Pelvic Inflammatory Disease: An Index For Female Infertility In A Teaching Hospital In Lagos, Nigeria

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ABSTRACT

Background: Increasing numbers of women experiencing delay in childbirth have been encountered in various locations including churches, community pharmacies, hospitals and even in the neighborhood. Also a higher proportion of women experienced ectopic pregnancies or miscarriages. All this prompted the researchers to try to determine probable causes for these events and thus resulted in this study.

Objective: The main purpose of this study was to explore the interrelationship that exists between pelvic inflammatory disease and infertility as well as investigate the level of suspicion of physicians in the relevant units (Obstetrics and Gynaecology) to the interrelationship.

Methodology: 20 physicians in Obstetrics and Gynecology of the Lagos University Teaching Hospital, Ibadan were interviewed by means of a semi-structured 2-part questionnaire. 100 cases of female patients with infertility problems were randomly selected from the Medical Records Department and assessed using a pre-formed Checklist. Recovery was 100%.

Results: From the results obtained it was documented that the problem of PID associated infertility is a serious one, which must be tackled appropriately. The level of suspicion of physicians in the relevant units must be raised to the likelihood of PID as a cause of infertility through timely and appropriate in-service education and training.

Conclusion: In order to prevent PID and the associated infertility, physicians and public health specialists need to understand the interactions of PID-causing microorganisms with the host immune system which will enable them provide efficient primary, as well as secondary prevention services to their patients. It is, therefore, essential that relevant in-service training be given to physicians in these units periodically to enable them perform this function effectively.

Key Words: Pelvic Inflammatory Disease (PID); Female Infertility; Infertility in Nigeria

INTRODUCTION

Infertility is a worldwide problem. It is sometimes called childlessness and should be differentiated from sterility, which is more definite and absolute and refers to an irreversible state. Infertility is an inability to achieve pregnancy despite regular unprotected sexual intercourse usually for a period of 1 year. It is estimated that 60% of married couples having regular, unprotected intercourse would achieve pregnancy in 6 months, 90% in 12 months and 95% in 18 – 24 months. Causes of female infertility include pelvic inflammatory disease (PID), endometriosis, hypothalamic-pituitary disorders, ovarian cysts, surgical problems, etc. though about 10% of couples will never know why they cannot conceive. PID is one of the major causes of infertility worldwide. Pelvic inflammatory disease (PID) is a spectrum of diseases of the female genital tract that includes endometritis, salpingitis, tubocervical abscess and peritonitis. Thus PID refers to infection of structures including the uterus, fallopian tubes, ovaries, bowel and the smooth membrane that lines the surface of the pelvic cavity (the peritoneum). Salpingitis is a commonly used synonym though not entirely accurate. Sexual transmission of Neisseria gonorrhoea and/or Chlamydia trachomatis accounts for more than half of all cases of PID but M. hominis and other organisms have also been implicated. Organisms such as E. coli and other enteric pathogens, especially anaerobes, also may cause PID especially when normal vaginal flora are supplanted with other organisms. 10 – 30% of infections are poly-microbial in nature.

Cases of infertility are on the increase worldwide. Ironically, infertility and sub-fertility are prevalent within the high fertility zones of Africa. Areas with high rates include Central Africa Gabon, Central African Republic, Democratic Republic of Congo, Chad and Cameroon. Intermediate rates exist in parts of West and East Africa. In Nigeria, over 800,000 couples are said to have difficulty in achieving desired pregnancy. The range of infertility rate is between 8.6 percent and 21.5% in developing countries with Eastern Africa having the lowest rate and Southern Africa the highest. There is evidence of a declining trend in infertility rates in parts of Sub-Saharan Africa such as Cameroon and Nigeria.

It is estimated that about 1.3 million women develop PID annually in the United States. Less than half of them present with acute PID. The remaining cases go undetected until the woman presents with signs of infertility. Lower abdominal tenderness, adnexal tenderness and pain on manipulation of the cervix are present on physical examination in up to 90% of women with PID. Other manifestations, such as elevated erythrocyte sedimentation rate (ESR) or C-reactive protein and elevated vaginal discharge vary widely in frequency. At present there are no effective ways to detect clinically silent disease and not surprisingly, these criteria for clinical diagnosis have low sensitivity and specificity.

