



CLINICAL PRESENTATION AND ULTRASONOGRAPHIC MARKERS OF PID

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ABSTRACT

INTRODUCTION: Pelvic inflammatory disease (PID) comprises a spectrum of inflammatory disorders of the upper female genital tract, including any combination of endometritis, salpingitis, Tubo-ovarian abscess, and pelvic peritonitis. The CDC has estimated that more than 1 Million women experience an episode of PID every year. Studies have reported prevalence ranging from 5.2% to 17.2% PID in various parts of India.

Ultrasound:- TAS was initially used followed by use of TVS with Doppler in diagnosis of PID, although there are no large studies evaluating its sensitivity and or overall usefulness. It is a frequently ordered study in patients with classic symptoms of PID or who have unexplained, acute pelvic pain.

MATERIAL AND METHODS: A retrospective analysis of medical records of patients with a complaint of lower abdominal pain was included in the study. Diagnosis of PID was made and patient was followed in the outdoor clinic. Pelvic examination was made. USG was done. According to symptoms and clinical examination for PID patients, the data was recorded. Medical record of 120 patients from 1 January 2020 to 31 May 2021 from a private clinic in Dist. Shivpuri were studied.

RESULTS: In our study out of 120 cases, most of the patients 50.83% belonged to 26-30 years of age, a maximum number of patients were rural 83.33%. Most of the patients were educated below HSC 56.66%. Most of them 85% were married and most of them were multipara 56.66%.

The most common presenting complaint was a pain in the abdomen (100%), followed by per vaginal discharge (65%), pain in the lower back (43.33%), abnormal uterine bleeding (40%), dysmenorrhoea (31.66%), dyspareunia (24.16%), fever (17.5%) and others.

On clinical examination abnormal PV discharge was present in 61.66% of cases, fixed and retroverted uterus with or without thickened appendages were found in 55% of cases. Cervical motion tenderness was found in 78.33% of cases. Adnexal tenderness was found in 80% of cases but adnexal mass was found in 10.83% of cases.

The most common finding on ultrasound scan was fluid in the pouch of Douglas 48.33%, followed by distal hydrosalpinx 28.33%, endometritis 18.33%, pyosalpinx 15%, TO Mass 13.33% and Pelvic collection in 10.83% of cases.

CONCLUSION: The focus of this study was to identify socio-demographic characteristics of PID, to see the variety of presenting complaints and pelvic examination findings and to correlate the clinical findings with the USG findings of PID.

Much studies about the sensitivity & specificity of USG are not available, but this is definitely the most frequently ordered investigation in cases of PID. Transabdominal findings of 'incomplete septa' 'cog wheel' 'beads on a strings' signs helps in distinguishing a dilated fallopian tube from other cystic adnexal masses

To prevent long term sequelae PID should be the part of differential diagnosis in all patients aged 15-44 year with non specific abdominal pain.

KEYWORDS :

INTRODUCTION

Pelvic inflammatory disease (PID) is infection and inflammation of upper genital tract caused by sexually transmitted disease (STD). It is defined as the clinical spectrum of upper genital tract infection due to ascend and spread of micro-organisms from the vagina and cervix to the endometrium (endometritis), fallopian tube (salpingitis), ovaries (ophoritis), pelvic peritoneum (pelvic peritonitis), pelvic cellular tissue or endopelvic fascia (parametritis). Acute salpingitis is usually taken as acute PID.¹

Pelvic inflammatory disease (PID) comprises a spectrum of inflammatory disorders of the upper female genital tract, including any combination of endometritis, salpingitis, Tubo-ovarian abscess, and pelvic peritonitis.

PID can be classified as acute, chronic or acute on chronic. The CDC has estimated that more than 1 Million women experience an episode of PID every year. Studies have reported prevalence ranging from 5.2% to 17.2% PID in various parts of India.

Many cases of PID are asymptomatic or present with minimal atypical symptoms.² Other symptoms of patients may include pelvic pain and tenderness, lower abdominal pain and

tenderness, pain with sexual intercourse, irregular menstrual bleeding, or purulent vaginal discharge.^{3,4,5}

Patients may also experience nonspecific symptoms such as lower back pain, nausea, and vomiting.

