical stimulation such as manipulating the ovaries, applying peritoneal traction, massaging the uterus, pulling on the umbilical cord to expel the placenta, and dilating the cervix[1-4].

Observation and the removal of the relevant stimuli indicated above can successfully control a significant portion of these intraoperative arrhythmias. A bolus of oxytocin results in tachycardia and hypotension. Hypotension is caused by peripheral vasodilatation, which decreases myocardial filling time and lowers cardiac output. Tachycardia can be harmful to these people because it causes ischemia since it increases workload, lowers blood pressure, and reduces coronary diastolic filling time[1,4,5].

Ergometrine raises the risks of myocardial ischemia and pulmonary oedema, as well as coronary vasoconstriction, hypertension, and these conditions. The effects of Prostodin[PG F2-alpha] on smooth muscles are connected to its side effects. They consist of bronchospasm, vomiting, diarrhoea, and systemic hypertension. Since these medications have the potential to cause deadly arrhythmias, anesthesiologists should exercise caution while delivering them. Since the heart rate rises by 25% during pregnancy, sinus tachycardia is extremely prevalent, especially in the third trimester. More than 50% of pregnant women who were evaluated for palpitations had ectopic beats and non sustained arrhythmia[5,6].

Both healthy adults and pregnant women are susceptible to perioperative cardiac arrhythmias on a regular basis. Hypoxia, hypercapnia, myocardial infarction, catecholamines, aberrant electrolytes, an acid-base imbalance, medication toxicity, and negative drug responses are some potential triggering factors. Regardless of the hemodynamic effects, the abrupt emergence of any new arrhythmia is alarming and demands care. Nonetheless, there are some physiological changes during pregnancy compared to a normal adult that raise the risk of perioperative cardiac arrhythmias in a typical pregnancy[4-8].

Certain physiological changes that take place during pregnancy and during anaesthesia can make arrhythmias more common in these people. Intravascular volume increased by 50%, reaching its peak during the third trimester, and systemic vascular resistance gradually decreased. During the first eight weeks of pregnancy, there is a 30–40% rise in cardiac output and a 15% increase in heart rate, with a peak at about 34 weeks. Moreover, the heart produces more blood, with an average heart rate of 8.7 6.7 L/min in the first trimester and L/min in the third. A 35% increase in stroke volume and a 15% rise in heart rate led to this outcome[5-7].

Stretch-activated ion channels are opened by the stretching of atrial and ventricular myocytes, which can lead to early after-depolarizations, shortened refractoriness, delayed conduction, and spatial dispersion. There have been a number of speculative explanations proposed to account for the increased likelihood of arrhythmias during pregnancy. They include atrial stretch, end diastolic volumes brought on by intravascular volume expansion, and hemodynamic, autonomic, hormonal, and emotional changes brought on by pregnancy that raise plasma catecholamine concentrations and adrenergic receptor sensitivity[4-6].

Progesterone has a specific action that can lower heart rate. Estrogen has the potential to change the actomyocinATPase interactions in the myocardium and boost the contractility of the myocardium. Studies show that oestrogens increase the amount of □-adrenergic receptors in the myocardium and the □-adrenergic receptors in platelets, despite the fact that there are no research specifically looking at the impact of sex hormones on the cardiac tissue[7-9].

Patients undergoing lower segment caesarean sections (LSCS) who have altered physiology due to pregnancy are more vulnerable when under anaesthesia. They run a high risk of developing further complications after surgery, including stroke, myocardial infarction, congestive heart failure, severe ventricular dysrhythmias, renal failure, and cardiac arrest, if they are not promptly identified and treated[1,8].

Pregnant women's resting ECGs will change slightly from those of non-pregnant women. The PR, QRS, and QT intervals may get shorter as the heart rate rises. Due to the gravid uterus, the electrical axis might shift to the left, and ectopics (premature atrial/ventricular beats) are extremely prevalent during pregnancy. In the inferior leads, there can be a Q wave and an inverted T wave. cardiac conduction problems are caused by chamber stretching, especially in the left atrium. While ventricular extrasystoles and supraventricular tachycardias are frequent during pregnancy, many other arrhythmias are benign and self-limited[8-10].

In the study conducted by Nirmala BC et al[1], 101 patients, or 14% of the 721 patients undergoing spinal anaesthesia for a caesarean section, experienced postoperative arrhythmias. Bradycardia was observed in 39 patients (5.40%), followed by ventricular ectopics in 30 patients (4.16%) in their study.

Similar to our study, 254 healthy women who were having a Cesarean section under spinal anaesthesia were prospectively investigated by Shen CL et al[11]. Nine patients (3.5%) had first-degree atrioventricular block, nine (3.5%) had second-degree atrioventricular block, seventeen (6.7%) had severe bradycardia (heart rate 50 beats/min), and three (1.2%) had multiple VPC. Those with severe bradycardia, multiple VPCs, or atrioventricular block had similar heights and weights to the other patients. The age of patients with the potentially harmful arrhythmias was older than that of patients in the other group, nevertheless (P = 0.006). They came to the conclusion that there were more arrhythmias and hypotension during spinal anaesthesia for caesarean sections than they had anticipated. Even though the majority of these arrhythmias were brief and resolved on their own, they occasionally happened unexpectedly and required urgent and immediate treatment.

In another study by Dev P et al[12], the incidence of arrhythmia was 31.9% during cesarean section under spinal anesthesia; and sinus bradycardia was the most common type.

The perioperative period allows for the observation of a wide variety of cardiac arrhythmias. Many of these perioperative arrhythmias spontaneously return. The majority of them can be successfully handled since their hemodynamics are stable. Oxytocic medication should only be administered intravenously because doing so can result in possibly fatal arrhythmias[12-14].

The initial blood loss, hypotension, bradycardia, and tachycardia are the most likely causes of these perioperative arrhythmias. Perioperative arrhythmias can also be caused by surgical procedures such touching the ovaries, gently pushing the abdomen during infant extraction, externalising the uterus, massaging the uterus, applying pressure to the umbilical chord to remove the placenta, and dilation of the cervix. The majority of them are preventable; surgeons should be more gentle, and anesthesiologists should be more watchful. Perioperative arrhythmias can cause serious cardiovascular problems because pregnant women have a decreased capacity for cardiopulmonary support[13-16].

## CONCLUSION

The incidence of perioperative arrhythmias following caesarean under spinal anaesthesia was examined in the current study. An outstanding local method that offers favourable operating circumstances for caesarean sections is spinal anaesthesia. Anesthesiologists who treat pregnant patients should keep in mind that perioperative arrhythmias can happen suddenly and that prompt management is the only way to ensure the safety of the mother. The patient must be closely watched and continuously monitored.

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