DIAGNOSTIC LAPAROSCOPY IN CHRONIC PELVIC PAIN: WHAT ARE THE ISSUES IN A RESOURCE POOR COUNTRY?.

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ABSTRACT

Background: In resource poor countries, the underlying diagnosis of the cause of chronic pelvic pain are unclear in many of the cases, because of the poor sophistication of the non-invasive investigation tools that are employed in making the diagnosis, and laparoscope is not available in many health facilities that manage gynaecological emergencies. A study of the role of diagnostic laparoscopy is necessary.

Aim: To determine the role of diagnostic laparoscopy in management of chronic pelvic pain in a resource poor country.

Method: A two year prospective, comparative study of 44 patients with chronic pelvic pain, who had initial diagnosis following non-invasive investigations (clinical/laboratory/ultrasound evaluation) and final diagnosis following laparoscopy, at Aminu Kano Teaching Hospital, Kano, Nigeria. The correlation of the initial diagnosis with final diagnosis (accuracy of initial diagnosis) was done using tests of validity.

Results: The period incidence was 27.9% of all gynaecological diagnostic laparoscopy. The sensitivity of initial diagnosis for ectopic pregnancy was 60.0%, specificity 89.5%, positive predictive value (PPV) 81.8%, negative predictive value (NPV) 51.5%, and accuracy 59.1%. For chronic pelvic inflammatory disease, the sensitivity was 23.3%, specificity 70.3%, PPV 21.4%, NPV 86.7%, and accuracy 61.4%. For pelvic adhesions, sensitivity was 0.0%, specificity 100.0%, PPV 0.0%, NPV 84.1% and accuracy 84.1%, and for uterine fibroids, the sensitivity was 100%, specificity 100%, PPV 100%, NPV 100% and accuracy 100%.

Conclusion: Diagnostic laparoscopy should be strongly considered as a primary evaluation tool in the management of chronic pelvic pain in resource poor countries.

Keywords: Chronic pelvic pain, resource poor countries, initial diagnosis, final diagnosis, tests of validity

INTRODUCTION

Chronic pelvic pain is non cyclical pain that lasts six months or more, is localized to the pelvis, the anterior abdominal wall at or below the umbilicus, or the buttocks, and is of sufficient severity to cause functional disability or require medical care[1,2]. It is not a disease, but rather, it is a symptom that can be caused by several different conditions, and may or may not be associated with menstrual periods[3-8].

Chronic pelvic pain affects 4 to 25% of women of reproductive age[9]. It accounts for approximately 10 percent of all ambulatory referrals to a gynaecologist, and about 40 percent of all gynaecological diagnostic laparoscopy that is performed annually in the United States of America[3]. A variety of gynaecologic, gastrointestinal, and bodywide disorders can cause chronic pelvic pain[3,9-11]. Gynaecologic causes account for 20 percent of the cases[3,12], and include, pelvic inflammatory disease, ectopic pregnancy, endometriosis, pelvic adhesions, uterine fibroids, ovarian cysts, menstrual causes like dysmenorrhoea or premenstrual syndrome[1,13-17].

Initial evaluation of the cause of chronic pelvic pain should include a history, physical examination, laboratory testing and findings of non-invasive tests

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to elucidate the diagnosis, rule out serious disease, and reassure the patient[1,18]. Among the non invasive tests, ultrasonography should be the first diagnostic imaging examination to be performed, in cases of chronic pelvic pain in which there are non-diagnostic clinical findings[1,18]. This modality is non-invasive and readily available even in low resource settings, and can be performed at the patient's bedside[3,4]. Transvaginal sonography (bladder filling not required) allows detailed visualization of the uterus and adnexa, including the ovaries[18]. The fallopian tubes are usually imaged only when they are abnormal and distended on physical examination, primarily from post-inflammatory obstruction[1,18]. Transabdominal sonography (bladder filling required) provides a more global view of the pelvic contents[18-20]. Transabdominal sonography is complementary to the endovaginal examination, and whether transabdominal sonography is performed first, and whether the complementary examination is needed for a final diagnosis, is a matter of individual clinical imaging practice[18].

