

Associated Factors with the Success Rate of Laparoscopic Surgery for Fallopian Tubal Occlusion in Vietnamese Infertile Women

Thang Nguyen Manh ^{1*}, Thanh Pham Hai ², Pau Loke Show ³, Nhon Bui Van ⁴, Hue Dao Thi ⁵, Linh Pham Thi ⁵

¹Department Obstetrics and Gynecology, Hanoi Medical University, Hanoi, VIETNAM

²Institute of Preventive Medicine and Public Health, Hanoi Medical University, Hanoi, VIETNAM

³University of Nottingham Malaysia Campus, Jalan Broga, 43500, Semenyih, Selangor Darul Ehsan, MALAYSIA

⁴Department of Science and Technology, Hanoi Medical University, Hanoi, VIETNAM

⁵Department Obstetrics and Gynecology, Duc Giang Hospital, Hanoi, VIETNAM

*Corresponding Author: nguyenmanhthanghmu@gmail.com; manhthang@hmu.edu.vn

Citation: Manh TN, Hai TP, Show PL, Van NB, Thi LP. Associated Factors with the Success Rate of Laparoscopic Surgery for Fallopian Tubal Occlusion in Vietnamese Infertile Women. *Electron J Gen Med.* 2021;18(4):em298. <https://doi.org/10.29333/ejgm/10868>

ARTICLE INFO

Received: 18 Sep. 2020

Accepted: 21 Jan. 2021

ABSTRACT

Background: Laparoscopic surgery for fallopian tubal occlusion (LSFFTO) could be an alternative method for tubal factor infertility. Here, we conducted this study to identify the factors associated with the success rate of LSFFTO in Vietnamese infertile women.

Methods: A cross-sectional study was conducted on infertile women (n=50). These patients were infertile due to distal tubal occlusions, and diagnosed via laparoscopic surgery (LS) with methylene blue administration. Both fallopian tubes (FT) were repaired and opened after LS. We used a self-developed tool to collect information from study subjects. The binary logistic regression method was used to find the associated factors with surgery outcome each side and both sides.

Results: Among 50 infertile women in the study, the percentage of opening status for FT was quite similar in both sides, 48% in left tube and 50% in right one. There were three factors associated with surgery outcomes in each side including secondary infertility, did not have tubal occlusion before LS, having history of miscarriage (induced abortions). For both tubes, there were 2 factors associated with the surgery outcomes: being no fallopian tubal occlusions before LS and having adhesions at the proximal part of Fallopian tube during the LS.

Conclusion: Our findings had highlighted the evidence of associated factors which affected LS in each side and both sides of fallopian tubes among Vietnamese infertile women.

Keywords: laparoscopic surgery, fallopian tubes, associated factors, infertile women, Vietnamese

INTRODUCTION

Tubal factor infertility (TFI) is responsible for more than a third of all female infertility [1]. In the 19th century, TFI was recognized as the main cause of infertility which was responsible for 20% to 30% of infertility in women worldwide [2]. On the other hand, a number of women who suffer from infertility are often confused by the fact that the majority of their infertility is of tubal origin [3]. Although different tubes and locations may be affected, hysterosalpingography (HSG) remains a valuable method used at the beginning of infertility assessment to determine the actual location of the tubal infection [3,4]. Other pelvic, peritoneal and tubal pathologies that may affect treatment outcomes can be examined by laparoscopy and dye tests to assess tube permeability that can affect to distinguish between real corneal occlusion and other causes [5]. Furthermore, it is therefore of the utmost importance how effectively we assess the condition of the tube and accurately predict the therapeutic effectiveness of laparoscopic surgery (LS). Without proper tubal monitoring, optimal tubal function cannot be achieved, which can lead to

an increased risk of ectopic pregnancy and waste precious time waiting for natural conception [6,7].

Laparoscopy - Assisted hysteroscopic cannula has been proposed as an alternative method for observing and assessing the permeability of infertility tubes [8]. It is an innovative method that has been compared to tubes in laparoscopic surgery. With the help of laparoscopy, the hysteroscopic approach makes it easier to perform a cannula examination of the pelvis as a whole [5]. It was invented to circumvent the problems inherent in assisted reproduction. Despite high demand, *in vitro* fertilization (IVF) approvals are hampered by a variety of factors, including religion, costs and success rates. Although it is becoming increasingly difficult to treat infertility with poor results, it remains the most reliable treatment option [9]. For a long time, restorative laparoscopic surgery using laparotomy was the only way to help patients to become pregnant. Micro laparoscopic surgery for the repair of tubes is the first major advance in this field [10], which not only improves the results, but also contributes to the definition of optimal technical guidelines and identifies the health of the tube mucosa as a key factor in determining the results. The laparoscopic approach was already described in 1977 [11], but

micro laparoscopic surgery quickly became the gold standard [12]. However, the progress of IVF made in the same year quickly reduced the use of restorative laparoscopic surgery for tubal closure. The success of micro laparoscopic surgery in modifying instruments and achieving encouraging results led many surgeons to adopt the new approach [12].

