



TUBAL SURGERY FOR INFERTILITY, IS IT STILL AN OPTION?

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Article Received on 01/09/2019

Article Revised on 22/09/2019

Article Accepted on 12/10/2019

ABSTRACT

While tubal diseases are complex groups of conditions and diseases which can be either acquired or congenital, the vast majority are infective in origins and mostly are due to pelvic inflammatory conditions. Most of these patients with tubal conditions are currently being referred to IVF treatments. As increasing numbers of patient are currently cannot afford this kind of treatment, more attention should be paid to the alternative which is tubal surgery. A major hindrance to the success of tubal surgery is the many classifications of tubal diseases which can be confusing to both patients and clinicians. The two main investigations that are used to diagnose tubal disease(HSG and laparoscopy) cannot diagnose the real state of tubal health because both cannot see what is happening within the tubal lumen. A patent tube should not mean a healthy tube because the transport of the either of egg, sperm or embryo would need a healthy lumen which can secret enough nutrients and healthy cilia which can propel the gametes or the zygote. In my opinion this can explain the high failure rate of tubal surgery even in the hands of best surgeons.

INTRODUCTION

Fallopian tubes are two complex channels, their complexity stems from the fact that they are not like any other channel, they are channels which have different compartments, each designed for a function which is not totally understood. The anatomical structure of the fallopian tubes begins at the uterus as very narrow part and gradually widens when it reaches the ovaries. The five compartments are (interstitial, Isthmus, Ampulla, Infundibulum and Fimbriae).

The isthmus is the narrowest part of the fallopian tubes and has the thickest wall, and it is located near the uterus. From there the isthmus widens into the ampulla which carries on widening until it reaches the funnel-shaped infundibulum before ending into the ovaries. Finger-like projections called the fimbriae extend from the infundibulum to embrace the surface of the ovaries and facilitating the capturing of the released egg.

Before the advent of assisted reproductive techniques, tubal surgery used to be an important part of our treatment of tubal diseases. Such Operative procedures to reconstruct occluded Fallopian tubes can date back to more than four decades ago (Siegler, 1977). Restoring tubal patency and anatomy in anticipation of an improved ability of ovum retrieval and transfer is the main objective of such surgery. However, early efforts rarely resulted in term pregnancy rates of more than 5% (Bateman et al., 1987). The reason for this low success rate relate to the fact that a healthy tube is not only a patent channel.

The limiting factor for many is mainly irreversible tubal mucosal and fimbrial damage, irrespective of variations such as size of hydrosalpinx (Boer-Meisel et al., 1986; Donnez and CasanasRoux, 1986; Sawada et al., 1997).

It is clear that the best chance of conceiving after prolonged infertility is with assisted conception methods, especially when the Fallopian tubes are found to be severely damaged. The success of surgical treatment in women with severely damaged tubes is poor in comparison. Accordingly, several authors have questioned whether tubal surgery is in fact obsolete with the increasing availability and success of IVF treatment (Paterson, 1984; Lilford and Watson, 1990; Anonymous, 1991a,b; DeCherney, 1992; Gomel and Taylor, 1992; Benadiva et al., 1995; Hull and Fleming, 1995; Shushan et al., 1995; Philips et al., 2000; Feinberg et al., 2007).

The best diagnostic tools

Before we decide which is the best tool to assess tubal health (not patency), let us see the two most common procedures we currently rely on, i mean HSG (hysterosalpingography) and Laparoscopy.

HSG: Hysterosalpingography is primarily used to examine women who have difficulty becoming pregnant by allowing the radiologist to evaluate the shape and structure of the uterus, the openness of the fallopian tubes, and any scarring within the uterine or peritoneal (abdominal) cavity.

HSG is also used to monitor the effects of tubal surgery.

The procedure can also be used to investigate repeated miscarriages that result from congenital or acquired abnormalities of the uterus and to determine the presence and severity of these abnormalities, including: Tumor masses, Adhesions, Uterine fibroids.

