Is Restrictive Bariatric Surgery Good Option in Improving Pregnancy Outcome in Obese Women?

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Abstract

Maternal obesity is a major cause of obstetric morbidity and mortality. Strong evidence links weight loss with improved fertility outcomes and reduced gestational complications in subsequent pregnancies. Bariatric Surgical procedures became widely available and facilitate weight loss. The procedure is effective in preventing the complications surrounding reproduction and pregnancy often seen in the obese woman. Restrictive procedure is one of bariatric surgery which is safe and effective treatment of obesity.

Aim of study: This study is done to evaluate the pregnancy outcome following restrictive bariatic surgery, the Laparoscopic Adjustable Gastric Banding (LAGB) and vertical-banded gastroplasty (VBG).

Methods: This prospective cohort study was carried out in Obstetric department of Zagazig University Hospitals between June 2011 and July 2014. The study enrolled 450 obese pregnant women whose pre-pregnancy mean body weight and BMI at the onset of pregnancy were 98 kg and 33.9 respectively. 50 women underwent restrictive bariatric surgery either by laparoscopic adjustable gastric banding (LAGB) or, vertical-banded gastroplasty (VBG) as (study group) and 400 women who were obese without underwent surgery (Control group). The mean interval from surgery to conception averaged 18.8 with standard deviation 10.2 months and those women lost a mean of 29 kg body weight before becoming pregnant. All were recruited from antenatal outpatient clinic. The exclusion criteria in both groups were: any medical disorders like hypertension, diabetes mellitus and previous caesarean section or uterine scar. We compared pregnancy complications, weight change during pregnancy, nutritional deficiencies, fetal birth weight and outcome, and mode of delivery between both groups.

Results: The percentage of pregnancy-induced hypertension in post-bariatric surgery women (case group) less than in the control group (8.5% versus 20%; P=0.001), rates of gestational diabetes mellitus (6.9% versus 12.8%; P=0.007). Rates of preeclampsia and eclampsia was (2.1% versus 7.5%, P=0.005). Nutritional deficiencies for mother post-bariatric surgery were more than those without surgery. Neonatal outcomes were similar or better after surgery compared with obese women. The rate of miscarriage, premature delivery and congenital anomalies percentages did not seem to significantly differ in pregnancies after bariatric surgery compared to control groups. The proportion of infants being small for gestational age was 6.2% versus 5.6% with no statistically significant differences but the proportion of large for gestational age infants was 4.1% versus 9.6% with significant differences p value 0.003. Cesarean deliveries were significantly more frequent in control women than in study cases (24.8% vs. 12.7%) with p value 0.001. Also, percentage of vaginal delivery in (case group) was significant higher than in (control group) but no significant differences in percentage of Instrumental deliveries.

Conclusion: Restrictive Bariatric surgery appears to be safe procedure, well tolerated during pregnancy and to have positive effects on pregnancy outcome when compared to pregnancies of obese women without surgery.

Keywords: Obesity; Pregnancy; Bariatric surgery; Fetal outcome

Introduction

Maternal obesity (defined as BMI ≥ 30 at the first antenatal consultation) has become one of the most commonly occurring risk factors in obstetric practice as it associated with increased risk of gestational diabetes, macrosomia, hypertension, preeclampsia, thromboembolism and intrapartum anesthesia problems than women of normal weight (BMI 18-25 kg/m²) [1].

The prevalence of obesity in pregnancy has risen dramatically in recent years. In the UK, 33% of pregnant women are overweight or obese and more than one-third of adult Americans are obese. The relationship between obesity and risk for morbidity from type 2 diabetes, hypertension, stroke, sleep apnea, osteoarthritis, and several cancers is well documented [2]. Obese women have an increased risk of intrauterine fetal death, preterm labor, miscarriage and fetal chromosomal anomalies. Obese women have a greater incidence of dysfunctional labor and caesarean section as well as postpartum haemorrhage [3].

