

## ORIGINAL RESEARCH

### Laparoscopy and genital tuberculosis: Uncovering the hidden

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#### ABSTRACT

**Background:** The female genital TB is a persistent infectious illness that has been linked to serious morbidity in the reproductive health of women. To prevent unwanted laparotomies, diagnostic laparoscopy may help in the early identification and safe management of genital TB.

**Objectives:** This study was planned to evaluate the role of laparoscopy in the diagnosis of genital tuberculosis in women.

**Methodology:** Total 80 women who underwent laparoscopy and were suspected to have genital tuberculosis in last two years were included.

**Results:** When comparing the diagnostic accuracy, all of the 80 patients with suspected diagnosis of genital TB on laparoscopy were included. As compared to laparoscopy, histopathology was able to diagnose only 10 (12.5%) cases of genital TB and CBNAAT was able to diagnose only 6 (7.5%) patients of genital TB.

**Conclusion:** Laparoscopy was found to be an excellent choice to diagnose genital TB over the HPE and CBNAAT. It is recommended that further studies should be conducted to establish laparoscopy as a standard method to diagnose genital TB.

**Keywords:** Genital tuberculosis, laparoscopy, histopathology, diagnosis.

#### INTRODUCTION

Mycobacterium TB is the bacteria that causes TB. Despite significant innovations in vaccinations and treatment regimes, TB persists as a major worldwide health issue. India is the country with the highest prevalence of TB, according to the WHO's high burden global ranking for the disease<sup>1</sup>. Tuberculosis (TB) infects 316 per 100,000 Indians. According to the India TB Report 2022 published by the union Health ministry, India had a significant 19% increase in tuberculosis cases in 2021 compared to the previous year<sup>2</sup>. TB most frequently affects the lungs (pulmonary TB). However, extrapulmonary manifestation of TB is a more frequent occurrence. Genital TB is extrapulmonary TB in female patients that affects the reproductive organs. Infertility, monthly irregularities, and chronic pelvic inflammatory disease comprise the most common clinical manifestations of female genital tuberculosis (FGTB)<sup>3</sup>.

Genital tuberculosis is silent in nature. This disease has a worldwide distribution. In the underdeveloped world, there is a substantial prevalence. Genital TB is challenging to identify

clinically due to its asymptomatic nature and variable clinical presentation. Up to 11% of incidences with genital TB are asymptomatic. Pyrexia with night sweats, lack of appetite, weight loss, poor general health, menstrual dysfunction, puberty menorrhagia, menorrhagia, postmenopausal haemorrhage, oligomenorrhea, and hypomenorrhea are some examples of general systemic symptoms. Amenorrhea, dysmenorrhea, infertility, abdominal lump, abdominal discomfort, chronic pelvic pain, acute abdomen, peculiar symptoms, vaginal or vulva ulcers, labial swelling, retention urine, urinary incontinence, and faecal incontinence are among the specific symptoms of genital TB<sup>4</sup>.

Around 9 % of extra pulmonary TB cases globally are caused by genitourinary TB. Infertility in women with genital TB is reported to result from endometrial damage, tubal blockage, ovarian and cervical disease, as well as other causes<sup>5</sup>. Genital TB prevalence rates range from less than 1% in high-income countries to as high as 3-26 % in low- and middle-income countries, according to data from infertility clinics around the world. In India, the reported annual burden of extra pulmonary TB was 20–25 percent, with 4% of those cases being urogenital TB<sup>6</sup>.

Genital TB is extremely challenging to diagnose in its early stages. Early detection may be linked to a positive outcome before significant genital damage has already occurred. Patients who have been affected, generally, have normal serological tests including hemograms including TLC and DLC, ESR, ELISA, Mantoux, and normal chest x-rays hence diagnosis is challenging because of the nonspecific nature of the common presenting symptoms<sup>4, 7</sup>. Abdominal and pelvic CT scans and abdominal and pelvic ultrasonography imaging has opened up possibilities. Although it has been proposed that imaging findings may be useful, the definitive diagnosis is made by culture, histology, and even histopathology. PCR or CBNAAT may also be negative<sup>8-10</sup>.

