Surgical management of tubal disease and infertility

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Abstract

With advances in assisted reproductive technology (ART), the role of reproductive surgery as the primary treatment of infertility has been questioned. Tubo-peritoneal factor infertility is common, and accounts for 30–40% of female infertility. The pathology of tubal disease ranges from peritubal adhesions, proximal and/or distal tubal blockage, hydrosalpinx to previous sterilization. In tubo-peritoneal factor infertility, reproductive surgery remains an important option and is complementary to ART. It should be considered as the first-line treatment if a good result is expected, when the pathology is treatable or if left untreated would adversely affect the results of ART. The success of reproductive surgery depends on careful patient selection using proper investigative tools, performed in units with expertise following microsurgical principles.

Keywords hydrosalpinx; peritubal adhesions; reproductive surgery; tubal disease

Introduction

Tubal and peritoneal factors account for 30–40% of female infertility. Some tubo-peritoneal pathologies are amenable to surgery. Nevertheless, with recent advances in assisted reproductive technologies (ART) producing pregnancy rates as high as 40–50% per cycle of treatment, the role of reproductive surgery as the primary treatment for infertility has been questioned. On the other hand, with careful patient selection using proper investigative tools, performed in units with expertise following microsurgical principles, the result of therapeutic surgery can be comparable to that of In-vitro fertilization (IVF). More importantly, surgery offers a long-term cure to the underlying pathology. Patients may have repeated attempts to conceive naturally without risking the complications associated with assisted conception, such as ovarian hyper-stimulation syndrome (OHSS) and multiple pregnancies. Therefore, reproductive surgery may still be considered a primary treatment on its own or complementary to IVF in the management of female infertility.

Developments in operative endoscopy have led to a revolutionary change in reproductive surgery. Laparoscopic surgery is minimally invasive with significantly less post-operative pain, quicker recovery and fewer cardiopulmonary complications compared with traditional laparotomy. The quality of the laparoscopic image has improved significantly with the introduction of newer fibre-optic technology as well as camera and light systems utilizing 3D technology, allowing better visualization. In addition, the availability of more versatile instruments allows better exposure, easier identification of pelvic anatomy and more precise surgery. The feasibility of laparoscopic suturing also allows increasingly more cases of reproductive reconstructive surgery to be carried out laparoscopically. Besides, laparoscopic surgery can be done on a day case basis with lower cost and a shorter duration of hospitalization.

Apart from being an alternative for women with tubo-peritoneal factor infertility, reproductive surgery may also be a complementary treatment option to ART in the presence of other fertility problems such as submucosal fibroids and endometrial polyps. Women should be well informed about the option of therapeutic surgery in case of tubo-peritoneal factor infertility before formulating the management plan. We discuss a few cases to highlight the surgical management of tubal disease and infertility.

Case 1 (aetiology and assessment of tubal disease)

Jane, a 28-year-old customer service assistant presents with a 3-year history of secondary infertility. She has deep dyspareunia and dysmenorrhoea. Her 5-year-old child was delivered by caesarean section after a failed induction of labour. She has a history of chlamydia infection which was treated with appropriate antibiotics. Jane has a BMI of 23, with regular menstrual cycles. Her tests for ovulation and ovarian reserve are normal, as is her partner's semen analysis. She has no other significant medical history and clinical examination is unremarkable. Jane is concerned about the effects chlamydia infection may have had on her Fallopian tubes and wants to discuss appropriate tests for assessing the tubes.

Discussion

Causes of tubal disease: the fallopian tubes are essential for natural fertility and have an important role in picking up ova and transporting ova, sperm, and embryos. They are also essential for sperm capacitation and ovum fertilization. However, the fallopian tubes are vulnerable to infection, endometriosis and surgical damage leading to tubal block. Tubal blockage can occur at the proximal, middle or distal portions of the tube, or involving both the proximal and distal portions of the tube (bipolar tubal disease). Pelvic inflammatory disease is a major cause of tubal subfertility and is the most common preventable cause of tubal infertility. Other causes of tubal blockage or damage include prior abdomino-pelvic surgery, endometriosis, postpartum sepsis and previous tubal sterilization. When salpingitis involves the luminal endothelium, ciliated cells lining the ampullary and infundibular portions of the lumen of the fallopian tube are destroyed. These ciliated cells, responsible for the transport of