Laparoscopy: This is considered by many as the gold standard investigative tool. It help us to check how these tubes looks from the outside, degree of scarring, location of pathology, evidence of any other conditions like fibroids, endometriosis, ovarian masses and finally checking the patency of fallopian tubes. As we all noticed, there are so many occasions when these tubes look healthy from outside without any associated pelvic pathology but still not patent to pass the dye. Some believe that tubal spasm can be blamed for that without necessarily having any secondary pathology. It cannot be distinguished from tubal occlusion, administration of anti spasmodic like glucagon can result in uterine relaxation and resolution of the temporary tubal occlusion. (Simpson et al).

Other tools like

HyCoSy test is performed by a sonographer with specialist skills in carrying out this type of procedure. A small thin catheter is passed through the cervix into the uterus and ultrasound contrast medium is passed through the fallopian tubes. The progress of the fluid can be monitored by ultrasound and any blockages or abnormalities can be detected. So again we go back to

the tubal patency theory as an indicator of presumed tubal health.

There was a lot of talking about tubal flushing as an aiding tool to unblock fallopian tubes. The most recent re search was conducted in June 2014. Selection criteria Randomised controlled trials (RCTs) comparing tubal flushing with oil-soluble or water-soluble contrast media, or with no treatment in women with subfertility (Mohiyiddeen et al 2015). That study concluded that evidence suggests that tubal flushing with oil-soluble contrast media may increase the chance of pregnancy and live birth compared to no intervention. Findings for other comparisons were inconclusive due to inconsistency and lack of statistical power.

It is obvious that neither HSG nor laparoscopy can give us an idea of the health of the tubal lumenl or any associated mucosal damage or distortion.

There are other tools which are not widley avialable which can help in looking into the lining of fallopian tubes like the one below:

Falloscopy (occasionally also **falloscopy**) is the visualisation of the inside of the tubes either through hysteroscopic or laparoscopic approach using micro endoscope. (Wong and walker 1999).

Table 1: Grades of salpingoscopic findings.

Puttemans Salpingoscopy Classification-1987

Grade I	normal mucosal folds
Grade II	Major folds separated and flattened, however, otherwise normal
Grade III	Focal adhesions throughout the mucosal folds
Grade IV	Extensive adhesions and/or flattened areas throughout the mucosal folds
Grade V	Total disappearance of mucosal folds

This technique is not practiced on a wide scale though it is in my view is the ultimate diagnostic tool which can tell us whether this patient would benefit from surgical option or the patient should be referred immediately for IVF. Also it has been shown that it can help in re establishing the function of the tube by simply flashing the channel and breaking any internal micro adhesions.

Classifications of tubal diseases

literatures show that there is a big list of classifications as seen below. Some of these classifications are very complex and confusing and usually does not aid much in decision making. The one i found most user friendly is 'H and R' classification (Hull and Rutherford 2004). This divide tubal diseases into three grades 1, 2 and 3. Grade 1(mild); Tubal fibrosis absent even if tube

occluded (proximally) Tubal distension absent even if tube occluded (distally) Mucosal appearances favourable Adhesions (peritubal-ovarian) are flimsy Grade 2; (Intermediate or moderate) Unilateral severe tubal damage With or without contralateral minor disease

'Limited' dense adhesions of tubes and/or ovaries Gade 3: (Severe) Bilateral tubal damage Tubal fibrosis extensive Tubal distension >1.5 cm Abnormal mucosal appearance Bipolar occlusion 'Extensive' dense adhesions.

Table 2: Classification of types of tubal disease.