Empirically, many doctors tend to draw conclusions about the integrity of the fallopian tubes based on diagnostic hysteroscopy. Characteristics for all of them would be the permeability of the fallopian tubes, defined as the visualization of the fallopian tubes into the ostia without the saline solution passing directly into the ostia [13]. Hysteroscopies are considered highly reliable and exclude intrauterine abnormalities that may be relevant to female fertility, including the presence of abnormalities in the ovaries, cervix and other reproductive organs, and abnormal blood flows [14]. A study assessed the accuracy of hysteroscopic air bubbles passing through the ostia of the fallopian tubes (83.7%) [8]. Although there were benefits of cover crops in the laparoscopic surgery in female infertility, but this laparoscopic surgery technique could be suitable for many low-income patients. There need stronger evidences about the factors affect to the laparoscopic surgery outcomes. So, we conducted this study to identify the factors associated with the success rate of LSFFTO among Vietnamese infertile women.

MATERIALS AND METHODS

Study Design and Study Objects

This was a cross-sectional study that conducted on infertile women. Those were infertile due to distal tubal occlusions, and diagnosed via laparoscopic surgery (LS) with methylene blue administration, both fallopian tubes were repaired and opened after LS. All study participations were at the Central Maternity Hospital from December 2016 to May 2017. Criteria for selecting the subjects in this study: the women who had designated infertility LS, distal tubal occlusions after laparoscopic tubal repair, did not be acute pelvic inflammatory disease and agreed to participate in the study. Exclusion criteria: contraindications to laparoscopy including cardiovascular diseases and thyroid disorders; patients underwent laparoscopy for infertility. There were 50 infertile women participating (Figure 1) in this study.

Measures and Data Collection

We used a self-developed tool to collect information from study subjects. There were 4 parts in our questionnaire: demographic (4 questions), pregnant history (6 questions), clinical history (7 questions) and outcome after laparoscopic surgery (1 question).

Ethical Consideration

The purpose of the study was clearly explained to the subjects and the questionnaires were given to the objects only willing to voluntary and orally agreed to participate. No pressure is applied to any person who participated in this study. The participants were explained the right to withdraw at any stage if they would not regard to any negative consequences and they understood that collecting the data was only for study purposes. The result of the research was aimed exclusively at improving clinical practice, not for any other purpose. Patients' information was kept in secret. All

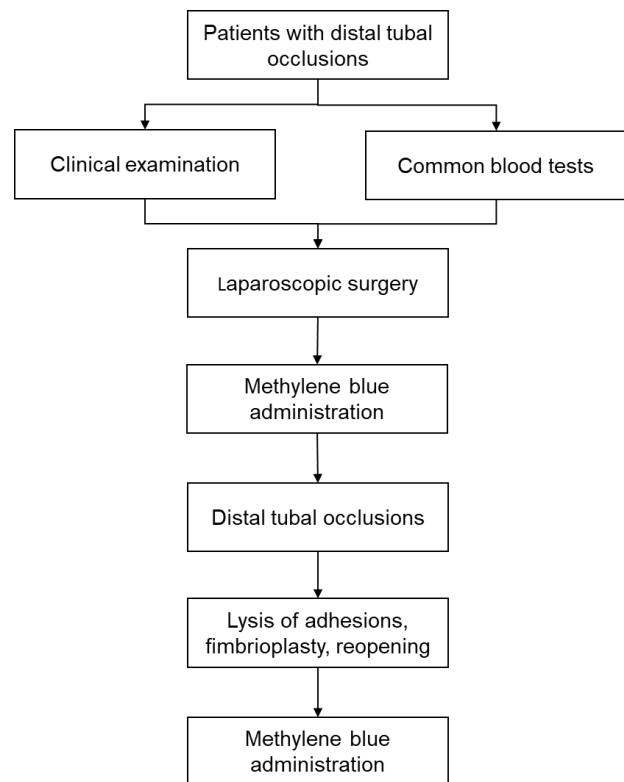


Figure 1. Framework of study

participants in the study agreed and signed a voluntary participation in the study.

