

Laparoscopic Evaluation of Female Infertility

Syed Masuma Rizvi¹, Shaheera Ajaz², Farhat Ali², Shazia Rashid³, Tashaffi Qayoom², Lubna Rashid²

¹Associate Professor, Department of Gynaecology and Obstetrics, Government Medical College, Srinagar, Jammu and Kashmir, India, ²Senior Resident, Department of Gynaecology and Obstetrics, SKIMS Soura, Srinagar, Jammu and Kashmir, India, ³Senior Resident Department of Gynaecology and Obstetrics, Government Medical College, Srinagar, Jammu and Kashmir, India

Abstract

Background: Infertility, one of the most common disorders confronting gynecologists, has multifactorial etiology and none of the laboratory findings alone is conclusive in diagnosis. Laparoscopy helps in finding the etiology and planning further management.

Objectives: The objectives of this study were to study the role of diagnostic laparoscopy in evaluation of female infertility and analyze the comparative frequencies of different etiologies in primary and secondary infertility.

Methodology: A total of 60 infertile patients underwent diagnostic laparoscopy after basic infertility work up in the Department of Gynaecology and Obstetrics, Government Medical College, Srinagar, from April 2013 to September 2014. Frequencies were calculated for laparoscopic findings regarding primary and secondary infertility.

Results: Of the 60 infertile patients, 41 (68.33%) had primary and 19 (31.67%) had secondary infertility. Mean duration of infertility was 4.08 years in primary and 5.15 years in secondary infertility. Of the secondary infertility patients, 47% had previous history of abortion. On laparoscopy, the most common finding was tubal blockade accounting for 26.8%, 57.9%, and 36.7% of primary, secondary, and total infertility patients, respectively. The difference in tubal factors in primary and secondary infertility was statistically significant ($P < 0.02$). Ovarian factors contributed to 24.5%, 15.9%, and 21.7% of primary, secondary, and total infertility patients, respectively. Uterine factors were implicated in 17%, 10.5%, and 15% of primary, secondary, and total infertility patients, respectively. Peritoneal factors were implicated in 22%, 5.2%, and 16.7% of primary, secondary, and total infertility patients, respectively. No cause was found in 9.7%, 10.5%, and 10% of primary, secondary, and total infertility patients, respectively, which were included in unexplained infertility.

Conclusion: Laparoscopy plays a valuable role in the complete evaluation of infertility. It helps to find those causes which are unrevealed by other investigations and thus helps to guide appropriate therapy.

Key words: Laparoscopic, Female, Infertility

INTRODUCTION

Infertility, one of the most common conditions confronting gynecologists, is defined as inability to conceive after 1 year of regular unprotected sexual intercourse.^[1]

Infertility is a problem of global proportion. The World Health Organization (WHO) estimates 60–80 million couples worldwide suffer from infertility.^[2] Infertility varies across regions of the world and is estimated to affect

8–12% of couples worldwide.^[3,4] The WHO estimates the overall prevalence of primary infertility in India to be between 3.9 and 16.8%.^[2] Estimates of infertility varies widely among Indian states from 3.7% in Uttar Pradesh, Himachal Pradesh, and Maharashtra^[5] to 5% in Andhra Pradesh and 15% in Kashmir.^[6]

Infertility can be divided into primary and secondary infertility. In primary infertility, no previous pregnancies have occurred, and in secondary infertility, a prior pregnancy although not necessarily a live birth has occurred.^[7] Globally, most infertile couples suffer from primary infertility.^[8]

The female factors contribute most (40–55%) in the etiologies of infertility followed by male factors (30–40%), both partners (10%), and unexplained (10%).^[9]

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www.ijss-sn.com

Month of Submission : 03-2018
Month of Peer Review : 04-2018
Month of Acceptance : 04-2018
Month of Publishing : 05-2018

Corresponding Author: Dr Shaheera Ajaz, House Number 8, Lal ded colony, Goripora, Rawalpura, Srinagar, Jammu and Kashmir, India. Phone: +91-9419522226. E-mail: shaheeraajaz900@gmail.com

Laparoscopy is an essential step and a standard procedure in the evaluation of infertile patients before initiating infertility treatment.^[10,11] Laparoscopy is the gold standard for diagnosing tubal and peritoneal disease, endometriosis and adhesions because no other imaging technique provides same degree of sensitivity and specificity. Laparoscopy with direct visual examination of the pelvic reproductive anatomy is the only method available for specific diagnosis of peritoneal factors that may impair fertility. It is also helpful in diagnosing uterine and ovarian factors. The practice committee of American Society of Reproductive Medicine suggests that laparoscopy should be seriously considered before applying aggressive empirical treatments involving significant costs and/or potential risks.^[12]

This study was conducted in Government Lalla Ded Hospital - a 500-bedded tertiary care center which is the only referral hospital which caters to the whole of Kashmir Valley and, therefore, reflects the whole scenario of Kashmir. Kashmir has low literacy rate of just 68%^[13] and about 20% of the people are living below poverty line.^[14] Thus, many people are illiterate and belong to low socioeconomic status. They go to untrained health practitioners for infertility treatment which leads to delay in proper management. Further, infertility, being highest in Kashmir among various states of India,^[6] needs an appropriate diagnosis and proper treatment at appropriate time.

