

NARRATIVE REVIEW

The role of salpingoscopy and fallopscopy in current clinical practice: A review.

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ABSTRACT

Objective. Tubal pathology accounts for a third of infertility cases of which about 80 percent affects the ampulla and distal tube and 10 - 25 percent the proximal tube. Infertile patients with tubal pathology have two options for treatment, in vitro fertilization or tubal reconstructive microsurgery. The present study aims to perform a literature review to give a comprehensive knowledge of the role of salpingoscopy/ fallopscopy in the assessment of tubal pathology in infertile couples and its impact on clinical practice.

Materials and Methods. A review of various articles on the technique of salpingoscopy/ fallopscopy and its clinical use in infertile patients was undertaken by searching databases like Pubmed, Scopus, Medline, Cochrane database, Embase, Web of science, Science direct, etc. The studies describing the methods and clinical scope of salpingoscopy and fallopscopy were included in the present study.

Results. The method of salpingoscopy/ fallopscopy and its role in the management of infertile patients has been studied in various aspects. The technique, the assessment and classification of tubal pathology, and the clinical impact on the management of the infertile couple has been reported as per actual literature data.

Conclusions. Salpingoscopy and fallopscopy are two important methods to assess the tubal mucosal surface. The conventional methods of examining the tubes by laparoscopy and HSG are inadequate for the study of tubal pathology. An endoscopic examination of the fallopian tubes along with HSG and laparoscopic evaluation of the pelvis will give complete information about the fallopian tubes.

Key words

Salpingoscopy; fallopscopy; tubal surgery; tubal infertility; unexplained infertility.

Introduction and background:

Tubal disease accounts for 25 to 40% of female factor infertility [1,2]. The outer fallopian tube is most commonly affected about 80 %, usually a hydrosalpinx, and the proximal tube is affected in 10 to 25% of cases [1]. The current trend in infertility treatment is to refer patients with tubal disease for In vitro fertilization (IVF) treatment. The success rate in IVF is about 30% live birth rate per cycle in women across all ages with tubal factor infertility. Estimated live birth rates can range from 9% to 69% in cases of tubal disease after correction by reconstructive microsurgery [1]. Although surgery has perioperative events it can yield good results in properly selected cases of tubal disease. Furthermore, it affects a long-term cure where several pregnancies can be attempted. However appropriate selection is the mainstay to offer the procedure to patients of tubal infertility. At present the main methods of assessing tubal disease are laparoscopy and hysterosalpingography (HSG). Both methods examine the gross pathology and the external disease of the fallopian tube. They do not examine the inner mucosal surface of the tube. Without examining the inner mucosa, it is not possible to give an objective assessment of tubal pathology [3,4]. The important techniques of examining directly the inner mucosal layer of the fallopian tubes are salpingoscopy and fallopscopy. The aim of the current study is a comprehensive non-systemic review of the literature to assess the feasibility and application of these procedures in infertility investigations and their impact on clinical decision-making. More objective information regarding the fallopian tubes is important to the clinician and the patient before making a decision for tubal microsurgery or IVF.

Aims and objective:

1. To review the literature on salpingoscopy and fallopscopy.
2. Current place of these procedures in tubal and unexplained infertility.

Material and methods:

A non-systemic review of various articles on salpingoscopy and fallopscopy, the methods, and clinical application of these procedures in infertility treatment was undertaken by searching the databases such as Pubmed, Cochrane database, Embase, Science direct, Google scholar etc. Studies describing the techniques, scoring systems, application in management, and prognosis in tubal and unexplained infertility were included. We searched various publications and studies till January 2023. The keywords used were fallopscopy, salpingoscopy, tubal surgery, tubal infertility, and unexplained infertility.

Discussion:

Fallopian tube disease accounts for 25 to 40% of female factor infertility [1,2]. Salpingoscopy is an endoscopic technique to visualize the tubal mucosa of the distal tubal segment of the fallopian tubes during laparoscopy. Salpingoscopy can be done in conjunction with laparoscopy or laparotomy under general anaesthesia and requires hospitalization. It can also be done as an office procedure performed in conjunction with a transvaginal hydro-laparoscopy [5].

Fallopscopy is a technique by which microendoscopy of the lumen of the fallopian tube from the utero-tubal ostia to the fimbria is performed by a non-incisional transvaginal approach.

