

An update on surgical management of tubal disease and infertility

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Abstract

Reproductive surgery remains an important option and is complementary to assisted reproductive technologies. A spectrum of tubal disease of varying severity is recognized at laparoscopy. Pathology may vary from peritubal adhesions, damaged fimbriae or distorted tubal anatomy to tubal blockage or hydrosalpinx (a fluid-filled distension of the fallopian tube in the presence of distal tubal occlusion).

Reproductive surgery should be considered as first-line treatment: when the correction of infertility pathology is achievable and a good result is expected; when the pathology is causing the patient pain or discomfort; and when if left uncorrected infertility pathology will compromise the results or increase the risks of assisted reproductive technology. The success of surgical infertility treatment depends on the careful selection of cases using appropriate investigative techniques, with procedures performed in centres with sufficient expertise. For both specialized reproductive and general gynaecological surgery, it is paramount to follow strict microsurgical principles to avoid adhesion formation and conserve normal tubal and ovarian tissues.

Keywords endometriosis; fibroids; polycystic ovarian syndrome; tubal disease

Introduction

Tubal and peritoneal factors account for 30–40% of cases of female infertility. Tubal factors include damage to or obstruction of the fallopian tubes, usually related to previous pelvic inflammatory disease (PID), pelvic or tubal surgery. Pelvic inflammatory disease is unquestionably the largest contributor to tubal infertility. When salpingitis occurs, luminal endothelial damage destroys the ciliated cells lining the ampullary and infundibular portions of the fallopian tube. These ciliated cells, responsible for transport of the gametes and embryo to their proper location, often do not recover after resolution of the infection. Loss of or compromise to ciliated cells leads to fibrosis both within the tube and distally, causing occlusion and possibly pelvic adhesions.

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Chlamydial salpingitis has a long incubation period and is likely to be asymptomatic. As a result, it is likely to lead to a prolonged, untreated infection causing permanent endothelial damage. Despite successful antibiotic treatment of laparoscopically confirmed PID, the risk of persistent tubal damage leading to infertility is approximately 8–12%. This risk doubles with each subsequent episode of PID so that infertility affects approximately 24% of patients following two documented episodes of PID, and approximately 54% of patients after three episodes.

Prior abdominal surgeries, septic abortions, appendicitis associated with rupture, endometriosis, or other inflammatory pelvic and abdominal processes have also been implicated in causing tubal disease. Some of the causes of tubal blockage are listed in Table 1.

While assisted reproductive technology (ART) results are improving, operative endoscopy has also advanced tremendously in recent years ensuring an ongoing place in the management of infertility. The quality of the laparoscopic image improved dramatically with fiberoptic technology, better light sources and cameras. The feasibility of laparoscopic suturing has allowed many reconstructive procedures that traditionally required a laparotomy to be accomplished safely with laparoscopy on a day surgery basis with lower costs, shorter hospital stay, and faster recovery times.

Unlike ART, that bypasses pelvic pathologies, surgical approaches improve fertility by correcting them and can improve a patient's related symptoms of pelvic pain and abnormal menstruation. Successful tubal surgery can provide a permanent cure. Couples can have unlimited attempts to conceive naturally without being subjected to the side-effects of multiple pregnancies and ovarian hyperstimulation syndrome. In contrast, in-vitro fertilization (IVF) is a stressful and time-consuming treatment

Causes of tubal blockage

Site of blockage	Causes
Proximal tubal blockage	<ul style="list-style-type: none"> • <i>Pelvic inflammatory disease</i> • <i>Salpingitis isthmica nodosa (SIN)</i>: nodular thickening of the isthmus portion of the tube • <i>Endometriosis</i>: endometriosis of the tubes can occur in the serosa or the mucosa • <i>Obliterative fibrosis</i>: in this condition, dense collagenous connective tissue replaces the lumen and the lamina propria of the tube, and involves the transmural segment of the tube • <i>Mucus, polyps and intramural debris</i>: these are reversible causes of tubal blockage via tubal flushing • <i>Salpingitis</i>: a polymicrobial aetiology in most cases • <i>Endometriosis</i>
Mid/distal tubal blockage	<ul style="list-style-type: none"> • <i>Surgery</i>: peri-tubular adhesions distort anatomy/sterilization

Table 1

and each attempt offers only a single chance of pregnancy, unless embryos are available to cryopreserve for future use.