Aims and Objectives

1. To study the utility of diagnostic laparoscopy in the evaluation of female infertility.
2. To analyze the comparative frequencies of different etiologies in primary and secondary infertility.

MATERIALS AND METHODS

This study was carried from April 2013 to September 2014 in the Department of Obstetrics and Gynaecology at Government Lalla Ded Hospital in Srinagar, Jammu and Kashmir. This was a cross-sectional study involving 60 patients. The inclusion and exclusion criteria were as follows:

Inclusion Criteria

The following criteria are included in the study:

1. Patients with primary or secondary infertility after excluding the exclusion criteria reporting to the hospital.
2. Normal semen analysis of the male partner.
3. Patients of polycystic ovarian syndrome not responding to treatment.

Exclusion Criteria

The following criteria are excluded from the study:

1. Couples with male factor infertility.
2. Couples who had not lived together for 12 months.
3. Patients with absolute or relative contraindications for laparoscopy.
4. Hyperprolactinemia or thyroid function abnormalities.
5. Vaginal causes for infertility.

All patients underwent standard infertility evaluation including complete history, physical examination with special reference to secondary sexual characters, thyroid examination, abdominal, per speculum, and per vaginal examination.

All baseline investigations, male semen analysis, and hormonal analysis including follicle-stimulating hormone (FSH), luteinizing hormone (LH), thyroid-stimulating hormone, serum progesterone day 21, anti-Mullerian hormone (AMH), and serum prolactin were done. TVS with antral follicle count (AFC) and hysterosalpingography were also done. Laparoscopic evaluation was done as per standard guidelines.

The data were collected on a pro forma and various laparoscopic findings in primary, secondary, and total cases of infertility were noted. SPSS (Version 20.0) and Microsoft Excel were used to carry out the statistical analysis of data. Data were analyzed with the help of descriptive statistics, namely percentages, means, and standard deviations and presented by means of bar and pie diagrams. Student's *t*-test was employed for parametric data, and for non-parametric data, Chi-square test or Fisher's exact test, whichever appropriate was applied. $P < 0.05$ was considered statistically significant.

OBSERVATION AND RESULTS

In the present study, out of 60 cases, 41 (68.33%) presented with primary infertility and 19 (31.67%) with secondary infertility. The age distribution is shown in Table 1. In our study, majority of patients of primary (58.5%) and secondary (52.6%) infertility belonged to the age group of 31–35 years. Minimum and maximum age for primary infertility was 21 years and 38 years, respectively.

In our study, majority of patients of primary infertility (78%) and that of secondary infertility (63%) had duration of infertility of 1–5 years. Longest duration of infertility in primary infertility group was 10 years and in secondary infertility group was 15 years. Mean duration of infertility for primary infertility group was 4.08 years and secondary infertility was 5.15 years. The mean duration of infertility

Table 1: Age distribution in cases of primary and secondary infertility

Age (years)	n (%)		
	Primary (n=41)	Secondary (n=19)	Total (n=60)
21–25	3 (7.4)	0 (0)	3 (5)
26–30	9 (21.9)	4 (21.1)	13 (21.67)
31–35	24 (58.5)	10 (52.6)	34 (56.66)
36–40	5 (12.2)	5 (26.3)	10 (16.67)
Total	41 (100)	19 (100)	60 (100)
Mean±SD	31.9±3.73	33.9±2.86	P=0.041 (Student's t-test)

SD: Standard deviation

Table 2: Obstetric histories in secondary infertility

Obstetric category	n (%)
Previous uneventful delivery	8 (42.2)
Previous abortion	9 (47)
Previous IUD	2 (10.5)
Total	19 (100)

IUD: Intrauterine device

between primary and secondary infertility groups was not statistically significant ($P = 0.174$).

The obstetrical history is shown in Table 2. In the present study, majority of the patients of secondary infertility - 9 cases (47.3%) had previous history of abortion. Out of nine cases, seven had spontaneous and two had medically induced abortion. Out of seven spontaneous abortions, there was a history of check curettage in three patients. Out of two medically induced abortions, one case gave a history of dilatation and curettage.