FGTB might have primary and secondary infertility for a number of reasons. The following tubal factors can affect fertilization and embryonic implantation: unilateral or bilateral hydrosalpinx with or without obstruction; loss of tubal function as a result of ciliary damage in FGTB; perisalpingitis that results in adhesions and the formation of tubo-ovarian masses; and unilateral or bilateral tubal blockage. In FGTB, abnormal ovarian function, endocrine dysfunction, chronic anovulation, the antigonadotrophic effect of *M. tuberculosis* even on an IVF cycle, poor embryo quality due to an intrinsic oocyte factor defect and decreased progesterone production (luteal phase defect), implantation failure, lower pregnancy rates, and higher abortion rates are all noted. Endometrial receptivity is affected by genital TB, which results in abnormal endometrial indicators, endometrial vascularization, endometrial atrophy, and synechiae<sup>11</sup>.

All abnormalities completely analysed by laparoscopy, including tuberculous lesions such as tubercles, shaggy regions, pyosalpinx, hydrosalpinx, beading of tubes, pelvic, abdominal, or perihepatic adhesions, ovarian tuberculosis, tube patency, and other abnormalities, were meticulously inspected. Sacculated tubes, convoluted, fluid-filled vesicles, hydrosalpinx, lead pipe appearance, encysted fluid collection, tubo-ovarian mass, pyosalpinx, different grades of pelvic adhesions, and miliary tubercle appearances are all diagnosed by laparoscopy. In order to prevent unnecessary laparotomies, diagnostic laparoscopy may help in early detection and appropriate management of genital TB<sup>10</sup>. However, it has not been verified that this method is effective in detecting genital TB. This investigation was designed to assess how well laparoscopy detects genital TB. This study aims to evaluate the roles of laparoscopy, histopathology examination and CBNAAT in FGTB cases treated at the host institute.

## METHODOLOGY

Study design: The present study was a retrospective study conducted at the department of obstetrics and gynecology at our institute. Approval from the institute ethics committee was obtained for conducting this study.

## LAPAROSCOPY

The most accurate method for detecting FGTB and abdomino-pelvic TB, particularly affecting of the oviducts, ovaries, and peritoneum, is laparoscopy or a dye test carried out under general anaesthesia. For improved outcomes, hysteroscopy is frequently used. When performing laparoscopy, one must carefully examine the entire peritoneal cavity (and not just the pelvis) by rotating the laparoscope by 360° in a systematic manner [first the pelvis to view the genitalia, then the ileocecal region, ascending colon, liver, gallbladder, stomach, entire small bowel, descending colon, omentum, and entire peritoneum] to look for various TB lesions and adhesions<sup>10</sup>.

## PATIENTS

Patients who presented in the department with infertility, tubo-ovarian mass, ectopic pregnancy over the duration of past two years and patients who underwent laparoscopy and had features characteristic of genital tuberculosis were enrolled in the study. All the cases were taken who had been given 14 days treatment of Doxycycline and Metrogyl for Pelvis inflammatory disease.

## TB EXAMINATION

The same surgeon analysed and documented the existence of all those symptoms and signs that are thought to be indicative of genital TB during the endoscopic examination. A curettage endometrial sample was sent for histopathology and CBNAAT examination. Retrospective correlations between the histopathology and CBNAAT results and the endoscopic parameters were made.

## STATISTICAL ANALYSIS

Data obtained from the medical health records were recorded on a predesigned proforma and then a masterchart was prepared from that data. Quantitative data is presented in the form of mean and standard deviation whereas the fraction of total and percentages were used to describe the qualitative data. Appropriate graphs and tables were used to represent the data.

## RESULTS

The mean age of the recruited patients was  $32 \pm 9.50$  years. Among all patients, most of the patients (61.25%) belonged to the age group of 31-40 years followed by 30 (37.5%) patients in 21-30 years age group and only one patient (1.25%) belonged to the age group of 11-20 years. Around 70 (87.5%) of patients belonged to the middle socioeconomic class whereas 6 (7.5%) patients belonged to the upper class and 4 (5%) patients belonged to the lower class. Among all patients, 78 (97.5%) were married and only 2 (2.5%) patients were unmarried, around 70 (87.5%) of patients were illiterate whereas 10 (12.5%) patients were illiterate (Table 1).