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the gametes and embryos to their proper location, often do not recover after resolution of the infection. Loss of ciliated cells, post inflammatory fibrosis and pelvic adhesion impair normal function of the fallopian tubes and can cause occlusion of the tubes in more severe cases. Chlamydia trachomatis accounts for around 50% of acute pelvic inflammatory disease in developed countries. Chlamydial salpingitis is usually asymptomatic and has a long incubation period. A prolonged, untreated infection is more likely to cause permanent endothelial damage. Gonorrhoea is another common infection, especially in young women of low socioeconomic groups. It may present as pelvic inflammatory disease, disseminated disease with systemic manifestations, or it may be asymptomatic. Besides, co-infection with chlamydia may occur in up to 30–50% of cases. Despite successful antibiotic treatment, the risk of persistent tubal damage leading to infertility in laparoscopically confirmed PID is approximately 8–12%. This risk increases 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. The causes of tubal infertility and obstruction are listed in Table 1.

Assessment of the fallopian tubes: there are various methods for assessing tubal patency. Traditionally, hysterosalpingogram (HSG) and laparoscopy with dye are the two widely used methods for assessing the patency of the tubes. The National Institute for Clinical Excellence (NICE) recommends that women who are not known to have co-morbidities (such as pelvic inflammatory disease, previous ectopic pregnancy or endometriosis) should be offered HSG because this is a reliable test for ruling out tubal occlusion, and it is less invasive and makes more efficient use of resources. Although HSG is regarded as safe, the procedure exposes women to ionizing radiation and the risk of an allergic reaction to contrast media. Some women also find the procedure uncomfortable and in some cases this may necessitate abandoning the procedure. HSG delineates the uterine cavity as well as the Fallopian tubes and may provide additional information on intrauterine lesions such as polyps, adhesions and submucous fibroids which may appear as filling defects on the HSG. The procedure is usually performed within the first 10 days of a cycle to avoid irradiation risk to an early pregnancy.

Where appropriate expertise is available, screening for tubal patency using hysterosalpingo-contrast-ultrasound (HyCoSy) may be considered as an alternative because it has comparable accuracy to that of HSG, but avoids radiation and allows simultaneous assessment of the uterus and ovaries. It is operator dependent and appropriate training and maintenance of skills is required.

Laparoscopy with dye test is often considered the "gold standard" and is recommended in women who have increased likelihood of pelvic pathology on account of a history of pelvic inflammatory disease, pelvic surgery and significant pelvic symptoms such as severe dysmenorrhoea and dyspareunia. This option is therefore more appropriate for case 1. Laparoscopy offers the opportunity to treat co-existing pathology. However, it does incur operative and anaesthetic risks and increased operating costs.

Fertiloscopy, also known as transvaginal hydrolaparoscopy (THL) is another approach, which permits direct visualization of the pelvic organs and confirm tubal patency under local anaesthesia or sedation. It involves the introduction of a needle transvaginally into the Pouch of Douglas (POD) followed by saline infusion and introduction of a small endoscope to visualize the pelvic anatomy. However, the procedure is not without risk, as bowel and rectal injuries following fertiloscopy have been reported.

It should be borne in mind that tubal patency does not necessarily equate to normal tubal function. We currently judge the severity of tubal damage mainly by tubal patency and the extent of peritubal adhesion, as determined by the American Fertility Society scoring system, rather than by the functional status of the tubal mucosa. Examination of the tubal mucosa provides important information on the function of tubes. Salpingoscopy is an endoscopic technique that allows direct evaluation of the ampullary tubal mucosa at the time of laparoscopy. Falloposcopy is microendoscopy of the fallopian tube from the uterotubal ostium to the fimbriae by a transcervical approach. It allows direct visualization of the entire fallopian tube lumen. However, it has limited clinical application partly because the procedure is expensive and partly because the quality of image obtained is generally of low quality.

The measurement of chlamydial antibodies in serum has been used in the screening of infertile women for tubal disease. High serum titres of chlamydial antibodies are associated with tubal damage resulting from previous pelvic inflammatory disease. However, it cannot locate the site of damage nor assess the extent of tubal disease, so in practice, cannot completely replace laparoscopy in the diagnosis of tubal disease.

