Review Article

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Fertility Enhancing Surgery: Uterine Factors Review Series I

Alka Patil[1], Sneha Sanap[2], Akshay Jagtap[3], Hetashvi Sudani[4]

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Author's Affiliations: [1]Professor and Head of Department, [2-4]Junior Resident, Department of Obstetrics and Gynecology, Annasaheb Chudaman Patil Memorial Medical College, Dhule, Maharashtra 424005, India.

Corresponding Author: Alka Patil, Professor and Head of Department, Department of Obstetrics and Gynecology, Annasaheb Chudaman Patil Memorial Medical College, Dhule, Maharashtra 424005, India.

Email: drpusuku@gmail.com

Abstract

Many innovations have been made in advanced reproductive technologies (ART) over the past several years. Gynaecologist will have to choose between ART and reproductive surgery for a larger number of patients. Compared to IVF, reproductive surgery has the potential to restore the natural procreation of the subfertile couple leading to several conceptions after one successful intervention. The incidence of infertility due to uterine structural abnormalities and endometrial pathology is approximately 5-10%. Even in the era of ART minimal invasive surgery has definite and very important role to restore and to improve fertility outcome. In this review series, we will explore fertility enhancing surgery related to uterine factors.

Keywords: Fertility; Fertility Enhancing Surgery; Uterine Factor; ART; Minimal Invasive Surgery.

Introduction

Many innovations have been made in advanced reproductive technologies (ART) over the past several years. These procedures now yield pregnancy rates of over 20% per cycle, rates that compare favourable to many types of reproductive surgery. Therefore, ART now represents a viable alternative for many patients suffering from infertility. As these pregnancy rates continue to rise, gynaecologist will have to choose between ART and reproductive surgery for a larger number of patients.[1]

Worldwide ART has replaced reproductive surgery for tubal factor infertility, limiting its role as first line treatment.[2] It is not clear whether this change in clinical practice is due to the higher cost-effectiveness of ART compared to reproductive surgery or caused by other factors such as a lack of surgical expertise, patient's desire to achieve results rapidly or the concern to protect patients from procedure-related complications. In moderate and severe endometriosis radical laparoscopic surgery is often delayed until several ART cycles have failed.[3] Its surgical treatment necessitates a high level of expertise.

Compared to IVF, reproductive surgery has the potential to restore the natural procreation of the sub fertile couple leading to several conceptions after one successful intervention.[4] In this review series, we will explore fertility enhancing surgery related to uterine factors.

Infertility is defined as the inability of a couple to achieve conception after 1 year of unprotected coitus.[5]

Causes of Infertility:

1. Uterine factors

- Congenital malformations such as absence of uterus, hypoplasia, septate uterus, bicornuate uterus
- Tuberculous endometritis
- Intrauterine adhesions
- Submucous polyp

- Uterine leiomyomas

2. *Ovarian factors*
- Hypothalamic anovulation
- Hyperprolactinaemia
- Polycystic ovaries
- Subclinical adrenal failure
- Luteinised unruptured follicles
- Luteal phase defect

3. Tubal factors
- Partial or complete bilateral tubal obstruction resulting from previous salpingitis. most commonly due to postabortal, puerperal, gonococcol, chlamydial or tuberculous in nature.

4. Peritoneal factors
- Pelvic adhesions
- Pelvic peritonitis
- Endometriosis

5. Cervical factors
- Thick cervical mucus
- Loss of mucus due to amputation of cervix, cone biopsies
- Faulty direction of cervix such as in retroversion or sever prolapse
- Cervical stenosis

6. Vaginal factors
- Vaginal tumours
- Vaginal Septa
- Vaginal membranes
- Purulent discharge[5]

The incidence of infertility due to uterine structural abnormalities and endometrial pathology is approximately 5-10%. Hysteroscopic surgical procedures for intrauterine pathology became popular as they avoided cutting through uterine musculature to enter the cavity.[7]

Discussion

Diagnosis and treatment of infertility has changed rapidly. The diagnosis of infertility has improved because of following factors:

- Radioimmunoassays
- Understanding of endocrinology
- Diagnostic endoscopy
- Imaging techniques

The laparoscopic treatment of all visible implants of minimal-mild endometriosis in women with otherwise unexplained subfertility is likely to be beneficial since it might increase the chance of a live birth or ongoing

pregnancy.[8]

A detailed and repeatable visualization of the pelvis has been enabled by way of laproscopy which has agreat impact on the management of infertility.[7]

From a prognostic point of view, the test 'diagnostic laparoscopy' fails to be an ideal predictor for infertility[9]

It is obvious that for the woman it is much preferable to have the surgical treatment performed during the initial diagnostic laparoscopy as it avoids a second intervention. This, however, requires a surgeon with sufficient clinical knowledge to recognize and assess the pathology and have the necessary surgical skills to perform the indicated surgery.

Surgical expertise should be sufficient to recognize hidden pathology as deep endometriosis, to recognize and avoid extensive coagulation of pathologies as endosalpingiosis and to avoid eventual nerve damage. The reproductive surgeon should have the skills to perform surgery without or with minimal damage to tubes, ovaries and ovarian reserve, and with minimal postoperative adhesion formation. Deep endometriosis excision should be sufficiently complete also when surrounding the ureter and penetrating the bowel wall. The required expertise and skill raises the delicate question of quality of surgery including the prevention of postoperative adhesion formation. Today adhesions can fortunately be prevented with conditions providing adequate surgical skills.[10,11]

Asherman's syndrome is found in approximately 5% of infertile women. The simple movement of hysteroscope can break mild or minimal adhesions. Thicker lesions require use of scissors or electrocautery. Balloon catheter can be used to provide tamponade. Conjugated oestrogen should be administered after surgery.