Out of eight uneventful deliveries, only two had delivered at home and six patients had a history of previous institutional delivery. Two patients with previous history of intrauterine device of fetus had institutional delivery at that time. The hysterosalpingogram findings are shown in Table 3. The causes of infertility are shown in Table 4. In our study, overall, uterine factors accounted for 15% of infertility patients. Fibroid uterus was the most common cause both in primary (14.6%) and secondary infertility (13.3%) group. Mullerian anomaly was found in one case (2.4%) of primary infertility who had unicornuate uterus. The difference in uterine factors in infertility on laparoscopy in primary and secondary infertility groups was not statistically significant ($P = 0.705$).

Bald ovaries (anovulation) were the most common ovarian cause (10%) in both primary (9.7%) and secondary infertility (10.5%). Of the six patients with bald ovaries, two patients had atrophic ovaries, with high FSH and LH and low AMH and AFC suggestive of premature ovarian failure. Polycystic Ovary Syndrome (PCOD) was present

in only primary infertility group. It accounted for 7.4% of the cases of primary infertility and 5% of the total cases of infertility. Ovarian cyst accounted for 5% of infertility patients. The difference in ovarian factors in primary and secondary infertility groups was not statistically significant ($P = 0.522$).

Peritoneal factors accounted for 16.7% of the cases of infertility. Pelvic endometriosis was seen in 8 patients (13.3%). All of these were in primary infertility group. Active pelvic infection was seen in one patient in primary infertility group (2.5%) and one in secondary infertility group (5.25%).

The difference in total cases with peritoneal factor in primary and secondary infertility groups was not statistically significant ($P = 0.148$). When endometriosis was compared between primary and secondary infertility patients, the difference was statistically significant ($P = 0.047$).

In some cases, more than one factor was detected on laparoscopy. The most important and significant one was considered. However, despite thorough laparoscopic evaluation, no factor was revealed in 6 cases (10%) and was, therefore, included in unexplained infertility.

Although tubal factor was more common in secondary infertility (57.9%) than primary infertility (26.8%), the difference being statistically significant ($P = 0.020$), it was the most common factor in both groups on laparoscopy. This was followed by ovarian, peritoneal, uterine, and unexplained (in that order) in both groups. Thus, there was no statistically significant difference in the distribution of causes among primary and secondary infertility ($P = 0.171$).

DISCUSSION

Diagnostic laparoscopy is an essential part in the complete evaluation of infertile couple. Direct visualization of abdominal and pelvic organs allows definitive diagnosis to be made in cases where clinical evaluation and imaging techniques have failed.

In the present study, laparoscopy was done to study its utility in the evaluation of female infertility, and comparative frequencies of different etiologies in primary and secondary infertility were analyzed. Of the 60 infertile patients, studied over a period of 18 months, 41 (68.3%) presented with primary infertility and 19 (31.7%) presented with secondary infertility. It was comparable to Naz *et al.* study,^[15] Shetty and Shetty study,^[16] Boricha *et al.* study,^[17] and Saini *et al.* study.^[18] 35 years is considered as the limit in fertility terms for advanced reproductive age (American Society of Reproductive Medicine,

Table 3: HSG findings in infertile women

HSG Finding	n (%)		
	Primary infertility (n=41)	Secondary infertility (n=19)	Total (n=60)
Normal	15 (36.6)	7 (36.9)	22 (36.7)
B/L blocked tubes*	16 (39)	10 (52.6)	26 (43.3)
U/L blocked tube	8 (19.5)	2 (10.5)	10 (16.6)
Hydrosalpinx	1 (2.45)	-	1 (1.7)
Mullerian anomaly	1 (2.45)	-	1 (1.7)
Total	41 (100)	19 (100)	60 (100)

*In 1 patient with secondary infertility with b/l blocked tubes endometrial cavity also was not delineated suggestive of Asherman's syndrome. 2 patients in secondary infertility with b/l blocked tubes had hydrosalpinx associated with blocked tubes. #Fisher's exact test

Table 4: Causes of infertility at laparoscopy

Causes of infertility	n (%)			p
	Primary (n=41)	Secondary (n=19)	Total (n=60)	
Uterine	7 (17)	2 (10.5)	9 (15)	0.705#
Tubal	11 (26.8)	11 (57.9)	22 (36.7)	0.020*
Ovarian	10 (24.5)	3 (15.9)	13 (21.7)	0.522#
Peritoneal	9 (22)	1 (5.2)	10 (16.6)	0.148#
Unexplained	4 (9.7)	2 (10.5)	6 (10)	1.000#
Total	41 (100)	19 (100)	60 (100)	

Distribution of causes in primary and secondary infertility group. $P=0.171^*$, Not significant. #Fisher's exact test, *Chi-square test

2013).^[19] In our study, 5 (12.2%) of women in primary infertility group and 5 (26.3%) of women in secondary infertility group were of age more than 35 years. As recommended by American Society of Reproductive Medicine, these women should be referred after 6 months of trying to conceive for infertility workup because of decline in fertility and increased time to conception after 35 years of age.^[19,20]

The mean duration of infertility for primary infertility was 4.08 years and that for secondary infertility was 5.15 years, which is comparable with Boricha *et al.*,^[17] Shetty and Shetty study,^[16] and Wani *et al.*^[21] study.

