# CASE PRESENTATION

## GESTATIONAL OBESITY AS A DETERMINANT OF GENERAL ANESTHESIA TECHNIQUE FOR CAESAREAN DELIVERY: A CASE REPORT

Obesidad en la gestación como determinante de técnica anestésica general para cesárea: reporte de caso

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**Summary**

**Background.** The incidence of obesity has undergone a dramatic increase around the world during the last few years. Such epidemic behavior has been associated with obstetric patient's frequent presentation of different stages of obesity when undergoing anesthetic procedure. Obesity in pregnant women involves the risk of adverse maternal and fetal outcomes. Hypertension and preeclampsia, diabetes, fetal macrosomia, caesarean delivery, difficult airway management and neuroaxial techniques are more likely to be performed in this group of patients.

**Materials and methods.** This is a case report of a morbid obese patient scheduled for caesarean delivery and tubal ligation. Regional, spinal and epidural techniques were attempted for surgery with unsuccessful results; this entails general anesthesia for surgery. The literature on complications due to obesity during pregnancy was reviewed, emphasising relevance for the anesthesiologist.

**Conclusion.** Obesity, especially morbid obesity in pregnant women, represents a challenge for anesthesia management. Updated knowledge of physiology and the conditions related to obesity in pregnancy is necessary; medical services must be prepared to provide optimum and safe obstetric anesthesia, analgesia and post-operation care.

**Key words:** obesity, pregnancy, obstetrics, anesthesia, general anesthesia.

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**Resumen**

**Antecedentes.** La incidencia de obesidad ha tenido un incremento importante en los últimos años a nivel global. Este comportamiento epidémico ha llevado a la presentación cada vez más frecuente de pacientes obstétricas con diversos grados de obesidad para procedimientos



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anestésicos. La obesidad en la paciente gestante tiene asociación con desenlaces adversos maternos y fetales, incremento en el riesgo de hipertensión y trastornos hipertensivos, diabetes, macrosomía fetal, nacimiento por cesárea, además de dificultad para realizar técnicas neuroaxiales y para el manejo de la vía aérea.

**Material y métodos.** Este es un reporte de caso de una paciente obesa extrema programada para cesárea segmentaria y esterilización tubárica. Se intentó la realización del procedimiento bajo anestesia neuroaxial subaracnoidea y epidural, sin éxito. Esto condicionó el empleo de anestesia general. Se realizó una revisión personal de la literatura que incluye las complicaciones relacionadas con obesidad durante la gestación de relevancia para el anestesiólogo.

**Conclusión.** La obesidad, especialmente cuando es extrema, representa un reto para el manejo anestésico de la paciente obstétrica. Es importante conocer la fisiología y las condiciones asociadas con la obesidad en la gestación y disponer de los recursos necesarios para conducir de forma segura la analgesia, la anestesia obstétrica y el cuidado postoperatorio.

**Palabras clave:** obesidad, gestación, anestesia obstétrica, anestesia general

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## Introduction

Obesity and being overweight represent a public health problem in both developed and underdeveloped countries (1). Such epidemic behavior poses new challenges for individual medical practice and health systems (2-3). There has been an increase in the prevalence of obesity and being overweight in reproductive-aged women; this has been estimated as being 30.2 percent and 56.7 percent respectively in the USA, leading to a high prevalence of obesity during pregnancy and complications arising from this (4).

In our country on 30 September 2009, became a presidential signing the law ordering the Colombian state, caring for all citizens who are morbidly obese (5). According to National Health Survey, in Colombia there are 5.7 million of obese and 15.4 million with overweight. Approximately 49 percent of women between 14 and 64 years and 39 percent of men in this age range suffer from obesity (6).

The literature contains different definitions for normality, being overweight and obesity; the most accepted one relies on the body mass index (BMI), normality being established as having 18.5–24.9 Kg/m-$^2$ BMI, being overweight as 25–29.9 Kg/m-$^2$ BMI and obesity being classified into the following three categories: class 1 30–35 Kg/m-$^2$ BMI, class 2 35–40 Kg/m-$^2$ BMI and class 3 and extreme obesity > 40 Kg/m-$^2$ BMI (7).