Computed tomography (CT) scanning may be used as the first diagnostic imaging examination[19]. Most often, ultrasonography is preferred over CT scanning in a female child or adolescent with pelvic pain, particularly because of concerns about radiation exposure[18]. Magnetic resonance imaging (MRI) with insignificant risk of radiation exposure, serves as an excellent imaging modality, in cases in which the ultrasonographic findings are equivocal[18-20].

Evaluating a diagnostic test is particularly challenging[18,21]. The basic performance characteristic of a test is the measure of its diagnostic or predictive accuracy. Areas, such as the identification of diseased patients, predictive modeling of future health status and costs and risk stratification, are just a few of the domains in which assessment of accuracy is beneficial, if not critical. The most commonly used analytical model for this purpose is the standard 2 x 2 table method in which sensitivity and specificity are calculated[22]. These measures are often expressed as percentages, and are usually determined against a reference standard test, sometimes referred to as a 'gold standard' test which must show a sensitivity, specificity and accuracy of 100% (diagnostic test), unlike a screening test which must show a sensitivity, specificity and accuracy of 70% or better to be rated positively in this category[21].

Two other important measures of test performance are positive predictive value (PPV) and negative predictive value (NPV)[21,22]. Both of these measures are often expressed as percentages. They are of limited value and are often difficult to interpret, as they depend on not only the sensitivity and specificity, but also the prevalence of the condition[21].

In the management of chronic pelvic pain, where the accuracy of the initial diagnostic tools does not meet the criteria for a diagnostic test, but that of a screening test, physicians should consider referring patients with chronic pelvic pain, for invasive diagnostic procedures like laparoscopy, colonoscopy, cystoscopy, with a diagnostic accuracy that approximates 100%[1,3]. This is because the ability to render an early correct diagnosis and appropriate treatment in these patients, can significantly improve future reproductive health outcome[12].

It is against this background that this study was designed, to determine the accuracy of the initial diagnostic tools, that are used in the management of chronic pelvic pain at Aminu Kano Teaching Hospital, Kano, Nigeria, a tertiary health facility in a resource poor country, in other to make recommendations that will ensure early correct diagnosis and appropriate treatment, that will improve the management outcome.

METHODS

This is a two year prospective, comparative study of 44 consecutive diagnostic laparoscopies for chronic pelvic pain, among women who presented at the gynaecological emergency department of Aminu Kano Teaching Hospital, Kano, Nigeria, between January 2008 and December 2009, to determine the accuracy of the initial diagnosis, i.e. correlation between the initial diagnosis (clinical/laboratory/non-invasive imaging tests) and the final diagnosis (laparoscopic diagnosis).

Clinical investigations involved patient's history and physical examination, which included a thorough history and general physical examination, abdominal and pelvic examination. Laboratory tests included a full blood count, urine pregnancy test, urinalysis, mid stream urine and high vaginal swab for microbiological examination, depending on the results of the physical examination. The results of serum β- HCG estimation were not usually available on time. The only non-invasive imaging test that

was available for use during the study period was transvesical ultrasound scanning using the abdominal probe, because transvaginal scanning using the vaginal probe is not preferred in our predominantly Islamic community. CT scan and MRI were not used in this study, because they were perceived as too expensive and unaffordable by the patients for routine use.

The investigation tool **that was used in the final diagnosis in this study was laparoscopy, which although** invasive, **was affordable for routine use by the patients. Laparotomy was reserved for therapeutic purposes. The procedure of laparoscopy and reasons for the operation were explained to the patients. Informed consent was obtained.** Laparoscopy was done under general anesthesia in all the cases. A thin telescope with a camera was inserted through a small semi-circular incision, about 3cm just below the umbilicus, after achieving pneumo-peritoneum with carbon dioxide that was instilled through a Verres needle, and access created by insertion of a trocar and sleeve, and withdrawal of the trocar and introduction of the telescope. Through the telescope, the pelvis and the reproductive organs were viewed. Where the laparoscopy was abnormal, proceed to definitive treatment was carried out, but where the laparoscopy was normal, focus was placed on the diagnosis and treatment of non-gynaecologic causes of chronic pelvic pain.