Methods and techniques of salpingoscopy and fallopscopy:

A. Salpingoscopy as an inpatient procedure under general anaesthesia [4]

During a laparoscopic assessment of an infertile patient, a salpingoscopy can also be done to assess and evaluate the tubal mucosal morphology in greater detail. The colpomicrohysteroscope (Richard Wolf, Knittlingen, Germany) is used for the procedure. The tubal ostia are localized by means of two atraumatic forceps. The salpingoscope without its sheath is introduced through a second suprapubic incision. It is inserted through the ostium and advanced along the tubal lumen until the isthmus ampullary junction is reached. The tubal lumen is distended by saline injection through the cervix of the uterus via Ruben's cannula. If the patient has a proximal tubal block, then the salpingoscope is introduced with its sheath, and saline is injected through its sheath. The procedure is monitored laparoscopically via the umbilical incision. Complications that are rare during the procedure include injury to the tubal epithelium, perforation, and bleeding [4].

B. Transvaginal salpingoscopy as an office procedure under local anaesthesia [5].

The patient is put in the horizontal decubitus procedure. The central part of the posterior fornix is infiltrated with Alphacaine. The posterior lip of the cervix is lifted and the Veress needle which is part of a specially designed dilating trocar system is introduced approximately 1.5 cm below the cervix and tested by deeper insertion for intraperitoneal location. About 100ml of saline solution at 37 degrees C (diluted in 1% lidocaine) is instilled in the pouch of Douglas. The Veress needle is removed and a rigid endoscope of diameter 2.7 mm with an optical angle of 30 degrees and flow channel is introduced through the trocar sheath approximately 1 cm into the pouch of Douglas. A digital video camera is attached to it. By manipulation of the scope, the posterior wall of the uterus is inspected and the tuboovarian structures are identified. Saline irrigation is continued. The tubal ostia are identified, and the scope is introduced into the ampulla of the tube. The microanatomical structure of the ampullary folds is inspected. No instruments are used to stabilize the ampulla. The success rate of the procedure is approximately 47 percent. Bleeding from the mucosal or serosal surface did not occur. The anterior pelvis however cannot be visualized in this method. The patient is conscious and can follow the procedure on the monitor [5].

C. Transvaginal fallopscopy under hysteroscopic guidance under general anaesthesia [6]

A hysteroscope is gently introduced through the cervical canal into the uterine cavity without cervical dilation. The uterine cavity is irrigated with Lactated Ringer's solution. Under video monitoring, the distal tip of the hysteroscope is directed to within 3 mm of one of the tubal ostia so a direct longitudinal view of the intramural tubal lumen can be seen. The coaxial technique involved passage of a small floppy, steerable stainless steel tapered guide wire into the fallopian tube under video hysteroscope monitoring [6]. When the wire passed the point of resistance or beyond the utero tubal ostium, a flexible teflon cannula was introduced over the guide wire and through the tubal ostium under direct hysteroscopic vision to the fimbrial segment of the fallopian tube. The guidewire is then withdrawn while the teflon cannula is kept in place and the fallopscopy is introduced through the teflon cannula. Fluid irrigation is done through the cannula lifting the endothelium off the lens of the fallopscopy so it can be advanced under direct vision. In all cases, a better inspection of the tubal epithelium is obtained by the retrograde withdrawal of the fallopscopy from the fimbria towards the uterine ostia. Dual monitoring is used for both hysteroscopic and fallopscopic

recordings [6]. Falloposcopy failed in 11% of cases. No complications such as bleeding, trauma, or perforation were noted from within the tube or around the external tube.

D. Falloposcopy by a linear everting catheter system [7].

The linear everting catheter system consists of an inner and outer catheter which are joined circumferentially at their distal tips by a flexible membrane. This membrane is flexible enough to conform to the anatomy of the fallopian tube and at the same time firm enough to open the internal lumen under pressure. The balloon pressure is controlled via a fluid-filled syringe fitted to the inflation port. The controlled pressure results in the eversion of the balloon membrane as it advances through the fallopian tube. The falloposcope can be introduced into this space and then advanced along the length of the everted balloon. Irrigation is delivered through the lumen. The linear everting catheter is introduced transcervically. The procedure is monitored through a video system [7].

Various scoring systems for fallopian tube pathology:

A. American Fertility Society Classification of distal tubal occlusion. 1988 [8]

The American Fertility Society (AFS) classification of distal tubal occlusion includes parameters such as distal ampullary diameter, tubal wall thickness, mucosal folds at the neostomy site, extent of adhesions, and type of adhesions. All the parameters are given a score and the tubal damage is assessed as mild (1- 8) moderate (9-10) severe (>10).

