Original Article

A follow-up study on fertility and menstrual pattern in infertile patients after laparoscopy in a tertiary care hospital in Bangladesh

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Abstract

Background: *Routine use of diagnostic laparoscopy for the evaluation of all cases of female infertility is under debate. Until now, laparoscopy has been widely used as a diagnostic and therapeutic means of treating infertility. This study investigates the fertility outcome for women 2 to 3 years after laparoscopic management. It assessed the benefit and effectiveness of both diagnostic and laparoscopic ovarian drilling regarding reproductive outcome and menstrual regularity.*

Methods: *From May 2013 to November 2014, a total of 303 infertile women undergoing laparoscopy at BIRDEM Hospital, were asked to participate in the study. Sixty subjects were lost to follow up making the study sample size 243.*

Results: *Mean age at the time of laparoscopy was 29.86 ± 4.6 (range 21 - 43) years, 61.7% of women (150 cases) were nulliparous, 38.3% (93 cases) had one child, abortion or ectopic pregnancy. From the time of index surgery to follow-up, 40.3% (98) of women who had tried to conceive had home pregnancy test positive and 25.5% (62) had a live birth following their surgery. Among these 62 subjects, 33 underwent Laparoscopic Ovarian Drilling (LOD) and other 29 had diagnostic laparoscopy along with or without other laparoscopic manipulations. A Chi-square test has revealed that there was significant increase in regularization of menstrual cycle among irregularly menstruating women after laparoscopy indicating regular ovulatory cycles.*

Conclusion: *Laparoscopic procedures can lead to positive results while treating infertility as well as menstrual disturbances, thus establishing a defined position in current fertility practice.*

Key words: *Laparoscopy, Infertility, Fertility outcome, Menstrual pattern.*

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Introduction

Infertility remains a multifaceted condition with substantial medical, economic, and psychosocial influence in our environment. Primary infertility (also called primary sterility) is defined as the inability to bear any children, either due to the inability to conceive or the inability to carry a pregnancy to a live birth. In medical studies, however, infertility is usually defined only as the inability to conceive.[1] Inability to conceive within two years of exposure to pregnancy is the epidemiological definition recommended by the World Health Organization. Clinical studies often use a one-year period of exposure. Secondary infertility, which has been shown to have a high geographical correlation with primary infertility, is the inability to bear a child after having an earlier birth.[1]

The incidence of infertility in any community varies between 5% and 15%.[2] Both partners in relationship contribute to potential fertility and both may be subfertile. The female factors contribute most (40-55%) in the

etiologies of infertility followed by male factors (30-40%), both partners (10%) and unexplained (10%). Infertility in female is caused by various factors. To determine the causes of sterility or impaired fertility, one must visualize the process of reproduction from gametogenesis to nidation.[2]

Laparoscopy is widely performed in infertile female for diagnosis and treatment. Ordinary examinations, such as hormonal testing, hysterosalpingography (HSG) and semen testing, fail to reveal a specific cause of infertility in one-third of cases.[3] Infertility as a consequence of tubal factors is common in women. Laparoscopy is very useful in diagnosing and treating tubal infertility because it provides important information about the pelvic cavity. In addition, laparoscopic procedures, such as adhesiolysis for peritubal disorders, are valuable procedures in the treatment of infertility. However, laparoscopy should be used with great care because it may cause serious complications, such as infection, hematoma and injury to the bowel and great vessels. In addition, laparoscopy is expensive because it is usually performed in a hospital setting. Several studies have shown that the incidence of unsuspected pelvic pathology found at laparoscopy is about 50%.[3] In this study, we analysed the pregnancy outcome after laparoscopic examination of infertile patients seen at our hospital to evaluate the role of laparoscopy in infertility.

The aim of this study was to report the observations from a longitudinal long-term study of women who underwent diagnostic laparoscopy as well as laparoscopic ovarian drilling (LOD). In addition, the study assesses the benefits and effectiveness of laparoscopy regarding reproductive outcome and pattern of menstrual cycle.

Methods

Between May 2013 and November 2014, a total of 303 women with infertility underwent laparoscopy in the Centre for Assisted Reproduction, Department of Obstetrics and Gynaecology, BIRDEM General Hospital-2. The data was collected from these 303 patients before and after each procedure, which included history of the patients and the laparoscopic findings. Later in December 2016, records of these 303 subjects were reviewed and a telephone follow up was attempted with each patient. However, in the attempt, sixty subjects were lost to follow-up. The remaining 243 patients provided the data for the two to three years' follow-up study. All 243 subfertile women fulfilled the criteria as per definition of infertility both primary and secondary, diagnosed by a combination of clinical features, abnormal endocrine tests or ultrasonographic findings, were included in the prospective observational study.

Laparoscopy was done under general anesthesia after taking the consent of the patient. A 10 mm scope was introduced through sub umbilical port and two grasping forceps were introduced through two 5 mm side ports. Upon entering the pelvic cavity pelvic anatomy was delineated, tubal patency test was done and sign of ovulation by presence of corpus luteum was noted. Pelvic pathologies like endometriosis, Polycystic Ovaries (PCO) and adhesions were diagnosed and appropriate therapeutic measurements were taken by laparoscopic surgery.