Data Processing and Analysis

Descriptive statistics

Chi square test and independent T-test were used to comparing the different of outcomes after laparoscopic surgery with demographic, pregnant history and clinical history. The results had the statistic significant if p-value lower than 0.05.

Inferential statistics

The stepwise logistic regression model was used to select the appropriate regression model. The binary logistic regression method was used to find the relationship between the success rate of laparoscopic surgery for each and both fallopian tubal occlusions with demographic, pregnant history and clinical history.

Results

Characteristics of Study Subjects

On 50 infertile women who had participated the study, the percentage of opening status of Fallopian tubal was 48% in the left tube, and 50% in the right one (Table 1). There was a different in history of miscarriage, induced abortions between group block in the right tube. The status of fallopian tubes as open witnessed the different between block or open statuses of fallopian tubal at both sides.

Table 1. Patient characteristics associated with the success rate of laparoscopic surgery for each fallopian tubal occlusion (n=50)

	Fallopian tubal					
	Left		P value	Right		P value
	Block 26 (52%)	Open 24 (48%)		Block 25 (50%)	Open 25 (50%)	
Age group (years)						
< 30	15	14	0.963*	15	14	0.774*
>= 30	11	10		10	11	
Mean (SD)	28.31 (0.97)	29.25 (1.08)	0.260^	28.48 (1.09)	29.04 (0.96)	0.351^
Living area						
Hanoi	4	3	0.547**	4	3	0.500**
Others	22	21		21	22	
Types of Occupation						
Manual labor	22	21	0.547**	22	21	0.500**
Office job	4	3		3	4	
Type of infertility						
Primary	15	12	0.586*	16	11	0.156*
Secondary	11	12		9	14	
Duration of infertility (years)						
<= 3	19	16	0.621*	17	18	0.758*
> 3	7	8		8	7	
Pelvic inflammatory disease						
Yes	26	21	0.103**	25	22	0.117**
No	0	3		0	3	
History of vaginal birth						
Yes	3	6	0.193**	4	5	0.500**
No	23	18		21	20	
History of Cesarean section						
Yes	3	0	0.133**	3	0	0.117**
No	23	24		22	25	
History of miscarriage, induced abortions						
Yes	6	11	0.090*	5	12	0.037*
No	20	13		20	13	
History of ectopic pregnancy						
Yes	2	2	0.664**	3	1	0.305**
No	24	22		22	24	
Fallopian tubes						
Open	26	16	0.001**	25	17	0.002**
Block	0	8		0	8	
Pelvic adhesions						
Yes	19	19	0.614*	20	23	0.209**
No	7	5		5	2	
Fitz-Hugh-Curtis syndrome						
Yes	7	12	0.093*	7	12	0.145*
No	19	12		18	13	
The proximal part of Fallopian tube						
Adhesions	18	21	0.119*	19	20	0.733*
No adhesions	8	3		6	5	
Laparoscopic surgery						
Fimbrioplasty	20	18	0.874*	18	14	0.189*
Lysis of adhesions/Reopening	6	6		7	11	
Methylene blue administration						
Open	21	23	0.114**	21	21	0.649**
Block	5	1		4	4	
Other symptoms						
Yes	4	1	0.200*	4	1	0.174*
No	22	23		21	24	

Note: * P values were determined by Chi-square; ** P values were determined by Fisher's exact test; ^ P values were determined by Independent T-test

In total, among the study subjects, there were 40% of woman did not have fallopian tubal occlusion after LS at both sides (Table 2). In this group, there were less patients had

fallopian tube status as open than the group had one/two fallopian tubal occlusions after LS (P value < 0.05).

Table 2. The success rate of laparoscopic surgery for Fallopian tubal occlusions (n=50)