B. Tubal disease staging by Winston Margara [9,10].

Table 1 depicts the classification of tubal disease by Winston Margara.

C. Tubal disease classification by Hull and Rutherford (2002) [11].

Table 2 depicts the classification of tubal disease by Hull and Rutherford.

D. New evaluation score that uses salpingoscopy to reflect fallopian tube pathology (Koji Nakagawa et al 2010)

Koji Nakagawa et al [12] devised a scoring system using the results of salpingoscopy. Six findings were noted during the salpingoscopy:

1. Adhesions.
2. Loss of mucosal folds
3. Rounded edges of mucosal folds
4. Debris
5. Foreign bodies
6. Abnormal vessels.

One abnormal finding was given an F score of 1 point. The maximum F score is 12 points.

E. Classification of tubal pathology by fallopscopy.

Kerin et al [13] devised a classification where they looked at the following parameters during fallopscopy, patency of the tubes, abnormal vascular pattern, degree of adhesion formation, amount of dilation, and abnormal intrauterine contents. Scoring for each of the 4 segments of the left and right tubes is done. According to scoring fallopian tube disease was classified as mild <20, moderate 20-30, severe >30.

Review of Literature:

One of the early descriptions of salpingoscopy for the evaluation of the fallopian tube was in 1988 [14]. 10 patients undergoing laparoscopy and 7 patients undergoing a laparotomy had a salpingoscopy performed with the same procedure. The tube was visualized from the fimbrial end to a point just distal to the ampullary-isthmic junction. No complications were observed. A discordance of 23.5% was noted overall between the fimbrial appearance at surgery and the salpinoscopic examination. They concluded patients with significant endosalpingeal damage have a poor prognosis following tuboplasty and should be given the option of IVF.

There is a discordance rate of 23% between salpingoscopy and conventional methods ie laparoscopy and HSG [14]. Marconi et al 1992 [15] evaluated 42 infertile patients using salpingoscopy as an adjunct to laparoscopy. Alteration in major and minor folds of the mucosa of the fallopian tubes and their vascularization, presence of micro adhesions, and cellular nuclei dyed with methylene blue in the lumen were evaluated. Fifty percent of the patients with no previous history of tubal disease presented with endosalpingeal alteration and in 37% of normal laparoscopies the salpinx had unilateral or bilateral salpingoscopic abnormalities. They concluded salpingoscopy should be carried out in all cases being evaluated for infertility during laparoscopy not only ones with pathology.

Koji Nakagawa et al 2010 [12] proposed a scoring system using the results of salpingoscopy which evaluated the relationship between scores and the outcome of pregnancy in 104 patients with unexplained infertility. They assessed six factors: adhesions, loss of mucosal folds, rounded edges of mucosal folds, debris, foreign bodies, and abnormal vessels. 1 F point was given for each factor. Patients with an F score of 0 and 1 had 30.6 % and 20% pregnancies respectively. Pregnancy with an F score of 0 was significantly higher than with high F scores. IUI and timed intercourse were advised in low F scores and patients with severe tubal damage were referred for IVF. Another method of salpingoscopy is a transvaginal office salpingoscopy. Stephan Cordts et al in 1998 [5] assessed transvaginal salpingoscopy as an office procedure for infertility investigation. They examined 70 women with primary symptoms of infertility with no history of pelvic disease or pelvic surgery, normal gynecological exam, and vaginal sonogram. Salpingoscopy was successful in 47% of the attempted tubes. Hydrolaparoscopy and transuterine dye hydrotubation can be performed in the same sitting [5]. Abdominal ostia can be cannulated with minimal or no manipulation. There is greater success in the pre-ovulatory or early post-ovulatory period with 64% success in the attempted tubes vs 31% in the follicular and late luteal phase. The overall success rate was 47% in the attempted tubes. The advantage of transvaginal salpingoscopy is that the normal position of the ampulla lies in the axis of the scope, and adhesions are better visualized under fluid than by laparoscopy. However tubal cannulation is difficult if there are adhesions, or the tubes are in an abnormal position. In the absence of a panoramic view, therapeutic manipulation at transvaginal hydrolaparoscopy is limited [5]. The major advantage of transvaginal salpingoscopy over fallopscopy is the visualization of both adnexal and mucosal adhesions. Kerin et al 1990 [6] described a microendoscopic technique of visual exploration of the fallopian tube. 44 women were examined by fallopscopy of which 36 had tubal damage and 8 served as controls. 38 underwent concurrent laparoscopy. Technical failure the inability to negotiate the tubal lumen in the absence of obstructive tubal disease was 11%. There were 63 successful procedures. The tubal lumen

was falloposcopically normal in 44% (28) of cases. Defects from partial to total obstruction were seen in the remaining 35 tubes (56%).