The various tests available to assess tubal patency and function are summarized in Table 2.

Common causes of tubal blockage

Site of Obstruction	Causes
Proximal tubal blockage	Amorphous debris and mucous plugs
	Pelvic inflammatory disease
	Salpingitis isthmica nodosa
	Endometriosis
	Obliterative intraluminal fibrosis
	Uterine synechiae
	Fibroids or polyps situated over the tubal ostium
Mid-segment tubal blockage	Post surgery
	Previous tubal sterilization
	Partial salpingectomy for ectopic pregnancy
	Congenital segmental absence
Distal segment blockage	Post surgical adhesions
	Endometriosis
	Pelvic inflammatory disease

Table 1

Case 2 (distal tubal disease, peri-tubal adhesions)

The same patient is listed for laparoscopy and dye test. At laparoscopy, the left tube was normal and patent. The right tube though patent had flimsy peri-fimbrial adhesions. What are the options for this couple and how would you counsel them?

A summary of the test available to assess tubal patency and function

Diagnostic test	Description	Advantages	Disadvantages
Hysterosalpingogram (HSG)	Injection of contrast media into the uterine cavity and X-ray taken to visualize the contour of the uterus and patency of the tubes	- Outpatient procedure - No need for a general anaesthetic - Provide information on uterine cavity and ampullary folds - Offers the opportunity for tubal cannulation if proximal tubal block is encountered - Relatively low cost	- Patient discomfort on injection of contrast media, may result in abandoning the procedure - No information on ovaries, peritubal pathology such as endometriosis - Over diagnosis of tubal occlusion possibly due to tubal spams from injection of contrast media - Risk of allergy to contrast media - Risk of radiation
Laparoscopy & Dye test	'Gold standard' for tubal evaluation. Involves laparoscopy and injection of methylene blue into the uterine cavity to test for tubal patency	- Able to visualize pelvic cavity (assess uterus, tubes, ovaries) - Able to treat pelvic pathology if present	- Invasive procedure - Inpatient or day surgery - General anaesthetic required - Complications from laparoscopy - Relatively expensive
Hystero-contrastsonography (HyCoSy)	Ultrasound guided procedure whereby galatose microparticles and air bubbles are injected into uterine cavity and used to assess tubal patency	- Outpatient procedure - Provides information about uterine cavity and ovaries - No risk of radiation	- Skills not widely available - Operator dependent - Cannot assess the ampullary folds
Fertiloscopy	Combination of transvaginal hydrolaparoscopy (THL), dye test, fimbrioscopy or salpingoscopy and hysteroscopy	- May be performed under local anaesthetic - Able to provide detailed information about pelvis, tubes and uterine cavity	- Skills not widely available - Special training required - Small risk of bowel perforation during insertion of fertiloscopy needle into Pouch of Douglas
Falloscopy	Transvaginal microendoscopy used to visualize the entire Fallopian tube	- Permits visualization of tubal mucosa	- Rarely performed nowadays partly due to cost
Chlamydia antibody testing	Blood test for Chlamydia antibodies	- Titres related to severity of tubal disease - Easy to perform and non-invasive	- Does not establish the site or extent of tubal disease

Table 2

Discussion

Distal tubal disease: distal tubal disease may range from thin, filmy adhesions to complete occlusion resulting in hydrosalpinx. The inflammatory response may be limited to the serosal surface of the fallopian tube or may cause extensive destruction of mucosal folds and the tubal lumen. There are two types of cells lining the tubal lumen, the secretory cells and the ciliated cells. The former cells produce secretion which provide a unique nurturing environment that enhances oocyte maturation and sperm function leading to improved fertilization, and is essential for early embryo development during the first 3–4 days mainly in the ampulla. The ciliated cells, on the other hand, are involved in transport of the gametes and embryos. It was observed in both animal and human studies that the reduction of fertility is proportional to the degree of mucosal damage.

Incomplete distal tubal blockage is referred to phimosis or fimbrial agglutination, while complete distal tubal blockage leads to hydrosalpinx. Fimbrioplasty is the lysis of fimbrial adhesions or dilatation of fimbrial strictures while neosalpingostomy is the creation of a new tubal opening in a fallopian tube with a distal occlusion.

