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Pregnancy Following Gastric Bypass for Morbid Obesity

Alan C. Wittgrove MD, FACS[1]; Leslie Jester CRNP[1]; Perri Wittgrove MD, FACS[2]; G. Wesley Clark MD[1]

Private Practice, [1]Departments of Surgery and [2]Obstetrics and Gynecology, Alvarado Hospital and Medical Center, San Diego, CA, USA

Background: Women who suffer from morbid obesity are often infertile. If these women are able to become pregnant, they are considered high risk because of the hypertension, diabetes and other associated risk factors. Following the pregnancy is difficult due to limitations of the physical examinations. More costly ultrasound examinations are needed at a higher frequency. Bariatric surgery reduces the woman's weight and the incidence of obesity related co-morbidities. The number of pregnancies and rate of complications during those pregnancies in our post-bariatirc surgical patients were evaluated.

Method: Our group has been doing bariatric surgery since the early 1980s. We have over 2000 active patients on our current newsletter mailing list. The patients also have a series of networks through support groups. The patients are informed to contact us when they become pregnant so we may assist the obstetrician with their care. Through these various means, we have been able to identify 41 women in our patient population who have become pregnant. Using personal interview, questionnaire, and review of perinatal records, pregnancy-related risks and complications were studied.

Results: With over a 95% follow-up rate on the patients identified as having been pregnant following surgery, we found less risk of gestational diabetes, macrosomia, and cesarean section than associated with obesity. There were no patients with clinically significant anemia.

Conclusion: Since the patients had an operation that restricts their food intake, some basic precautions should be taken when they become pregnant. With this in mind, our patients have done well with their pregnancies. The post-surgical group had fewer pregnancy-related complications than did an internally controlled group that were morbidly obese during their previous pregnancies.

Key words: Gastric bypass, morbid obesity, pregnancy.

Correspondence: Alan C. Wittgrove MD, FACS, 6719 Alvarado Road, Suite 308, San Diego, CA 92120, USA. Tel: (+1) 619 229 3940; Fax: (+1) 619 229 3951; E-mail: acwmd@electriciti.com

Introduction

Obesity is rapidly becoming the nation's number one health risk.[1,2] Diet and behavior modification are notoriously unsuccessful ways to lose weight and maintain weight loss.[3–5] Recently, the safety and effectiveness of drug therapy for obesity have been questioned. Bariatric operations are effective at achieving weight loss, but is it safe to become pregnant following these operations?

Morbid obesity has long been known to be a cause of infertility, and several authors consider obese pregnant women to be 'high risk'.[6–8] Obesity during pregnancy increases the frequency of hypertension, pre-eclampsia, diabetes, macrosomia, neural tube defects and intra-partum anesthesia complications.[9,10] Is it safer to become pregnant while morbidly obese, or safer to become pregnant once the patient is 'postoperative' from her bariatric surgery, and has sustained the majority of her weight loss? We retrospectively evaluated all of our gastric bypass patients who had become pregnant.

Method

Our group has been performing bariatric surgery for more than 15 years, and our active contact management database for newsletters contains details of more than 2000 patients. Active follow-up is maintained even years after the operation whenever possible. We have follow-up clinics in several cities throughout California to facilitate follow-up and ease travel problems for the patient.

Through long-term follow-up, we knew of many women who had become pregnant. We also

placed several articles in our newsletters about our pregnancy study, and sent out special mailings to our entire database to solicit contacts of women who had become pregnant following the bariatric operation. All leads and contacts were followed, and we discovered 41 patients who had become pregnant after operation; 40 cooperated with the study. All patients were interviewed by our Nurse Practitioner (L.J.), and a standardized form was used for information gathering. Medical records releases were obtained from the patients, so that additional medical information could be reviewed as indicated.

Our group performs primarily Roux-en-Y gastric bypass (RYGB) operations with a 15 ml measured proximal gastric pouch, divided stomach, and a *proximal* Roux-en-Y configuration. We also have a series of about 550 biliopancreatic diversion (BPD) patients that we follow; they were not included in this study.

Results

There were 49 pregnancies among 36 women, with 36 singleton births, three twin pregnancies and two triplet pregnancies. No fertility drugs were used. There was one elective and seven spontaneous abortions.

Of the 41 women who became pregnant after RYGB 17 had been pregnant prior to their bariatric procedure. These women served as their own controls. Table 1 shows the pre- and postoperative pregnancy statistics of this group as well as the total post-operative group.

In our series there were no women who suffered with clinically significant anemia. There were no transfusions and no iron was administered parenterally.

There were 13 Cesarean sections for the entire postoperative group. Within this group, there were five primary cesareans in 36 singleton births; the same number as that performed on just 17 patients pregnant prior to bariatric surgery. Of note (and of unknown significance), in spite of this small sample size, is that the incidence of breech presentation was higher than the usually quoted rate of 3% of term births.

One patient was diabetic during her 'postoperative' pregnancy. She became pregnant within 1 year of RYGB and she shows no evidence of being diabetic now, 2 years post-partum. Table 1 shows the incidence of diabetes for the women who serve as their own control group.

The average weight gain with pregnancy *before* bariatric surgery, was 20.4 kg. The average weight gain for RYGB patients was 12.7 kg. This weight gain was, on average, lost within 5 weeks post-partum. There were two significant outliers who took months to lose their pregnancy weight.

Discussion

Bariatric surgery is the most effective tool to assist in the weight loss of the morbidly obese.[11,12] Is pregnancy safe following these procedures? Our data appears to indicate an emphatic 'yes'.[13] We would like to emphasize, however, that in order to maximize outcomes certain recommendations be followed.

