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IVF after bariatric surgery

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Abstract

Little data exist regarding in vitro fertilization in women who have undergone bariatric surgery. Our experience with five patients suggests IVF is a safe and effective fertility treatment for these women although special considerations should be made including the type of bariatric procedure the patient underwent and relating this knowledge to symptoms the patient may experience during their IVF cycle.

Obesity is a common problem among reproductive age women in the United States, placing them at increased risk for problems such as cardiovascular disease, diabetes, and some cancers (1). Furthermore, for obese women of reproductive age, fertility and pregnancy may also be affected (1–3). Weight loss is often recommended to obese women desiring pregnancy to improve fertility and help decrease morbidity in pregnancy (3–5).

One increasingly common treatment option for severe obesity is bariatric surgery (2). This type of surgery is recommended for patients with a body mass index (BMI) of 40 kg/m² or higher, or 35 kg/m² and high risk conditions such as severe sleep apnea, cardiac disease or diabetes (6). Two of the most common bariatric surgery procedures are laparoscopic adjustable gastric banding and the Roux-en-Y gastric bypass. Gastric banding limits intake by restricting the gastric reservoir and delaying emptying, while the Roux-en-Y procedure limits small intestine absorption of nutrients and also decreases the size of the gastric reservoir. Sleeve gastrectomy is another procedure that is increasing in popularity. This surgery is restrictive like the gastric band, but is thought to provide additional benefit by decreasing secretion of the appetite-stimulating hormone ghrelin(4). Studies have shown these procedures lead to more rapid, significant, and persistent weight loss than conventional treatment like diet and exercise, leading to greater improvements in obesity-related morbidity, and possibly reduced mortality (6,7).

While there is data on pregnancy outcomes after bariatric surgery (4), there is little data on outcomes in bariatric patients requiring assistive reproductive technology to conceive. Here we discuss five patients (TABLE 1) from our center who underwent bariatric surgery followed by in vitro fertilization (IVF). Appropriate IRB approval for presentation of this data was obtained.

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Patient 1

Patient 1 is a 37 year old with a 46 month history of infertility due to male factor. The patient underwent a Roux-en-Y gastric bypass procedure two years prior to starting IVF. The patient lost 150 pounds and had a BMI of 26.8 kg/m² at the start of her single IVF cycle. Twelve oocytes were retrieved and subjected to intracytoplasmic sperm injection (ICSI). Seven oocytes fertilized and three cleavage stage embryos were transferred resulting in delivery of a term singleton. The patient did not experience any complications.

Patient 2

Patient 2 is a 37 year old with a 24 month history of infertility due to male factor and uterine fibroids. The patient underwent a Roux-en-Y gastric bypass procedure two years prior to her first IVF cycle, at which time she had lost 100 pounds and her BMI was 36 kg/m². The patient underwent three IVF cycles. In the first cycle three oocytes were retrieved and all fertilized after intracytoplasmic sperm injection. Two cleavage stage embryos were transferred but no pregnancy resulted. In the second cycle seven of thirteen oocytes fertilized after ICSI and two cleavage stage embryos were transferred resulting in a chemical pregnancy. In the third cycle the patient had five of seven oocytes fertilize after ICSI. Three cleavage stage embryos were transferred and she delivered twins at term. The patient experienced no complications during her IVF cycles or pregnancy.

Patient 3

Patient 3 is a 31 year old with a ten year history of infertility due to a tubal factor. The patient underwent a Roux-en-Y gastric bypass procedure five years prior to IVF and lost 100 pounds. Her BMI when she presented for IVF treatment was 23 kg/m². The patient underwent 1 cycle of IVF. Four of ten oocytes fertilized with conventional insemination and nine of 11 oocytes fertilized with ICSI. She had two day five embryos transferred resulting in a twin gestation. Her IVF cycle was complicated by mild ovarian hyperstimulation syndrome with ascites, increased abdominal girth, shortness of breath, and chest pain. She responded well to supportive care, but unfortunately experienced pre-term labor and delivered non-viable twins at 24 weeks of gestation.

Patient 4

Patient 4 is a 29 year old with a 36 month history of infertility due to male factor and PCOS. The patient underwent a Roux-en-Y gastric bypass two years prior to starting IVF and lost 100 pounds. Her BMI was 39 kg/m² at the time of her first IVF cycle. She underwent two fresh IVF cycles followed by two cycles with frozen embryos. In her first fresh IVF cycle, conventional insemination resulted in fertilization of only one of ten oocytes. The resulting zygote failed to progress and transfer was not performed. ICSI was used to inseminate oocytes in the second cycle resulting in fertilization of seven of eleven oocytes. The patient failed to conceive after transfer of two cleavage-stage embryos. Three cryopreserved embryos from the second cycle were thawed and transferred resulting in a twin conception. The conception spontaneously reduced to a singleton pregnancy. She had an uncomplicated term delivery.