Risk Factors for PID include younger age of first sexual intercourse multiple sexual partners, failure to use contraception, history of prior STDs of PID, history of sexual abuse⁶ or an intrauterine contraceptive device and use of vaginal douche. Gynecologic surgical procedures that affect the cervix such as endometrial biopsy, curettage (after the termination of pregnancy), and hysteroscopy break the cervical barriers, predisposing women to ascending infections.^{7,8}

CDC (Centre of Disease Control) Criteria for diagnosis of PID (2010) are described as minimal and additional.¹ Minimal criteria include:- 1. Lower abdominal pain and tenderness (90% cases), 2. Bilateral adnexal tenderness (95.5% cases) and 3. Cervical motion tenderness. Additional criteria that support the diagnosis of PID are 1. Temperature >101°F (>38.3°C), 2. Abnormal cervical or vaginal muco-purulent discharge, 3. Low back pain, 4. Irregular vaginal bleeding, 5. Dysuria, 6. Leucocytosis >10,000/mm³, 7. Pelvic abscess or

inflammatory complex mass, 8. Increased ESR, 9. Increased CRP levels and 10. Laboratory documentation of cervical infection by *N. Gonorrhoea* and *Chlamydia trachomatis*. The most specific criteria for diagnosing PID comprises of 1. Histopathologic evidence of endometritis on biopsy, 2. Ultrasonographic, CT scan or MRI, 3. Laparoscopic findings of PID showing inflamed tubes, hydrosalpinx, pyosalpinx or tubo-ovarian masses.

Gainsville staging of acute PID consist of 5 stages.¹

Stage I. Acute endometritis- salpingitis without peritonitis or adhesions.

Stage II. Acute salpingitis with peritonitis with purulent discharge.

Stage III. Acute salpingitis with superimposed tubal occlusion or tubo ovarian complex.

Stage IV. Rupture tubo-ovarian abscess.

Stage V. Tubercular salpingitis.

Grading of PID via clinical and laproscopic finding is given as mild, moderate and severe.

As the etiology of PID is complex and polymicrobial, broad-spectrum antimicrobial coverage is recommended. The CDC proves definite recommendations for outpatient and inpatient treatment of PID. The decision regarding inpatient or outpatient therapy should be based on clinical criteria. All women should be followed up at 48-72 hours of initiation of therapy to assess response. If necessary, patients who do not respond to therapy within 72 hours should be hospitalized for parenteral therapy.³

Chronic PID is usually the result of long-term complication of acute PID which may include infertility, ectopic pregnancy and chronic pelvic pain. It occurs mainly in genital tuberculosis and actinomycosis. Genital TB is an important cause of chronic PID in developing nations like India. TB endometritis is often focal.

Patients suffering from chronic endometritis may have an underlying cancer of cervix or endometrium. Pyometra is usually met within elderly women and is one of the best-recognized forms of chronic endometritis.

Ultrasound:- TAS was initially used followed by use of TVS with Doppler in diagnosis of PID, although there are no large studies evaluating its sensitivity and overall usefulness.^{9,10,11} It is a frequently ordered study in patients with classic symptoms of PID or who have unexplained, acute pelvic pain. Trans abdominal scan is apt for determining overall extent of disease. Transvaginal sonography with color or power Doppler, however, has significantly improved the ability to detect subtle abnormalities such as slightly swollen fallopian tubes and to distinguish whether the ovary is involved in and abscess.¹²

In medical imaging, the ability to make the correct diagnosis depends upon knowledge of the possible manifestations of the disease and correlation with the clinical findings. Transvaginal imaging is suited uniquely in both these regards for diagnosing PID.¹³

Acute PID USG Findings:-

The findings of PID are often subtle and sometimes nonspecific in a patient without an abscess or pyosalpinx.

If the patient has some fat in the pelvis, inflammatory changes will be seen as increased echogenicity and subtle changes in uterine size and of the adjacent fat is better visualized in transabdominal scan.

