Diagnostic laparoscopy in female infertility

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ABSTRACT

Objective: To highlight the importance of laparoscopic evaluation in the etiology of infertility and to evaluate the etiology in primary and secondary infertility.

Methods: This retrospective study included 1233 patients complaining of infertility, 919 patients had primary infertility and 314 patients had secondary infertility. All had been subjected to diagnostic laparoscopy at the Infertility Center in Al-Batool Teaching Hospital, Mosul.

Results: Laparoscopy diagnosed pelvic abnormality in 87.27% of infertile patients which was statistically significant difference comparing to no abnormality detected in 12.73%. The ratio of positive findings in secondary infertility was significant in comparison with the positive findings in primary infertility. Single pelvic abnormality detected during laparoscopy among infertility patients was seen in 75.09% of cases and it was statistically different from multiple pelvic abnormality: 24.91%, and it was highly significant among primary infertility patients (77.24%) and among secondary infertility patients (30.87%). Among all infertile patients, ovarian factor was the most common (66.83%) followed by tubal factor (22.03%), endometriosis (4.46%), pelvic inflammatory disease (2.85%), pelvic adhesion (2.10%) and uterine fibroid (1.73%). Ovarian factor was highly significant in primary infertility while tubal factor and pelvic inflammatory disease were the highly significant in secondary infertility.

Multiple pelvic pathology identified by laparoscopy showed the tubal factors associated with poly cystic ovary in 29.49% of cases (31.66% in primary infertility and 25% in secondary infertility with no significant statistical difference). Pelvic inflammatory disease associated with other pelvic abnormality 34.09% was highly significant among secondary infertility patients. Congenital uterine abnormalities was not seen alone, it was seen associated with other causes among primary infertility patients (9 cases 0.72%).

Conclusion: Diagnostic laparoscopy is a valuable technique and is a mandatory invasive investigation for complete assessment of female infertility before the couple progresses to infertility treatment especially where assisted reproductive techniques were not available.

Keywords: Infertility; primary infertility; secondary infertility; diagnostic laparoscopy.

الخلاصة

الهدف: تبيان أهمية الناظور التشخيصي في معرفة سبب العقم عند النساء في حالات العقم الأولي والثانوي.

الطريقة: دراسة استقصائية لـ 1233 مريضة لديها حالة عقم من اللواتي راجعن مركز العقم في مستشفى النبول التعليمي في الموصل. 919 مريضة تعاني من العقم الأولي و314 مريضة تعاني من العقم الثانوي.

النتائج: أظهرت النتائج بناء الناظور شخص وجد سبب في الحضور في 77.2% من الحالات وكان يوجد سبب واحد في الحضور هو الأكثر في حالات العقم الأولي 9.9% بينما وجود عدد أسباب في الحضور كانت الأكثر بين حالات العقم الثانوي. المبيض ومشاكل السبب الرئيسي في حالات العقم وهو السبب الأكبر في العقم الأولي بينما مشكلة الأنانيب.
On visual laparoscopic inspection, the appearances of the ovaries are suggestive of certain clinical conditions\(^1\). Most ovarian abnormalities can be managed laparoscopically and often a laparoscopic examination of the adnexa will enable the gynecologist to decide if laparotomy is indicated. Laparoscopy is an ideal procedure for diagnosing and staging endometriosis, because the magnification offered by the laparoscope\(^{14}\). It is generally accepted that it is the gold standard in diagnosing tubal pathology\(^{15,16}\) and its etiology\(^{15}\). It is superior in evaluation of proximal tubal obstruction\(^{3,4,14}\), and other intra-abdominal causes of infertility, as pelvic adhesions and endometriosis\(^{1,3,5,6,9,12,14,15,17,18}\). It also allows the identification of peritubal adhesions either of inflammatory origin or due to endometriosis\(^7,19\). For these reasons, the cost and associated surgical morbidity of laparoscopy have traditionally been justified\(^7\).

This study was carried out to highlight the importance of laparoscopic evaluation in the etiology of infertility and to obtain an idea about the etiology of primary and secondary infertility in our locality.

