Casos clinicos

Cardiac arrhythmia following spinal anaesthesia at caesarean section

Arritmia cardiaca posterior a anestesia espinal en cesárea

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ISSN: 1012-2966
ISSN-e: 2227-3662
Periodicity: Semestral
vol. 43, no. 1, 2020
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Received: 07 October 2019
Accepted: 20 March 2020

URL: http://portal.amelica.org/ameli/journal/414/4141742038/

DOI: https://doi.org/10.47993/gmb.v43i1.29

Abstract: Arrhythmia and tachycardia are very common in pregnant women, although spinal block may be a safe anaesthetic technique, severe tachycardia, cardiac arrest and other arrhythmias are reported during spinal anaesthesia practices. Bupivacaine and levobupivacaine may increase the PR interval and QRS duration and prolong cardiac conduction. Dexmedetomidine has sympatholytic, sedative, respiratory stability without ventilatory depression, amnesic and analgesic properties, adverse effects of dexmedetomidine are initial hypertension, hypotension, nausea, bradycardia, atrial fibrillation, pulmonary edema, oliguria and thirst. The patient is 33 years old and 39.2 weeks pregnant, with no history of pathology. She received spinal anaesthesia and after a 10 min bradycardia of 39 corrected with atropine and later with sinus arrhythmia. In conclusion, the presence of cardiac arrhythmias may be due to several factors, and continuous monitoring of the electrocardiogram is essential to recognise and correct them in a timely manner.

Keywords: sinus arrhythmia, dexmedetomidine, spinal anesthesia.

Resumen: La arritmia y taquicardia son muy comunes en las embarazadas, aunque el bloqueo espinal pueda ser una técnica anestésica segura, la taquicardia grave, la parada cardiaca y otras arritmias son relatadas durante las prácticas de raquianestesia. La bupivacaina y levobupivacaina pueden aumentar el intervalo PR y la duración del QRS y prolongar la conducción cardiaca. La dexmedetomidina tiene propiedades simpaticolíticas, sedativas, estabilidad respiratoria sin depresión ventilatoria, amnésicas y analgésicas, los efectos adversos de la dexmedetomidina son la hipertensión inicial, hipotensión, naúseas, bradicardia, fibrilación atrial, edema pulmonar, oliguria y sed. Paciente de 33 años de edad con embarazo de 39,2 sem. Sin antecedentes patológicos. Recibe anestesia espinal y a los 10 min bradicardica de 39 corregida con atropina y posterior con arritmia sinusal. En conclusión la presencia de arritmias cardiacas puede deberse a varios factores, es trascendental la vigilancia y monitoreo continuo del electrocardiograma para reconocer y corregir de manera oportuna.

Palabras clave: arritmia sinusal, dexmedetomidina, anestesia espinal.

Cardiac arrhythmias are a major cause of morbidity and mortality during the perioperative period, as well as in critically ill patients in intensive care units (ICU)[1].

Los agentes anestésicos pueden presentar actividad pro-arritmica y antiarritmica al inducir actividad eléctrica por medio de varios mecanismos[2].

Anaesthetic agents can exhibit both proarrhythmic and anti-arrhythmic activity by inducing electrical activity through various mechanisms[2].

Neuroaxial anaesthesia is considered the preferred method of obstetric analgesia and anaesthesia for vaginal or caesarean delivery care. The effects of drugs to the foetus are avoided, anaesthesiologists generally do not use sedatives and other drugs before birth[3].

Arrhythmia and tachycardia are very common in pregnant women, although spinal block may be a safe anaesthetic technique, severe tachycardia, cardiac arrest and other arrhythmias are reported during spinal anaesthesia practices[4].

Bupivacaine and levobupivacaine may increase the PR interval and QRS duration thereby prolonging cardiac conduction[5].

Dexmedetomidine is a potent and highly selective high-selective α-2-adrenoceptor agonist with sympatholytic, sedative, respiratory stability without ventilatory depression, amnesic and analgesic properties, which has already been described as a useful and safe supplement in several clinical applications[6] .