Definitive diagnosis of PID requires invasive testing. This can include an endometrial biopsy showing evidence of endometritis, laparoscopy with abnormality consistent with PID or transvaginal sonography showing thickened, fluid-filled tubes with or without free pelvic fluid or a tubo-ovarian abscess. Despite the advantages of these techniques, most
women suspected of having PID in the emergency department (ED) are generated by clinical signs and symptoms. A high level of suspicion and a low threshold for initiating treatment in PID are essential for facilitating detection and optimizing patient outcomes. Clinical vigilance should be applied to all women of childbearing age with pelvic pain. New and highly effective treatment regimens have been introduced for PID and so a number of therapeutic options are available for managing problematic, and frequently, poorly compliant patients with PID. In this regard, the CDC recommends a number of possible regimens most of which mandate the use of a broad-spectrum cephalosporin administered parenterally (initially) along with an oral agent effective against Chlamydia, such as doxycycline. Commonly used regimens for in-patient treatment of PID include the combination of cefoxitin, ceftriaxone, or cefotetan plus doxycycline; plus intravenous metronidazole followed by oral therapy with metronidazole plus doxycycline; gentamicin plus clindamycin; and intravenous ampicillin plus bacampicillin plus doxycycline. Although not included as current CDC guidelines, intravenous azithromycin therapy followed by oral azithromycin (preferably in combination with an anti anaerobic agent such as metronidazole) has been shown to be safe and effective.

Management of infertility secondary to PID is mainly by surgery. The advent of high success rate with in-vitro fertilization as performed in selected centers of excellence has however changed this.

MATERIALS AND METHODS

The Lagos University Teaching Hospital, O & G clinic is the base for this study as it is the long-standing specialist facility in the State and in fact in the Nation. Pelvic inflammatory disease and infertility are cases that are usually referred for Specialist attention. This study was carried out to document the interrelationship that exists between PID and infertility as well as investigate the level of suspicion of physicians in O & G to these interrelationships.

Semi-structured, 2-part questionnaires were administered to 20 Doctors in O & G to elicit their opinions about the role of PID in infertility cases in the Hospital. The first part had open-ended questions while the second part required responses using a semantic scale from lowest (1) to highest (5). Response rate was 100%.

100 case notes of patients with infertility problems were randomly selected through the Medical Records Department and analyzed. A checklist was developed to retrieve relevant information from these case notes. The data obtained was analyzed using Microsoft Excel software to determine frequencies and means.

RESULTS

In defining infertility, 19 responses out of 69 (27.5%) stated that it is the inability to conceive while 24.6% of the responses added “after a period of one year” while another 20.9% of responses added “despite regular sexual intercourse. Other inclusions included "with unprotected sex" and "with uninterrupted sex". 23.7% of responses (18 out of 76) stated tubal factors as the commonest cause of infertility, 15 (19.7%) indicated male factors and 7 persons (9.2%) indicated fibroids. Others included hormonal factors and polycystic ovarian syndrome (7.9% each) as well as PID, ovulatory disorder and endometrosis (6.6%). (Table I)

All doctors assessed indicated that some infertility cases are reversible. Some of the reversible ones indicated are tubal factors (18, 42.9%), hormonal factors (7, 16.7%), male factors (6, 14.3%). (Table I)

In defining what PID is, 19 out of 46 responses indicated that it is an infection associated with females (41.3%), 10 respondents (21.7%) added “of the genital tracts” and 9 others (19.6%) added “of the fallopian tubes, ovaries and endometrium”. 4 others (8.7%) used the term “inflammation” and another 3 (6.5%) used the term “pelvic infection”.

15 responses out of 44 (34.1%) stated that PID frequently occurs in sexually active women, 11 responses (25.0%) included women of reproductive age and 9 respondents (20.5%) indicated those individuals in adolescents and young adults. Other responses include women from poor economic backgrounds (9.1%), people with multiple sex partners (4.5%) and those that engage in unprotected sex (4.5%). (Table II)

2 respondents out of 15 (12.5%) indicated that PID had to be severe to cause infertility while 8 others (50.0%) indicated that it has to be at least moderately severe. 2 respondents (12.5%) stated that it can only occur after more than one episode. Another 4 respondents (25.0%) stated that it does not depend on severity or duration.