Dechaud et al 1998 [16] evaluated routine falloposcopy in infertile patients undergoing basic infertility investigations. Based on HSG and laparoscopy 75 infertile women were classified into tubal or unexplained infertility. All patients underwent falloposcopic examination under GA with a linear everting catheter. Based on the falloposcopic findings they were reclassified as falloposcopic tubal or falloposcopic unexplained infertility. The tubal catheterization rate was 94.5%. The mean duration was 19 minutes per tube. Based on a standard scoring system spontaneous pregnancy rates were 26.6% for a score of <20, 11.5% for a score of 21 -30, and 0% for a score of >30. The complication rate was 5.1% and there was pinpoint perforation. 3 tubal infertility patients were reclassified as unexplained and 2 unexplained infertility patients were reclassified as tubal lesions by falloposcopic evaluation.

Cox's statistical model was used to examine certain parameters such as age, duration of infertility, etiology of infertility by HSG or laparoscopy, and etiology of infertility by falloposcopy to predict the likelihood of pregnancy. None of the factors were statistically significant in predicting pregnancy. However, the only predictive factor nearing statistical significance was infertility defined by falloposcopic criteria. HSG and laparoscopy were not predictive. The pregnancy rate was directly correlated with the state of the tubal mucosa.

S. Rimbach et al (2001) [17] reported a large prospective international multicentric study that investigated the feasibility of falloposcopy as a routine investigation in infertility patients. 367 patients with 639 tubes were recorded in 18 centers. Falloposcopy was performed by hysteroscopic guidance and coaxial tubal cannulation. The procedure was successful in 69.6% of tubes. The number of patients who received a complete falloposcopic examination was 57%. Another 23.7% of patients had unilateral evaluation depending on the indication. Failures occurred in hysteroscopy (6.1%), cannulation step (10.6%), and visualization (16.4%). Intracavitary pathology or thick endometrium interfered with hysteroscopic access [18,19]. However technical insufficiencies resulting in catheter damage or vision-disturbing light reflections were the cause of most cannulation. They concluded that the procedure is limited by technical difficulties and indicated in selected cases rather than routine application.

The principal goal of surgical treatment is to restore the normal anatomy of the tubes and their functional integrity. The main surgical procedures include adhesiolysis, salpingoovariolysis, fimbrioplasty, and neosalpingostomy (summarised listed below in Table 3.). Reconstructive microsurgery can be done both by laparoscopy and laparotomy. A meta-analysis of 5 non-randomized controlled trials revealed a pooled intrauterine pregnancy rate of 28.9% under laparoscopic operation and 30.9% after open surgery [1]. The difference was not statistically significant. The crucial element of reproductive surgery is to prevent secondary adhesions.

The success of the surgery depends on the severity of tubal disease and the condition of the endosalpinx. Many studies show that about 80% of women with peri adnexal adhesions have healthy endosalpinx and within 1 year of adhesiolysis about 70% were pregnant and have a term delivery. [20,21,22,23]

Fimbrioplasty has high success rates. In a case series of 273 patients, Tran reports a live birth rate of 71.5% after this procedure [24]. Rates after neosalpingostomy in a meta-analysis of 22 observational studies (1972 -2014) showed a pooled live birth of 25 % [25]. Reproductive rates are good in well-selected patients. Good prognosis cases are limited to flimsy adhesions and mildly dilated tubes <3 cm pliable walls and lush normal folded mucosa. However tubal surgery not only results in increased intrauterine pregnancies but also ectopic pregnancy. The patient should be counseled regarding this.

The inner part of the fallopian tube is a cause of tubal obstruction in 15 -20% of cases. Allahbadia et al 2010 [26] reviewed minimal invasive transuterine tubal catheterization for both diagnostic and therapeutic

indications. Endoscopic techniques falloposcopic/ hysteroscopic/ laparoscopic tubal aqua dissection, guidewire cannulation with dilatation, and direct balloon tubuloplasty may be used to break down intraluminal adhesions or dilate a stenosed but relatively healthy tube. High patency and pregnancy rates have been reported [27,28].