Adverse effects of dexmedetomidine include initial hypertension, hypotension, nausea, bradycardia, atrial fibrillation, pulmonary oedema, oliguria and thirst[7]. Overdose can cause first- or second-degree atrioventricular block. Most of the adverse effects associated with the use of dexmedetomidine occur during or immediately after the attack dose[8] .

Case presentation

Paciente A 33 year old female patient from Cercado - Cochabamba, on 03 June 2019 goes to the Gynecology-Obstetrics emergency department of the Hospital Obrero N° 2 "Caja Nacional de Salud".

Patient is 39, 2 weeks pregnant weeks gestation due to the last menstrual period (FUM), previous Caesarean section, obstetric formula: G2C1P0A0. With mild abdominal pain.

The Obstetrics and Gynaecology Department decided to terminate the pregnancy with the diagnosis of pregnancy at 39.2 weeks, previous caesarean section and prodromal labour, and requested an assessment by anaesthesiology. The patient reported that she was fasting for more than two hours and the pre-anaesthetic evaluation is detailed below:

Personal background

- No relevant pathological history and no allergies.
- Personal habits: no alcoholism, smoking.
- Surgical history: bilateral tonsillectomy 22 years ago under general anaesthesia without complications, caesarean section 6 years ago for circular cord with spinal anaesthesia without complications.

Author notes

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- Gynaeco-obstetric history: G2 C1 P0 A0.
- Drugs: ferrous sulphate 200 mg, 1 tablet orally daily.

General Physical Examination:

Patient with anxiety, afebrile, with moist and pink mucous membranes, hemodynamically stable.

Vital signs: blood pressure 110/70 mmhg. Heart rate 80 beats per minute. Oxygen saturation at room temperature 96%.

Regional physical examination:

- Airway: Incomplete teeth, Mallampati I, Thyro-mental distance greater than 6 cm. Sternal-mental distance greater than 10 cm.
- Neck: Mobile, symmetrical.
- Neurological: conscious, oriented. Glasgow: 15/15.
- Heart: rhythmic, regular.
- Lungs: preserved vesicular murmur.
- Abdomen: globose at the expense of a pregnant uterus, with a uterine height of 29 cm. Single product, in longitudinal position, cephalic presentation, left dorsum, fetal heart rate of 150 beats per minute and active fetal movements.
- Extremities: normotrophic, normotonic with palpable peripheral pulses, capillary refill less than 2 seconds.

Supplementary examination

Hemogram and blood chemistry (Table 1)

	Patient Laboratory Data		Normal value
Hemogram	Red blood cells *	4 590 000	4,20-5,80
	Hemoglobin	12,2 g/dl	11-16,5 g/dl
	Hematocrit	36,5 %	35-54 %
	White blood cells	7 750 µL	4,5-10,0 µL
	Platelets *	278 000	150-400
Blood chemistry	Glycemia	60 mg/dl	70-110 mg/dl
	Creatinine	0.8 mg/dl	0,5-1,5 mg/dl
Other	TP/INR	10,1/1	10 seg/1.0
	Blood Group	O (+)	
	HIV test	Non-reactive	
	Hepatitis B-C test	Negative	

* Red blood cells: (UL) * Platelets: (µL)

TABLE 1.
Patient's laboratories

Obstetric ultrasound: placenta anterior, not previa. Grade I. (Figure 1)

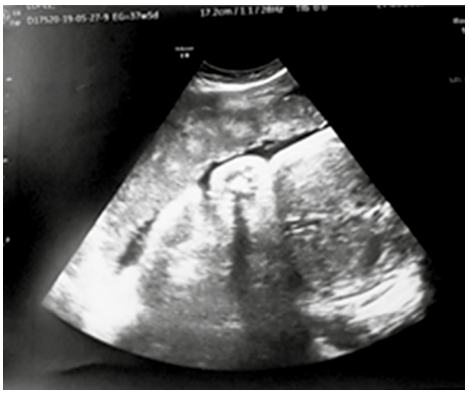

FIGURE 1.
Anterior placenta, not previa. Grade I.

