



A TERTIARY CARE CENTRE STUDY OF ANAESTHETIC AND OBSTETRIC CHALLENGES OF MORBID OBESITY IN CAESAREAN DELIVERIES

Anaesthesiology

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ABSTRACT

Background The association between obesity and pregnancy can result in further limitation of parturient physiological reserve. Indeed, maternal obesity is associated with an increased risk of delivery and postpartum complications. **Objective:** To evaluate the impact of maternal morbid obesity on the anaesthetic and obstetric difficulties and complications in morbidly obese parturient that had caesarean delivery in a tertiary care centre. **Methods:** The obstetric theatre records and case files were reviewed for caesarean deliveries in the MRA Medical college, Ambedkarnagar(U.P), from January 2017 to January 2020. About 254 patients underwent caesarean section during the said period and of them the available records showed that about 31 patients in the said period were morbidly obese (Body Mass Index of greater than or equal to 35kg/m²). **Results:** There were thirty-one patients with morbid obesity (12.2%). The average Body Mass Index (BMI) was 38.3kg/m² (SD ± 2.99). Other findings included macrosomia (7 or 25.8%), gestational diabetes (13%) and pregnancy induced hypertension (7 or 22.5%). There were two neonatal deaths but no maternal deaths. **Conclusion:** Obesity has a multitude of adverse effects on the mother and the fetus. The anesthetic complications can be fatal, and it is essential to have a multidisciplinary management plan that includes the obstetrician, anesthesiologist, and neonatologist to help avoid emergent interventions.

KEYWORDS

anaesthetic, obstetric, morbid obesity

INTRODUCTION

Obesity is a disorder of energy balance. It is derived from the Latin word *obesus*, which means fattened by eating. The dramatically increasing rate of obesity in the general population also extends to women of reproductive age. During the entire course of pregnancy, elevated body mass index (BMI) is an independent risk factor for many maternal and fetal comorbidities. Pregnancy in women who are overweight, obese, or morbidly obese is a major health concern. More alarming is that the percentage of morbidly obese women which has doubled in the last decade [10]. Two studies from the United States of America (USA) [7] and the United Kingdom [8] gave prevalence rates in the caesarean section population of 40% and 19% of morbidly obese patients using the definition of BMI > 35kg/m² for morbid obesity involved.

Morbid obesity of parturients reportedly occurs in about 1% of perinatal medicine [1]. It is gaining importance because of a rising trend in juvenile obesity especially in the developed as well as in developing world [1]. The definition of morbid obesity has variously been put at a Body Mass Index (BMI) of greater than 35kg/m², 2, 3. This definition corresponds to the World Health organization (WHO) classification of severe obesity or class II obesity (class three being BMI > 40kg/m²) [4]. The WHO classification of obese class II associates it with severely increased anaesthetic and obstetric risk [5]. (Table 1)

Table I – Classification of Obesity According to the WHO

Classification	BMI(kg.m ⁻²)	Risk of comorbidities
Normal	18.5 - 24.9	Medium
Overweight		≥ 25
Pre-obese	25 – 29.9	Increased
Obese class 1	30 – 34.9	Moderate
Obese class 2 (MORBID OBESE >35 BMI)	35 – 39.9	Severe
Obese class 3	≥ 40	Very severe

Morbid Obesity in the pregnant woman is associated with a broad spectrum of problems, including dramatically increased risk for caesarean delivery, diabetes, hypertension and preeclampsia. A thorough understanding of the physiology, associated conditions and morbidity, available options for anesthesia and possible complications is therefore important for today's anesthesiologist. There are very few studies on the anaesthetic management of morbidly obese parturients

especially in semi urban and in rural India, where the obstetrician and anaesthetists have to contend with the challenges of such a patient.

Methods

The study design was an observational retrospective study on anaesthetic and obstetric difficulties and complications in morbidly obese parturient that had caesarean delivery at the MRA medical college, Ambedkar nagar from January 2017 to January 2020. It included pregnant (BMI ≥ 35kg.m⁻²) older than 18 year of age who underwent cesarean section under spinal anesthesia, except for cesarean section performed after labor analgesia. Incomplete or illegible anaesthetic or obstetric case files were not included. Variables evaluated included age, weight, height, BMI, physical status (ASA), anesthetic techniques, difficulty in spinal puncture, hemodynamic complications (bleeding and hypotension), and anesthetic complications. Also collected was the estimated blood loss (EBL), incidence of postdural headache, and fetal – maternal morbidity. The Spearman and Pearson tests were used to evaluate correlation. The Kruskal-Wallis test was used to compare continuous variables. A $p < 0.05$ was considered statistically significant. General anaesthesia was achieved with rapid sequence intubation with the relaxant technique. Laryngeal mask airways (LMA) were available for use in case of failed intubation and rapid desaturation. Patients that had either the body weight or height not recorded were also excluded from the study. Weight used in this study was the last one taken before caesarean delivery.