Diagnosis of tubal disease

There are many diagnostic tests for evaluating tubal patency but our ability to evaluate tubal function is limited, and tubal patency does not necessarily equate to satisfactory tubal function. We currently judge the degree of tubal damage by assessment of tubal patency and of the extent of peritubal adhesions, as determined by the American Fertility Scoring System rather than by the functional status of the tubal mucosa. Although current technology – such as salpingoscopy or fertiloscopy – now enables us to examine tubal mucosa in greater detail, it is still not possible to determine the intricate physiological function of the fallopian tube just by mere macroscopic inspection.

Investigations for tubal disease can be divided into radiological tests, microbiological tests and surgical tests (see Table 2). The National Institute for Clinical Excellence (NICE) recommend that women who are not known to have co-morbidities (such as pelvic inflammatory disease, previous ectopic pregnancy (EP) or endometriosis) should be offered hysterosalpingography (HSG) to screen for tubal occlusion. HSG is a reliable test for excluding tubal occlusion, and it is less invasive and makes more efficient use of resources than laparoscopy. For women who are not known to have co-morbidities and where the appropriate expertise is available, hysterosalpingo-contrast-ultrasonography

may also be considered. However, if women are thought to have co-existing pathology, it is preferable to offer laparoscopy and dye transit test to allow tubal and other pelvic pathology to be assessed at the same time.

Tubal disease and surgery

Peritubal adhesiolysis

Peritubal adhesions interfere with ovum pick-up and tubal transport, while periovarian adhesions may inhibit ovulation. The effect of tubal and ovarian adhesions on fertility was investigated by Tulandi et al. (1990), in an early controlled study which evaluated the effect of salpingo-ovariolysis on subsequent fertility. The cumulative pregnancy rate in the group that underwent salpingo-ovariolysis was three times higher than in the non-treated group (32% vs 11% at 12 months and 45% vs 16% at 24 months). This study confirmed that pregnancies can occur spontaneously in a small proportion of women with periadnexal adhesions and patent tubes and established the therapeutic value of salpingo-ovariolysis in such cases. When the adhesions are mild and filmy, adhesiolysis will result in good cumulative conception rates (60% in 24 months). However, dense adhesions carry a worse prognosis than fine, filmy adhesions.

Studies have shown that de novo adhesion formation was greater following laparotomy as compared with laparoscopy. The degree of magnification achieved during laparoscopy permits equivalent ease of surgery as with open microsurgery and the initial access to adherent pelvic organs is more easily achieved, without the need for macro-dissection. Laparoscopic salpingo-ovariolysis for periadnexal adhesions, when compared with laparotomy and adhesiolysis has several advantages both in terms of lower cost and speedier postoperative recovery. Adhesiolysis can frequently be performed at the time of the routine diagnostic laparoscopy during investigation of infertility providing preoperative consent has been obtained from the patient. Laparoscopic lysis of dense adhesions may be difficult, particularly for thick, vascular and extensive dense adhesions between the adnexa and bowel. It is debatable as to whether microsurgery via laparotomy may occasionally be preferable in such cases, as these patients have a very poor prognosis after surgery and are best referred for IVF. Other considerations prior to surgery include female age, as IVF success rates decline with advancing age and in women above the age of 40 years it is prudent to progress to IVF quickly rather than wait for tubal surgery to prove successful. The couple will have been investigated thoroughly before the decision is made to proceed with tubal surgery and if there are co-existing fertility problems – for example sperm dysfunction – IVF should be recommended. Patients who have had prior attempts at surgical tubal repair and patients with multifocal tubal disease have a very poor prognosis and, therefore, are not surgical candidates. Contraindications to tubal surgery are female age of 43 years or more, follicle stimulating hormone levels ≥ 15 IU/l, AMH ≤ 5 pmol/l, inoperable tubal disease and abnormal semen analysis.

Proximal tubal disease

The narrow lumen of the proximal tube and its thick muscular wall with the physiological constrictor mechanism renders it prone to blockage by mucus or uterine debris. Spasm of the

A summary of the diagnostic tests available for tubal disease

Investigation	Description
Hysterosalpingogram	Injection of contrast media cervically and X-rays taken to illustrate the contour of the uterus and patency of the tubes
Laparoscopy and dye	'Gold Standard' for tubal evaluation. Involves laparoscopy and injection of methylene blue cervically to test tubal patency
Hysterocontrastsonography (HyCoSy)	Ultrasound-guided procedure – galactose microparticles are injected into the uterine cavity, air bubbles are followed into the uterine cavity and used to assess tubal patency
Fallopscopy	Transvaginal microendoscopy a fine endoscope is used to visualize the entire fallopian tube
Fertiloscopy	Combination of transvaginal hydrolaparoscopy, dye test, fimbrioscapy or salpingoscopy, and hysteroscopy
Chlamydia testing	Blood test for Chlamydia antibodies

Table 2

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