Abnormal findings were detected in the fallopian tubes of 40% of patients with unexplained infertility who underwent salpingoscopy in this study. HSG, vaginal ultrasound, and laparoscopy cannot detect these abnormalities. Patients who were positive for chlamydia antibodies had a high incidence of tubal mucosal abnormalities. Women with infertility are more likely to have chronic endometritis (CE). Bacterial interaction with the endometrial milieu leads to changes in the leukocyte population, cytokine production, and growth factors, all of which lead to detrimental effects on the receptivity of the endometrium. In women with unexplained recurrent pregnancy loss (RPL), effective antibiotic treatment of CE appears to enhance the pregnancy and live birth rates. In addition to conventional histology, immunohistochemistry is advised to improve detection accuracy [29].

Vitagliano A et al. in their study showed that the negative effects of CE on negative IVF outcome may be restricted to severe disease, whereas mild CE may have no influence on IVF success rate [30].

Salpingoscopy is the only method available for the assessment of the inside of the oviducts. It is capable of producing in vivo images of the actual site of human fertilization. This can direct decisions toward tubal reconstructive microsurgery or artificial reproductive technique (ART).

Salpingoscopy is an important component of the examination of the tubes and should be incorporated into the routine investigation of the infertile couple for the following reasons ---

- a. It can be safely incorporated as a step during laparoscopy or pelvic hydrolaparoscopy.
- b. Complicated equipment is not required. The abdominal salpingoscopy can be done with a rigid hysteroscope, a colpomicrohysteroscope which is introduced through a second suprapubic incision [4]. A more simplified technique using a standard 2.9 mm diagnostic hysteroscope with a single flow diagnostic sheath is introduced through an accessory port. This adds an extra 15 mins to the surgical procedure [31].
- c. The learning curve is less as compared with falloposcopy and the time taken to examine each tube is less. Furthermore, the rate of success is approximately 97% in abdominal salpingoscopy whereas it is only 70% in transuterine falloposcopy [17] with several failures due to technical issues.
- d. Almost 75-80% of tubal pathology involves the outer 2/3rds of the fallopian tubes ie from the fimbria and ampulla to the ampullary isthmic junction [1]. Therefore, a routine examination of these organs during the fertility workup is important. This should not be restricted to abnormal findings but also to normal laparoscopic findings as diseased tubal mucosa is found in 37% of normal laparoscopies [15].

Successful pregnancies vary from 80% in salpingo-adhesiolysis to 25% in complicated neosalpingostomies [1]. These rates are encouraging. Furthermore, the pregnancy rates are almost similar following laparoscopy or laparotomy [1].

Recanalization is contraindicated in florid infection and long tubal obstruction. Falloposcopic intervention has good outcomes in well-selected patients of proximal tubal occlusion (PTO).

Schmidt et al used a linear everting catheter system on 62 patients and reported a pregnancy rate of 52% overall in patients with normal endosalpinx and 80% following insemination. There were no ectopic pregnancies [32].

Fallopscopy is technically a more difficult procedure than salpingoscopy. The method requires complex instrumentation using a hysteroscope with a coaxial catheter or everting catheter system falloposcope [33]. Both these methods have a long learning curve and high failure rates. Success rates amount to between 47% to 70% [5,17] Therefore falloposcopic examination should be restricted to selected cases. Proximal tubal block in HSG reports, abnormal laparoscopy dye test, high chlamydia antibodies, and history of tuberculosis should alert the clinician to the possibility of proximal tubal block. The aim of assessing the inner mucosal surface of the fallopian tube which requires an extra procedure is to select the patient appropriately for tubal microsurgery.

Fallopian tube recanalization can be performed with catheters, flexible guidewires or balloon systems under falloposcopic guidance. Fallopscopy provides a unique possibility to accurately image the fallopian tube and identify endotubal disease and classify proximal tubal obstruction. Non-hysteroscopic transcervical fallopscopy with a linear eversion catheter is an outpatient technique with good predictive value [34].

When compared to parous women, women with recurrent pregnancy loss had considerably higher levels of AGR3 and S100P immunostaining in the ciliated cells of the luminal epithelium, indicating that these conditions may have an abnormal subcellular location-associated pathogenesis [35].

In the peritoneal milieu, CTLA4-based autoimmunity contributes to chronic inflammation, and there is preliminary indication that anti-CTLA antibodies could provide a novel target therapy for endometriosis. CTLA4 gene studies, however, do not support the hypothesis that CTLA4-linked autoimmunity is a major factor in the etiology of endometriosis. These results support the function of intricate connections among the immune checkpoint molecule family concerned [36].