The data obtained were analyzed and presented in tabular forms. The correlation between the initial diagnosis and the final diagnosis (accuracy of initial diagnosis) was evaluated using tests of validity, which involved the sensitivity, specificity, positive predictive value, negative predictive value, and accuracy.

To determine the positive and negative predictive value of ultrasonography, patients were categorized into four groups (a to d) Group a: those whose Ultrasound and final diagnosis were positive (true positives). Group b: those whose ultrasound diagnosis were positive and final diagnosis was negative (false positives). Group c: those whose ultrasound diagnosis were negative and final diagnosis was positive (false negatives). Group d: those whose ultrasound and final diagnosis were negative (true negatives).

Sensitivity was taken as the proportion the diseased patients who were reported as positive i.e. true positives/true positives and false negatives (a/a+c).

Specificity was taken as the proportion of the disease free patients who were reported as negative i.e. true negatives/false positives and true negatives (d/b+d).

Positive predictive value was taken as the proportion of diseased patients in the final diagnosis to those diagnosed as diseased ultrasonographically i.e. true positives/true positives and false positives (a/a+b).

Negative predictive value was the proportion of disease free patients in final diagnosis to that reported by ultrasound i.e. true negatives/false negatives and true negatives (d/c+d).

Accuracy was the percentage of test results that was correctly identified by the test, i.e true positives and true negatives/ total test results (a+d/a+d+b+c)

RESULTS

The total number of gynaecological diagnostic laparoscopy during the study period was 158, among them chronic pelvic pain accounted for 44 cases, giving a period incidence of 27.9% of gynaecological diagnostic laparoscopy for chronic pelvic pain. Infertility evaluation (65.8%) was the commonest indication for gynaecological diagnostic laparoscopy during the study period, followed by chronic pelvic pain (27.9%), while missing Intrauterine Contraceptive Device (IUCD) accounted for 6.3%

Ectopic pregnancy (56.8%) was the commonest cause of chronic pelvic pain, followed by chronic pelvic inflammatory disease (15.9%), pelvic adhesions (15.9%), and uterine fibroids (11.4%).

Ectopic pregnancy was diagnosed in the initial diagnosis in 9 patients (20.5%), and was confirmed in the final diagnosis in 25 patients (56.8%). Sixteen cases of ectopic pregnancy were misdiagnosed (false negative cases) as chronic pelvic inflammatory disease (7 cases), ovarian cyst (3 cases), idiopathic chronic pelvic pain (3 cases), endometriosis (2 cases) and appendicitis (one case), while two cases of chronic pelvic inflammatory disease were misdiagnosed as ectopic pregnancy (false positive cases). The sensitivity of initial diagnosis for ectopic pregnancy was 60.0%, while the specificity was 89.5%, positive predictive value (PPV) was 81.8%, negative predictive value (NPV) was 51.5%, and accuracy was 59.1%.

Chronic pelvic inflammatory disease was diagnosed in the initial diagnosis in 14 cases (31.8%), and was confirmed in 3 cases. There were 4 false negative

cases (9.1%), which made it 7 cases (15.9%) in the final diagnosis. False positive results were obtained in 11 cases (25.0%), of which 7 cases (15.9%) were cases of ectopic pregnancy, and 4 cases (9.1%) were pelvic adhesions. The 4 false negative cases (9.1%) were misdiagnosed as ectopic pregnancy in 2 cases (4.6%), and appendicitis in 2 cases (4.6%).The sensitivity of initial diagnosis for chronic pelvic pain was 23.3%, specificity 70.3%, PPV 21.4%, NPV 86.7%, and accuracy 61.4%.

Pelvic adhesions was not diagnosed in the initial diagnosis in any of the cases, but was confirmed in 7 cases (15.9%) in the final diagnosis. In the initial diagnosis, four cases of pelvic adhesions (9.1%) were misdiagnosed as chronic pelvic inflammatory disease, two cases (4.6%) as endometriosis, and one case (2.3%) as idiopathic chronic pelvic pain. The sensitivity of initial diagnosis for pelvic adhesion was 0.0%, specificity 100.0%, PPV 0.0%, NPV 84.1%, and accuracy of 84.1%.

