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ORIGINAL ARTICLE

Anesthetic and obstetric outcomes in morbidly obese parturients: a 20-year follow-up retrospective cohort study

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ABSTRACT

Background: In 1993, Hood and Dewan published the results of a trial comparing obstetric and anesthetic outcomes of 117 morbidly obese parturients with matched controls. The authors demonstrated a higher initial epidural anesthesia failure rate, a higher cesarean delivery rate and an increased risk of obstetric complications. We replicated the previous study to provide updated information on outcomes in the morbidly obese pregnant population. We hypothesized that morbidly obese women would still have higher complication and failure rates compared to matched controls and that general anesthesia would be less commonly used than in the previous study.

Methods: The medical records of 230 patients weighing >136 kg (300 pounds) were compared to matched controls: the next patient delivered by the same obstetrician with a weight <113 kg (250 pounds).

Results: The mean weight of the morbidly obese group was 53.4 ± 6.6 kg/m² compared to 31.1 ± 5.4 kg/m² in the control group. Fifty percent of morbidly obese women required cesarean delivery compared to 32% of controls ($P < 0.01$). Morbidly obese patients had a longer first stage of labor ($P < 0.01$), larger neonates ($P < 0.01$), and were more likely to have a failed initial neuraxial technique for labor analgesia ($P < 0.01$). The need for a replacement procedure for labor was 17%, significantly less than 20 years ago when 42% of catheters in morbidly obese women failed ($P < 0.01$). Failure rates of neuraxial anesthesia for cesarean delivery were similar between groups. Neuraxial procedure times were greater in morbidly obese parturients ($P < 0.01$). Morbidly obese women were less likely to receive general anesthesia compared to 20 years ago (3% vs. 24%, $P < 0.01$).

Conclusions: Morbidly obese parturients are still at increased risk for antenatal comorbidities, failed labor analgesia, longer first stage of labor and operative delivery. Replacement labor epidural catheters and general anesthesia for cesarean delivery are less commonly required anesthetic techniques compared to the original study.

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Introduction

In 1993, Hood and Dewan published a large trial comparing anesthetic and obstetric outcomes of 117 morbidly obese parturients with matched controls.¹ The authors collected data prospectively over an 11-year period to accumulate adequate numbers for comparison. They demonstrated a higher initial epidural failure rate, as well as increased risk of obstetric comorbidities and need for cesarean delivery. Their results highlighted the importance of early epidural catheter placement with frequent assessment in morbidly obese parturients. Their data are still commonly cited in anesthesia management recommendations for that population,

such as the 2013 American College of Obstetricians and Gynecologists' Committee Opinion on Obesity in Pregnancy.²

The prevalence of obesity in the USA has increased dramatically during the past two decades, from approximately 23% to 34% of adults over 20 years.³ Theoretically, medical personnel have become more accustomed to the challenges of morbidly obese parturients, including the need for careful planning, prolonged surgery, specialized equipment, and skills for placement of neuraxial blocks. We attempted to replicate Hood and Dewan's study to provide updated information on obstetric and anesthetic outcomes in the morbidly obese pregnant population. We hypothesized that morbidly obese women would still have higher complication and failure rates compared to matched controls. Given changes in modern clinical practice and newer airway tools, we also hypothesized that combined spinal-epidural (CSE) techniques would be used more often

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for cesarean delivery in the morbidly obese pregnant population and that, when compared to controls, the use of general anesthesia would be less common than in the past.

Methods

Following Institutional Review Board approval, the medical records of pregnant patients weighing >136 kg (300 pounds) were retrospectively reviewed and compared to matched controls, consistent with the previously published study criteria.¹ The definition of morbidly obese in pregnancy is controversial, and therefore, we chose our classification based on the study we hoped to replicate, rather than World Health Organization (WHO) body mass index (BMI) standards. Also consistent with the previous study, the matched control group in our cohort study was deemed to be the next patient delivered by any mode by the same obstetrician. The rationale behind this matching strategy was to minimize the effects of medical practice variation. A matched control delivered by the same practice group was used if another patient was not available in that month. A weight restriction of <113 kg (250 pounds) was implemented for the matched controls to create a comparison group that minimized the number of morbidly obese women.

Data were collected for both patient groups from the years 2011–2012. From handwritten anesthetic records and electronic delivery summaries, we extracted and analyzed epidemiologic data, maternal complications,

type of delivery, obstetric management, anesthetic technique and complications, and neonatal outcomes. A total of 230 morbidly obese patients plus their matched controls were identified. On rare occasions, data were missing or unavailable for a small number of participants on isolated variables. Therefore, any specific analysis might involve less than the total sample size. We attempted to replicate Hood and Dewan's study to the extent possible when choosing coding strategies and statistical techniques.

Statistical analysis

Mean data were analyzed with Welch two sample t-tests, median data with Wilcoxon rank sum tests, and frequency data with Fisher's exact test, as appropriate. For time data, Wilcoxon rank sum tests were used because of skewed data and outliers. *P* values for statistical significance within each set of analyses were adjusted for multiple comparisons using Bonferroni's correction.

Results

Morbidly obese pregnant women were taller but had similar gravidity, parity, and gestational ages at delivery (Table 1). Even with a weight restriction on the control group, the matched controls for this study were significantly larger by BMI than the comparison group from the data published in 1993 (mean 31.1 ± 5.4 vs. 27.8 ± 5.8 , $t=5.2$, $P < 0.01$). Table 2 compares key

Table 1 Patient characteristics

	Morbidly obese (<i>n</i> =230)	Controls (<i>n</i> =230)
Age (years)	28.4 ± 5.6	27.1 ± 6.3
Height (cm)	169.0 ± 7.3*	162.3 ± 6.5
Weight (kg)	151.9 ± 15.7*	81.8 ± 15.0
Body mass index (kg/m ²)	53.4 ± 6.6*	31.1 ± 5.4
Gestation (weeks)	38.2 ± 2.6	38.2 ± 3.0
Gravidity	2 [1,3]	2 [1,4]
Parity	1 [0,1]	1 [0,2]

Data are mean ± SD, median [IQR]. **P* < 0.01.

Table 2 Comparison of key outcomes between original and current study

	Hood & Dewan data ¹		Current data	
	Morbidly obese	Control	Morbidly obese	Control
Body mass index (kg/m ²)	52.6 ± 6.0	27.8 ± 5.8*	53.4 ± 6.6	31.1 ± 5.4*
Cesarean delivery rate	72/117 (62%)	28/117 (24%)	116/230 (50%)	74/230 (32%)
Cesarean delivery in labor	41/86 (48%)	9/98 (9%)	56/170 (33%)	25/181 (14%)
Failed labor analgesia requiring repeat procedure	33/79* (42%)	4/67 (6%)	28/163* (17%)	4/147 (3%)
GA required for cesarean delivery	17/72* (24%)	8/28 (29%)	3/116* (3%)	5/74 (7%)

Data are mean ± SD or number (%). **P* < 0.01. GA: general anesthesia comparisons were made between morbidly obese (or matched controls) at the two different time frames.

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