Authors and study type	Number	Classification	Criteria	Pregnancy (%)	Surgery
Caspi <i>et al.</i> (1979) prospective	101	I, II, III, IV, occluded/ not occluded	Type and extent of adhesions, tubal occlusion	9.7–61.5	Tubal surgery
Boer-Meisel <i>et al.</i> (1986) prospective	108	I, II, III	Extent and type of adhesions, diameter of hydrosalpinx, condition of mucosa, wall thickness	77, 21, 3	Salpingostomy, adhesiolysis
Donnez and Casanas-Roux (1986) prospective	257	I, II, III, IV	ampullary dilatation, wall thickness, fimbrial ciliated cell percentage, tubal occlusion score	60.48, 25, 22	Fimbrioplasty, salpingostomy
Mage <i>et al.</i> (1986) retrospective	76	I, II, III, IV; I, II, III, IV	Tubal: patency, mucosa, hydrosalpinx, thickness; adhesions: type and location	58, 37, 10, 0; 39, 32, 27, 5	Laser salpingostomy and adhesiolysis
Carey and Brown (1987) retrospective	87	Mild/moderate	Type and extent of adhesions	73, 33, 33; 25, 20, 67 (ectopic)	Adhesiolysis
Wu and Gocial (1988) prospective	188	I, II, III, IV; no surgery versus surgery	Adhesion, tubal occlusion, tubal state	67, 41, 12, 0 with surgery; 24, 10, 3, 0 without surgery	Tubal surgery
Watson <i>et al.</i> (1990) retrospective	82	A, B, C, D	Tubal patency and sites of blockage	15; 11 (LB rate)	Tubal surgery
Winston and Margara (1991) retrospective	388	I, II, III, IV	Based on Boer-Meisel's classification: tubal wall thickness, mucosa, adhesions, hydrosalpinx	33* at 48 months	Distal salpingostomy
Singhal <i>et al.</i> (1991) retrospective	232	Adhesiolysis, salpingostomy, TCA	Type of operation, age, severity of adhesion	25 within 12 months; 40 within 50 months	Tubal surgery
Marana <i>et al.</i> (1995) prospective	55	I, II, III, IV; I, II, III, IV, V	AFS adhesions and distal tubal occlusion; salpingoscopic grades based on intraluminal folds	58, 43, 40, 80	Salpingo-ovariolysis, salpingoneostomy
Surrey and Surrey (1996) prospective	55	AFS and I, II; I, II	Laparoscopic scores (AFS); salpingoscopic score (patency epithelial pallor, dilatation, vascularity, intraluminal adhesion)	27, 10 (2 years); 39, 4	Nothing or small neo-salpingostomy
Akande <i>et al.</i> (2004) retrospective	192	I, II, III	Hull and Rutherford classification, using mucosal state, severity of	9, 48, 69 (LB within	Tubal surgery

IVF or tubal surgery, which one to go for??

Although many gynaecologists think tubal surgery is a dying art view of increasing popularity of IVF among many fertility specialists, there is increasing evidence that there is slow resurrection of this art especially in the face of increasing cost facing patients who are thinking or contemplating IVF treatment. There are many studies that have been published which have indicated that there is still a space for tubal surgery. Obviously evidence would be much strong if it is coming from randomised controlled trials or systematic review of few studies. Most recently in 2017 the Cochrane database published this evidence which was comparing tubal surgery versus IVF or expectant management for patients with tubal factor for infertility.

They concluded that background Tubal surgery to overcome infertility caused by tubal disease is becoming popular, in part because of risks and costs related to IVF, which offers another option for overcoming tubal infertility. Benefits obtained from tubal surgery would

potentially be sustained over multiple cycles and many years, even resulting in multiple livebirths. However, tubal surgery is expensive, as it requires additional specialist training and experience among gynaecologists who perform the procedure, and it can involve adverse effects (including ectopic pregnancies) and operative risks. The effectiveness of tubal surgery in comparison with no treatment (expectant management) or IVF in women with tubal infertility is unknown. This review identified no suitable trials and no randomised evidence is currently available. Research is needed to obtain information about adverse outcomes and costs (Cochrane Database of Systematic Review 2017).

Types of tubal surgery

There are different types of tubal surgery described; Tubal re anaestomosis
Fimbrioplasty,
Fimbriolysis
Neosalpingostomy,
Tubo- corneal anaestomosis

Fluoroscopic transcervical balloon
 Hysteroscopic transcervical guidewire
 Hysteroscopic transcervical coaxial

Tubal surgery are a group of different procedures which are designed to correct different tubal problems. As we can see from the table below that tubal re anastomosis has the highest success.

Using a logistic regression, te Velde and coauthors analyzed 215 surgical procedures and determined that the location of the anastomosis, the number of tubes repaired, and the presence of coexisting fertility factors were key variables that predicted success(te Velde 1990).