**Methods**

This 5 years retrospective study was done at the Infertility Center in Al-Batool Teaching Hospital where files of infertile women who have undergone diagnostic laparoscopy from January 2001 to January 2005 were recorded and included in the study.

One year or more of regular unprotected sexual intercourse without conceiving is the definition of infertility considered in this center.

All infertile patients underwent evaluation with history from male and female and clinical examination, as well as evaluation of
ovulation, tubal patency (most cases) and male factor by seminal fluid analysis.

Diagnostic laparoscopy was decided to the infertile patient who had one or more of the following: history suggestive of endometriosis, previous pelvic inflammatory disease, previous pelvic surgery, abnormal hysterosalpingography or there was greater than 36 months period of infertility.

Diagnostic laparoscopy was done using the same method and the same principle in reporting the result by the four gynecologists who work in this center (at study time) who had approximately same experience level in doing laparoscopy.

Laparoscopy was done as a day case under general anaesthesia. Pneumoperitoneum was created by CO$_2$ gas through varess needle. During the procedure, pelvis was inspected, visualizing uterus, fallopian tubes, ovaries, round ligaments, uterovesical pouch, uterosacral ligaments and pouch of Douglas. The tubes were visualized and any abnormalities were noted. Both ovaries were examined regarding their size, shape, evidence of ovulation. Peritubal, periovarian and omental adhesions, tubo-ovarian masses, endometriotic deposits, fibroid, presence of free fluid in the pouch of Douglas or any other pathology of the appendages if present was noted.

The patency of the fallopian tubes was ascertained by injecting methylene blue into the uterine cavity and observing it as it spilled through the fimbrial ends.

The statistical analysis was performed using statistical program (Minitab version 11) and Fisher test (sometimes). P value <0.05 was considered significant.

### Results

In this study total numbers of patients were 1233, upon whom diagnostic laparoscopies were performed. Among them 919 patients (74.53%) had primary infertility, 314 patients (25.47 %) had secondary infertility.

Pelvic abnormality was seen in 1076 patients (87.27%) (791 patients (86.07%) among primary infertility and 285patients (90.70%) among secondary infertility) and it statistically differed from normal pelvis; Table (1). The ratio of positive findings in secondary infertility was statistically significant in comparison with the positive findings in primary infertility.

#### Table (1): Laparoscopic findings in infertility patients

| Type              | No pelvic abnormality | Pelvic abnormality |
|-------------------|-----------------------|--------------------|
|                   | No. | %   | No. | %   |
| Primary infertility| 128 | 13.93 | 791 | 86.07 |
| Secondary infertility| 29  | 9.24  | 285 | 90.76  |
| Total             | 157 | 12.73 | 1076| 87.27  |

Single pelvic abnormality was detected during laparoscopy among infertility patients in 75.09%, n=808 of cases and it was statistically different (p value 0.000) from multiple pelvic abnormality 24.91%, n=268 and it was the highly significant among primary infertility patients (77.24%, n=611) and among secondary infertility (30.87%, n=88). As shown in table (2).

#### Table (2) : Types of pelvic abnormalities among infertility patients.

| Type                | Single pelvic abnormality | Multiple pelvic abnormalities | P-value | Chi .sq |
|---------------------|---------------------------|-----------------------------|---------|---------|
|                     | No. | %   | No. | %   |         |         |
| Primary infertility | 611 | 77.24 | 180 | 22.76 | 0.000   | 409.686 |
| Secondary infertility| 197 | 69.12 | 88  | 30.88 | 0.000   | 83.375  |
| Total               | 808 | 75.09 | 268 | 24.91 | 0.000   | 542.00  |
Ovarian factor (66.83%, n=540) was the highest abnormality seen among infertility patients followed by tubal factor (22.03%, n=178), endometriosis (4.46%, n=36), pelvic inflammatory disease (PID) (2.85%, n=23), pelvic adhesion (2.10%, n=17) and uterine fibroid (1.73%, n=14). Bilateral tubal blockage diagnosed in 74.43% of tubal factor cases. Although ovarian factor was the most common cause identified in both primary (n=445, 72.83%) and secondary infertility (n=95, 48.22%) but it was highly significant in primary infertility (p value=0.000). Tubal factor (39.09%) and pelvic inflammatory disease (5.08%) were significantly different (p value 0.000, 0.03 respectively) in secondary infertility than primary infertility (16.53%, 2.13%). Other causes showed no significant difference between them. Table (3).