**Table 1: Sociodemographic determinants of the recruited patients**

Variable	Subdomain	Number	Percent
Age groups	11-20 years	01	1.25
	21-30 years	30	37.5
	31-40 years	49	61.25
Socioeconomic status	Lower class	4	5

	Middle class	70	87.5
	Upper class	6	7.5
<b>Marital status</b>	Married	78	97.5
	Unmarried	2	2.5
<b>Education status</b>	Illiterate	10	12.5
	Literate	70	87.5

Clinical history revealed that 68 (85%) proportion of the patients were nullipara whereas 12 (15%) patients were of 1-2 parity (Table 2).

**Table 2: Clinical determinants of the recruited patients**

Variable	Subdomain	Number	Percent
<b>Parity</b>	Nullipara	68	85
	1-2	12	15
<b>Infertility status</b>	Primary	70	87.5
	Secondary	8	10

When source of genital TB was traced down, it was found that most of the patients 15 (18.75%) had the past history of TB, another 8 (10%) patients had previous history of contact with TB patients and 4 (5%) patients had family history of TB. However, in 53 (66.25%) patients the source of infection was not known (Table 3).

**Table 3: Source of genital TB**

Source	Number	Percent
<b>Past history</b>	15	18.75
<b>Family history</b>	04	5
<b>H/o contact</b>	08	10
<b>Not known</b>	53	66.25

Laparoscopic finding revealed periovarian adhesions in 76 (95%) patients, tubercles in 40 (50%) patients, tubal beading in 36 (45%) patients, unilateral Tubo-ovarian mass in 6 (7.5%) patients and hydrosalpinx in 6 (7.5%) patients (Table 4).

**Table 4: Laparoscopic finding**

Laparoscopic finding	Number	Percent
<b>Periovarian adhesions</b>	76	95
<b>Tubercles</b>	40	50
<b>Tubal beading</b>	36	45
<b>Unilateral TO mass</b>	6	7.5
<b>Hydrosalpinx</b>	6	7.5

When comparing the diagnostic accuracy, histopathology was able to diagnose only 10 (12.5%) cases of genital TB and CBNAAT was able to diagnose only 6 (7.5%) patients of genital TB. The Mantoux test was performed in 64 (80%) patients and ESR was done in 32 (40%) patients (Table 5).

**Table 5: Confirmation of diagnosis of genital TB**

Laparoscopic finding	Number	Percent
<b>Laparoscopy</b>	80	100
<b>HPE</b>	10	12.5
<b>CBNAAT</b>	6	7.5
<b>Mantoux test</b>	64	80
<b>ESR</b>	32	40

## DISCUSSION

WHO claims that TB is an international pandemic. 13 of the 15 nations with the highest estimated TB incidence rates are in Africa, while six Asian nations—Bangladesh, China,

India, Indonesia, Pakistan, and the Philippines—account for half of all new cases. Many individuals found that they have the condition by accident, while a significant portion of symptomless patients never found out. Genital tuberculosis is thought to affect 5% of women who seek treatment for infertility globally. The majority of these women (80–90%) are between the ages of 20 and 40, although older women have also been reported to carry the disease. Tuberculosis in the tubes may result in ectopic pregnancy and only minor tissue damage. In 60% of cases, severe tube injury might result in tubal obstruction. In 47.2% of instances, tuboovarian masses and peritubal adhesions were discovered. However, an endometrial ulcer, an accumulation of caseous material to produce pyometra, intrauterine adhesions, and a partial obliteration of the cavity may exist in the endometrium. When tuberculosis is identified early with positive samples for acid fast bacilli before the onset of fulminant genital TB, pregnancy rates have been shown to increase<sup>12</sup>.

Because it may result in infertility, FGTB continues to be a problem in developing nations like India. Due to the absence of symptoms, early detection is still difficult, and some patients seek therapy after the infections have already done irreversible harm to their endometrium and fallopian tubes. Due to their capacity to identify only a few copies of DNA and not live bacteria, molecular assays like PCR have gained popularity. However, the false positive rates of this test in earlier studies has led to a concerning predicament<sup>13</sup>. Sampling the endometrium alone precludes cases of TB involving fallopian tubes and other pelvic organs untreated. In order to address this problem, the current study established laparoscopy as an auxiliary diagnostic method for genital TB.

Eighty to ninety percent of individuals with female genital TB diagnosed were found to be between the age of 20 to 40 years<sup>14</sup>. In our study, 61.25% patients belong to the age group of 31-40 years and 87.5% of patients belongs to the middle socioeconomic class. In the study by Akter et al., the mean age of women with genital tuberculosis was 28 years<sup>15</sup>. Similarly, previously Aggarwal et al., have reported that maximum patients with genital TB were belonged to the age of 26-30 years and 78% patients belonged to the lower socioeconomic class<sup>16</sup>.