With accuracy comparable to HSG, sonohysterosalpingography (HyCoSy) is a non-invasive method. A number of research have been conducted on various contrast agents that might be utilized during this procedure, and more recent studies have looked at the hysterosalpingo-foam sonography (HyFoSy) process as a new method for examining the function of the tubes in infertile women. HyFoSy is a technique that is frequently employed to check for tubal patency nowadays, although its effectiveness in terms of pregnancy outcomes is not entirely known [37].

Conclusion:

Many patients of unexplained infertility are reclassified as tubal infertility after full evaluation which includes examination of the inner mucosal layer of the uterine tubes. The conventional methods of examining tubes by laparoscopy and HSG are inadequate for the study of tubal pathology. Without a study of the inner mucosa of the tube, an assessment of the fallopian tube is incomplete. Salpingoscopy and fallopscopy are two important methods to assess the tubal mucosal surface and clinical assessment is incomplete without these methods. Salpingoscopy assesses the outer 2/3 of the tube whereas fallopscopy can examine the whole length of the tube from the uterine cornu to the peritoneal surface. The primary importance of fallopscopy is that it can examine the inner 1/3 of the uterine tubes and check for the proximal tubal block. Following an appropriate assessment of the fallopian tubes aided by salpingoscopy and fallopscopy the

decision to proceed with natural pregnancy or tubal surgery or ART must be made after discussing with the patient her needs and prognosis.

A falloposcopic examination combined with a conventional examination of HSG/laparoscopy dye test will give a complete assessment of the tubes and guide the clinician as to whether the best line of treatment would be spontaneous birth, ART, or tubal reconstructive microsurgery. Discussion and involvement of the affected couple are important to decide the course of action. Furthermore, low-resource setup may not be able to offer expensive and complex IVF treatments.

Tubal reconstructive microsurgery has an advantage over IVF in that it improves the patient's fertility so that she has the chance to conceive several times over several cycles whereas IVF only allows conception over one or two cycles and the patient remains infertile. The prognosis of tubal microsurgery is good in well-selected cases and this means not only the results are encouraging but it can be done in a low-resource setting and where there are financial constraints. Surgeons can be trained without expensive endoscopic equipment.

However, without endoscopic examination of the tubal mucosa, good results will not be evident. Tubal surgery not only improves pregnancy rates but also increases ectopic rates. This should be discussed with the patient. It is therefore imperative to assess all tubal factors before attempting tubal reconstructive microsurgery and reconsider patients who would otherwise be referred for IVF treatment or labeled as infertile.

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Authors contribution:

S.P.: Writing- original draft,

A.D.: Writing- review & editing

R.M.: Supervision

L.L.: Writing- review & editing

P.T.: Validation, Writing- review & editing

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Table 1. Winston Margara classification of tubal disease.

| Stage | Details |
|--------------|--|
| I | Hydrosalpinx (thin- walled) with or without minimal fibrosis. Mucosa: no flattened areas and thrown into folds Filmsy adhesions limited to ampulla and ovary. Ovary: found and mostly free |
| II | Hydrosalpinx (Thick- walled) with Normal mucosa Mucosal fold: flattened areas or few folds along with thin-walled areas Adhesions: Thick and fibrous on Tube and ovary Ovary: Found and mostly free |
| III | Thick- walled hydrosalpinx along with extensive mucosal damage Thick fibrous adhesions Clean hydrosalpinx having thin wall along with patent isthmus showing nodularity. Ovary: Absent on that side or incarcerated against sidewalls of pelvis |
| IV | Tubo-ovarian mass/ Fibrous, Adherent hydrosalpinx Incarcerated Ovary + Ishmic damage |

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Table 2. Hull and Rutherford classification of tubal disease.

| Grade of the disease | Severity | Details |
|-----------------------------|----------------------|--|
| I | Minor disease | On occlusion (Proximal) Absent tubal fibrosis On Distal Tubal Occlusion: Absent tubal distension Mucosa: Favourable Adhesions on tube and Ovary: Filmsy |
| II | Intermediate disease | Tubal damage: Unilateral and severe ± Contralateral affected tube Adhesions on tube and ovary: Limited and dense |
| III | Severe disease | Tubal damage: Bilateral severe Fibrosis of the tube: Extensive Tubal distension >1.5 cm. Mucosa; Abnormal looking Bipolar occlusion Adhesions: Extensive and dense. |

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Table 3. Surgical treatment Options.

| Options for surgical treatment |
|---------------------------------------|
| Adhesiolysis |
| Salpingoovariolysis |
| Fimbrioplasty |
| Neosalpingostomy |

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