# Implications of obesity on gynaecological surgery

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## Abstract

This review on the impact of obesity on gynaecological surgery highlights the effect of obesity on various aspects of reproductive health including fertility, heavy menstrual bleeding, pelvic floor dysfunction and endometrial cancer. We discuss the anaesthetic concerns surrounding the obese patient requiring surgery, and the technical aspects of operating on the obese patient including laparoscopic and open surgery. The intraoperative and postoperative complications associated with obesity are also explored.

**Keywords** anesthesia; endometrial cancer; heavy menstrual bleeding; hysterectomy; incontinence; infertility; laparoscopy; obesity; pelvic organ prolapse; polycystic ovarian syndrome

## Introduction

In the United Kingdom, more than half of all women are either overweight or obese. The World Health Organisation (WHO) defines a person with a body mass index (BMI) of 25–30 kg/m$^2$ as overweight and a BMI >30 kg/m$^2$ as obese. BMI >40 kg/m$^2$ is described as morbid obesity. Obesity affects more than a billion people throughout the world in both western and developing countries and this epidemic has had a profound impact on many aspects of female reproductive health (Box 1).

This review will focus on the effect of obesity on reproductive health, particularly on the implications for gynaecological surgery on the obese patient.

**Implications of obesity on reproductive health**

- Fertility
- Heavy menstrual bleeding
- Pelvic floor dysfunction
- Endometrial cancer

**Box 1**

## Implications of obesity on reproductive health

### Infertility

Fertility rates are reduced in those couples where the female partner is overweight or obese, largely due to menstrual cycle irregularity or anovulation. When this is also associated with biochemical disturbances and/or symptoms of acne or hirsutism, polycystic ovarian syndrome (PCOS) is diagnosed.

The National Institute for Health and Care Excellence (NICE) guideline on fertility recommends that women who have a body mass index (BMI) of 30 or over should be informed that they are likely to take longer to conceive. One possible mechanism for this is that the increased body weight and fat tissue is associated with sex steroid imbalance. This is mainly due to the reduction of sex hormone-binding globulin (SHBG) levels in the circulation, resulting in an increased fraction of free androgens in blood. Hyperandrogenism may arrest folliculogenesis through inhibition of granulosa cell proliferation and maturation. Hyperinsulinaemia in the presence of obesity may also play a role in causing premature maturation of granulosa cells.

A further contributing factor in the fertility of obese women includes sexual dysfunction which could be related to physical or psychological disturbances.

According to NICE, women who have a BMI of 30 or over and who are not ovulating should be informed that losing weight is likely to increase their chance of conception (NICE) and pregnancy rates are highest in those who participate in group programmes involving exercise and dietary advice. Weight loss programmes applied to obese patients with PCOS result in the improvement of the abnormal biochemical and hormonal parameters. It is estimated that for the majority of women, a period of 3–6 months is required to lose 5–10 kg in body weight.

Laparoscopic ovarian drilling (LOD) is a further management option for anovulation. Regarding the influence of obesity on the effectiveness of LOD, a retrospective study including 200 patients with PCOS, who were treated unsuccessfully with clomiphene, showed that LOD applied to women with a BMI >35 kg/m$^2$ induced significantly lower ovulation and pregnancy rates as compared to moderately overweight and normal weight women. Several studies have shown a negative correlation between BMI and the response to various medical treatments including clomiphene and gonadotrophins. However, LOD has been shown to sensitise clomiphene-resistant patients to this drug.

Women who are obese respond less well to drugs used for ovarian stimulation for the treatment of anovulation and assisted conception. Moreover, there are technical difficulties associated with clinical procedures of assisted reproduction techniques (ART) such as imaging the ovaries and oocyte retrieval.

Results from ART demonstrate a reduction in pregnancy rates (RR 0.87, 95% CI 0.80–0.95, P = 0.002) in obese women (BMI >30 kg/m$^2$) when compared with those who have normal BMI (<25 kg/m$^2$). Live birth rates also reduced as BMI increases.

Of those who conceive after ART, there is a 30% increased risk of miscarriage if women are overweight (BMI >25 kg/m$^2$) compared to those with normal BMI (RR 1.33, 95% CI 1.06–1.68). This risk further increases to just over 50% when miscarriage rates are compared in those who are obese to those with a BMI <30 kg/m$^2$ (OR 1.53, 95% CI 1.27–1.84). Given that the success of ART clearly worsens as BMI increases, NICE

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recommend that a woman's BMI should ideally be in the range 19–30 kg/m$^2$ before commencing assisted reproduction.

### Heavy menstrual bleeding

Obese women are reported to be three times more likely to suffer from menstrual abnormalities than women of a normal weight. In addition, weight loss can restore menstruation to a normal pattern. Heavy menstrual bleeding (HMB) is defined as excessive menstrual blood loss (MBL) which interferes with a woman's physical, social, emotional and or material quality of life. In clinical research, HMB has an objective definition wherein a total MBL of 80 ml or greater is considered as HMB.

