INVITED COMMENTARY

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Surgery in Restorative Reproductive Medicine

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ABSTRACT

Restorative reproductive surgery has emerged to become an exciting and promising field of surgery that can transform the way that we treat patients, especially regarding fertility. As a prime example of this type of surgery, restorative reproductive surgery for endometriosis, a common and debilitating disease that can lead to infertility and pelvic pain, offers a root cause treatment to remove the actual disease and to optimize the reproductive anatomy, for best patient outcomes. Optimal excision of endometriosis and prevention of pelvic adhesions has been shown to lead to reduce symptoms, to lead to high natural fertility rates, and to lead to very low rates of the need for repeat surgery. Patients have improved symptoms and quality of life, in addition to improved fertility chances for one and subsequent pregnancies (if desired), demonstrating the link between wellness and fertility.

There is an urgent need for more resources, training, advocacy, research and publication for this exciting area of restorative reproductive surgery. Its time has come.

Keywords: surgery, restorative surgery, restorative reproductive medicine, alternatives to IVF, optimal excision, adhesion prevention

INTRODUCTION

Restorative reproductive medicine seeks to systematically identify underlying health conditions contributing to reproductive dysfunction and suboptimal reproductive health, and to provide root cause solutions to improve wellness and fertility. Surgery has a foundational role in optimizing anatomy in a restorative reproductive medicine approach.

This narrative is not meant to be a systematic review of restorative reproductive surgery; rather, it is meant to highlight that this emerging area of treatment and to encourage interest, development, and training in this transformative way of treating patients.

What is restorative reproductive surgery?

Restorative reproductive surgery encompasses all procedures or interventions which aim to alleviate symptoms, while at the same time, to restore reproductive organ function. The goal of restorative reproductive surgery is to optimize reproductive function to enhance health and natural fertility potential.

This approach of restorative surgery has been neglected with the advent of artificial reproductive technology, which often bypasses reproductive organ disease and dysfunction to achieve a pregnancy. Consequently, restorative reproductive surgery has been developed primarily by those committed to offering a root cause solution to infertility by optimizing pelvic anatomy and reproductive organ function. Female restorative reproductive surgery is often performed, not by a general gynecologist, but by a specialist in this area of surgery.

Restorative reproductive surgery for females includes but is not necessarily limited to procedures to (1) optimize pelvic anatomy, especially of excision of endometriosis[1] and prevention of pelvic adhesions,[2] (2) open fallopian tubes, including tubal cannulation (to open or normalize the pressures at the proximal end of the tube),[3] fimbrioplasty, or neosalpingostomy (opening the distal end of a fallopian tube that is blocked)[4] or reconstruction after previous tubal ligation,[5, 6, 7] (3) optimize ovarian function, such as ovarian drilling[8] or wedge resection for polycystic ovaries,[9, 10] and (4) prepare the uterine cavity for implantation, including procedures to correct intrauterine anomalies[11] and cesarean scar defects or isthmocele,[12] or to remove intrauterine fibroids, polyps and intrauterine adhesions. Restorative reproductive surgery for males includes but is not necessarily limited to varicolectomy[13] to improve the testicular environment for sperm production.

Surgery to optimize pelvic anatomy in the setting of endometriosis

One of the most common conditions warranting restorative reproductive surgery is endometriosis. This is a condition where the endometrial cells that are normally only within the uterine cavity are also found outside of the uterus. In the early stages of endometriosis, a pelvic exam and imaging are normal,

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and yet it can still negatively affect fertility. As the disease progresses, it invades tissue, and develops manifestations including ovarian endometriomas, or deep infiltrating lesions into other pelvic structures. Pelvic adhesions also form, leading to further organ dysfunction.

Endometriosis is often associated with debilitating pain and infertility[14], but it is underdiagnosed and undertreated. The economic burden of this disease has been estimated to be $119 billion annually in the United States alone[15]. Endometriosis is found in about 1 in 10 women in the general asymptomatic population, but it is found in 50% of women with infertility without pelvic pain,[16] and in our experience, in 80% of women with pelvic pain that that does not improve with hormonal suppression, and in over 90% of women referred for surgery with pain and infertility [unpublished data, Saint Louis University, NCT03002870, clinicaltrials.gov]. Unfortunately, many of these women are told they have unexplained infertility after very minimal workup and evaluation. Normalization or dismissal of pelvic pain, routine treatment of painful periods with long-term hormonal suppression, and quick referral and access to artificial reproductive technologies for fertility issues are factors contributing to the long delay in the surgical diagnosis of endometriosis of 10-12 years.[17, 18]

The usual treatments that are offered for pelvic pain associated with endometriosis are hormonal regimens that seek to suppress the activity and symptoms of endometriosis by inducing a state of what could be considered either chemical pregnancy or chemical menopause, often with significant negative side effects.[19] These treatments suppress both symptoms and fertility.