In our study, tubal factors were responsible for infertility in 22 (36.7%) cases, which were comparable with Shetty and Shetty,^[16] Samal *et al.*,^[22] and Agarwal and Anand^[23] study. It was accounted for 11 (26.8%) of primary and 16 (57.9%) of secondary infertility. Tubal factor was the most common cause of both primary and secondary infertility in our study which was comparable with Samal *et al.* study^[22] but differed from other studies.^[16,18,23] Tubal occlusion usually represents past pelvic infection or surgery. Incidence of subsequent tubal infertility is 8%, 19.5%, and 40% after one, two, and three episodes of pelvic inflammatory disorder (PID).^[24]

In secondary infertility patients, 75% of the previous uneventful deliveries and 100% of dilatation and evacuations had been done in hospital settings. Thus, 100% institutional deliveries and aseptic precautions during abortion and delivery in these hospital settings can prevent PID and hence tubal block in these patients.

As tubal factor is the most common factor in primary infertility also, it may be because of subclinical PIDs in young women and adolescents because of poor perineal hygiene, particularly during menstrual periods. Thus, proper education and counseling of adolescent girls are an important preventive measure for infertility.

Ovarian factor was the second most common cause of infertility in our study. It accounted for 13 (21.7%) of total infertility patients, 10 (24.5%) cases of primary infertility, and 3 (15.9%) cases of secondary infertility which correlates with study from Samal *et al.*^[22] and Shetty and Shetty.^[16]

According to ASRM-sponsored consensus workshop group, polycystic ovary syndrome (PCOS) is the most common cause of anovulation or oligoovulation in women presenting with infertility.^[25] In our study, polycystic ovaries were present in 3 cases (5%) of infertility and were the second most common cause of ovarian factor for infertility. This is because only those cases of PCOS were included in the study, who did not respond to medical treatment. All 3 of these cases belonged to primary infertility group (7.4%). There was no case of PCOD in secondary infertility which may be because of small study group of 60 patients in our study.

In our study, peritoneal factors accounted for 10 (16.7%) of the total cases of infertility - 9 (22%) of primary infertility cases and 1 (5.2%) of secondary infertility. These findings were comparable with Agarwal and Anand study^[23] and Saini *et al.* study.^[18]

Endometriosis was found in 8 (13.3%) of the total cases of infertility which was comparable with Agarwal and Anand

study.^[23] All the 8 cases belonged to primary infertility group (19.5%). There was no case of endometriosis among secondary infertility patients. The incidence of endometriosis has been found more in primary infertility as noticed in other studies.^[26,27] Finding of no case of endometriosis in secondary infertility may be because of small study group of 60 patients in our study.

In developing countries, PID is a common cause of infertility. Tubal occlusion usually represents past pelvic infection or surgery. A single episode of PID causes up to 8% of future tubal factor for infertility.^[24] In our study, active pelvic infection was present in 1 case of primary infertility (2.5%) and 1 case of secondary infertility (5.2%).

Despite thorough laparoscopic evaluation, no cause (unexplained infertility) was detected in 6 (10%) cases - 4 patients (9.7%) were primary infertility and 2 (10.5%) of secondary infertility which was comparable with Saini *et al.* study.^[18]

Thus, diagnostic laparoscopy by direct visualization of the pelvic organs facilitates the exact identification of the pelvic etiology in majority of the patients and thus helps to guide appropriate therapy. In some patients, it alters treatment plans, including earlier utilization of assisted reproductive technology, thus avoiding unnecessary medical treatment. It also helps in giving definitive diagnosis so that couples who have no chance of conception can plan earlier for adoption.

CONCLUSION

Laparoscopy plays a valuable role in the evaluation of infertility. In our study, laparoscopy helped to detect a cause in 90% of the infertile patients. Furthermore, keeping in view, the high rates of infertility and illiteracy in our region and large number of patients having tuboperitoneal factor for infertility, for which laparoscopy is the gold standard, laparoscopy is a very effective procedure in evaluating these infertile women and thus to plan appropriate management.

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How to cite this article: Rizvi SM, Ajaz S, Ali F, Rashid S, Qayoom T, Rashid L. Laparoscopic Evaluation of Female Infertility. *Int J Sci Stud* 2018;6(2):117-121.

Source of Support: Nil, **Conflict of Interest:** None declared.