It does not have an initial electrocardiogram as per service protocol.
Diagnostic Impression:

- 9.2 weeks pregnant
- Previous caesarean section
- Prodromes of labour
- Single live fetus
- American Society of Anesthesiologists Physical Status Classification ASA-II

Anesthetic plan: neuraxial anaesthesia, post-surgical analgesia, prevention of hypotension, nausea and vomiting.

The patient in the operating room underwent basic monitoring of vital signs, and was found to have BP: 112/62 mmhg, HR: 76x', SatO2: 96%. Patient in sedentary position, asepsis and antisepsis were performed, lumbar puncture by median approach with Whitacre pencil point spinal needle No. 27 at the level of the L4-L5 space; confirming the correct placement of the needle by the free flow of cerebrospinal fluid, anaesthetic mixture was administered containing: 10 mg of 0.5% hyperbaric Bupivacaine and dexmedetomidine 3 μg. Patient in supine position with pelvic wedge for uterine displacement to the left. Basic monitoring of non-invasive blood pressure, continuous electrocardiogram, heart rate and pulse oximetry was performed; these parameters were checked every 3 minutes trans-surgically.

Dermatome level reached T5. Ten minutes after anaesthesia, mean arterial pressure increased by 6 mmHg from baseline and bradycardia of 39 beats per minute, atropine 0.5 mg IV was administered, and BP 100/58 mmhg. With a good result of 105 beats per minute and maintained throughout the anaesthetic procedure between 108 - 95 beats per minute (Figure 2).

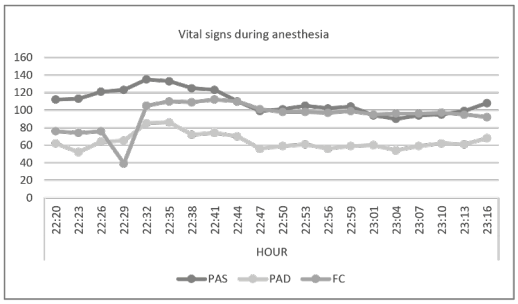

FIGURE 2.
Recording of systolic blood pressure, diastolic blood pressure and heart rate

Crystalloid solutions were administered at a rate of 15ml/kg, a female newborn was obtained with an APGAR of 8 at one minute and APGAR 9 at 5 minutes, and oxytocin 3 IU was administered intravenously as a bolus in three minutes.

Our patient presented an increase in blood pressure within the first 10 minutes.

Alterations in the electrocardiogram were evidenced without repercussions on blood pressure (Figure 3). At the conclusion of the procedure, a cardiological assessment was requested

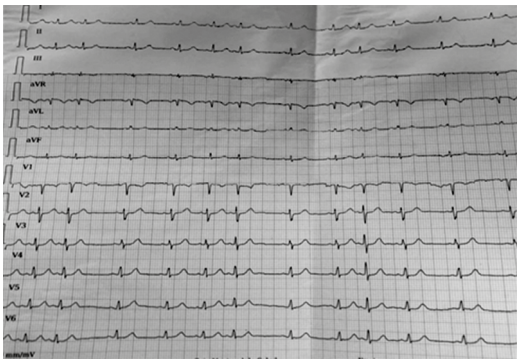

FIGURE 3.
Patient's electrocardiogram

The cardiology service mentioned that it was a transient sinus arrhythmia that only warranted monitoring, without medication. The patient was discharged two days after surgery without any cardiac problems, with sinus rhythm and was monitored by obstetrics in 10 days.

Discussion

The presentation of the clinical case is important to determine the causes of bradycardia, especially in obstetric anaesthesia.