The health problem of obesity pushes lots of women at reproductive age, to seek long-term treatment to enable weight loss. However, little anti-obesity interefrences has been found to be helpful. Non-operative means of weight loss include lifestyle interventions, such as diet, exercise and medication generally have modest benefits and their efficacy is directly linked to compliance, which wanes overtime Comparing with surgery, Bariatric surgery has proved the most effective long-term weight loss strategy in obese women of reproductive age, but clinicians should be aware of the effects of bariatric surgery on fertility and future pregnancies.
Patients and Methods

This prospective cohort study was carried out in Obstetric department of Zagazig University Hospitals between June 2011 and July 2014. Written Consent was taken from all patients who participated in our work. The study enrolled 40 obese pregnant women whose pre-pregnancy mean body weight 98kg and body mass index (BMI) 33.9 at the onset of pregnancy, 50 underwent restrictive bariatric surgery before conception either by laparoscopic adjustable gastric banding (LAGB) or, vertical-banded gastroplasty (VBG) as (study group) group (A) and they lost a mean of 29 kg body weight before becoming pregnant. The mean interval from surgery to conception averaged 18.8 with standard deviation (SD) 10.2 months.(Control group) group (B) included 400 women who were obese without surgery who were recruited from antenatal outpatient clinic. The exclusion criteria in both groups were: any medical disorders like hypertension, diabetes mellitus and more than two previous caesarean section. The study protocol was approved by the Ethics Committee of the Zagazig University Hospitals. We compared pregnancy complications, fetal birth weight and outcome, delivery method, weight change during pregnancy, and nutritional deficiencies between both groups.Almost all pregnant women in Study regularly visit antenatal clinic, usually from the 6-9th week of gestation. Full history was taken andrecorded several data such as age, parity, pre-gestational weight and BMI. Clinical examination was done and exclude any patient has chronic medical disorders like hypertension, diabetes or previous caesarean section. Regular antenatal ultrasound scan and laboratory testing during pregnancy to all women enrolled in the study. Laboratory testing included a complete blood count, electrolytes, glucose, iron studies, ferritin, vitamin B12, albumin, calcium and folate. To perform these tests once a trimester if the levels are normal. Abnormal levels or persistent deficiencies despite supplementation would require additional testing and management in consultation with the bariatric surgery team and early consultation with a clinical nutritionist is recommended. Screening for gestational diabetes with 50 g glucose was replaced by home glucose monitoring with fasting and 2- hour postprandial blood sugars for 1 week during the 24-28 weeks of pregnancy to avoid Dumping syndrome.Birth-related variables such as birth weight, gestational length, instrumental delivery, caesarean section, as well as if the women were the result of a twin birth. Preterm birth was defined as less than 37 completed weeks of gestation, small for gestational age small-for-gestational age (SGA) as <10th percentile and large-for-gestational age (LGA) >90th percentile.Normal delivery was defined as a vaginal delivery without any instrumental assistance. Statistical analyses were performed using Statistical Package for the Social Sciences (SPSS) for Windows. Student's t test, Kruskal–Wallis test, Wilcoxon signed rank test, and Mann–Whitney U tests were used to compare groups where appropriate.All P values were the results of two-sided tests, and they were considered significant if<0.05.

Results

The characteristics of the patients of both groups are listed in (Table 1). The mean age of the patients with bariatic surgery (case

### Table 1: The demographic characteristics of studied groups.

<table>
<thead>
<tr>
<th>Demographic characters</th>
<th>Case group ( N=50)</th>
<th>Control group ( N = 400 )</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age ( years )</td>
<td>29.7± 5.1</td>
<td>29.4 ±4.8</td>
<td>0.193</td>
</tr>
<tr>
<td>Mean body mass index BMZS (kg/m2)</td>
<td>31.3±3.5</td>
<td>31.7±6.2</td>
<td>0.103</td>
</tr>
<tr>
<td>Parity ( mean )</td>
<td>1.4±1.0</td>
<td>1.2± 0.8</td>
<td>0.176</td>
</tr>
<tr>
<td>Assisted reproduction (ICSI) (%)</td>
<td>5 (10 %)</td>
<td>41 (10.2%)</td>
<td>0.144</td>
</tr>
<tr>
<td>Mean weight gain during pregnancy (kg)</td>
<td>7.3±1.4</td>
<td>9.1±1.7</td>
<td>0.01</td>
</tr>
</tbody>
</table>

The data are presented as mean ± SD or N (%). P value < 0.05 is significant.
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Table 5: Mode of delivery.