Most tubal factor cases of primary and secondary infertility were diagnosed to have bilateral blockage (69.306% and 81.33% respectively) with no significant difference between them.

| Causes                        | Primary infertility | Secondary infertility | P-value | Chi sq |
|-------------------------------|---------------------|-----------------------|---------|--------|
|                               | No.     | %        | No.     | %       |         |         |
| Ovarian                       | 445     | 72.83    | 95      | 48.22   | 0.000   | 40.695  |
| Tubal                         | 101     | 16.53    | 77      | 39.09   | 0.000   | 25.903  |
| Pelvic inflammatory disease   | 13      | 2.13     | 10      | 5.08    | 0.037   | 4.360   |
| Endometriosis                 | 30      | 4.91     | 6       | 3.04    | 0.289   | 1.123   |
| Pelvic adhesion               | 13      | 2.13     | 4       | 2.03    | 0.934   | 0.007   |
| Uterine Fibroid               | 9       | 1.47     | 5       | 2.54    | 0.319   | 0.993   |
| Total                         | 611     |          | 197     |         |         |         |

Polycystic ovary was the common finding among infertility patients (97.2% (primary 97.3% and secondary 96.84% of ovarian factors) while ovarian cyst and tumour constitute 2.7%; table (4). There was no significant statistical difference between primary and secondary infertility.

| Pathology                      | infertility | Primary infertility | Secondary infertility | P-value | Chi sq |
|--------------------------------|-------------|---------------------|-----------------------|---------|--------|
|                                | No.     | %        | No.     | %        |         |         |
| Poly cystic ovary (PCO)        | 525     | 97.22    | 433     | 97.3     | 92      | 96.84   | 0.976   | 0.001  |
| Ovarian cyst and tumour        | 15      | 2.78     | 12      | 2.7      | 3       | 3.16    | 0.809   | 0.058  |
| Total                          | 540     |           | 445     |           | 95      |         |         |        |

In the study multiple pelvic abnormalities identified by laparoscopy showed the tubal factor associated with poly cystic ovary (PCO) in 83 cases (39.71%), 61 cases primary infertility (44.52%) and 22 cases secondary infertility (30.55%) with no significant statistical difference.
Among patients with tubal blockage with other apparent pelvic pathology, 71 cases (76.34%) due to pelvic inflammatory disease (PID), 17 cases (18.28%) due to endometriosis, 5 cases (5.38%) due to pelvic adhesion. Pelvic inflammatory disease associated with other abnormality seen in 71 cases (26.49%) with statistical difference between secondary infertility (n=30, 34.09%) and primary infertility (n=41, 22.77%).

All cases of uterine abnormality (9 cases, 0.72%) were seen in primary infertility associated with other abnormality (7 cases with polycystic ovary and 2 with tubal blockage). Other associations between multiple pelvic abnormalities show no significant difference between primary and secondary infertility.

Discussion

According to the criteria followed in this study for choosing infertile patients for diagnostic laparoscopy, 74.53% had primary infertility and 25.47% had secondary infertility. It is nearly similar to the laparoscopic study conducted in Bahawal Victoria Hospital (72.19%) of infertile women had primary infertility and (27.81%) had secondary infertility and to the result of Krishna et-al study (20) where 70.44% primary infertility and 29.55% secondary infertility, as well as to Cairo study (14) where primary and secondary infertility affected 70.7% and 29.3% of the couples respectively.