Primary genital TB is a very uncommon condition. It has been reported that 25 to 50 percent of patients often have a history of extra genital TB diagnosis or treatment<sup>17</sup>. In our study, 18.75% patients had the past history of TB, another 10% patients had the previous history of contact with TB patients and 5% patients had family history of TB. In a prior research by Akter et al., 33.3 percent of patients had a history of exposure to TB patients, and 16.6 percent of patients had a history of extra genital TB; this left 50% of patients with no relevant history<sup>15</sup>. In our study also, previous history of TB was unknown in 66.25% patients. Due to early presentation of infertility and the asymptomatic character of genital TB in infertile women, there is a relative lack of history of extra genital tuberculosis.

Prior research by Malhotra et al. showed the excellent accuracy of laparoscopy in the diagnosis of genital TB, with laparoscopic findings indicative of tuberculosis detected in 39.3% of PCR positive patients and 9% of PCR negative cases<sup>13</sup>. On laparoscopic examination, the lesions suggestive of tuberculosis were observed in 74% cases in study by Agarwal et al.<sup>16</sup>. Similar to these studies, in our study also laparoscopy was found to be highly efficient in diagnosis of genital TB evident by confirmed diagnosis in all 80 cases.

Previously, the various abnormalities of fallopian tube reported by Sharma et al., were hydrosalpinx (21.7%), pyosalpinx (2.9%), beaded tubes (10.1%) and tobacco-pouch appearance (2.9%)<sup>18</sup>. Anormal findings suggestive of tuberculosis like dilated tubes (29.4%), beaded appearance of tubes (12.7%), hydrosalpinx (25.9%), coiling of tubes (9.7%), lead pipe like appearance were reported by Agarwal et al.<sup>16</sup>. Similarly, in the present study we reported tubercles in 40 (50%) patients, tubal beading in 36 (45%) patients, unilateral to mass in 6 (7.5%) patients and hydrosalpinx in 6 (7.5%) patients. It was earlier found that most women

had blocked fallopian tubes or there was inability to see tubes due to adhesions (14.2%)<sup>18</sup>. Periovarian adhesions were reported in 76 (95%) patients in the present study.

In our investigation, 5 cases of repeat laparoscopy revealed clearance of clogged tubes and tubercular lesion elimination. During the procedure, it was discovered that CBNAAT and HPE might not detect genital TB. It is disputed whether to begin antitubercular therapy based on laparoscopic results. The diagnosis of genital TB is only the tip of the iceberg. The diagnosis cannot be made only on the basis of polymerase chain reaction, which may provide false positive results. By using a variety of observations, hysteroscopy and laparoscopy can both diagnose genital TB<sup>18</sup>.

In cases of genital TB, endoscopic examination of the uterine cavity may reveal a normal cavity with bilaterally open ostia. However, more frequently, the endometrium appears paler and the cavity is partially or entirely destroyed by adhesions of varied intensity (grade 1 to grade 4), frequently including ostia. There can be a little cavity that has shrunk. In our research on hysteroscopy in genital TB, we saw greater difficulties in displacing the cavity and performing the surgery as well as increased risk of complications such as severe bleeding, perforation, and genital TB flare-up. In order to prevent false passage creation and harm to the pelvic organs, hysteroscopy in a patient with genital TB should be performed by an expert surgeon, preferably under laparoscopic guidance<sup>19</sup>.

The most accurate method for identifying genital TB is a laparoscopy and dye hydrotubation (lap and dye test), particularly for tubal, ovarian, and peritoneal illness. For further information, the test can be paired with hysteroscopy. Congestion, edoema, and adhesions in the pelvic organs as well as many fluid-filled pockets are possible in the subacute stage. Over the fallopian tubes and uterus, there are miliary tubercles and white, yellow, and opaque plaques. In the chronic stage, abnormalities may include short, swollen tubes with agglutinated fimbriae (patchy salpingitis), yellow, small nodules on the tubes (nodular salpingitis), and unilateral or bilateral hydrosalpinx with tubes that are retort-shaped as a result of the agglutination of fimbria and pyosalpinx or caseosalpinx<sup>20</sup>.