Patient 5

Patient 5 is a 29 year old with a 36 month history of infertility due to male factor and PCOS. The patient underwent a gastric banding procedure one year before IVF and lost 60 pounds with a BMI of 30 kg/m². The patient underwent one cycle of IVF/ICSI. Eleven of thirteen

oocytes fertilized and two day five embryos were transferred resulting in an uncomplicated singleton pregnancy and delivery.

Overall, these patients tolerated IVF well, and four of the five went on to have term deliveries. While these patients did well, our experience demonstrates special considerations should be taken.

It is not clear if weight loss due to bariatric surgery improves IVF outcomes, although weight loss may help obese women, and in particular women with PCOS, conceive naturally (8,9). In addition, studies have shown that obesity may be associated with decreased pregnancy and live birth rates after IVF (3,10,11). Obesity has also been associated with increased dose and duration of gonadotropin stimulation, lower peak estradiol levels, and increased oocyte retrieval time (3,10,12,13). Three of the five bariatric surgery patients in our series conceived with their first IVF cycle, and the other two required additional cycles.

None of these patients experienced IVF complications attributable to prior bariatric surgery, but one patient did have a mild case of ovarian hyperstimulation syndrome (OHSS). While there is no evidence that previous gastric bypass predisposes patients to OHSS, the presence of OHSS in post-gastric bypass surgery patients could lead to serious complications. OHSS can lead to ascites and increased intra-abdominal pressure, potentially increasing the risk of two late complications of gastric bypass surgery, intestinal obstruction and internal hernia (6). Internal hernia is a late complication of gastric bypass surgery which can present clinically with vague abdominal complaints such as nausea and abdominal pain. This clinical presentation can also occur in patients with OHSS. However, internal hernia requires surgical intervention to prevent bowel necrosis and perforation, so prompt diagnosis with upper GI series and CT scan is important to prevent further complications (14). Physicians should closely monitor for signs and symptoms of OHSS and maintain a high index of suspicion for internal herniation in gastric bypass patients with OHSS because of the possible difficulty in distinguishing between the two conditions and the morbidity associated with internal hernias.

Another issue for gastric bypass patients undergoing IVF is timing of the procedures. Rapid weight loss and increased risk of nutritional deficiencies in the first year after bariatric surgery have led to recommendations suggesting that gastric bypass surgery patients wait at least 12 months before attempting pregnancy (4,15,16). Because age is a strong predictor of IVF outcome, older obese women desiring pregnancy may wish to consider this delay before deciding on gastric bypass surgery. Of note, two of the patients described here were of advanced maternal age and had successful outcomes.

Nutrition is another important issue in women attempting to conceive after gastric bypass surgery (4). While nutritional deficiencies can occur after both restrictive and malabsorptive procedures, more serious deficiencies are usually associated with the malabsorption-producing procedures (17). Gastric bypass surgery can lead to deficiencies in iron, folate, vitamin B12, calcium, and vitamin D. These deficiencies may increase the risk for fetal complications such as low birthweight, neonatal hypocalcemia, neural tube defects (16). Testing for nutritional deficiencies, and correction if necessary, should be performed prior to IVF or in any woman considering pregnancy who has undergone gastric bypass surgery (4). All of the patients described had adequate nutritional supplementation, and none of the children born had any signs of neural tube defects or growth restriction.

IVF after bariatric surgery can be safe and successful as demonstrated in our case series. Women and their care team should be aware of issues such as complications of IVF and gastric bypass surgery, the importance of delaying pregnancy after bariatric surgery, and the special nutritional requirements of bariatric surgery patients. While our data supports the

safety of IVF for women who have undergone bariatric procedures, future research following this patient population is warranted as surgical approaches to weight loss are evolving.

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Table 1

Patient Characteristics

Patient	Age	Bariatric procedure, weight loss (lbs.)	Length of infertility, infertility diagnosis	BMI (kg/m ²) at time of IVF	# IVF cycles	IVF complications	IVF outcome
1	37	Roux-en-Y, 150	46 months, male factor	26.8	1	None	Term singleton
2	37	Roux-en-Y, 100	24 months, male factor/fibroids	36	3	None	Cycle 1:failed, 2:chemical, 3:term twins
3	31	Roux-en-Y, 100	10 years, male factor/PCOS	22.8	1	Mild OHSS	Pre-term labor/delivery of twins at 24 weeks, 0/2 survived
4	29	Roux-en-Y, 100	36 months, male factor/PCOS	39.2	3	Twin gestation spontaneously reduced to singleton	Cycle 1:failed fertilization, 2:failed, 3:FET-term singleton
5	29	Gastric banding, 60	36 months, male factor/PCOS	29.9	1	None	Term singleton