Peritubal adhesiolysis: pelvic adhesions are often associated with tubal disease. Peri-tubal adhesions may limit tubal mobility affecting the transport of gametes within the tube, or create a physical barrier to ovum pick-up. Periovarian adhesions may inhibit ovulation. The effect of tubal and ovarian adhesions on subsequent fertility has been investigated in controlled studies. The cumulative pregnancy rate following 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 suggests

that pregnancies can occur spontaneously in women with peri-adnexal adhesions and patent tubes, but also suggests a significant therapeutic value of salpingo-ovariolysis in such cases.

The therapeutic outcome of adhesiolysis will be affected by the extent of adhesion and the type of adhesion (filmy or dense), the presence of inflammation and the degree of tubal disease.

In patients with filmy adhesions, the cumulative pregnancy rate after adhesiolysis can be as high as 68% at 24 months, which suggests that adhesiolysis is of benefit to women with filmy adhesions. However, pregnancy rates fall to less than 20% in women who undergo adhesiolysis for dense adhesions. Thus, women with dense pelvic adhesion may be more suited to have IVF treatment.

Studies have shown reduced de novo adhesion formation following laparoscopy when compared with laparotomy. There are two possible explanations. Firstly, laparoscopy avoids tissue desiccation which predisposes to inflammation and subsequent adhesion formation. Secondly, laparoscopy eliminates manual tissue handling leading to inadvertent serosal damage which is a pre-requisite for adhesion formation. Laparoscopic lysis of dense adhesions can be difficult, especially for thicker, vascular, dense adhesions involving the bowel. In such cases, it may be necessary to convert laparoscopy to laparotomy and lysis of adhesion with the use of microsurgical techniques including gentle tissue handling and frequent irrigation to avoid desiccation.

Case 3 (distal tubal disease, hydrosalpinx)

The same patient subsequently conceived spontaneously, but had a miscarriage at 8-weeks' gestation. Four months later, a pelvic ultrasound scan organized by her General Practitioner because of pelvic pain suggests bilateral hydrosalpinges which was confirmed at laparoscopy. What are the options for this couple and how would you counsel them?

Discussion

Hydrosalpinx is the dilation of fallopian tube in the presence of distal tubal obstruction. It is well known that women with hydrosalpinges have a worse prognosis than those with other types of tubal infertility undergoing IVF. In women undergoing IVF, the presence of hydrosalpinx is associated with early pregnancy loss, poor implantation and lower pregnancy rates. This may be due to the leakage of hydrosalpingeal fluid into the uterine cavity causing a hostile endometrial environment for embryo implantation and development, or simply a mechanical washout of embryos. In a meta-analysis by Camus et al., women with a hydrosalpinx had a 50% reduction in the odds of clinical pregnancy and delivery and a 40% increase in the odds of spontaneous miscarriage compared to those without.

Hydrosalpinx should be diagnosed and treated because it may impair the result of IVF. In a Cochrane review, Johnson et al. concluded that laparoscopic salpingectomy significantly increased the odds of ongoing pregnancy (OR 2.14; 95% CI 1.23 −3.73) and clinical pregnancy (OR 2.31 95% CI 1.48−3.62) in women with hydrosalpinx before IVF when compared with no treatment. The findings suggested that prophylactic salpingectomy and IVF are complementary to each other in the treatment of hydrosalpinx-related infertility. However, there are concerns about the potentially negative impact of salpingectomy on ovarian function and the response to ovarian stimulation during IVF treatment. During laparoscopic salpingectomy, special care should be exercized to avoid compromizing the ovarian blood supply by staying close to the fallopian tube.

Treatment options other than salpingectomy may also be considered. Laparoscopic proximal tubal occlusion is an alternative if salpingectomy is not technically possible due to the presence of significant pelvic adhesions. Occlusion of the tube serves the purpose of interrupting the passage of hydrosalpingeal fluid to the endometrial cavity. Data from the Cochrane review suggested that laparoscopic proximal tubal occlusion is as effective as laparoscopic salpingectomy and increases the IVF success rate by approximate 2-fold. However, leaving the hydrosalpinx behind may interfere with the aspiration of oocytes in some cases. In addition, women may experience exacerbation of pain after proximal tubal ligation because of on-going inflammation and distension of the fallopian tube resulting from occlusion at both distal and proximal ends. Consequently, women should be carefully counselled about the options of salpingectomy and proximal tubal occlusion and decisions individualized according to patient preference, presence of pain and extent of pelvic adhesions.