	Fallopian tube		P value
	One or two tubal blocks	Open in both tubes	
	30 (60.00%)	20 (40.00%)	
Age group (years)			
< 30	18	11	0.726*
>= 30	12	9	
Mean (SD)	28.5 (0.93)	29.15 (1.16)	0.332^
Living area			
Hanoi	4	3	0.590**
Others	26	17	
Types of Occupation			
Manual labor	26	17	0.590**
Office job	4	3	
Type of infertility			
Primary	18	9	0.297*
Secondary	12	11	
Duration of infertility (years)			
<= 3	8	7	0.529*
> 3	22	13	
Pelvic inflammatory disease			
Yes	30	17	0.058**
No	0	3	
History of vaginal birth			
Yes	4	5	0.293*
No	26	15	
History of Cesarean section			
Yes	3	0	0.207**
No	27	20	
History of miscarriage, induced abortions			
Yes	7	10	0.051*
No	23	10	
History of ectopic pregnancy			
Yes	3	1	0.472**
No	27	19	
Fallopian tubes			
Open	28	12	0.004*
Block	2	8	
Pelvic adhesions			
Yes	21	17	0.224*
No	9	3	
Fitz-Hugh-Curtis syndrome			
Yes	10	9	0.405*
No	20	11	
The proximal part of Fallopian tube			
Adhesions	21	18	0.094*
No adhesions	9	2	
Laparoscopic surgery			
Fimbrioplasty	21	11	0.279*
Lysis of adhesions/ Reopening	9	9	
Methylene blue administration			
Open	23	16	0.780*
Block	7	4	
Other symptoms			
Yes	4	1	0.326**
No	26	19	

Note: * P values were determined by Chi-square; ** P values were determined by Fisher's exact test; ^ P values were determined by independent T-test

Associated Factors

The binary logistic regression had found, there were 3 factors affecting the laparoscopic surgery outcome in left tube while there were 2 factors affecting the laparoscopic surgery

outcome in the right one (Table 3). With the left tube, patients who was secondary infertility made them more be reach the status of block after laparoscopic surgery. Infertile women did not have tubal occlusion before laparoscopic surgery would be

Table 3. The factors associated with the success rate of laparoscopic surgery for each fallopian tubal occlusion (n=50)

		Fallopian tube			
		Left (Block vs Open)		Right (Block vs Open)	
		OR	P value	OR	P value
>= 30-year-old	(No)	0.82	0.150	-	-
	Yes	(0.63 - 1.07)			
Secondary infertility	(No)	0.65	0.045	-	-
	Yes	(0.43 - 0.98)			
History of vaginal birth	(No)	1.46	0.055	-	-
	Yes	(1.00 - 2.11)			
History of Cesarean section	(No)	-	-	0.63	0.073
	Yes	-		(0.39 - 1.03)	
History of miscarriage, induced abortions	(No)	1.78	0.007	1.39	0.011
	Yes	(1.19 - 2.65)		(1.09 - 1.77)	
History of ectopic pregnancy	(No)	-	-	0.68	0.084
	Yes	-		(0.44 - 1.04)	
No tubal occlusion before laparoscopic surgery	(No)	0.66	0.000	0.56	0.001
	Yes	(0.54 - 0.8)		(0.41 - 0.77)	
Fitz-Hugh-Curtis syndrome	(No)	1.26	0.066	1.23	0.097
	Yes	(0.99 - 1.59)		(0.97 - 1.55)	
Laparoscopic surgery: Fimbrioplasty	(No)	1.39	0.052	-	-
	Yes	(1.01 - 1.93)			

Note: P values were determined by Binary logistic regression

Table 4. The factors associated with the success rate of laparoscopic surgery for both fallopian tubal occlusions (n=50)

	OR	P value
One/Two fallopian tubal occlusions before laparoscopic surgery	0.59	0.001
No Fallopian tubal occlusion before laparoscopic surgery	(0.43 - 0.80)	
The proximal part of Fallopian tube (No adhesions)	1.39	0.034
Adhesions	(1.03 - 1.87)	

Note: P values were determined by Binary logistic regression

reduce in the open status of fallopian tube at both sides. Study subjects who had history of miscarriage (induced abortions) increased the rate of open status of left tube as same as of the right one after laparoscopic surgery.

With the success rate of laparoscopic surgery for both fallopian tubal occlusion, there were 2 factors affecting the laparoscopic surgery outcomes (**Table 4**). Participations who had no fallopian tubal occlusions before laparoscopic surgery would increase the rate of block status in both sides of fallopian tube after laparoscopic surgery. Infertile women who had adhesions at the proximal part of Fallopian tube during the laparoscopic surgery would have more change to be at open status in both sides of fallopian tube after laparoscopic surgery.

DISCUSSION

Our study had conducted in 50 infertile women who had taken the laparoscopic surgery for both fallopian tubal occlusions. There were some statistically significant differences in demographic characteristics between groups had open and block status of fallopian tube after laparoscopic surgery when we look at each side and both sides. We had identified some associated factors to the laparoscopic surgery outcomes in each side and both sides.