Obesity is defined as being a gain in weight during pregnancy greater than 110–120 percent of ideal body weight by first prenatal control, absolute pregnant weight greater than 90 kg or greater than 30 kg/ m$^2$ BMI. Some limits to weight-gain have also been defined according to pre-pregnancy weight. An obese patient should undergo a weight increase of less than 7.5 kg, an overweight one 7.5 to 12.5 kg and normal weight female 12.5 to 15 kg (6). Around 6 percent to 10 percent of pregnancies are associated with obesity, 0.43 percent to 3 percent corresponding to extreme obesity (8).

### Obstetric complications of obesity

An association has been established between being overweight and obesity during pregnancy

and adverse maternal and fetal events (9). Such excess risk constitutes a continuum from the pre-conception, pregnancy, intra-labor and puerperium period, extending for several years after pregnancy is over (8-10). Related morbidity is represented by a metabolic syndrome having clinical manifestations of chronic high blood pressure and hypertensive disorders of pregnancy, pre-gestational or gestational mellitus diabetes and dislipidemia (2).

Regarding fetal complications, the greater incidence of congenital malformations should be stressed, especially neural tube defects (11-12), fetal macrosomia, as conditioning complications during labor (dystocia of the shoulders and caesarean section) (7). Obstetric ecography's usefulness is limited for detecting such alterations from the technical point of view (2).

Increased fatty tissue hampers invasive and non-invasive monitoring of blood-pressure and airway management for the anesthesiologist (13). The latter risk is of special interest according to reports of such high intubation failure rate (up to 33%), representing (together with gastric aspiration) the main causes of anesthesia-related deaths (13-14). It may be impossible to perform regional techniques if suitable length devices are not available and they also present a greater failure rate than when used in patients who are not obese (13). Gestational obesity is a preventable risk factor which must be a priority in public health measures orientated towards promoting healthy life-styles and training health service providers so that they intervene through education and preventing associated complications (7-9).

**Clinical case**

The case of a 33-year old patient who was 38 weeks pregnant is reported; she was programmed for caesarean section plus tubaric sterilization at La Victoria Instituto Materno Infantil Hospital (state hospital company) in Bogotá, Colombia.

She had an obstetric history of three pregnancies, having had two eutocic vaginal births. Pregnancy was controlled to full term; she was classified as being extremely obese, weighing 152 Kg (64.1 $Kg/m^2$ BMI). She had a background of hypohyroidism diagnosed four years ago; this had been controlled by receiving 50 mcg/ day of L-thyroxin. She had no background of chronic hypertension or hypertensive complications of pregnancy. Gestational diabetes was excluded during prenatal controls.

The following vital signs were noted during physical examination: FC 117, Fr 18, PA 119/82 M 94; predicted difficulty for laryngoscope: 7 cm chin-thyroid distance, 5 cm oral aperture, regular cervical mobility, 1 tongue–pharynx ratio; removable upper prosthesis; abdomen having abundant adipose panicula and pregnant uterus. There were no other remarkable alterations. Paraclinical signs: Hb 13, 37.8 percent hematocrite, 0.72 mg/dL creatinine, 108 mL/min creatinine clearance, negative proteinuria.

The informed consent was signed and the risks and complications were explained; it was decided to use a neuroaxial subarachnoideal anesthetic technique. A conventional surgical table was used, 18 g peripheral venous access, pulse oxymetry, cardiovisoscopy and non-invasive blood pressure monitoring with standard adult-sized tube (12 cm).

A lumbar puncture was unsuccessfully attempted using Quincke caliber 27 g 88 mm needle. Faced by such limitation, another attempt was made at epidural anesthesia with Touhy caliber 17 91 mm needle without managing to localize the epidural space.

**Figure 1**. *Patient in sedestation position ready for applying neuroaxial subarachnoideal technique.*

**Figure 2.** *Patient in ramp position prior to anesthetic induction.*

The patient was then given general anesthesia in view of the impossibility of performing a regional technique. She received 10 mg metoclopramide and 50 mg ranitidine 20 minutes before anesthetic induction. Rapid sequence induced with 150 mcg fentanyl, 400 mcg sodium thiopental, 200 mg succinilcoline; orotracheal intubation in ramp position using 7.5 mm tube, Cormack and Lehane laryngoscopy I. Inhalatory maintenance with 2.6 percent sevofluorane and additional relaxation with 20 mg rocuronium.
Three gynecologist–obstetricians participated in the procedure, 10 minute cutaneous incision–extraction time. Female new-born, weighed 2,820 g, 45 cm length, 36 week gestational age (*Capurro*), 4, 9, 10 *Apgar* at 1, 5 and 10 minutes, respectively. Diagnosed as pre-term new-born; weight adequate for gestational age. She was hospitalized in the neonatal unit for basic care as she presented hypoglycemia.