It is also possible to achieve proximal tubal occlusion with hysteroscopic placement of a micro-insert such as Essure. Aurora et al. in a systematic review of 11 observational studies (115 women) concluded that women who had hysteroscopic proximal end occlusion with Essure and who underwent further IVF cycle had a pregnancy rate of 38.6% and a live birth rate of 27.9% per embryo transfer, which is similar to results following laparoscopic salpingectomy, although direct comparative data is not available.

However, Essure has been withdrawn from sale in countries other than the Unites States.

Ultrasound guided aspiration of hydrosalpingeal fluid may be carried out at the time of egg collection. However the efficacy of this procedure has not been proven. Hydrosalpinx fluid can rapidly re-accumulate. Aspiration is associated with a risk of infection and prophylactic antibiotics should be considered.

Neosalpingostomy - the creation of a new tubal opening in a fallopian tube with a distal occlusion - is another option. The prognosis of therapeutic surgery for distal tubal blockage depends very much on the severity of tubal damage. The tubal wall thickness, diameter of hydrosalpinx and the extent of peritubal adhesions are other factors affecting the prognosis. In women who have mild distal tubal disease, 80% achieved intrauterine pregnancy after therapeutic surgery. In women who have moderate distal tubal disease, the conception rate was 17%. On the other hand, the pregnancy rate dropped to 5% in women with severe distal tubal disease, which is also associated with an increased ectopic pregnancy rate of up to 20%. Careful preoperative and intraoperative assessments are important to identify those patients who are most likely to be benefit from distal tubal surgery. If HSG films are available, evidence of concurrent proximal disease including constriction of and leakage of dye into muscular layer of the isthmic portion (which is indicative of salpingitis isthmica nodosa) should be carefully examined, as bipolar tubal disease is associated with a poor prognosis and is considered as a contra-indication for reconstructive surgery. During the neo-salpingostomy operation, the luminal surface of the distal part of fallopian tube should be examined by salpingoscopy to rule out

any intra-luminal adhesions and fibrosis, the presence of which should prompt a decision to proceed to salpingectomy. In addition, the overall clinical picture needs to be taken into consideration for example, in the presence of a significant male factor infertility or poor prognostic factors, salpingectomy or proximal tubal occlusion with recourse to IVF is preferred. However, for those who do not wish IVF or have good prognostic factors, consideration should be given to surgical repair.

Case 4 (proximal tubal disease)

Martha and her partner James present with a 3-year history of primary infertility. Her ovarian reserve tests, test for ovulation and pelvic ultrasound are normal. The HSG has been reported as "suspected left proximal tubal block". At laparoscopy, no fill or spill of dye could be seen from the left tube. The right tube was patent. There were no peri-tubal adhesions or endometriosis and the rest of the pelvic anatomy was normal. James's semen analysis is normal. What are the possible treatment options?

Discussion

Proximal tubal disease: proximal tubal blockage occurs in 10–25% of women with tubal disease. The narrow lumen, its thick muscular wall, along with the physiological constrictor mechanism in the proximal tube makes it prone to blockage. The blockage may be functional, due to spasm of the uterotubal ostium, or organic, due to a mucus plug or debris, or fibrosis associated with salpingitis isthmica nodosa (SIN) resulting from endometriosis or infection.

The findings of cornual or proximal tubal blockage on HSG should be interpreted with caution. False positive results may arise from tubal spasm, especially in case of bilateral proximal blockage. Spasm can result simply from the increased intrauterine pressure in response to the transcervical injection of contrast medium. This phenomenon may be avoided by introducing the contrast medium slowly into the uterine cavity, thereby avoiding abrupt increase in intrauterine pressure which predisposes to tubal spasm. The sensitivity and specificity of HSG are only 65% and 83% respectively. In one study of fallopian tubes which were thought to be proximally occluded on HSG, 33% of tubes were found to be occluded by amorphous material only. In fact, such non-structural occlusion can often be dislodged by application of hydrostatic pressure. In a Cochrane review, Mohiyiddeen et al. concluded that there is a significant increase in pregnancy and live birth rates with tubal flushing using oil-soluble contrast, but not with water-soluble media, when compared with no treatment. There were no significant differences in miscarriage, ectopic pregnancy and infection rates between tubal flushing with oil-soluble and flushing with water-soluble media.