Uterine fibroids were diagnosed in the initial diagnosis in 5 patients (11.4%), and were confirmed in the final diagnosis in all the 5 patients (11.4%). There was no case of misdiagnosis. The sensitivity of initial diagnosis for uterine fibroids was 100%, specificity 100%, PPV 100%, NPV 100%, and accuracy of 100%.

DISCUSSION

The period incidence of 27.9% of all gynaecological diagnostic laparoscopies for chronic pelvic pain in this study, is lower than 40 percent from the United States of America, where chronic pelvic pain is the commonest indication[1,3]. This may probably be because evaluation of the infertile couple was the commonest indication for gynaecological diagnostic laparoscopy in this study, and studies from resource poor countries[5], because tubal factor is the commonest cause of female infertility in resource poor countries like Nigeria[5], as a result of high prevalence of pelvic infection and inflammation from sexually transmitted diseases, septic abortions, puerperal sepsis and post operative sepsis[18].

This may also explain why the long term complications of pelvic infections like ectopic pregnancy, chronic pelvic inflammatory disease, and pelvic adhesions were the commonest gynaecological causes of chronic pelvic pain in this study, and other studies from resource poor countries[4,5]. The dearth of these risk factors in developed countries, may explain why tubal factor infertility is uncommon, and ovarian factor is the commonest cause of infertility[17], and endometriosis and pelvic adhesions are the commonest causes of chronic pelvic pain[1].

The low sensitivity and accuracy of the initial diagnosis for ectopic pregnancy in this study, was a result of the high number of unclear cases (false negative cases), probably because transabdominal ultrasound scanning and urine pregnancy test were the non-invasive investigation tests that were available, and results of serum β-HCG are usually delayed, and a number of important surgical and gynecologic emergencies have similar clinical and ultrasonic presentations[12]. This agrees with other studies from resource poor countries like Nigeria[4], and has made gynaecologists in these resource poor regions, to regard chronic ectopic pregnancy as the "black sheep of gynaecology", which require a high index of suspicion to make the diagnosis[4].

In the initial diagnosis, chronic pelvic inflammatory disease was the commonest case of misdiagnosis with ectopic pregnancy, which agrees with other studies[4.5]. This may probably be because of the similar ultrasonographic appearance, and certain laboratory studies that can be used to support the diagnosis like C-reactive protein, and chlamydial and gonococcal DNA probes and cultures, and imaging studies, such as computed tomography, and magnetic resonance imaging which may also prove helpful in unclear cases, were not available for routine use during the period of this study, which was also the report in other studies from resource poor countries[4,16].

The similar ultrasonographic appearance may be because chronic pelvic inflammatory disease may produce thickened, fluid-filled tubes, tubo-ovarian abscess, and extend to produce pelvic peritonitis and Fitz-Hugh-Curtis syndrome (perihepatitis), with pus in the pelvis, which on pelvic ultrasonography may appear as adnexal mass and pelvic fluid collection[18]. This has prompted gynaecologists in resource poor countries, to exclude ectopic pregnancy convincingly in all cases of chronic pelvic inflammatory disease[4,5]. This may account for the low sensitivity and accuracy of the initial diagnosis for chronic pelvic inflammatory disease in this study, and studies from developing countries[5].

The low sensitivity and accuracy of the initial

diagnosis for pelvic adhesions in this study, and studies from resource poor countries[5], may probably be because pelvic ultrasound scan is not helpful in the diagnosis of conditions like pelvic adhesions, irritable bowel syndrome, diverticulitis or painful bladder syndrome[1]. The high sensitivity, specificity and accuracy of the initial diagnosis for uterine fibroids in this study, and other studies from Nigeria[5], may probably be because transabdominal ultrasound scan is helpful in excluding pelvic masses and pelvic fluid[19].