The presence of even small amounts of complex pelvic fluid is suspected for free pus. Increased ovarian volume is a useful sign of PID.¹⁴ The margins of the ovaries also may become indistinct in PID.

USG finding of the fallopian tubes are the most significant and specific landmarks of PID. Normal fallopian tubes are difficult to visualize on routine transvaginal sonography, unless outlined by fluid. The fallopian tube swells, and the walls and endosalpingeal folds thicken, allowing visualization with USG, when inflamed. It appears as an indistinct, elongated, noncystic mass in close proximity to the ovary, but separated from it. The tube becomes ovoid or pear shaped, filling with fluid that may be anechoic or echogenic, with layers, which in cross section, appears as 'cog wheel' sign.

when the fallopian tube is dilated and is doubled, the wall provokes a sonographic sign of incomplete septa. Echo-refrigent material in the interior of the fallopian tube found in case of pyosalpinx.¹⁵

A tubo-ovarian complex is indicated when the ovary adheres to the tube but remains visualized.

A tubo-ovarian abscess is the result of a complete breakdown of ovarian and tubal architecture such that no longer separate structures are identified. Both tubes are inflamed and occluded, the entire complex typically takes on a U shape as it fills the cul de sac., extending from one adnexal region to the other. The lateral and posterior borders of the uterus become obscured, and individual tubes and ovaries cannot be distinguished.¹³

The findings in power and color Doppler are increased flow (hyperemia) in the walls and incomplete septa of the inflamed tubes. Color Doppler helps in differentiating PID from tumors or masses but specific resistive and pulsatility indices are not useful.

Chronic PID USG Findings:-

Chronic endometritis findings on ultrasounds are- Increase in endometrial thickness, asynchronous with the phase of the menstrual cycle, persistently thin endometrium (Tuberculosis), irregularity of the endometrium, endometrium with hyperchogenic spots intracavitary synechiae, micropolyps, fluid of debris accumulated within the endometrial cavity. Hematometra, hypervascular endometrium in the secretory face. Sometimes calcification of entire endometrium can be seen.^{16,17}

A hydrosalpinx can be distinguished from other cystic adnexal lesion by USG. A hydrosalpinx tends to be anechoic, more tubular, and often demonstrates the 'incomplete septa' sign. The tubal wall is thin, and in cross section demonstrates the 'beads-on-a-string' sign.¹⁸ A hydrosalpinx can mimic a cystic ovarian mass.

A peritoneal inclusion cyst is demonstrated in USG when the ovary is surrounded by a loculated fluid collection with thin septations.¹⁹

Fitz-Hugh-Curtis syndrome, (Perihepatitis associated with PID) which occurs in 3% to 10% of patients is diagnosed by a reactive ileus.

MATERIAL AND METHODS

A retrospective analysis of medical records of patients with a complaint of lower abdominal pain was included in the study. Diagnosis of PID was made and patient was followed in the outdoor clinic. Pelvic examination was made. USG was done. According to symptoms and clinical examination for PID patients, the data was recorded. Medical record of 120

patients from from 1 January 2020 to 31 May 2021 from a private clinic in Dist. Shivpuri were studied. Information was collected like age parity, age at marriage, socioeconomic status, residence, education, use of any contraceptive, any findings like related risk factors. Symptoms and clinical examination like pain in the lower abdomen, abnormal vaginal discharge, backache, irregular menstrual periods, pain during intercourse, infertility, fever, lassitude and headache, nausea and vomiting and dyspareunia was noted. Patient was educated, counseling done, diagnosis and treatment were done in a single visit according to WHO criteria. Any laboratory tests were studied. USG findings were duly noted and correlated with the patients. Patients in need of TVS to confirm the diagnosis was also done selectively.

All the data were analyzed using IBM SPSS Ver.20 software. Cross tabulation and frequency distribution were used to prepare tables. Data are expressed as numbers, percentage and mean.

RESULTS

Table 1. Socio-demographic pattern.