Surgical options for true proximal tubal blockage include tubal cannulation and, microsurgical tubal anastomosis. Tubal catheterization or cannulation can be performed by either a radiographic approach (selective salpingography with tubal cannulation) or a hysteroscopic approach (hysteroscopic tubal cannulation). Selective salpingography consists of passing a catheter through the cervix into the proximal tubal ostium under fluoroscopic guidance, followed by injection of contrast medium. If tubal blockage cannot be overcome by the flushing action of the contrast medium, a small inner catheter with a flexible guide wire is advanced through the proximal tube. In hysteroscopic proximal tubal cannulation, the catheter system includes an outer sheath, inner catheter and a guide wire. With the use of operative hysteroscopy, the ostium can be identified, through which the catheter set is introduced. Once the cornual segment is cannulated with the inner catheter and guide wire, diluted methylene blue dye is injected into the catheter to assess if recanalization has been achieved. Usually hysteroscopic tubal cannulation is performed under laparoscopic guidance which minimizes the risk of tubal perforation, confirms the restoration of tubal patency and permits simultaneous inspection of pelvic organs to detect any unsuspected pelvic pathology which may have a negative impact on pregnancy rates if left untreated. In a recent met-analysis by De Silva et al. of observational studies, the pooled pregnancy rate was approximately 27% at 12 months after the use of tubal catheterization for unilateral or bilateral proximal tubal obstruction (27 studies, 1556 patients). The pooled live birth rate (14 studies, 551 patients) was 22% and ectopic pregnancy rate (27 studies, 1556 patients) was 4%.

If tubal cannulation cannot overcome the proximal tubal blockage, one option would be to microsurgical tubo-cornual anastomosis, whereby the blocked cornual segment of the tube is resected followed by re-anastomosis. A case series by Singhal et al. reported that the live birth and ectopic pregnancy rate of women who underwent micro-surgical tubo-cornual anastomosis was 29% and 5% respectively. Adverse prognostic factors for future fertility include a significant reduction of the residual length of tube, evidence of pelvic inflammatory changes involving the other segment of the tube and the presence of other infertility factors. Specialized training, experience and availability of equipment all have a major effect on the outcome of tubal surgery.

Sterilization reversal: between 0.2% and 3% of women who have had surgical tubal sterilization will request a reversal procedure. The younger the patient at the time of sterilization, the more likely that she will regret her decision. The most frequently cited reason for requesting a reversal procedure is the desire for children with a new partner.

In general, sterilization reversal is associated with a high pregnancy rate of up to 80%. Several factors may affect the outcome. Firstly, age of the women is important. In one large series, the pregnancy rate after sterilization reversal among women aged 15–30 years, 30–33 years, and greater than 33 years were 73%, 64% and 46%, respectively. Secondly, procedures that destroy the least amount of the tube have the highest success rates after reversal. The use of Filshie clips or Falope rings for sterilization is associated with a higher chance of success with reversal. Tubal cautery usually destroys a longer segment of the tube and is associated with a reduced chance of success. Higher pregnancy rates and a lower median interval between surgery and pregnancy are expected when the length of the tube after re-anastomosis is more than 4 cm. The prognosis is better when there is no significant discrepancy in diameters of the two ends of the tube at the site of anastomosis, e.g. isthmic to isthmic, or cornual to isthmic anastomosis. The length of time between sterilization and reversal is not generally regarded as important, but one study noted an increased risk of damaged mucosa with flattening of epithelium and polyp formation in the proximal portion of the tube after 5 years of sterilization.