Reversal of neuromuscular block with 2 mg neostigmin, 1 mg atropine applied. Awake extubation. No complications were presented. Time in surgery was 75 minutes and time under anesthetic 90 minutes (Figures 1-2).

## Discussion

Obesity significantly increases the incidence of cesarean birth, 20.7, 33.8 and 47.4 percent for nulipar patients having normal, obese and morbid obese BMI, respectively (15). There is also an association with increased risk of morbidity, mortality and operation and anesthetic complications (7-16).

Such context poses the need for multidisciplinary management since the moment of pre-anesthetic evaluation for the early detection of alterations during the course of pregnancy and minimizing the maternal and fetal risk of adverse events occurring. Suitable communication is required between obstetricians, anesthesiologists and nursing personnel for managing the obese patient during labor or cesarean section (13). The indications for a cesarean section must have already been very clearly defined, being identical to those for non-obese patients and vaginal birth

should have been promoted by offering epidural analgesia (15).

The technical limitations must be recognized, as must the lack of availability of sufficient resources conditioning using general anesthesia for this procedure. The necessary equipment must be available in operating rooms for monitoring these patients, such as non-invasive blood pressure measurement tubes, suitable surgical tables for 300 kg weights, suitable length needles for subarachnoideal (Spinocan 120 mm Braun, Germany), epidural (Perican 150 mm, Braun, Germany) and anesthetic combined puncture (Spocan 150 mm, Braun, Germany) (13-17).

In spite of the preference for regional anesthesia for carrying out cesarean section (due to the possibility of encountering difficulty when managing the airway and the risk of bronchoaspiration), choosing subarachnoideal anesthesia could be inadequate given the following considerations. Firstly, local anesthetic dissemination could be unpredictable and high levels of spinal blocking could be reached.

A lesser average volume of cephalorachidian liquid and the presence of soft fatty tissue have been found in intervertebral foramen in obese patients as an explanation for lower anesthetic requirement (13), added to increased intra-abdominal pressure, cava and ingurgitation compression of the epidural venous plexus (18). Secondly, a single dose of anesthetic could prove insufficient, assuming a technically more time-consuming procedure having probable complications such as uterine atony and excessive intra-operation bleeding (13).

Even though the continuous epidural technique could resolve this problem, a greater than 25 percent failure rate has been reported for this technique in these patients (19) due to difficulty in localizing the space and blocking sacral roots, thereby leading to visceral pain when manipulating the uterine segment and the bladder. It would thus seem more useful to recur to the combined technique for achieving subarachnoideal blocking quality and epidural catheter flexibility (13).

Balki *et al.*, studied 46 obese parturients, with pregnancy body mass index (BMI) > 30 Kg/M2 (MBI: 33-86 Kg/M2), requesting labor epidural analgesia. They demonstrated that ultrasound imaging in the transverse plane had a strong correlation between the ultrasound estimated distance to the epidural space and the actual distance measured by the needle in obese parturients. They suggest that prepuncture lumbar ultrasound may be a useful guide to facilitate the placement of epidural needles in obese parturients (20).

General anesthesia appears to be an alternative in elective cesarean section today and the sole technique for use with the critical obstetric patient (21). Difficulty should be foreseen for intubation, pre-oxygenating and in having resources available for managing the difficult airway; prophylaxis using gastric aspiration with particulate antacids and prokinetics should be considered (13-22). In spite of this technique being used, no reduction in *Apgar* score has been demonstrated in the newborn at 5 and 10 minutes when extraction (cutaneous incision–extraction time) has been less than five minutes (21). Extraction took 10 minutes in the case reported here. The availability of a neonatal critical care unit thus becomes fundamental for the above and other neonatal complications related to the obesity–gestational diabetes spectrum.

Publishing this case has been aimed at alerting obstetric attention-providing institutions to the

deficiencies which many of them present in terms of providing integral attention for this type of patient and the fruit of pregnancy. It has also highlighted the challenge implied in its anesthetic-surgical management.

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