Results. About 254 patients underwent caesarean section during the said period and of them the available records showed that there were 31 patients with a BMI > 35kg/ m² (12.2% approx prevalence of morbid obese in our study).

Table 2 shows the mean age and anthropometric data of the patients.

Table 2- age and anthropometric data FOR 31 MORBID OBESE PATIENTS

	MINIMUM	MAXIMUM	MEAN
AGE(Years)	22	38	30
WEIGHT(KG)	73	137	100
HEIGHT(centi metre)	142.2	182.8	1.6
BMI(KG/M2)	36	40	38

Patients were classified as ASA I, II, III, and IV (Table 3). Out of 254 files evaluated around 31 patients were morbidly obese, with the

presence of prior hypertension reported in 14 patients (45.2 %), diabetes by 5 patients (16.2%), deep venous thrombosis by one patient (3.2%), and dyslipidemia by one patient (3.2%). The majority of patients 21(58.6%) underwent elective cesarean section. 10(41.4%) procedures were emergency cesarean sections, and in most of those cases, patients were classified as ASA II and III(6 and 4 cases, respectively).

Table 3-Physical status (ASA)and classification of obesity)

	FREQUENCY	
PHYSICAL STATUS		
ASA I	2	
ASA II	18	
ASA III	11	
ASA IV	--(referred to better care facility)	
TOTAL	31	
OBESITY		MEAN SURGICAL TIME(MINUTES)
CLASS 2	28	83.78 ± 21.18
CLASS 3	3	88.78 ± 21.18
TOTAL	31	

As can be seen in Table 3, all of patients had BMI> 35 When mean surgical time was related to the body mass index, it was greater the higher the degree of obesity, with statistically significant differences (p=0.04),.

Spinal anesthesia was the anesthetic technique used more often (77.4%), but other techniques such as single and continuous epidural,combined and general anesthesia were also reported (Table 4). General anesthetics performed in two cases .

Table 4- Anaesthetic techniques

	FREQUENCY
SPINAL ANAESTHESIA	24
SINGLE EPIDURAL	1
CONTINUOUS EPIDURAL	2
COMBINED	2
GENERAL	2
TOTAL	31

Technical difficulties regarding the anesthetic procedure were also observed. In patients, it was difficult to palpate the interspinous spaces. Lumbar puncture was difficult in patients, and those difficulties were directly related to the degree of obesity . Difficulty in catheter progression in the epidural space was reported in two patients, one class 1 and the other class 2, who underwent continuous epidural anesthesia.

Mean volume of bleeding estimated during the cesarean section was 500 mL approx, ranging from 200- to 1,500 mL; the amount of bleeding was greater than the higher the classification of obesity without statistically significant differences (p = 0.52).

Complications observed during the cesarean section included one case of hypoxia (0.3%),one case of hypotension but no bronchospasm related The need to complement anesthesia was greater in obesity 3. The mean age of the patients was 30 years. The average BMI was 38kg/m2 (SD ± 2.99). Two delivered under general anaesthesia (including one failed spinal that were converted to general anaesthesia). The mean estimated blood loss was 781.6mls (SD ± 349mls) and the incidence of postdural puncture headache was (2/24 or 8.3%). All patients were at term except two patients who delivered at 34 and 36 weeks respectively.

Table 5 shows the indications for caesarean section in most morbidly obese in our study with previous caesarean section with big baby being commonest(9/31,29.03%) followed by Postdated pregnancy with previous caesarean section(5/31,16.12%)

Table 5

Indications for caesarean Section	Number N=31
Previous caesarean section with big baby	9

Postdatism with previous caesarean section	5
Fetal distress	3
Moderate to severe pregnancy induced hypertension	3
Prolonged labor	3
Malpresentation	3
Bad obstetric history	1
Uterine fibroid in lower uterine segment obstructing labor	1
Placenta previa	1
Gestational diabetes/Macrosomia	1
Multiple Pregnancy	1

DISCUSSION

In India, obesity has reached an epidemic proportion, affecting 5% of the country's population. 8 Saha and others 10 submitted to the National Family Health Survey that there is an increased trend towards overweight or obesity in Indian women from 10% in 1998-9 to 14.6 %in 2005.. Pregnancy in women who are overweight, obese, or morbidly obese is a major health concern. In obese parturients, the perinatal and maternal morbidity are more common, so it is more likely to plan for elective caesarean section. Morbidly obese parturients along with physiological and pharmacological variations pose significant challenges such as patient positioning, difficult intravenous cannulation, anticipated difficult airway, risk of aspiration, associated comorbidities, postoperative ventilatory support, and risk of thromboembolism under general anesthesia .