Tubal anastomosis may be carried out via laparoscopy or laparotomy. Despite the advantages of laparoscopic surgery, many reproductive surgeons continue to perform tubal re-anastomosis via laparotomy because the laparoscopic approach requires superb suturing skills and laparoscopic microsurgical instruments. Nevertheless, in experienced hands, laparoscopic sterilization reversal has a result comparable to that of microsurgery performed via laparotomy, around 80% conception rate at 12 months. The introduction of robotic techniques, with better ergonomic qualities, is expected to enhance surgical precision and reduce fatigue, but the clinical benefits to the patient are as yet unproven.

General consideration and patient selection

The management of tubo-peritoneal factor infertility should be individualized. The age of the patient, ovarian reserve, prior fertility, site and extent of the tubal disease, presence of other infertility factors, experience of the surgeon, success rates of the IVF program, patient preference, religious beliefs and the cost are all important factors to be considered. Prior to making a decision on how best to manage tubal disease, a proper work-up to rule out any co-existing infertility factor is essential. Semen analysis must be performed, as a grossly abnormal result may be a contraindication to surgery.

The rationale, potential benefits and complications of the proposed treatment should be clearly discussed before formulating the management plan. Tubal therapeutic surgery can offer a permanent cure in some women so that they can have repeated attempts to conceive naturally and avoid the risks associated with IVF. However, women with tubal therapeutic surgery will have a higher risk of ectopic pregnancy in general and an early pregnancy scan in subsequent pregnancies is advised. They should be informed about other possible surgical risks like bleeding, infection, iatrogenic injuries and anaesthetic risks.

Laparoscopy remains the gold standard to diagnose the tubal disease and assess the severity of tubal damage. Therapeutic surgery remains a viable option in the management of tubo-peritoneal factor infertility. The success of therapeutic surgery depends on prudent selection of cases. Ideal candidates for therapeutic surgery are those who are young, with minimal degree of tubal damage, and no concomitant infertility factor.

Microsurgical principles

Microsurgery is a concept that involves the utilization of a set of technical principles and specially designed micro-instruments to minimize tissue injury and to achieve optimal anatomical reconstruction. The relevant techniques include: appropriate magnification, good lighting, complete removal of diseased tissue, meticulous haemostasis, avoidance of peritoneal desiccation with continuous irrigation of exposed peritoneal surface and the use of micro-suture. The use of microsurgical technique should lead to a reduced risk of iatrogenic adhesion formation. Microsurgical principles should be followed not only in reconstructive surgery of the fallopian tube, but whenever gynaecological surgery is performed in women of the reproductive age group.

Conclusion

Reconstructive tubal surgery remains a viable option in women with tubal infertility. In selected cases, it produces results comparable to IVF treatment. Surgical intervention is necessary in most cases of distal tubal disease with hydrosalpinges in the form of either salpingectomy, proximal tubal occlusion or in selected cases, salpingostomy. Women with proximal tubal disease will often benefit from hysteroscopic tubal cannulation. Women with infertility resulting from tubal disease should have ready access to experienced reproductive surgeons to contribute to the formulation of an optimal treatment plan. ◆

FURTHER READING

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Practice points

- Tubo-peritoneal factor infertility is common, and accounts for 30–40% of female infertility.
- The common causes of tubal disease are infection, endometriosis, previous surgery, and inflammatory disease.
- Hysterosalpingogram allows the tubes and uterine cavity to be assessed, and should be offered to women with a low risk of tubal disease. Hysterosalpingo-contrast-ultrasound (HyCoSy) is an alternative with comparable accuracy to that of HSG, which avoids radiation and allows simultaneous assessment of the ovaries. In women with a high risk of tubal disease, or if HSG suggests tubal blockage, a laparoscopy and dye test should be offered.
- Tubal patency does not equate with normal tubal function; direct inspection of the mucosa (salpingoscopy) provides important additional information about the function of tube.
- In selected cases of hydrosalpinges, salpingoscopy should be performed to assess the degree of tubal mucosal damage. In the absence of any evidence of mucosal damage, salpingostomy should be considered. On the other hand, if the mucosa has been significantly damaged or destroyed, IVF is a better option
- Hysteroscopic proximal tubal cannulation is an effective treatment for proximal tubal blockage.
- Reversal of sterilization is associated with a cumulative conception rate higher than that achieved with one cycle of IVF treatment.
- Microsurgical principles should be followed in reconstructive surgery of the fallopian tube, and should be borne in mind when gynaecological surgery is performed in women of the reproductive age group.