Restorative reproductive surgery seeks to offer a root cause treatment to endometriosis by restoring the healthy reproductive anatomy. This involves several steps: releasing of all areas of abnormal peritoneum or lesions (both typical and atypical) suspicious for endometriosis, optimal excision of all these lesions - superficial and deep - wherever found, including on or near vital structures, and preventing pelvic adhesions from forming or reforming.[20]When all these steps are performed systematically and deliberately, normal pelvic anatomy is restored, reproductive function is improved, and excellent clinical outcomes have been shown for all the outcomes that matter to patients.[21, 22, 23]

Endometriosis implants seen during laparoscopic surgery are typically described as black powder-burn lesions. However, especially in younger patients, there has been an increase in awareness of surface lesions of endometriosis that can have many other appearances, including lesions that are brown, white, vesicular or miliary, deep retraction pockets,[24] or even in paratubal cysts.[25] Optimal excision of endometriosis includes removal of all areas of affected peritoneum for best results. Even in young women, studies have shown that optimal excision of endometriosis has the potential for complete eradication of the disease,[20] obviating the need for long-term hormonal suppression. While the gold standard diagnosis of endometriosis is by a tissue confirmation from excision surgery,[26] the surgery is done minimally invasive, and can be see-and-treat,[27] and potentially one-and-done surgery (see below).

In contrast, the most common way general gynecologists treat endometriosis is by a process called ablation,[28] which aims to destroy endometriosis lesions with some form of energy, however without actual removal of the implants. The problem with this approach is that complete removal of the disease is not achieved, especially when the disease is deeper or near vital structures. Also, because most experts have recommended long-term postoperative hormonal suppression to reduce recurrence of the endometriosis, surgeons may consider it less important to remove completely all implants or lesions suspicious for endometriosis. However, while postoperative hormonal suppression has been shown to increase the pain-free interval after surgery, or time to recurrence of an ovarian cyst of endometrioma, it has not been shown to decrease recurrence of the actual disease.[29,30] The rates of repeat surgery after ablation are between 40-60%.[31,32] In fact, what is seen is likely persistence of the disease rather than true recurrence of the disease, because the original disease was not completely excised.

Optimal excision of endometriosis has been shown to lead to significant improvement in pelvic pain symptoms and overall quality of life,[21,22] and significant improvement in sexual functioning.[33] Combining optimal excision of endometriosis with optimal prevention of pelvic adhesions has been shown to lead to significant improvement in fertility chances, and even in patients with advanced endometriosis affecting the ovary, with a very low rate repeat of surgery. Our group has recently published two key studies in this regard. One study is the first study of its kind, showing a benefit of an adhesion prevention strategy for pregnancy, the outcome that matters most to the patient. The overall long-term incidence of pregnancy, even in patients with at least one ovarian endometrioma more than 3 cm, was up to 67%.[34] The second study showed a very low rate of repeat surgery, under 3% in 10 years,[23] demonstrating that one-and-done surgery is possible for patients, without long-term post-operative hormonal suppression, which we avoid because it does not help fertility and can have significant adverse side effects. Together, I believe these studies point to a paradigm shift highlighting the potential for restorative reproductive surgery to transform the way we can treat patients with endometriosis.

The need for expert surgeons in restorative reproductive surgery

Traditionally, microsurgical techniques via laparotomy (open surgery) were used for pelvic surgery, which involved the surgeon wearing surgical loops to improve visualization, and to aid in fine, precise surgery. With the advent of minimally invasive gynecologic surgery, laparoscopic (keyhole) surgery, or robotic surgery, surgeons have improved visualization through high-definition optics, which affords the benefit of focused illumination and magnification. Minimally invasive gynecologic surgery improves patient outcomes because it reduces blood loss and risk of infection, fosters faster recovery, and is less prone to adhesion formation postoperatively.[35] However, even though minimally invasive gynecologic surgery is becoming the mainstay of gynecologic surgery for routine

procedures, it requires dedicated training and skill,[36] especially when applied to a level that qualifies as restorative reproductive surgery.

Several authorities have called for the need to train experts who can recognize all the various forms of endometriosis especially in early endometriosis or in younger women, and to develop centers of expertise or centers of excellence,[37] with multi-disciplinary teams - including colorectal and urological, even cardiothoracic specialists – to be able to address deep or advanced endometriosis that affects multiple organs or vital structures such as bowel, bladder, ureter, and diaphragm.

CONCLUSIONS

Restorative reproductive surgery has emerged to become an exciting and promising field of surgery that can transform the way that we treat patients, especially regarding fertility. As a prime example of this type of surgery, restorative reproductive surgery for endometriosis, a common and debilitating disease that can lead to infertility and pelvic pain, offers a root cause treatment to remove the actual disease and to optimize the reproductive anatomy, for best patient outcomes. Optimal excision of endometriosis and prevention of pelvic adhesions has been shown to lead to reduce symptoms, high natural fertility rates, and very low rates of the need for repeat surgery. Patients have improved symptoms and quality of life, in addition to improved fertility chances for one and subsequent pregnancies (if desired), demonstrating the link between wellness and fertility.

There is an urgent need for more resources, training, advocacy, research and publication for this exciting area of restorative reproductive surgery. Its time has come.

CONFLICTS OF INTEREST DISCLOSURE

The author declares that he has no conflicts of interest.

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