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CLINICAL ARTICLE

Effect of bariatric surgery on pregnancy outcome ☆

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Abstract

Objective: To compare the perinatal outcomes of women who delivered before with women who delivered after bariatric surgery. *Methods:* A retrospective study was undertaken to compare perinatal outcomes of women who delivered before with women who delivered after bariatric surgery in a tertiary medical center between 1988 and 2006. A multivariate logistic regression model was constructed to control for confounders. *Results:* During the study period, 301 deliveries preceded bariatric surgery and 507 followed surgery. A significant reduction in rates of diabetes mellitus (17.3% vs 11.0; $P=0.009$), hypertensive disorders (23.6% vs 11.2%; $P<0.001$), and fetal macrosomia (7.6% vs 3.2%; $P=0.004$) were noted after bariatric surgery. Bariatric surgery was found to be independently associated with a reduction in diabetes mellitus (OR 0.42, 95% CI 0.26–0.67; $P<0.001$), hypertensive disorders (OR 0.38, 95% CI 0.25–0.59; $P<0.001$), and fetal macrosomia (OR 0.45, 95% CI 0.21–0.94; $P=0.033$). *Conclusion:* A decrease in maternal complications, such as diabetes mellitus and hypertensive disorders, as well as a decrease in the rate of fetal macrosomia is achieved following bariatric surgery.

1. Introduction

The prevalence of people who are overweight or obese has increased dramatically in high-income countries over the past 20 years [1–3]. Figures for 1999–2002 showed that in the United States approximately two-thirds (65.1%) of Americans aged 20 years or older had a body mass index (BMI, calculated as weight in kilograms divided by height in meters squared) greater than 25 and were considered overweight, one-third (30.4%) were considered obese (BMI greater than 30), and

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Table 1 Clinical characteristics of women who delivered before and women who delivered after bariatric surgery [a]

Characteristics	Deliveries before bariatric surgery (n=301)	Deliveries after bariatric surgery (n=507)	*P* value
Maternal age, y	26.5±4.3	31.3±5.1	<0.001
Gestational age, wk	38.9±2.5	38.7±2.4	0.14
Ethnicity			0.28
Jewish	98.3	97.4	
Bedouin	1.7	2.6	
Gravidity			<0.001
1	43.2	26.2	
2–4	51.8	65.5	
≥5	5.0	8.3	
Parity			<0.001
1	35.9	18.5	
2–4	51.8	60.0	
≥5	12.3	21.5	
Previous cesarean delivery	7.6	20.1	<0.001
Obesity [b]	19.6	9.5	<0.001
Pregestational diabetes	5.6	2.4	0.014

[a] Values are given as mean±SD, or percentage.
[b] Maternal prepregnancy body mass index of 30 or greater (calculated as weight in kilograms divided by height in meters squared).

4.9% were morbidly obese (BMI greater than 40) [1]. Between 1999 and 2002, close to one-third of women of childbearing age (20–39 years) were classified as obese in the United States, and an additional 25% of women in this age cohort were overweight [1]. In Sweden, the increase in numbers of overweight women has been less prominent, but is indisputable nonetheless [4]. In the United Kingdom up to 40% of women in one study had a maternal BMI classified as either moderately or very obese [5]. In Israel, obesity rates are high and similar to those reported in the United States [6].

In addition to the escalating prevalence of overweight and obese women of reproductive age, the rates of adverse perinatal outcomes and comorbidities are also rising. Pregravid obesity is a significant risk factor for both adverse maternal and perinatal outcomes [7–11], with an increased risk for spontaneous abortions and congenital anomalies encountered in early pregnancy [10,12–14]. Gestational hypertensive disorders and diabetes, the maternal manifestations of the metabolic syndrome, become clinically recognized in the later stages of pregnancy [7–9,12]. The combination of pregestational metabolic syndrome and the physiological changes of pregnancy cause an increased risk for problems such as chronic cardiac dysfunction, proteinuria, sleep apnea, and nonalcoholic fatty liver disease [12]. During labor, obesity increases the risk for cesarean delivery and the associated complications of anesthesia, infection, wound disruption, and deep venous thromboembolism [7,12]. Obesity is also associated with short-term perinatal risks of macrosomia, birth trauma, and shoulder dystocia, and long-term risks of adolescent and adult metabolic syndrome [7–9,12–15].

Weight loss before conception is the optimum way to decrease the risk for medical and obstetric complications in obese women of reproductive age. Because medical therapy and lifestyle changes have had limited success in maintaining long-term weight loss, bariatric surgery has become a popular alternative for obese women planning pregnancy [12]. Recent evidence reported that pregnancies after bariatric surgery were uncomplicated and well tolerated by the mothers, even in the presence of gestational diabetes mellitus [16–18]. The purpose of the present study was to examine the perinatal outcomes of women who delivered before bariatric surgery with women who delivered after bariatric surgery. We hypothesized that the perinatal outcomes of pregnancies following bariatric surgery would be

Table 2 Gestational risk factors and perinatal complications in women who delivered before and women who delivered after bariatric surgery [a]

Characteristics	Deliveries before bariatric surgery (n=301)	Deliveries after bariatric surgery (n=507)	OR	95% CI	*P* value
Fertility treatment	6.6	7.5	1.1	0.6–1.9	0.38
Recurrent abortion	4.3	5.5	1.3	0.7–2.5	0.28
Hypertensive disorders (total)	23.6	11.2	0.4	0.3–0.6	<0.001
Severe pre-eclampsia	4.0	1.0	0.2	0.1–0.7	0.005
Diabetes mellitus (total)	17.3	11.0	0.6	0.4–0.9	0.009
Gestational diabetes mellitus	11.6	8.7	0.7	0.5–1.2	0.11
Placental abruption	0.3	0.8	2.4	0.3–21.4	0.39
PROM	7.6	10.5	1.4	0.8–2.4	0.11
Malpresentation	5.3	8.7	1.7	0.9–3.1	0.056
IUGR	2.3	3.9	1.7	0.7–4.1	0.15
Anemia (Hb<10 g/dL)	70.9	61.8	0.7	0.5–0.9	0.014

Abbreviations: PROM, premature rupture of membranes; IUGR, intrauterine growth restriction; Hb, hemoglobin; OR, odds ratio; CI, confidence interval.
[a] Values are given as percentages unless otherwise indicated.