

## Correlation between Polymerase Chain Reaction Positive and Laparoscopic Findings in the Diagnosis of Genital TB

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### Abstract:

**Background:** Uncommon female genital tuberculosis (GTB), which can lead to infertility in young women, is brought on by the Mycobacterium tuberculosis complex. Due to the weak symptoms of GTB and the absence of suitable procedures, identification is challenging, which causes underreporting and delayed treatment. A quicker and more precise diagnosis of GTB is promised by molecular diagnostics like PCR. Contamination concerns continue. Early detection safeguards the reproductive system.

**Methods:** The study comprised infertile women with positive endometrial TB PCR results who underwent hystero-laparoscopy as part of infertility evaluation. The pre-ovulatory stage included medical exams, pelvic scans, hysterosalpingograms, and laparoscopic procedures. Age, type of infertility, and prior TB history were all noted for the individuals.

**Results:** 56.5% of the 69 patients were 20-30 years old and 34.8% were 31-40. 65.2% had primary infertility, 34.8% secondary. Most (82.6%) had never had TB. 2.9% had positive culture and AFB smear results, whereas 94.2% had positive PCR results. 60% of patients had adhesions and pelvic congestion on laparoscopy, suggesting GTB. 27.5% of patients had abnormal hysteroscopy results, most often poor endometrium and bald regions.

**Conclusion:** Infertility is brought on by genital TB, especially in young women who already have primary infertility. PCR is capable of detecting GTB but not diagnosing it. Early detection facilitates the initiation of treatment and prevents reproductive harm. The promise of PCR for GTB screening requires more research.

**Keywords:** Genital tuberculosis, Polymerase chain reaction (PCR), Laparoscopy, Female infertility, Endometrial TB, Reproductive system damage.

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### Introduction

The ancient pathogen that causes tuberculosis (TB) is the Mycobacterium tuberculosis complex. Female genital tuberculosis (GTB), an uncommon form of TB that mostly affects the lungs, has the potential to impair a young woman's ability to conceive. The endometrium and fallopian tubes are the main sites of GTB, which commonly develops from extrapulmonary tuberculosis or spreads from nearby abdominal organs.[1] Global expansion of GTB is a result of factors such as population growth, squalor, HIV infection, and immigration from underdeveloped nations. It is more common in underdeveloped countries where it accounts for a significant share of gynaecological cases.

Numerous incidents, which would indicate a higher genuine occurrence, go unreported because of the mild symptoms and insufficient testing.[2] Since GTB frequently exhibits no outward signs and is frequently only identified after the female reproductive system has been significantly damaged, it is challenging to diagnose. The diagnostic process also employs a number of tests with varied degrees of sensitivity and specificity. GTB makes it difficult to utilise the standard Mantoux test, which is routinely used to diagnose tuberculosis.[3]The polymerase chain reaction (PCR), a recent advancement in molecular diagnostic techniques, holds promise for a quicker

and more accurate identification of GTB. Due to the remarkable sensitivity of PCR, Mycobacterium TB DNA can be discovered at incredibly low amounts. However, concerns about false-positive test results brought on by contamination in labs and hospitals still exist. By establishing proper laboratory practises, this issue can be minimised.[4]

Laparoscopy and hysteroscopy are essential for diagnosing and treating infertile women with GTB because they allow for a visual evaluation of the abdomen and pelvic regions. It might be difficult to connect subclinical occurrences with mild symptoms to test results, though.[5]

Given the need for a rapid and precise diagnostic method for public health concerns, researchers are studying whether a positive PCR test for endometrial TB can aid with early GTB detection and treatment. Correlating PCR data with laparoscopic visual assessment is being studied as a potential diagnosis method.[6]

## Results

**Table 1: Age Distribution**

Age in years	No. of Patients (n=69)	%
20-30	39	56.5
31-40	30	43.5

The age distribution of patients in the study shows that 56.5% of the participants were between 20 and 30 years old, while 43.5% were in the age range of 31 to 40 years.

**Table 2: Nature of Infertility**

Nature of IF	No. of Patients (n=69)	%
Primary infertility	45	65.2
Secondary infertility	24	34.8

The nature of infertility among the patients indicates that 65.2% of them had primary infertility, while 34.8% experienced secondary infertility.

**Table 3: Previous History of PTB/EPTB**

Prev. H/o. of TB	No. of Patients (n=69)	%
Pulmonary	6	8.7
Genital	1	1.4
Abdomen/intestinal	3	4.3
Bone/joint	2	2.9
Nil	57	82.6

The table on the previous history of PTB/EPTB shows that among the patients (n=69), 8.7% had a history of pulmonary TB, 1.4% had genital TB, 4.3% had a history of TB related to the abdomen/intestinal area, 2.9% had TB in the bone/joint, and the majority of patients (82.6%) had no previous history of TB.

**Table 4: Culture And Afb Findings In Endometrial TB-PCR Positive Cases**

Pipelle Findings	No. of Patients (n=69)	%
PCR	65	94.2
Culture (bact)	2	2.9
AFB smear	2	2.9

The table regarding culture and AFB findings in endometrial TB-PCR positive cases shows that out of the total patients (n=69), 94.2% had positive results in PCR testing, indicating tuberculosis infection. Only 2 patients (approximately 2.9%) had positive culture findings for bacterial growth, and an equal number (2 patients, approximately 2.9%) had positive AFB smear results, suggesting acid-fast bacilli presence.