Obese parturients have limited physiologic reserves with long periods in supine position represents a cardiovascular and respiratory risk due to changes in lung volumes and capacities, changes in ventilation/perfusion ratio, and aorta-cava compression. The cephalad retraction of the adipose tissue leads to maternal respiratory difficulties and also worsen hypotension. Spinal anesthesia is the most common type of anesthesia used in cesarean sections . It causes a more dense and reliable blockade and fast onset; however, technical difficulties do exist, such as the potential for a higher blockade of the thoracic musculature leading to respiratory difficulties and impossibility of complementing the anesthesia in case the surgery is prolonged . In our study, spinal anesthesia was the technique used more often, which is in agreement with reports in the literature. In our data, we did not find reports of respiratory difficulties and no patient presented hypoxia.

The increased risk factors including comorbidities in this study are in tandem with findings from other studies, including hypertension and cardiovascular diseases, and type 2 diabetes 4, 7, 8, 10, 11, 12 . Obstetric risks include the following: in the presence of obesity, a clinical diagnosis of pregnancy is sometimes difficult to make. As the pregnancy proceeds, it may be difficult to evaluate the size of the fetus, determine the presenting fetal part, detect the fetal heart, or recognize the presence or absence of polyhydramnios¹³. Cephalopelvic relationships are difficult to estimate, with any clinical accuracy, when patients are fat. The potential risk of cephalopelvic disproportion is always present, particularly as multiparity and the increased lordosis caused by obesity are both predeterminants of spondylolisthesis.

If Caesarean section is necessary, and there is a natural hesitancy to operate on obese patients, the hazards of both surgery and anaesthesia are increased. Depending on the site of the abdominal wound, there may be delayed healing due to haematoma formation and sweating, apart from intraoperative challenges like haemorrhage and achievement of haemostasis. During the puerperium, there is an increased risk of deep vein thrombosis³.

Twenty-four morbidly obese patients in this study delivered under spinal anaesthesia using the available Quincke sizes 23 ,25 and 26 needles and two parturients delivered under general anaesthesia (including one failed spinals that were converted to general anaesthesia). The incidence of postdural puncture headache (PDPH) at 8.3% after spinal anaesthesia in this group is actually lower than that in the non-obese spinal anaesthesia population, estimated at 25% and 40% with the 25G and 23G cutting needles respectively 14-17. This is significant as more attempts may have been made to achieve successful dural puncture in this study.

The decreased incidence of PDPH in morbidly obese parturients may relate to the large abdominal panniculus that functions as the

equivalent of an abdominal binder, elevating intraabdominal pressures and retarding the degree of spinal fluid leakage through the dural puncture site 18. However, because of the technical difficulties involved in achieving successful subarachnoid block in morbidly obese patients, it is best undertaken by experienced anaesthetists who are also proficient in endotracheal intubation, should spinal anaesthesia fail.

Major challenges in regional anaesthesia for obese pregnant women include the identification of appropriate landmarks, adequate patient positioning prior to and after performing the block, choosing a needle of sufficient length and the appropriate dose of local anaesthetic 19. It has been recommended that doses of local anaesthetics should be reduced by 25% for subarachnoid and epidural blocks in morbidly obese patients 20. The moderately higher prevalence of obesity in India in recent years might be due to changing food habits that have cuisines are higher in fat and calorie content. It is also known that Indians gain more weight when they relocate to the Western world 21. Use of spinal anaesthesia in morbidly obese patients minimised the risk of failed or difficult intubation with its consequences, and was largely responsible for the good outcome in this high risk group. The surprising absence of stillbirths may be related to higher socio-economic status of the patients and good referrals. It has been reported that the poor in the developed and the affluent in the developing countries are the predominately obese population 22.

Spinal anaesthesia is advised for use in our environment not just because of cost effectiveness, but because the incidence of post-dural headache may be reduced in obese patients 16, 17. The number of attempts before successful subarachnoid injection of bupivacaine was not documented, and was one limitation in this study. Another limitation was the retrospective nature of the study. Use of the more fine needles might result in even lower rates of PDPH.