<table>
<thead>
<tr>
<th>Mode of delivery</th>
<th>Case group (A) (N = 50)</th>
<th>Control group (B) (N = 400)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vaginal delivery</td>
<td>41 (87.3%)</td>
<td>286 (74.8%)</td>
<td>0.001</td>
</tr>
<tr>
<td>Instrumental (ventose)</td>
<td>3 (6.3%)</td>
<td>31 (8.1%)</td>
<td>0.092</td>
</tr>
<tr>
<td>Cesarean section</td>
<td>6 (12.7%)</td>
<td>95 (24.8%)</td>
<td>0.001</td>
</tr>
</tbody>
</table>

The data were significantly more frequent in control women than in study cases (24.8% vs 12.7%) with P value 0.001. Also, percentage of vaginal delivery in (case group) was significant high than in (control group) but no significant differences in percentage of Instrumental deliveries (Table 5).

Discussion

Public health research has identified obesity as the second leading cause of death in America, behind only tobacco-related illness. More young women are seeking obesity treatments, which may cause increased pregnancies after weight loss. Women who successfully lose weight after bariatric procedures and become pregnant need to be evaluated carefully because of various operative procedures. Restrictive operations limit caloric intake and primarily consist of vertical banding gastroplasty or gastric banding [14]. Restrictive procedures consist in reducing the stomach’s capacity so as to induce early satiety and reduce energy intake. While this type of procedure seems to lack the effect on enteroendocrine mediators seen after RYGB, the main satiety-inducing mechanism in this case derives from the activation of specific receptors of the myenteric ganglia; and these vagal stimulations are responsible for a smaller appetite. Postoperative complications of restrictive procedures are infrequent less than malabsorptive procedures [15]. Women who receive recommended supplemental vitamins and minerals usually do not have anemia or vitamin deficiency and have less complicated pregnancies than morbidly obese women. Women who have malabsorptive procedures might have deficiencies in iron, vitamin B12, or fat-soluble vitamins. Electrolyte abnormalities can result if recommended supplements are not taken or if the length of remaining small bowel is inadequate [16]. The National Institute for Health and Clinical Evidence concluded that; Surgery remains more effective than a non-surgical approach for people who are obese and weight loss after surgery has the potential to confer enormous health benefit for mother and child in the longer term (measured up to 10 years after surgery) [17]. There is increasing evidence to suggest that weight loss after bariatric surgery may improve maternal and perinatal outcomes by reducing obesity-associated obstetric risk factors. A number of recent case-control and cohort studies demonstrate that women who have had preconceptional bariatric surgical procedures may have lower rates of obesity-related pregnancy complications such as gestational diabetes and hypertensive disorders than either historical controls or women who had pregnancies before their bariatric procedures [12,18]. Skull 2004, Marceau 2004, Dixon 2005, Ducarme 2007 and Lapolla 2010 demonstrated lesser weight gain during pregnancy in postbariatric women than that in those obese without surgery. Our study agreed with their results as we found that postbariatric women gained weight during their pregnancy less than control group with p value 0.01. [19-23]. In a retrospective cohort study of US insurance,Bennett et al. found that women who had delivered after their bariatric procedure had substantially lower rates of preeclampsia and eclampsia, chronic hypertension complicating pregnancy, and gestational hypertension), even after adjustment for age, multiple pregnancy, surgical procedure, and pre-existing diabetes [24]. Similarly, in a large retrospective study