Pregnancy should be avoided during the first 12 to 18 months postoperation. During this time, the woman is eating very small amounts of food and is generally on a steep weight loss curve. One concern is that the patient or her baby will become 'unhealthy' in this relative starvation state. The

Table 1. Comparison of patients who had been pregnant before and after their bariatric surgery as well as the total postoperative group (Singleton births only)

Morbidity	Preoperative ($n = 17$)	Postoperative ($n = 17$)	Total postoperative group ($n = 36$)
Pre-term labor (self reported)	3/23 Babies	2/18 Babies	4/36 Babies
Hypertension	7	0	0
Diabetes mellitus	4	0	1
Cesarean section	6 Total (5 primary)	6 Total (3 repeat, 3 primary) (2 breech)	13 Total (5 primary) (3 breech)
Macrosomia (> 4000 gm)	7/23	1/18	2/36

second concern is that the overall weight loss may be less.

Early prenatal care is essential for pregnancy dating and nutritional evaluation. It is important to determine the baseline nutritional status early in the course of the pregnancy. Laboratory data assists in this assessment. If there are deficiencies, they are best corrected early in the pregnancy. Ideally, the time to correct nutritional problems is pre-conception, making pregnancy planning the most sensible approach.

Vitamin and iron supplementation is important in all pregnancies. It is even more important for post-bariatric surgical patients. The prenatal vitamins should be given *in addition to* the patient's usually prescribed vitamin supplementation and *not instead of* that supplementation. We have found ferrous fumerate to the best tolerated and most effective iron supplement when the duodenum is bypassed, although a prosepective, randomized study is needed to better evaluate this recommendation.

Prenatal care is best accomplished with careful coordination between the obstetrician and the bariatric surgeon. There are significant differences between the restrictive operations (such as the operation studied in this paper) and those that cause malabsorption. There are also combinations of the two types which generally take on the risks of the malabsorption procedure. The bariatric surgeon will best understand the physiologic changes induced by the anatomic manipulations. These surgeons also better understand the disease of morbid obesity and the behaviors that are important to follow after RYGB. For example, the pregnant bariatric patient, in general, should eat two to four high-protein, well-balanced meals each day. She should *not* be told to eat six or more small meals each day to insure adequate nutrition. If she begins this behavior during the pregnancy, she will probably continue to 'snack' postpartum, which will sabotage the overall success of the obesity surgery.

Gastric bypass patients will experience a 'dumping' syndrome if they ingest large quantities of simple sugar. This is impoartant at 28 weeks when obstetricians routinely test for gestational diabetes. Since the 50 g glucose load used for this test can make the patient quite ill it is best avioded. Instead, we would recommend a fasting and 2 hour post-prandial glucose level and a Hgb A1C level is there is any question. RYGB offers most diabetics a remission/cure for their glucose intolerance.[14–17] Our study reinforces what others have found:[18] the overall risk of gestational diabetes is significantly less than that seen in the morbidly obese woman.

Although our series is small, the data indicates less macrosomia, less hypertension and less diabetes in the post-gastric bypass women than in the morbidly obese patients. In addition, we noted no increased risk of spontaneous abortion, intrauterine growth retardation, congenital anomalies or maternal nutritional deficiencies.

References

1. Willett WC, Mason JE *et al.* Weight, weight change, and coronary heart disease in women: risk within the 'normal' weight range. *JAMA* 1995; **273**: 461–5.
2. Colditz GA, Willett WC *et al.* Weight gain as a risk factor for clinical diabetes mellitus in women. *Ann Int Med* 1995; **122**: 481–6.
3. Wadden TA. Treatment of obesity by moderate and severe caloric restriction: results of clinical research trails. *Ann Intern Med* 1993; **229**: 688–93.
4. Rosenbaum M, Leibel RL. Obesity: medical progress. *New Engl J Med* 1997; **337**: 396–407.
5. Methods for voluntary weight loss and control: NIH technology assessment conference panel: consensus development conference, 30 March to 1 April, 1992. *Ann Intern Med* 1993; **119**: 764–70.
6. Maeder EC, Barno A, Mecklenburg F. Obesity: a maternal high-risk factor. *Obstet Gynecol* 1975; **45**: 669–71.
7. Perlow JH, Morgan MA. Massive maternal obesity and perioperative cesarean morbidity. *Am J Obstet Gynecol* 1994; **170**: 560–5.
8. Perlow JH, Morgan MA, Montgomery D *et al.* Perinatal outcome in pregancy complicated by massive obesity. *Am J Obstet Gynecol* 1992; **167**: 958–62.
9. Johnson SR, Kolberg GH, Varner MW. Maternal obesity and pregnancy. *Surg Gynecol Obstet* 1987; **164**: 431–7.
10. Hood DD, Dewan DM. anesthetic and obstetric outcome in morbidly obese parturients. *Anesthesiology* 1993; **79**: 1210–8.
11. Wittgrove AC, Clark GW, Schubert KR. Laparoscopic gastric bypass, Roux en-Y: technique and results in 75 patients with 3–30 months follow-up. *Obesity Surg* 1996; **6**: 500–4.
12. Brolin RE. Gastrointestinal surgery for severe obesity. *Nutrition* 1996; **12**: 403–4.
13. Bilenka B, Ben-Shlomo I, Cozacov C *et al.* Fertility, miscarriage and prgnancy after vertical banded gastroplasty operation for morbid obesity. *Acta Obstet Gynecol Scand* 1995; **74**: 43–4.