In our results, the rate of open status of fallopian tube in one side was around 50%; and that rate of both sides was 40%. Women, who had successful completed the laparoscopic

surgery, could be spontaneous pregnancy or intrauterine insemination-assisted pregnancy with higher success rate [15], while, those with the unsuccessful laparoscopic surgery could remain the requirement of more treatment and care. Because when fallopian tube is block, the tubal injury could cause to women infertility [16]. In addition, women with both sides of tube at block status had witnessed a higher level of pain than one with one side at block.

On the other hand, we had found that the tubal occlusion before laparoscopic surgery could affect the laparoscopic surgery outcome of each side. Our finding was in line with Alain Audebert's research [17]. Another result was similar with Alain Audebert's research is that we had proved that woman with at least one fallopian tubal occlusion was block before laparoscopic surgery might reduce the success rate of laparoscopic surgery outcome [17]. To explain these similarities, the reason might due to adhesions in the proximal part of fallopian tube. We also found the association of this factor to the laparoscopic surgery outcome of each side. Furthermore, Regina Promberger et al. [18] had pointed out the negative effect of adhesions in the proximal part of fallopian tube which might could cause for the outcome treatment [18]. The adhesions problem had been considered as a contraindication a long time ago in the research of Michel Canis et al. [19]. Thus, more preparations needed to be done for the infertile women before they did the laparoscopic surgery.

There were some limitations in our study. First of all, our study is a cross-sectional study. So, we could not explain the cause and effect of associated factors we had found to the laparoscopic surgery outcome. To control this limitation, we

had selected the studies subjects with many clinical inclusion criteria. By that, our finding might have higher meaning with clinical case. Secondly, we did not have a large sample size as same as other study. Because we conducted this study in one location, there were not many study subjects met the inclusion criteria. We had controlled this limitation by collecting historical subclinical details to increase the reliable information for the outcome. To avoiding our research limitations, future studies need to be done in different locations at a large area. In addition, there need to do cohort study to classify the effect of associated factors to the laparoscopic surgery outcome.

CONCLUSION

Our study provides information on the success rate of laparoscopic surgery and the associated factors with laparoscopic surgery outcome. In the future, prospective cohort studies and randomized trials with a larger sample size are necessary to inform better clinical decision-making about the surgical treatment for infertile women in Vietnam.

Author contributions: TNM and HDT designed and performed experiments and collected data and informed consents. TNM, TPH, VNB, HDT, LPT and PSL analysed and interpreted the results, and edited and corrected the manuscript. TNM, TPH, and PLS wrote the manuscript. All authors approved the final manuscript.

Funding: No funding was received in this study.

Declaration of interest: All authors have no conflicts of interest or financial ties to disclose.