of all women between 1998–2006 who delivered after bariatric surgery in a tertiary unit in Israel, Weintraub et al. found a significant reduction in the rates of gestational diabetes mellitus (17.3% versus 11.0%; P=0.009) and hypertensive disorders in pregnancy (23.6% versus 11.2%; P=0.001) after analysing 301 deliveries preceding bariatric surgery and 507 following surgery [25]. Our results agreed with those studies as we found the percentage of pregnancy-induced hypertension in case group less than in the control group (8.5% versus 20%; P=0.001), rates of gestational diabetes mellitus (6.9% versus 12.8%; P=0.007). Rates of preeclampsia and eclampsia was (2.1% versus 7.5%; P=0.005) Several case reports have described nutritional deficiencies in women becoming pregnant after bariatric surgery. In particular, Bebber et al. [26] reported that such women had frequently had low levels of vitamin B12 (in 53.4% of cases), folic acid (16%), ferritin (41.7%),calcium (16.7%) and albumin (10%), that the authors attributed to the women's considerable weight loss before their pregnancy (47.8 ± 22.2 kg). Our study had near results to them as we found Nutritional deficiencies for mother after bariatric surgery were more than those without surgery in the form of deficiencies in vitamin B12 (29.7%), folic acid (10.6%), ferritin (25.5%), calcium (12.7%) and albumin (8.5%). Pregnancy following bariatric surgery has also been demonstrated to reduce fetal macrosomia (birth weight>4000 g). Weintraub et al. found a significant reduction in the incidence of macrosomia in women who delivered after bariatric surgery compared with those who delivered before (7.6% versus 3.2%; P = 0.004) [25]. A reduced risk of macrosomia is not supported by all studies. In a prospective study of 79 consecutive pregnancies following laparoscopic adjustable gastric banding in comparison with the same patient's penultimate pregnancies before surgery, Dixon et al. found that although the pregnancy maternal weight gain was lower in those who had undergone surgery, there was no significant difference in birth weight between the two groups [20]. Our study found that the proportion of large for gestational age infants was 4.1% versus 9.6% with significant differences p value 0.003 which agreed with Weintraub et al but did not agree with Dixon et al. The study by Sheiner et al. demonstrated an apparently increased rate of intratrimester growth restriction with a history of bariatric surgery (5% versus 2%; P <0.001), [27]. Ducarme et al. demonstrated the rates for low birth weight (<10% centile) were lower amongst postbariatric surgery patients compared with controls (7.7% versus 10.6%) [22], Dixon et al. demonstrated significant differences in the incidence of SGA infants in post-bariatric surgery patients compared with controls. Our study demonstrated the proportion of infants being small for gestational age was more in patient post bariatric surgery (6.2%) than control group (5.6%) but, with no statistically significant differences. Shneider 2004, Skull 2004 and Lapolla 2010 reported increased the rate of caesarean delivery in women had bariatric surgery but Ducarme et al. 2007 reported decrease rate of caesarean delivery post bariatric surgery to half that of obese nonsurgical. Other studies found that does not appear to have a strong relationship with caesarean delivery rates [28]. A review by Vrebesch et al. 2012 found that the incidence of caesarean sections was lower after BS [10]. Other reviews concluded that the incidence of caesarean section after BS is unclear and will need to be investigated further [4]. Our results found significant difference in caesarean section rate between both groups. The rate was lesser in women who have had bariatric surgery than those had no surgery. This agreed with Ducarme et al. 2007 and Vrebesch et al. 2012. That may be due to increase the rate of medical complication like hypertension, preeclampsia and gestational diabetes in obese women without surgery (control group).

Conclusion

The present study concludes that restrictive bariatric surgery improves pregnancy outcomes and lowers the risk of adverse obstetrical complications in obese women. It is a safe procedure and is well tolerated during pregnancy. Recommendation to be the preferred procedure in obese women is planning to become pregnant.

References