Overall a meticulous preoperative assessment and preparation is required for caesarean section in a morbid obese parturient both by anesthesiologist and obstetrician,

CONCLUSION

In short, obesity has become an emerging threat to the health of pregnant women apart from being a multifaceted preoperative and intra-operative problem like transportation of the patient from the ward to the operating room, wound healing, and difficulties in establishing regional blocks because of difficulties in identifying landmarks that the obstetric anaesthetist has to grapple with. Furthermore, its association with postoperative complications such as venous thromboembolism and wound infections necessitates a comprehensive strategy that encompasses a multidisciplinary and holistic approach in management. Adequate prepregnancy counseling and ideal prepregnancy body weight are the best way to improve the outcomes from this problem. Obesity has a multitude of adverse effects on the mother and the fetus. The anesthetic complications can be fatal, and it is essential to have a multidisciplinary management plan that includes the obstetrician, anesthesiologist, and neonatologist to help avoid emergent interventions.

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REFERENCES

- Voigt M, Zygmunt M, Henrich W et al. Analysis of subgroup of pregnant women in Germany. 16th Communication: morbid obesity: pregnancy risks, birth risks and status of the newborn. *Geburtsh Frauenheilk* 2008; 68: 794-800.
- Bhattacharya S, Campbell DM, Liston WA et al. Effect of Body Mass Index on pregnancy outcomes in nulliparous women delivering singleton babies. *BMC Public Health* 2007; 7:168. <http://www.biomedcentral.com/14712458/7/168>
- Bray GA. Pathophysiology of obesity. *Am J Clin Nutr* 1992; 55(2):488S-494S. <http://www.ajcn.org/content/55/2/488S.full.pdf+html>
- Weiss JL, Malone FO, Emig D et al. Obesity, obstetric complications and caesarean delivery rate – A population-based screening study. *Am J Obstet and Gynecol* 2004; 190(4): 1091 – 1097.
- WHO expert consultation: Appropriate body mass index for Asian population and its implication for policy and intervention strategies. *The Lancet* 2004; 363(9403):157-163.
- Katz S. Anaesthesia for the obese parturient. *O&G Magazine* 2008; 10 (4): 29-31.
- Muir HA, Peterson – Layne CL. Review of morbid obesity in obstetric anaesthesia practice. *ASA Abstracts*, October 14, 2007.
- Saravanakumar K, Rao SG, Cooper GM – Obesity and obstetric anaesthesia. *Anaesthesia*, 2006; 61:36-48.
- Bamgbade OA, Khalaf WM, Ajai O et al. Obstetric anaesthesia outcome in obese and non-obese parturients undergoing caesarean delivery: an observational study. *Int J Obstet Anaesth* 2009; 18(3):221-225.
- Saha UC, Saha KB. A trend in women's health in India--what has been achieved and

- what can be done. *Rural Remote Health*. 2010;10(2):1260.
- Cedergren MI. Maternal morbidly obesity and the risk of adverse pregnancy outcome. *Obstet Gynecol* 2004; 103(2): 219-224.
- Beazley JM. Special Circumstances Affecting Labour. In: Dewhurst's textbook of Obstetrics and Gynaecology for Postgraduates. 5th Ed. Oxford: Charles R. Whitfield, 1995; 316-317.
- Turnbull DK, Shepherd DB. Postdural puncture headache- pathogenesis, prevention and treatment. *Br J Anaesth* 2003; 91(5):718-729.
- Barker P. Headache after dural puncture. *Anaesthesia* 1989; 44: 696–697.
- Vallejo MC. Anaesthetic management of the morbidly obese parturient. *Curr Opin Anaesthesiol*. 2007; 20(3):175-180.
- Whitty RJ, Maxwell CV, Carvalho JC. Complications of neuraxial anaesthesia in an extreme morbidly obese patient for caesarean section. *Int. J. Obstet. Anesth.* 2007; 16(2):139-144.
- Jones N, Peck M, Gowrie S et al. Post dural puncture headache in morbidly obese patients. *Can J Anaesth* 2006; 53 (Supplement 1): 26346.
- Leykin Y, Pellis T. Pathophysiological and perioperative Features of Morbidly Obese Parturients: Regional Anesthesia & Analgesia for Labour. *Expert Rev of Obstet Gynecol*. 2009; 4:313-319. http://www.medscape.com/viewarticle/703502_6
- Tuteja LV, Vanarase MY, Deval BB. Anaesthetic management of a morbidly obese patient. *JPGM* 1996; 42(4): 127-128.
- Park Y, Neckerman KM, Quinn J, Weiss C, Rundle A. Place of birth, duration of residence, neighborhood immigrant composition and body mass index in New York City. *Int J Behav Nutr Phys Act*. 2008; 5:19. Accessed on 6/10/ 2011 by 12.47pm GMT.
- Rao DP, Rao VA. Morbidly obese parturient: Challenges for the anaesthesiologist, including managing the difficult airway in obstetrics. What is new? *Indian J Anaesth* 2010; 54(6): 508-521.