Patients were discharged from hospital on the same day or next day depending upon the surgical interventions. First follow up of the patients were done on 7th postoperative day. Ovulation induction and other modalities of treatment were given according to the diagnosis.

The age of the patients when diagnosis was made, other demographic detail including Body Mass Index (BMI), primary and secondary infertility were documented. Any pregnancy following laparoscopy was documented. Outcomes were categorically recorded as no pregnancy till date, live birth rate (per couple), miscarriage rate (per pregnancy), intrauterine death (IUD) and neonatal death. Also pattern of menstrual cycle before and after laparoscopy were observed in course of the study.

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The BIRDEM General Hospital Ethical Committee had approved before the start of the work.

A formal written consent had been taken from each woman recruited for the study before data was used for analysis and, for publishing the study as well.

Statistical analysis

All quantitative data were expressed as mean ± standard deviation (SD) while categorical variables were expressed as percentages. Continuous variables were compared using chi-square test. All statistical analyses were performed using SPSS statistical software (version 20.0). A two-tailed p value less than 0.05 was considered statistically significant.

Results

Total of 303 women underwent laparoscopy during the study period and among them 60 subjects were lost to follow up. Remaining 243 women had completed data set up to 2 to 3 years follow-up (representing 80.19% follow-up rate).

Mean age at the time of laparoscopy was 29.86 ± 4.6 (range 21 - 43) years. The mean BMI of the subjects were 26.5 ± 5.2 kg/m^2 as shown in Table I. Among them, 61.7% of women (150/243) were nulliparous and 38.3% (93/243) had one child or had history of abortion, ectopic pregnancy or menstrual regulation (MR).

Twenty-nine (11.9%) of total subjects were diabetic. Known case of hypothyroidism was found in 26 (10.6%) subjects and 8 (3.2%) of all subjects were hypertensive (Table I).

Surgical interventions were laparoscopic ovarian drilling in 99 (40.7%) and the remaining 144 (59.2%) had laparoscopic manipulations consisting of adhesiolysis of tubes or vaporization or fulguration of endometriotic lesions or just had diagnostic laparoscopy (Table I).

Table I Demographic characteristics of infertile women (n = 243)

Demographic characteristics	
Age at the time of laparoscopy (years)	29.86 ± 4.6
Distribution of patients according to age groups (n=243 & %)	
≥25	46 (18.9%)
26 - 30	92 (37.9%)
31 -35	78 (32.1%)
36 - 40	26 (10.7%)
≥ 41	1 (0.4%)
BMI (kg/m^2)	26.5 ± 5.2
Parity of the patients	
Nulliparous	150 (61.7%)
Multiparous	93 (38.3%)
Medical disorders	
Diabetes	29 (11.9%)
Hypothyroidism	26 (10.6%)
Hypertension	8 (3.2%)
Surgical interventions	
Laparoscopic ovarian drilling	99 (40.7%)
Diagnostic laparoscopy ± adhesiolysis	144 (59.3%)

Table II Findings of laparoscopic dye test (n=243)

	Frequency	Percent
Dye test positive	215	88.5
Dye test negative	28	11.5
Total	243	100.0

During laparoscopy, chromotubation or dye test was performed in all subjects. Table II shows bilateral tubal blockage in 28 (11.5%) cases and among the dye test positive 215 cases, both tubes were patent in 162 subjects (Table III).

Table III Findings of laparoscopic positive tubal patency test(n=243)

	Frequency	Percent
Unilateral tube patent	53	21.8
Bilateral tubes patent	162	66.7
Total	215	88.5

Pregnancy outcome:

From the time of index surgery to follow-up (2-3years), 40.3% (98/243) of women who had tried to conceive, had home pregnancy test positive and 25.5% (62/243) had a live birth following their laparoscopy.

Among the 62 successful reproductive outcomes, 62.9% (39/62) of the subjects had primary infertility and rest 37.1% (23/62) had secondary infertility (Table IV).

Table IV Successful pregnancy outcome among primary and secondary infertility

Variables	Frequency	Percentage
Primary infertility	39	62.9
Secondary infertility	23	37.1
Total successful pregnancy	62	100.0

Of total 243 subjects, 145 did not conceive during the follow up period. Table V shows the distribution of pregnancy outcome among the rest 98 subjects who had positive pregnancy test after laparoscopy.

Table V Distribution of pregnancy outcome after laparoscopy

Pregnancy outcome	Frequency	Percentage
Live birth	62	63.3
Abortions	28	28.6
Intrauterine death	1	1.0
Neonatal death	4	4.1
Ectopic pregnancy	2	2.0
Molar pregnancy	1	1.0
Total pregnancy	98	100.0

Laparoscopic Ovarian Drilling was done in 33 cases (53.2%) of successful pregnancy.