Pelvic abnormalities were diagnosed in this study in 87.27% of infertility cases which is higher than other studies where seen in 61.03% in Bitzer et-al study (17), 62% in Oxford (7) and 58.58% in Mehmood study (1). This can be explained by the design of most other studies which include unexplained infertility only.

Pelvic abnormality in primary infertility was seen in 73.51% and in secondary infertility in 26.49% in this study which is nearly similar to the result seen in Bahwall study (1) where 73.73% of primary infertility and 26.26% of secondary infertility. But it differs from Bitzer et-al study (17) which showed the same percentage of abnormal findings in primary and secondary infertility. The positive findings in secondary infertility were significantly higher than primary infertility which conforms with Hovav et-al study (21).

During evaluation of infertility causes in this study, the ovarian factor (66.83%) was the most common cause followed by tubal factor (22.03%) which differ from Mehmood study (1) and Usmani et-al study (22) where the tubal factor was the most common cause and constituted 35.85%, and 37.6% of cases respectively while ovarian factor was seen in 32.83%, and 26.08% of cases respectively. These difference can be explained by the omission of diagnostic curettage as a routine investigation which was done by different category health personnel during evaluation of infertile patients in Mehmood study as well as lower incidence of sexually transmitted disease.

Pelvic endometriosis (4.46%) was seen less frequently than in other studies (16.16% (1), 5.35% (22)) due to the difference in racial and environmental factor as well as to the practice of avoiding sexual intercourse at time of menstruation. But it is seen more than in Otolorin et-al study (23) (1.8%) which may be due to difficulty in diagnosing mild cases in early use of laparoscopy as it was done in 1987.

Pelvic inflammatory disease (2.85%) and pelvic adhesion (2.1%) in our study was seen less frequently than in other studies (23,24); it may be due to low incidence of sexually transmitted diseases in our locality.

Uterine fibroids (1.73%) diagnosed in infertility patients in this study was much lower than in other studies (22) where was seen in 7.14% (22) and 15.15% (1, 23) which could be explained by the difference in racial and environmental factors between the studies.

Polycystic ovary seen in 97.22% of cases among ovarian factor of infertility which is somewhat similar to Usmani et-al study (22) where it accounted for all cases. Bilateral tubal blockage constituted 74.43% of patients with tubal blockage which is higher than Vasiljevic et-al study (25) where was seen in 50.94% of cases and lower than 78.57% seen among infertile Nigerian women (23).

While comparing the most significant cause among primary and secondary infertility, the
result showed ovarian factor (72.38%) among primary infertility group and tubal factor (39.09%) among secondary infertility group, which differ from other studies (24,26) where all showed the tubal factor was the significant cause among primary and secondary infertility. This could be explained by the fact of low occurrence of pelvic infection in primary infertility and the high occurrence of post partum and post abortal infection and pelvic inflammatory disease in secondary infertility. During laparoscopy multiple pelvic abnormalities were seen and the association of tubal factor with polycystic ovary (PCO) was seen in 39.71% of cases which is lower than Kousta et al study (27) where was seen in 50% of cases.

In this study, among patients with tubal blockage, it appears mainly due to pelvic inflammatory disease, endometriosis and pelvic adhesion, while in Jamal study (28) the cause was mainly due to pelvic inflammatory disease, tuberculosis and endometriosis.

The higher incidence of pelvic inflammatory disease associated with other abnormality in secondary infertility can be explained by higher incidence of pelvic inflammatory disease among secondary infertility and its sequela of tubal blockage and pelvic adhesion which is seen later.

All cases of uterine abnormality 0.72% seen on laparoscopy among infertility patients were diagnosed among primary infertility and all associated with other pelvic abnormality, which is less than in other studies where it was seen in 2.9% (29) and 5% (26).

Conclusion
The diagnostic laparoscopy is a valuable technique and is a mandatory invasive investigation for complete assessment of female infertility.

Recommendation
As the high cost of In Vitro Fertilization (IVF) needed and its unavailability in our locality, it is a good practice for infertile women to complete all investigations of infertility including laparoscopy before referral of patient to In Vitro Fertilization.

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