Regional anaesthesia is the preferred technique for caesarean section because it allows maternal-fetal contact without airway manipulation and maintenance of respiratory reflexes. According to Joseph et al[9], recognised adverse effects of regional anaesthesia in parturients and non-parturients are hypotension, arrhythmia and cardiac arrest.

Cardiac arrhythmias are a major cause of morbidity and mortality during the perioperative period, as well as in critically ill patients in intensive care units. Rhythm disturbances can be well tolerated by the normal heart. However, it can cause significant haemodynamic instability in patients with a congenital or acquired heart problem[1].

In the clinical case presented, the patient had no cardiac abnormalities on monitoring and visualisation of the electrocardiogram at the start of anaesthesia. It is important to remember that hormonal and haemodynamic changes that occur during pregnancy may also result in pro-arrhythmic effects. Pregnancy may trigger the development of new arrhythmias or aggravate existing ones. In addition, levobupivacaine and bupivacaine for spinal anaesthesia were shown to shorten QT intervals in patients. Premature atrial and ventricular beats are also very frequent[4].

We can mention that the patient presents with anxiety and as described by Deniz et al[4], Sato et al[10] and Jang[11], triggering factors for bradycardia are: stress, emotions, pain, anxiety, fear, blood phobia, coughing, urination and increased afferent activity of the trigeminal and carotid sinus.

Shen et al[12] describe surgical manoeuvres such as externalisation of the uterus can also increase vagal tone and cause arrhythmia.

Anaesthetic agents can trigger pro-arrhythmic and anti-arrhythmic activity by inducing electrical activity through various mechanisms. Bupivacaine is the most commonly used drug in obstetric anaesthesia4. In our patient bupivacaine heavy 10 mg was used. There are reports, as mentioned by Leone et al[5], that the dissociation caused by bupivacaine is 10 times longer than lidocaine and the blockade induced by bupivacaine can accumulate, resulting in a more marked cardiac depression.

On the other hand, the patient had a rise in blood pressure within the first 10 minutes plus atropine administration that was elevated for a further 20 minutes, after which a drop in blood pressure was observed that ranged from 100/60 mmhg to 103/62 mmhg. Whereas, Ingersoll et al13 indicate that dexmedetomidine has a biphasic response with a transient increase in blood pressure followed by a sustained decrease in heart rate which appears to be a similar combination of a baroreflex-mediated reduction in heart rate coinciding with transient increases in blood pressure, reduced centrally mediated sympathetic tone and increased vagal tone. Talke et al[14] argue that perioperative use of α-2 agonists associated with bradycardia, sedation and dry mouth and one patient in their study had sinus pause for 5-10 seconds during intubation.

The aim of using dexmedetomidine to prolong analgesic rescue and decrease the need for intravenous analgesics can be used intravenously, intranasally, intrathecally, Xiong et al[15] describe dexmedetomidine which can prolong the duration of sensory blockade and motor blockade.

The newborn recorded APGAR of 8 and 9 at 1 minute and 5 minutes, Wang et al[16] state that there are no adverse effects in newborns and that the placental transfer rate of dexmedetomidine is 0.68.

The dermatome level reached in the patient is T5, according to Owzuck et al[17], the high sympathetic blockade may contribute to haemodynamic instability occurring with regional anaesthesia and the inotropic agents used may cause proarrhythmic effects.

At 10 minutes after intrathecal administration of the drugs, bradycardia of 39 beats per minute was present and atropine 0.5 mg was administered and as mentioned by Afonso et al8;, the common side effects of dexmedetomidine are bradycardia and hypotension, the temporary effects can be controlled with atropine, ephedrine and volume infusion.

Kalra et al[18] reported bradycardia followed by atypical Wenckebach block following spinal anaesthesia in an obstetric patient.

In conclusion, the presence of cardiac arrhythmias may be due to several factors, and continuous monitoring of the electrocardiogram is essential to recognise and correct in a timely manner in patients under regional anaesthesia, perform left uterine lateralisation, prevent maternal hypotension, and administer cocarga fluids.

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