Incidence is 0.1 to 1.5%. Mullerian anomalies due to defective lateral fusion may be associated with infertility or repeated pregnancy loss. Prevelance in women with RPL is significantly higher (10-12%). Among congenital anomalies, septate uterus is associated with the highest incidence of reproductive failures. Intrauterine adhesions impair the implantation process with resulting pregnancy loss. Hysteroscopic adhenolysis needs to be undertaken in women with genital tuberculosis before IVF.[7]

Minimal Invasive Surgery have distinct advantage of:

- Shorter hospital stay.
- Lower incidence of postoperative paralytic ileus.
- Faster recovery.
- Tamponade effect on small vessels by pneumoperitoneum.
- Less drying of tissues because of close environment helps decrease chance of adhesion formation and adds to advantage for fertility enhancing procedures.

Minimal Invasive surgeries also reduces associated morbidity:

- Pain.
- Impaired fertility.
- Bowel obstruction.

In present era, reproductive surgery can be divided into 3 categories:

- Surgery as a primary conventional surgical treatment of infertility.
- Surgery to enhance the pregnancy outcome of IVF.
- Surgery for fertility preservation.

The availability and advances in ART have reduced the need for reproductive surgery as a primary surgical treatment of infertility.[12]

- Inadequate reproductive surgery involves
- Absence of diagnosis
- Wrong indications
- Decreased follicular reserve
- Ovarian damage
- Postoperative adhesions

Fibroids are present in approximately 5-10% of patients presenting with infertility, submucosal lesions appear to strongly interfere with the chance of pregnancy. Approximately 50% of the women with infertility and myomas become pregnant after myomectomy.[12]

Fibroid interferes with:

- Sperm Migration
- Ovum transport
- Embryo transplant

Surgical indications of myomectomy:

- Submucous or intramural fibroid that distort the uterine cavity.
- Fibroids greater then 3cm.
- Multiple fibroids.

There are different approaches to myomectomy as it can be done laparoscopically, abdominal, vaginal route and hysteroscopically. Endoscopic myomectomy currently represents the standard minimally invasive surgical procedure for treating various fibroids in patients with AUB and reproductive issues being the most common indication.[13]

Laproscopic myomectomy when performed by an experienced surgeon can be considered a safe technique with extremely low failure rate and good results in terms of pregnancy outcome.

Only a few reported adenomyosis related complications were found in a literature review. These included rapid growth of adenomyosis or adenomyoma in pregnancy, spontaneous miscarriage, preterm birth, intrauterine growth restriction, preeclampsia, obstetric hemorrhages, and spontaneous rupture of an unscarred uterus during pregnancy or labor.[14,15] In this regard, it has been suggested that alterations in the inner myometrium of women with adenomyosis may result in defective remodeling of the spiral arteries during the decidualization process, leading to vascular resistance and an increased risk of defective deep placentation.[16]

Conservative surgery for adenomyosis may result in

- Risk of adhesions
- Deformity of uterus
- Occlusion of fallopian tube
- Risk of subtotal/total hysterectomy

Correction of uterine malformations

The treatment depends on the severity present and on the menstrual, sexual and reproductive symptoms. Vaginal septa are removed unless they are symptomless and there is no prospect of marriage and childbearing.

Non-communicating rudimentary uterine horns are painful and may cause complications and should be treated with excision. When a bicournate and septate uterus has caused not less than three miscarriages and no pregnancy has resulted in a viable child, surgery may be indicated. In case of bicournate uterus, an incision is made over the uterus and the two horns are sutured together to form a single cavity. The results depend on a careful choice of cases according to the exact anatomy as shown by hysterography. Surgeries like Jone metroplasty, Transcervical lysis of uterine septum, all have now only historic importance.

Operative hysperoscopy has replaced all of above by a simple procedure where in the septum is cut hysteroscopically by scissors, resectoscope or laser (argon, KTP or Neodymium-doped: yttrium aluminium garnet) after including endometrial atrophy by administering gonadotrophin-releasing hormone (GnRH) analogue for two months. Laproscopic guidance is required to confirm that the uterus is indeed septate and not bicournate, and to determine the end point of resection – the myometrial fibres can be seen hysteroscopically and the light can be seen transmitted through the fundus uniformaly. Healing of the septal areas occurs in two months and they are covered by endometrium.

Hysteroscopy should be considered mandatory if the following are suspected on HSG or on transvaginal sonography:

- An intrauterine lesion e.g. leiomyoma or endometrial polyp; congenital uterine anomaly
- Intrauterine adhesions because of past history of uterine curettage, complicated forceps delivery, severe pelvic inflammatory diseases, puerperal sepsis or recurrent miscarriage;
- In women undergoing IVF, failure of implantation of embryos after three cycles[17]

Conclusion

Even in the era of ART minimal invasive surgery has definite and very important role to restore and to improve fertility outcome.
In current practice, myomectomy is the most common procedure offered to women seeking to retain their uterus. When performed by an experienced surgeon the procedure is safe and the morbidity is no greater than that of a hysterectomy.

The required combination of reproductive knowledge, expertise, and surgical skills is obvious. Reproductive surgery is not mainstream surgery. It also raises the question of the surgical skills of fertility/IVF specialists and of reproductive knowledge of even excellent endoscopic surgeons.

Training in reproductive surgery has been a concern for many years[18,19] Laparoscopic training in endoscopic surgery remains a worldwide difficulty if judged by the still limited percentage of total laparoscopic hysterectomy. Training in reproductive surgery constitutes an even bigger problem because of the technical difficulty of deep endometriosis surgery together with the limited number of Severe interventions

in reproductive medicine. Minor surgery requires adequate training in order not to damage the reproductive organs and to avoid postoperative adhesions, which can become a cause for infertility.

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