Actions taken in attempting to reverse PID-associated infertility include surgical intervention (100%), drug use (52.6%) and assisted reproductive technique (21.1%). (Table III)

All respondents stated that Neisseria gonorrhoea and Chlamydia trachomatis (100.0% each) are implicated in PID. In addition, out of the 19 respondents, 4 (21.1%) indicated Gram-positive microbes, 3 (15.8%) each stated Trichomonas vaginalis and bacterioides species. Others included Mycobacteria tuberculosis, anaerobes and Gram-negative organisms (10.5% each). One respondent indicated staphylococcus (5.3%).

Using a semantic scale, the respondents indicated that patients come to the O & G clinic very “often” with infertility problems and that PID occurs in the clinic “often” and that recurrent cases of PID “often” occur. They indicated that PID is suspected to be the cause of infertility “often”. They also indicated that PID leads to infertility and ectopic pregnancy “often”. They indicated that PID-caused infertility is “usually” reversible. The reverse PID-caused infertility is however, “usually” recurrent. They also indicated that PID patients’ partners are “often” screened for infection and that they are “often” found positive. The respondents also indicated that PID patients are “often” married and they “very often” have multiple partners.

RESULTS OF CASE NOTE SURVEY

The analysis revealed that of the 100 cases, 29 were associated with PID while 71 were not. Of the 71 that were not, causes included fibroid, hormonal imbalance, ovarian cyst, polycystic ovarian syndrome, male factor and even stress/depression. (Figure I). PID diagnosis is made based on clinical examination.

Various drugs were used in treating the various conditions and included metronidazole, doxycycline, ciprofloxacin, ofloxacin, gynotroxyd, vibramycin, nystatin, feldene, paracetamol and diflucan. Combination drug therapies used include metronidazole + doxycycline, metronidazole +
doxycycline + ciprofloxacin, metronidazole + ciprofloxacin and metronidazole (± doxycycline).

The case notes revealed that 10.3% and 14.1% of the PID-associated and Non-PID associated cases had a history of surgery carried out on them, 6.9% and 8.5% had STD history and 48.3% and 28.8% had vaginal discharge. 65.5% and 54.9% were primarily infertile. Women with pyrexia accounted for 17.2% and 5.6% respectively and women that experienced dyspareunia were 34.5% and 12.7% respectively in the two groups. 7 patients each (24.1% each) had cervical and adnexal tenderness in the PID-associated group while 9 and 3 persons (12.7% and 4.2%) had cervical and adnexal tenderness in the Non-PID associated group. 44.8% and 26.8% of women in each group experienced abdominal pain while 10.3% and 5.6% each experienced pelvic pain in the two groups. (Figure 2)

**TABLE I**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>FREQUENCY</th>
<th>IF REVERSIBLE</th>
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<tbody>
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<td>Tubal factors</td>
<td>18</td>
<td>18</td>
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<tr>
<td>Male factors</td>
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<tr>
<td>Fibroid</td>
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<tr>
<td>Hormonal factors</td>
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<td>7</td>
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<tr>
<td>PID</td>
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<td>-</td>
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<td>Ovulatory disorders</td>
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<tr>
<td>Congenital abnormality</td>
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<tr>
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**TABLE II**

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<tr>
<th>ITEM</th>
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<td>Sexually active</td>
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<tr>
<td>Adolescent or young adults</td>
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<tr>
<td>Poor economic class</td>
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<tr>
<td>Unprotected sexual intercourse</td>
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<td>History of abortion</td>
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**DISCUSSION**

A dramatic increase in the incidence of PID in recent years has led to a parallel increase in consequent infertility. The economic and psychological costs of infection and infertility are severe and preventable. Thus, this study sought to document the relationship between infertility and PID in Lagos, Nigeria using as base the long-standing specialist hospital in the state. Also the degree of suspicion of physicians in relevant units to identify and diagnose PID as cause of infertility was investigated.