Other studies indicate that success rates are dependent on maternal age and postoperative tubal length. (Dubuisson et al 1995)(Rouzie et al 1995). Microsurgical treatment success rates are higher with isthmic-isthmic anastomoses after fallope ring or clip application(Henderson 1984, Boeckx et al 1986) and lower when electrocautery was used for the tubal ligation procedure(Rock et al 1984).

In the case of extensive adhesions or insufficient tubal length, it may be possible to treat only one tube. Cumulative pregnancy rates are similar when one or both tubes are repaired (61% versus 56%), although the time until conception is longer after unilateral repair(Rouzi et al 1995).

Microsurgical techniques require magnification, meticulous hemostasis, minimal tissue handling, methods to prevent desiccation, minimally reactive suture, and avoidance of peritoneal irritants(Winston1980).

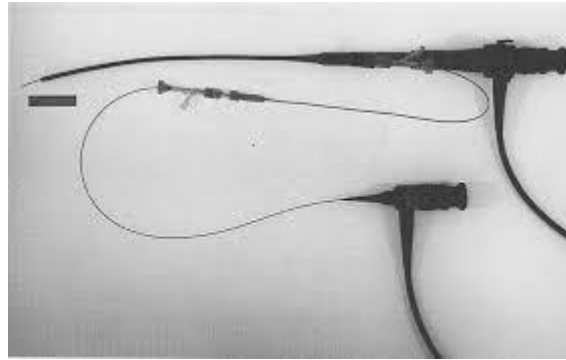
Microsurgery results in superior outcomes for salpingolysis, fimbrioplasty, neosalpingostomy, midsegment anastomosis, tubouterine anastomosis, tubouterine implantation, and tubal reanastomosis when compared with macrosurgery(Fayez and Suliman 1982, Siegler et al 1985).In two small series, microsurgical outcomes using loupe magnification or the operating microscope were similar(Hulka and Halme 1988).

Table 3: Tubal surgery outcome- Lee and Glob 2008.

	<i>Tubal Anastomosis</i>	<i>Fimbrioplasty and Fimbriolysis</i>	<i>Neo-Salpingostomy</i>	<i>Tubo-corneal Anaestomosis</i>
<i>Pregnancy rate</i>	69% - 90% (laparotomy) 31% -70% (laparoscopy)	25% - 45% (laparotomy) 25.8% - 58.7% (laparoscopy)	11.6% - 36.8% (laparotomy) 0% - 42% (laparoscopy)	56% - 75%
<i>Delivery rate</i>	45% - 82% (laparotomy) 25% - 50% (laparoscopy)			
<i>Ectopic rate</i>	1% - 5% (laparotomy) 0% - 6% (laparoscopy)	2% - 3.7% (laparotomy) 5.4% -9.8% (laparoscopy)	1.8% - 22.3% (laparotomy) 2.9% - 10.5% (laparoscopy)	5% - 9.5%

Table 4: Tubal surgery outcome-Lee and Glob 2008.

Author	Method	N	(%)	Pregnancy (%)	Ectopic (%)
Cofino(46)	Fluoroscopic transcervical balloon(FTB)	64	36	26.6	1.6
Thurmond(92)	Fluoroscopic transcervical coaxial(FTC)	100	NA	34	5
Kumpe(93)	FTC	22	NA	13.6	9
Thompson(94)	FTC	28	NA	14.3	3.6
Deaton(95)	Hysteroscopic transcervical guidewire	11	NA	27.3	27.3
Novv(96)	Hysteroscopic transcervical coaxial(HTC)	10	NA	20	0
Huang(97)	HTC	78	NA	58.9	NA



Falloscope

CONCLUSION

I think there is still a place for tubal surgery in modern infertility management due to the fact that tubal factor of infertility is still a major contributor to the causes of infertility in up to one third of couples. Assisted reproduction techniques have witnessed huge changes over the last two decades with much improvement in success rates however that happened at a cost to the patients who are now facing tremendous bills which they cannot afford and therefore tubal surgery can and should come back as competitor with a success rate not far away from IVF in certain groups of patients.

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