In resource rich countries, in addition to patient's history and physical examination, laboratory investigations and transabdominal ultrasound scan that are commonly used in resource poor countries[4,5], non-invasive investigations like results of serum β –HCG estimation, transvaginal ultrasound and CT scans, and MRI are frequently used as part of the initial investigation tools[3,23]. Magnetic resonance imaging (MRI) serves as an excellent imaging modality in cases in which the ultrasonographic findings are equivocal[1]. Studies that compared the findings from MRI with ultrasonograms, found that MRI was more accurate than ultrasonography in the diagnosis of the cause of chronic pelvic pain, with a diagnostic accuracy that approach 100%[24,25], which may explain why studies from resource rich countries, suggested that diagnostic laparoscopy should no longer be considered a routine part of the evaluation of chronic pelvic pain[1,18,19,23].

In this study and studies from resource poor countries[4,5], the accuracy of the initial investigation tools, that are used in the investigation of the cause of gynaecological chronic pelvic pain is poor, except for uterine fibroids. Further evaluation using a 'gold standard' investigation tool with an accuracy that approximate 100% will be needed for a final diagnosis, as this will help to avoid the financial and human costs that are associated with incorrect diagnoses, which can include poor patient care, unnecessary complications, suffering, and in some circumstances, even death[18].

Laparoscopy which is the current criterion standard for the diagnosis of ectopic pregnancy or chronic pelvic inflammatory disease[18], is suggested as a primary procedure despite its invasive nature, because it may fully define and diagnose in approximately 100% of cases, the causes of gynaecological chronic pelvic pain, like pelvic masses consistent with tubo-ovarian abscess or ectopic pregnancy, chronic pelvic inflammatory disease, pelvic adhesions, and endometrioma by direct visualization[3,18,19]. Also material can be obtained for definitive culture and histological studies[18].

Diagnostic laparoscopy provides a unique combination of user-friendliness, reliability, a high diagnostic accuracy, and affordability for doctors and patients in resource poor countries[9,24,25]. Unlike CT scan and MRI, it is easier to maintain, the skill that is required to operate the instrument and interpret the findings are less sophisticated, and it is not sensitive to the erratic power supply in resource poor countries[5]. The drawbacks of laparoscopy are that the procedure is invasive, it exhibits inter-observer variability, and requires an operating room and anesthesia[9,18].

Table 1: Shows the Correlation of the Final Diagnosis with Initial Diagnosis (Accuracy of Initial Diagnosis)

Cases	Initial diagnosis n (% of frequency)	Final diagnosis (% frequency)	n of False positive (n)	False negative (n)	True negative (n)	Sensitivity %	Specificity %	PPV %	NPV %	Accuracy %
Ectopic pregnancy	11.0 (25.0)	25.0 (56.8)	2.0	16.0	17.0	60.0	89.5	81.8	51.5	59.1
Chronic PID	14.0 (31.8)	7.0 (15.9)	11.0	4.0	26.0	23.3	70.3	21.4	86.7	61.4
Adhesions	0.0 (0.0)	7.0 (15.9)	0.0	7.0	37.0	0.0	100.0	0.0	84.1	84.1
Uterine fibroids	5.0 (11.4)	5.0 (11.4)	0.0	0.0	39.0	100.0	100.0	100.0	100.0	100.0

CONCLUSION

The accuracy of the initial investigation tools that are used in the diagnosis of the cause of gynaecological chronic pelvic pain is low, except for uterine fibroids, at Aminu Kano Teaching Hospital. Diagnostic laparoscopy should be strongly considered as a primary evaluation tool in the management of chronic pelvic pain.

Health facilities that manage gynaecological emergencies in resource poor countries should make available, diagnostic laparoscopy 24 hours of the day, in order to meet the medical environment demands. Involvement of governmental and non-governmental organizations, to provide the equipments and man power, and ensure sustenance, is needed in resource poor countries, where the health budgets and management policies are poor and erratic.

However, because of the biases inevitable in this hospital-based series and the small sample size, larger prospective multicentre studies will be required to confirm these findings.

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