The responses from the physicians gave the definition of infertility as the inability to conceive after a period of one year of regular sexual intercourse with unprotected sex. This definition is in consonance with definitions for infertility in various literature. Most of the physicians agree that tubal factors is the major cause of infertility. An additional 5 people also selected PID as the major cause of infertility. Considering that PID is a major cause of tubal factor infertility, it can be surmised from this result that PID is the most common cause of infertility in Lagos. This is again supported by literature. Another positive finding in this study is that tubal factor infertility is largely reversible. Variables affecting reversibility would include length/duration of tubal factor problem, severity and frequency. However up to 25% of respondents in this survey do not believe duration, severity and frequency has anything to do with it.

The high degree of involvement of male factors in female infertility in this survey is noted. This is a pointer for future research and this is especially important as the female is usually blamed when couples are infertile in developing countries including Nigeria.

The definition for Pelvic Inflammatory Disease (PID) reveals that it is essentially an infection or inflammatory
disease associated with females, which affects the genital tract or fallopian tubes, ovaries and endometrium. This definition is accurate going by literature.\textsuperscript{13, 17, 18}

Actions taken to revert PID-associated infertility include surgery, drugs and assisted reproductive techniques – ART\textsuperscript{3}. The use of ART is on the increase in modern times. Drugs are limited in usefulness because once pus formation, scarring and adhesions in the tubes and other reproductive organs have occurred, drugs become useless in resolving the problem.

This survey also reveals that PID and infertility are serious enough problems in this teaching hospital. This is an index that it is indeed a serious problem in the state. Infertility problems occur often, PID and recurrent PID occur often and it leads to infertility and ectopic pregnancy often and similar results were documented in previous studies.\textsuperscript{12, 15, 16, 17} However, results from the case note survey reveals that the degree of suspicion for PID-related events is still not high enough. Of the 100 cases surveyed, 29 cases were said to be associated with PID. However, of the 71 cases remaining, 19 cases were associated with abdominal pain, 9 with adnexal tenderness, 3 with cervical tenderness, 4 with pelvic pain, 4 with pyrexia, 19 with vaginal discharge, 9 with dyspareunia, 6 with history of STD and 10 with history of surgery. From this data, it is very likely that more cases should have been handled as being PID-associated. The WHO and CDC recommended a minimum criteria required for empiric treatment of PID. These criteria (major determinants) include lower abdominal tenderness, adnexal tenderness and cervical motion tenderness and no evidence of competing diagnosis e.g. acute appendicitis.\textsuperscript{19} Minor determinants i.e. signs that may increase the suspicion of PID include fever (oral temperature greater than 38.5°C), vaginal discharge, documented STD, elevated ESR, elevated C-reactive protein, dyspareunia and systemic signs such as vomiting. This is because clinical contingencies usually require that antibiotic therapy be initiated on the basis of non-invasive evaluation.

All respondents indicated \textit{N. gonorrhoea} and \textit{C. trachomatis} as the two major causes of PID. This is rightly so as documented by various studies\textsuperscript{4, 5}. The threat posed by \textit{N. gonorrhoea} is on the decline in developed countries while that posed by \textit{C. trachomatis} is on the increase worldwide. Other organisms implicated by the respondents in this survey include Gram-positive organisms, \textit{Staphylococcus, Chlamydomonas vaginalis, Bacteroides species, Mycobacterium tuberculosis}, anaerobes and Gram-negative organism. From literature, however, other organisms implicated include anaerobic bacteria such as \textit{Bacteroides} and \textit{Peptostreptococcus}; Facultative bacteria including \textit{Enterobacteriaceae, H. influenzae} and \textit{C. vaginalis}; \textit{Streptococcus} groups B and D and \textit{Mycoplasma} such as \textit{M. hominis} and \textit{M. urealyticum}; \textit{Trichomonas, Mycobacteria} and \textit{Staphylococcus} are not options included in literature.

CONCLUSION AND RECOMMENDATION

In order to prevent PID, physicians and public health specialists need to understand the interactions of PID-causing microorganisms with the host immune system. By the time PID symptoms are detected, considerable tubal damage already exists limiting the effect of tertiary prevention of PID. Thus secondary prevention should keep the lower genital tract infection from moving up to the upper genital tract. Health providers play a key role in secondary prevention by screening for STDs, and in primary prevention by counseling patients about safer sex practices. Therefore, it is essential that relevant in-service training be given to physicians in these units periodically to enable them perform this function effectively.

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