Age group	Number of patient	Number of patients (%)
18-25 year	29	24.16
26-30 year	61	50.83
31-35 year	23	19.16
36-40 year	7	5.83
Total	120	100
Residence	Number of patient	Number of patients (%)
Rural	100	83.33
Urban	20	16.66
Total	120	100
Educational status	Number or patient	%
Illiterate	7	5.83
Up to primary	31	25.83
Up to HSC	68	56.66
Graduate	14	11.66
Post Graduate	7	5.83
Total	120	100
Married/unmarried		
Married	102	85
Unmarried	18	15
Total	120	100
Parity	Number of patient	Number of patients (%)
Nullipara	31	25.83
Primipara	21	17.5
Multipara	68	56.66
Total	120	100

In our study out of 120 cases, most of the patients 50.83% belonged to 26-30 years of age, a maximum number of patients were rural 83.33%. Most of the patients were educated below HSC 56.66%. Most of them 85% were married and most of them were multipara 56.66%.

Table: 2 Presenting complaints

Complaint	Number of patient	Number of patients (%)
Pain in the abdomen especially in the pelvic area	120	100
Abnormal vaginal discharge (Heavy, unpleasant smelling vaginal discharge which becomes purulent and or copious)	78	65

Abnormal Uterine Bleeding	Intermenstrual Bleeding	48	40
	Menorrhagia		
	Menometrorrhagia		
Pain in the lower back		52	43.33
Dysmenorrhoea		38	31.66
Dyspareunia		29	24.16
Fever		21	17.5
Nausea & Vomiting		18	15
Unable to conceive		16	13.33
Others: fatigue and headache, Frequent urination		16	13.33

In our study, the most common presenting complaint was a pain in the abdomen (100%), followed by per vaginal discharge (65%), pain in the lower back (43.33%), abnormal uterine bleeding (40%), dysmenorrhoea (31.66%), dyspareunia (24.16), fever (17.5%) and others.

Table:-3. Pelvic examination findings

PV findings	Number of patients	Percentage
Abnormal PV discharge (May be foul smelling)	74	61.66
Fixed and retroverted uterus with or without thickend appendages	66	55
Cervical motion tenderness	94	78.33
Adnexal tenderness	96	80
Adnexal mass	13	10.83

In our study abnormal PV discharge was present in 61.66% of cases, fixed and retroverted uterus with or without thickend appendages were found in 55% of cases. Cervical motion tenderness was found in 78.33% of cases. Adnexal tenderness was found in 80% of cases but adnexal mass was found in 10.83% of cases.

Table:- 4. Ultrasound finding in pelvic inflammatory disease

Finding on Ultrasound	No.	Percentage
No Identified pelvic pathology	18	15
Fluid in pouch of Douglas (only)	58	48.33
Pelvic collection	13	10.83
ENDOMETRITIS - Fluid or debris accumulated within the endometrial, Persistently thin endometrium, Thickened and Heterogeneous endometrium asynchronous with the phase of the menstrual cycle, Endometrium with hyperchogenic spots (synechiae), Sometimes Calcification of entire endometrium	22	18.33
Oophoritis - Enlarged ovary with increase flow, with adjacent free fluid and/or A polycystic like appearance of the ovary.	14	11.66
Hydrosalpinx - Tubular appearance, separate from the ovary, C- shaped or S-shaped fluid filled structure (sonolucent contents) in adnexa and occasional longitudinal folds in the ampullary portion of the fallopian tube. The waist sign (Indentations on the opposite sides of the wall) in combination with a tubular shaped cystic mass.	34	28.33
Pyosalpinx - Thicken tube >5mm, Debris in tube mixed echogenic of refringent contents (Beads-on-a-string, cogwheel, incomplete septa sign)	18	15
TO Mass - Unilateral or Bilateral complex adnexal masses with debris, septations and irregular thickened walls, Echogenic debris within the pelvis.	16	13.33

In our study the most common finding on ultrasound scan was fluid in the pouch of douglas 48.33%, followed by distal hydrosalpinx 28.33%, endometritis 18.33%, **pyosalpinx** 15%, **TO Mass** 13.33% and Pelvic collection 10.83%. No Identified pelvic pathology 15%,