REFERENCES

- Daniilidis A, Balaouras D, Chitzios D, Theodoridis T, Assimakopoulos E. Hydrosalpinx: Tubal surgery or in vitro fertilisation? An everlasting dilemma nowadays; a narrative review. *Journal of Obstetrics and Gynaecology* 2017;37(5): 550-6. <https://doi.org/10.1080/01443615.2017.1287685> PMID:28325120
- Kase NG, Weingold AB. Principles and Practice of Clinical Gynaecology. 2nd Revised edition ed. New York: Churchill Livingstone; 1990.
- Hou HY, Chen YQ, Li T-C, Hu CX, Chen X, Yang ZH. Outcome of Laparoscopy-Guided Hysteroscopic Tubal Catheterization for Infertility Due to Proximal Tubal Obstruction. *Journal of Minimally Invasive Gynecology* 2014;21(2):272-8. <https://doi.org/10.1016/j.jmig.2013.09.003> PMID:24080141
- Deaton JL, Gibson M, Riddick DH, Brumsted JR. Diagnosis treatment of cornual obstruction using a flexible tip guidewire. *Fertility and Sterility* 1990;53(2):232-6. [https://doi.org/10.1016/S0015-0282\(16\)53272-5](https://doi.org/10.1016/S0015-0282(16)53272-5)
- Ikechebelu J, Mbamara S. Should laparoscopy and dye test be a first line evaluation for infertile women in southeast Nigeria? *Nigerian journal of medicine: journal of the National Association of Resident Doctors of Nigeria* 2011;20(4):462-5.
- Jain G, Khatuja R, Juneja A, Mehta S. Laparoscopy: as a first line diagnostic tool for infertility evaluation. *Journal of clinical and diagnostic research: JCDR* 2014;8(10):OC01-OC2. <https://doi.org/10.7860/JCDR/2014/9822.4929> PMID: 25478408 PMID:PMC4253226
- Graspeuntner S, Bohlmann MK, Gillmann K, Speer R, Kuenzel S, Mark H, et al. Microbiota-based analysis reveals specific bacterial traits and a novel strategy for the diagnosis of infectious infertility. *PloS one* 2018;13(1):e0191047-e0191047. <https://doi.org/10.1371/journal.pone.0191047> PMID:29315330 PMID:PMC5760088
- Török P, Major T. Accuracy of Assessment of Tubal Patency with Selective Perturbation at Office Hysteroscopy Compared with Laparoscopy in Infertile Women. *Journal of Minimally Invasive Gynecology* 2012;19(5):627-30. <https://doi.org/10.1016/j.jmig.2012.03.016> PMID:22935304
- Mekaru K, Yagi C, Asato K, Masamoto H, Sakumoto K, Aoki Y. Hysteroscopic tubal catheterization under laparoscopy for proximal tubal obstruction. *Archives of Gynecology and Obstetrics* 2011;284(6):1573-6. <https://doi.org/10.1007/s00404-011-2007-6> PMID:21779770
- Swolin K. Electromicrosurgery and salpingostomy: Long-term results. *American Journal of Obstetrics and Gynecology* 1975;121(3):418-9. [https://doi.org/10.1016/0002-9378\(75\)90024-1](https://doi.org/10.1016/0002-9378(75)90024-1)
- Gomel V. Salpingostomy by laparoscopy. *J Reprod Med* 1977;18(5):265-8.
- Bellina JH, Fick AC, Jackson JD. Application of the CO₂ Laser to Infertility Surgery. *Surgical Clinics of North America* 1984;64(5):899-904. [https://doi.org/10.1016/S0039-6109\(16\)43432-8](https://doi.org/10.1016/S0039-6109(16)43432-8)
- Cholkeri-Singh A, Sasaki KJ. Hysteroscopy for Infertile Women: A Review. *Journal of Minimally Invasive Gynecology* 2015;22(3):353-62. <https://doi.org/10.1016/j.jmig.2014.12.163> PMID:25553895
- Zhang E, Zhang Y, Fang L, Li Q, Gu J. Combined hysterolaparoscopy for the diagnosis of female infertility: a retrospective study of 132 patients in china. *Materia socio-medica* 2014;26(3):156-7. <https://doi.org/10.5455/msm.2014.26.156-157> PMID:25126006 PMID:PMC4130695
- Ikechebelu JI, Eleje GU, Bhamare P, Joe-Ikechebelu NN, Okafor CD, Akintobi AO. Fertility Outcomes following Laparoscopy-Assisted Hysteroscopic Fallopian Tube Cannulation: A Preliminary Study. *Obstetrics and gynecology international* 2018;2018:7060459. <https://doi.org/10.1155/2018/7060459> PMID:29977301 PMID:PMC6011055
- Török P, Molnár S, Herman T, Jashanjeet S, Lampé R, Riemma G, et al. Fallopian tubal obstruction is associated with increased pain experienced during office hysteroscopy: a retrospective study. *Updates in Surgery* 2020;72(1):213-8. <https://doi.org/10.1007/s13304-020-00712-x> PMID:31993995
- Audebert A, Pouly JL, Bonifacie B, Yazbeck C. Laparoscopic surgery for distal tubal occlusions: lessons learned from a historical series of 434 cases. *Fertility and Sterility* 2014;102(4):1203-8. <https://doi.org/10.1016/j.fertnstert.2014.06.047> PMID:25150389
- Promberger R, Simek I-M, Nouri K, Obermaier K, Kurz C, Ott J. Accuracy of Tubal Patency Assessment in Diagnostic Hysteroscopy Compared with Laparoscopy in Infertile Women: A Retrospective Cohort Study. *Journal of Minimally Invasive Gynecology* 2018;25(5):794-9. <https://doi.org/10.1016/j.jmig.2017.11.020> PMID:29221993
- Canis M, Mage G, Pouly JL, Manhes H, Wattiez A, Bruhat MA. Laparoscopic distal tuboplasty: report of 87 cases and a 4-year experience. *Fertility and Sterility* 1991;56(4):616-21. [https://doi.org/10.1016/S0015-0282\(16\)54589-0](https://doi.org/10.1016/S0015-0282(16)54589-0)