Pattern of menstrual cycle:

Before laparoscopy, 143 (58.8%) women had regular menstrual cycle and rest 100 (41.2%) women had menstrual irregularities. However, after laparoscopy, 87 out of 100 women's menstrual cycles have become regular. As shown in Table VI, regularization of menstrual cycles was significantly higher after laparoscopy than before laparoscopy (94.6% Vs 58.8%, p=0.000).

Table VI Pattern of menstrual cycle before and after laparoscopy

Pattern of menstrual cycle	Before laparoscopy		After laparoscopy		P value
	Regular cycles	Irregular cycles	Regular cycles	Irregular cycles	0.000
	141 (58.8%)	100 (41.2%)	228 (94.6%)	13 (5.40%)	

P after chi-square test

Discussion

In our day to day clinical practice, it is not always possible to justify when to offer laparoscopy in fertility work-up. The routine use of diagnostic laparoscopy for the evaluation of all cases of female infertility is currently under debate.[2] According to data published in retrospective non-controlled studies, diagnostic laparoscopy after several failed cycles of ovulation induction enables the detection of a significant proportion of pelvic pathology amenable to treatment.[3] A Cochrane review has shown that laparoscopic ovarian diathermy in clomiphene-resistant polycystic ovarian syndrome is at least as effective as gonadotrophin treatment, and results in a lower multiple pregnancy rate. In a recent publication from Royal College of Obstetricians and Gynaecologists (RCOG) green top guideline, laparoscopic ovarian drilling was labeled as second line of treatment in PCOS.[4]

Following laparoscopy, 40.3% (98) women got pregnant and 25.5% (62) pregnancies ended up with delivery of alive child. The mean duration between the laparoscopy and successful first pregnancy outcome was around 14 months. The type of laparoscopic intervention did not influence much in the fertility outcome among primary and secondary infertility group.

Current evidence indicates that the surgical treatment of minimal or mild endometriosis increases the spontaneous pregnancy rate in infertile women. The position of operative laparoscopy for endometriosis and adhesions prior to Intrauterine Insemination (IUI) treatment or after failed IUI treatment is a matter of debate and further prospective randomized studies are needed to test the hypothesis that this surgical approach can improve the pregnancy rates during IUI treatment. Randomized trials confirming the role of the surgical treatment of moderate and severe endometriosis in infertility are lacking, but its value has generally been accepted. [5,6]

Dramatic improvement in Assisted Reproductive technology (ART) outcomes in recent years could bring many dilemmas regarding the role of diagnostic laparoscopy in infertility evaluation and treatment. Growing tendency to bypass diagnostic laparoscopy and perform ART has been seen in recent time. Especially developing country like ours, where ART are expensive and social taboos made it controversial, diagnostic laparoscopy is the choice. Laparoscopy is beneficial for patients with infertility as it has been demonstrated to be a reliable procedure in detecting the pelvic pathologies with immediate management.[7]

Among women with menstrual disturbances before laparoscopy, a significantly high rate of spontaneous postoperative regular cycles were observed. One source claimed that these improvements were temporary, whereas this study showed continuity. With regular periods, regular ovulations are not a certainty, but it represents a strong evidence of frequent ovulatory activity.

It has been shown that laparoscopic treatment can give excellent results regarding infertility as well as menstrual disturbances, and recently that the improvements are lasting.[5,8] Surgical treatment has the great advantage of being an occasional procedure with few complications and lasting effect on infertility and menstrual disturbances, thus giving relief from the nuisance of unpredictable periods. Therefore, the patients may plan their pregnancies to come without medical aid.[5]

The position and timing of diagnostic laparoscopy in ovulation induction treatment is difficult to establish due to a lack of randomized controlled studies. LOD in the treatment of the clompihene resistant PCOS patient is at least as effective as gonadotrophin treatment and has a significantly lower risk of multiple pregnancy.[9] There is however a lack of knowledge regarding the long-term outcome of this procedure on the reproductive function of the ovary. It is unknown if surgical treatment of minimal to mild endometriosis coexisting with PCOS can improve the success of ovulation induction. [10,11]

Disadvantages of diagnostic laparoscopy include the need for general anaesthesia, patient's anxiety and the possibility of adhesion formation. In a large Finnish follow-up study, the complication rate of diagnostic laparoscopy was 0.6 per 1000 procedures.[2,12] However, advantages include the possibility to perform both diagnosis and therapy at the same time, and the opportunity to combine the laparoscopy with the hysteroscopic exploration of the uterine cavity with an endometrial biopsy, all as part of day care surgery. In this review paper, an effort is made to define the position of diagnostic laparoscopy in current fertility practice.

In conclusion, pregnancy rates and obstetric outcome are positive while significant improvement in menstrual regularity is also seen after diagnostic/operative laparoscopy. This procedure should be considered in current fertility practice. However, there is a need for further randomized controlled trial (RCT) defining the position and timing of laparoscopic surgery.

Conflicts of interest : Nothing to declare.

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