DISCUSSION

In our study out of 120 cases, most of the patients 50.83% belonged to 26-30 years of age, a maximum number of patients were rural 83.33%. Most of the patients were educated below HSC 56.66%. Most of them 85% were married and most of them were multipara 56.66%.^{20,21,22} Our study was comparable with various studies in which the most common age was 26-30 years most of the patients were married, of the lower middle class^{18,19,20} and multiparaous. Our study was not comparable with the study of **Elie Newabong et al.**²³ in which a lower incidence of PID was found in married woman of 41%. In our study, most of the patients were not using any method of contraceptive 65(54.16667%). The Barrier was the most common 31(25.8333%) contraceptive in practices. 24(20%), of patients and had a history of use of IUD and these findings were comparable with various studies where IUD users were 20.5%, 27.3%, 22% and 26% in various studies respectively.^{20,21,22,24}

In our study, the most common presenting complaint was a pain in the abdomen (100%), followed by per vaginal discharge (65%), pain in the lower back (43.33%), abnormal uterine bleeding (40%), dysmenorrhoea (31.66%), dyspareunia (24.16), fever (17.5%) and others. In a study of **Shide et al**²² pain in the abdomen was 93.5%, per vaginal discharge 66.5%, fever 51%. In the study of **Elie Newabong et al**²³, pain in the abdomen in 75.7% per vaginal discharge 73.27% and fever 70.85%. Study of **Burnakis TG et al**²⁵, **Blake DR**²⁶ also showed lower abdominal pain was the most common symptom in PID patients. Our study was not comparable with the study of **Francisco et al**²⁷ in which, the most common clinical finding were vaginal discharge 47% and pelvic pain 39%

In our study abnormal PV discharge was present in 61.66% of cases, fixed and retroverted uterus with or without thickend appendages were found in 55% of cases. Cervical motion tenderness was found in 78.33% of cases. Adnexal tenderness was found in 80% of cases but adnexal mass was found in 10.83% of cases. In the study of **Shinde et al**²² fornical tenderness in 89%, cervical motion tenderness in 84% per vaginal discharge in 71% and adnexal mass in 19.5% was found in cases of PID on per vaginal examination which was comparable with our study. Our study was not comparable with the study of **Ahmed et al**²⁸ in which fornical tenderness was found in 100% cases, cervical tenderness in 100% cases and per vaginal discharge in 16% cases.

In our study the most common finding on ultrasound scan was fluid in the pouch of douglas 48.33%, followed by distal hydrosalpinx 28.33%, endometritis 18.33%,**pyosalpinx** 15%, **TO Mass** 13.33% and Pelvic collection 10.83%. No Identified pelvic pathology 15%. In study of **Ikobho ebenezer howells et al**²⁹, the most common finding on ultrasound scan was fluid in the pouch of douglas 45.7%, followed by distal hydrosalpinx in 20% patients. Tubo ovarian mass in 2.9% of cases and pelvic collection was found in 2.1% of cases.²⁹ In another study the sign of imcomplete septum and tubal contents of mixed echorefringences were the most characteristic findings of pyosalpinx and tubo-ovarian abscess. Thin wall of 5 mm 5(29.4%), Cogwheel 5(29.4%), Beads-on-a-string 5(29.4%), Imcomplete septa 6(35.2%), Sonolucence contents 4(23.4%), Mixed contents 7(41.1%), Tubo-ovarian complex 4(23.4%).¹⁵

Ultrasound findings. Extra
Pelvic inflammatory disease
Pelvic inflammatory disease (PID) is defined as the acute clinical syndrome associated with spread of microorganisms