HMB is a common complaint of women during any stage of their reproductive life from menarche to perimenopause, irrespective of BMI. Menstrual problems make up a significant proportion of the general practice workload and generate a large number of specialist referrals whilst also having a significant socio-economic impact, with some 800,000 women annually seeking treatment for this complaint in the United Kingdom.

PCOS itself is a significant cause of abnormal uterine bleeding. Importantly, however, women with PCOS are commonly overweight or obese (38–66%). Therefore, it is difficult to separate the effects of obesity from the effects of PCOS.

In the early 1990s, it was estimated that at least 60% of women presenting with HMB went on to have a hysterectomy. This was often the only treatment offered. Given the risks associated with major surgery in all patients and indeed in patients with raised BMI, clinicians advocate medical management in the first instance. Irrespective of BMI, pharmaceutical treatment is the first line option as recommended by NICE. The levonorgestrel-releasing intrauterine system (IUS) is considered a 'first-time' treatment option for the management of HMB. It also protects against endometrial hyperplasia in ovulatory dysfunction. A recent study among adolescent women who underwent bariatric surgery showed a high acceptance rate of this method for the management of menstrual complaints. In the case of IUS failure, non-steroidal anti-inflammatory drugs (NSAIDS), tranexamic acid, norethisterone or the combined oral contraceptive pill may be useful alternatives. However, raised BMI is associated with poor efficacy of hormonal contraception suggesting an effect of obesity on the bioavailability or action of steroids. Both weight loss and metformin administration are reported to benefit menstrual bleeding disorders.

Additional management options include endometrial ablation, which would be preferable over hysterectomy particularly when patients have raised BMI. Data are sparse on the outcome of such less invasive surgical approaches for management of HMB in obese women. A recent publication reported that patients with a BMI of greater than 34 kg/m$^2$ showed a trend towards failure with this intervention.

### Endometrial cancer

Obesity is a recognized risk factor in the development of endometrial cancer, particularly type 1 (endometrioid) endometrial cancer. In the UK, approximately 50% of endometrial cancers are attributable to obesity. This is due to raised circulating oestrogen levels, as a consequence of the peripheral conversion of androgens by the enzyme aromatase, found in adipose tissue. Prolonged unopposed oestrogen exposure will lead to a continuous spectrum of change from proliferative endometrium, through endometrial hyperplasia/polyp to endometrial carcinoma. Circulating adipokines have also been associated with increased angiogenesis as well as cell proliferation.

### Urogynaecological conditions

Obesity is associated with a high prevalence of pelvic floor disorders, including urinary incontinence, faecal incontinence, sexual dysfunction and uterovaginal prolapse. Increased body weight causes increased intra-abdominal pressure. Over time, this may weaken the pelvic floor's innervation and musculature, causing stress urinary incontinence. Increased weight also contributes to increased intravesical pressure and associated urethral dysfunction. Overactive bladder symptoms are also reported to be higher in patients with obesity, the mechanism for which is poorly understood.

Weight loss by surgical and non-surgical methods plays a major role in the improvement of symptoms of urinary incontinence and uterovaginal prolapse. Conservative methods for treating stress urinary incontinence include pelvic floor exercises, supervised pelvic floor rehabilitation, electrical stimulation of pelvic floor muscles and use of duloxetine, which is a serotonin and noradrenaline reuptake inhibitor. Vaginal pessaries can be used for women with pelvic organ prolapse who prefer to avoid surgery or who are unsuitable for surgery due to other co-morbidities.

## Surgical management of gynaecological issues related to obesity

An important initial consideration before embarking upon gynaecological surgery in the obese patient is to ask is the operation indicated, or are there alternatives. For many conditions, there are lifestyle or medical management options which may improve symptoms and quality of life without the risks of surgery. For instance, weight loss may encourage spontaneous ovulation and the return of fertility, and the Mirena IUS is a successful treatment for heavy menstrual bleeding and indeed is the first-line treatment according to NICE guidelines.

Surgical weight loss through bariatric surgery may play a role in improving reproductive health. Seventy per cent of female patients seeking bariatric surgery are of childbearing age, and up to 25% suffer from infertility. NICE guidelines recommend that bariatric surgery be considered when the BMI is 40 kg/m$^2$ or more, or for those with a BMI 35–40 kg/m$^2$ in the presence of other co-morbidities and where other nonsurgical methods have proven unsuccessful. While many studies have small numbers, evidence does suggest that bariatric surgery improves the markers of PCOS which influence fertility, including anovulation, hirsutism and insulin resistance. Women are recommended to wait at least 1 year before becoming pregnant although evidence is limited and advice should be individualized depending on the age of the patient.

If surgery is still required, ensure that the patient is fully counseled of the risks of the operation and advised that any