In genital TB, many forms of adhesions may encompass genital organs with or without omentum and intestines. On laparoscopy, perihepatic adhesions are quite common in FG TB patients. A previous laparoscopic study on 85 FG TB patients found tubercles on the peritoneum in 15.9% of cases, tuboovarian masses in 26%, caseous nodules in 7.2% of cases, encysted ascites in 8.7% of cases, various grades of pelvic adhesions in 65.8% of cases, hydrosalpinx in 21.7% of cases, pyosalpinx in 2.9% of cases, beaded tubes in 10% of cases, tobacco pouch in 14.2% cases<sup>4</sup>. We also observed increased complications on laparoscopy for FG TB as compared to laparoscopy performed for nontuberculous patients.

A thorough history taking, a thorough systemic and gynaecological examination, and the prudent use of diagnostic modalities such endometrial biopsy in combination with imaging techniques and endoscopic visualization, particularly with laparoscopy, are used to arrive at the final diagnosis. By integrating the history taking, examination, and investigations, several writers have created an algorithm for the precise diagnosis of FG TB. A high index of suspicion is necessary since many instances of FG TB may be treated early on without significantly harming genital organs because untreated FG TB can result in permanent infertility through endometrial and tubal damage (Asherman's syndrome). A comprehensive clinical examination, careful history collection, and judicious utilisation of investigations—particularly endometrial sample for AFB culture, PCR, and histological testing—are all necessary for the diagnosis. Hysteroscopy and laparoscopy may aid in early diagnosis and assessing the severity of the condition to predict fertility<sup>4</sup>.

Patients with tuboovarian TB who also have peritoneal involvement (ascites) and frequently elevated blood CA-125 levels are frequently mistaken as having ovarian cancer and subjected to invasive surgery that is not necessary. A significant portion of the cases in our research

have been investigated for the possibility of malignant tumour. Although they are not precise, imaging modalities are helpful in the diagnosis of FG TB. Unfortunately, FG TB lesions are typically pauci-bacillary and insufficient sample with bacillary lesions is required for the acid-fast stain (Ziehl-Neelsen stain) or *Mycobacterium tuberculosis* culture<sup>3</sup>.

A positive Mantoux test was also considered to be a significant criteria to suspect genital TB because other test findings provided corroborative evidence of tuberculosis. A histopathological investigation is simple, rapid, and affordable and reveals *M. tuberculosis*-specific traits. However, because genital TB is secondary, the quantity of infecting organisms is low, the sampled location might not accurately represent the affected region, and the infected site can be easily missed. Additionally, because the endometrium sheds in cycles, granulomas do not have enough time to develop, hence the endometrium may not always exhibit signs of TB. It's possible that the biopsy sample will provide a modest amount of tissue and little blood flow. Due to these reasons, to ensure maximum yield multiplespecimens from several sources should be collected<sup>8</sup>.

Our study is from a single centre that included infertile women while removing potential confounding factors including current or previous pulmonary or extra-pulmonary TB that might affect the results of a laparoscopy. Additional testing should be done for common pelvic infections, just as was done before the research, as the symptoms that result from these infections might be mistaken for genital TB. The same surgeon performed or oversaw all laparo-hysteroscopies, eliminating observer bias. The limitation of our study was inability to do long-term follow-up beyond a year to ascertain how many women continued to exhibit latent illness reactivation to active genital TB. It is also important to emphasize that performing laparoscopy to diagnose TB is not always advisable as knowledge along with being an invasive procedure has its own limitations

## CONCLUSION

Histopathology and CBNAAT alone cannot be used as the basis of diagnosing FG TB, as there are high false negative reports. However, they should form the basis of triaging women with unexplained infertility especially when sequelae of TB are present. Laparoscopy is found to be an excellent choice to point towards the diagnosis of genital TB over the HPE and CBNAAT. It is recommended that further studies should be conducted to establish the role of laparoscopy as a standard and valid method to diagnose genital TB when other investigations are non-reliable. Gynecological symptoms brought on by FG TB include infertility, irregular menstruation, and persistent pelvic discomfort. A detailed history, clinical examination, and appropriate utilisation of investigations—in particular, endometrial aspirate for AFB culture, PCR, and histopathology with the help of endoscopy—are used to make the diagnosis.

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