(unrelated to pregnancy or surgery) form the vagina or cervix to the endoemtrium,⁵ Fallopian tubes and or the contiguous structures.⁶ This disease can lead to infertility, ectopic pregnancy and chronic pelvic pain.^{7,8} Sexually active adolescents are at eh greatest risk for PID. Other risk factors include multiple sexual partners, a high number of sexual partners throughout an individual's lifespan, the use of an intrauterine device (IUD), an untreated infected male sex partner (s), a history or previous PID presence of Neisseria gonorrhoeae or Chlamydia trachomatis in the reproductive tract and frequent vaginal douching.⁷ PID causes more morbidity than necessary for three reasons: women are not hospitalized when they should be many women receive inadequate antibiotic therapy and the male partner was not treated or is treated inappropriately.⁹ PID may manifest itself by various clinical presentations: silent (asymptomatic), atypical, acute and chronic. the patient present with acute PID complains mainly of low abdominal tenderness. Some of them may have patient with a normal temperature. Laboratory findings show an increased sedimentation rate and white blood cell count. The next step os to evaluate the pelvic ultrasonographically keeping in mind that the sonographic findings may be normal in the early course of the disease.¹⁰

Acute PID usually presents with:

1. Thickening of the tube wall of² more than 5 mm.
2. Incomplete septa correlating with the mucosal folds in the dilated tube that is sonolucent or contain low-level echoes (This findings does not discriminate between acute and chronic cases).
3. "Beads-on-a-string" sign, which defines hyperechois mural nodules measuring about 2 to 3 mm. visualized on the cross-section of a fluid-filled distended tube.
4. Formation of the tubo-ovarian complex (the ovary cannot be separated from the tube by pushing it with the vaginal probe).
5. Fluid in the cul-de-sac.
6. Low-to-moderate resistance index (RI = 0.53 ± 0.09) obtained from the adnexal region. Figured 60.1A to C demonstrate complex adnexal mass in a patient with acute PID.

Chronic PID can develop either as the consequence of an acute, symptomatic infection or as a consequence of a silent asymptomatic disease in patients withlut any clinical evidence of salpingitis. The most common ultrasound appearance is the hydrosalpinx, formed when the fimbrial part of the tube is closed because of pelvic adhedions causing the accumulation of tubal mucus. Chronic hydrodalpinx is usually discovered accidentally on a routine transvaginal ultrasound scan or during the assessment of infertile patients (Table 60.1)

Table 60.1: A suggested algorithm for the diagnosis of pelvic inflammatory disease.

Diagnosis	Clinical signs	Ultrasound findings	Color Doppler findings
Acute salpingitis	Low abdominal tenderness increased/Nor mal body temperature SD,L	Tubes filled with inflammatory secretions Retort-shaped tubes	Low-to moderate resistance index (RI = 0.53 ± 0.09)
Tubo ovarian abscess	Severe pain in the lower abdomen High fever SE, L	Multilocular or unilocular fluid-filled structure Air bubbles in case of gas-producing bacterial infection	Low vascular resistance signals obtained form the speta or periphery of the lesion (RT = 0.40 ± 0.08)

Chronic salpingitis	Mild or absent symptoms infertility	"Cogwheel sign" Distended tubes with incomplete septa Hyperechogenic Knots may be visualized every few millimeters in a transverse section	High Vascular resistance (RI = 0.71 ± 0.09) Absence of diastolic flow, indicating irreversible scarification (RI = 1.0)
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Generally, the drug of choice is doxycycline. Alternatively, cephalosporins, macrolides and quinolones are used. Partner is advised to undergo the same antibiotic treatment which is an integral part of treatment of a married PID patients.

CONCLUSION

The focus of this study was to identify socio-demographic characteristics of PID, to see the variety of presenting complaints and pelvic examination findings and to correlate the clinical findings with the USG findings of PID.

Although much studies about the sensitivity & specificity of USG are not available, this is definitely the most frequently ordered investigation in cases of PID. Transabdominal findings of 'incomplete septa' 'cog wheel' 'beads on a strings' signs helps in distinguishing a dilated fallopian tube from other cystic adnexal masses. Transvaginal Scan & colour power Doppler also adds to our diagnosis of PID more specifically, because it helps in co-relation with the clinical findings. USG has always been of help in diagnosing the extent of disease in our study. TVS has enhanced our ability to detect the subtle abnormal findings of PID at an early thereby supporting the diagnosis & starting the treatment early, preventing the patient from chronic complications & healthcare facility of system.

To prevent long term sequelae PID should be the part of differential diagnosis in all patients aged 15-44 year with non specific abdominal pain.

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