## Materials and Methods

All infertile women who undergo hystero-laparoscopy as part of the infertility workup and had positive endometrial TB PCR results were suspected of having genital tuberculosis included in this study and female patients refusing to have a hystero-laparoscopy and with negative endometrial TB-PCR results were excluded from this study. A description of the method to all the research participants' female subjects. The agreement of each woman taking part in the study. Comprehensive medical examinations, abdominal and local checks, Mantoux tests, CBCs, pelvic scans, and hysterosalpingograms were performed on all women. Hysterosalpingography was carried out in pertinent instances during the pre-ovulatory stage, typically on days 6 to 10 of the cycle, and a pipelle endometrial sample was obtained for TB-PCR.

**Table 5: Laparoscopic Findings In Endometrial TB-PCR Positive Cases**

Laparoscopy Findings	No. of Patients (n=69)	%
Suprahepatic adhesion	12	17.4
Pelvic adhesion	22	31.9
Pelvic congestion	5	7.2
Bowel/omental adhesions	10	14.5
Peritubal adhesions	18	26.1
Cornual block	14	20.3
Delayed spillage	17	24.6
Fimbrialphimosi	7	10.1
Hydrosalpinx	10	14.5
Granulomas	2	2.9
Shortened tubes	4	5.8
Sacculations/beaded tubes	13	18.8
Rigid tubes	2	2.9
TO mass	3	4.3
Other incidental findings (Endometriosis)	8	11.6

In our study, 40% of patients showed no laparoscopic evidence of GTB. 60% of patients who had laparoscopy had the following conditions: TO-mass in 4 patients (5.7%), suprahepatic adhesions in 13 patients (18.8%), pelvic adhesions in 24, peritubal adhesions in 19, omental and intestine adhesions in 11, and bowel adhesions in 19. On chromopertubation, 18 patients (26%), cornual block (15 patients (21.7%), sacculations (13 patients (20.2%), hydrosalpinx (11 patients (15.9%), shortened tubes (4.3%), rigid tubes (4.3%), and fimbrialphimosi (six patients (8.7%) were all observed. Another unintentional discovery was endometrioma, which appeared as endometriotic patches in 9 patients (13.1%).

**Table 6: Hysteroscopic findings**

Hysteroscopy Findings	No. of Patients (n=69)	%
Normal findings	50	72.5
Abnormal findings	19	27.5
Cervical stenosis	1	1.4
Poor endometrium	7	10.1
Bald areas	4	5.8
Distorted Ostia	2	2.9
Synechia	1	1.4
Fibrosis	2	2.9
Tubercles	0	0.0
Calcification	0	0.0
Other findings	4	5.8
Endometrial polyp	3	4.3
Polypoidal endometrium	2	2.9

In the examination of 69 patients, the results of hysteroscopy showed that 72.5% had normal findings and 27.5% had aberrant findings. Poor endometrial (10.1%), bald spots (5.8%), and abnormal cervical stenosis (1.4%) were the most prevalent aberrant findings. Other less frequent aberrant findings were from 1.4% to 4.3% of cases for each of the following: deformed ostia, synechia, fibrosis, endometrial polyp, and polypoidal endometrium. During hysteroscopy, no instances of tubercles or calcification were seen.

### Discussion

Genital tuberculosis (GTB) diagnosis might be challenging at times due to its mild symptoms and lack of reliable diagnostic instruments. Early detection is crucial for managing and avoiding issues, including infertility. The correlation

between PCR positivity and laparoscopic findings in the diagnosis of GTB was investigated in this study.[7,8]Our study cohort consisted of infertile women who underwent hystero-laparoscopy as part of the infertility evaluation and who had positive endometrial TB PCR results, raising suspicion of GTB. Of the 69 participants in the study, 72.5% had normal hysteroscopy results, and 27.5% had abnormal ones.[9] The two most frequent abnormal hysteroscopy findings were poor endometrium and bald patches (10.1% and 5.8%, respectively). Less frequent defects included cervical stenosis, malformed ostia, synechia, fibrosis, endometrial polyps, and polypoidal endometrium.[10]

The remaining 60% of patients exhibited a variety of symptoms that were suggestive of GTB, while 40% of patients showed no evidence of GTB during laparoscopy. These included adhesions in the peritubal region, the tubo-ovarian mass, the

intestinal and mental regions, the suprahepatic and pelvic regions, and the pelvic congestion.[11]

The high PCR positivity rate (94.2%) in our study raises questions about possible false-positive results caused by tainted lab apparatus. As a result, it is crucial to maintain strict quality control of PCR to avoid overtreating people who are symptom-free.[12]

The study underlines the importance of early diagnosis in order to start quick treatment and prevent further damage to the reproductive system. Additional investigation is needed on the use of PCR as a screening method for GTB in order to provide an accurate diagnosis. In our study, primary infertility accounted for 65.2% of cases and secondary infertility for 34.8%, with an average patient age of 29 years. Because GTB primarily affects young women, prompt diagnosis is essential for effective treatment. [13]

Genital TB, which most frequently appears as primary infertility, most frequently affects young women. Since most women present with no symptoms, examining these people requires a high degree of suspicion. Tubal infection seems to be the main contributor to infertility in GTB women. Being a paucibacillary disease, GTB, PCR appears to be a rapid and highly sensitive diagnostic approach. It cannot, however, confirm or disprove genital TB on its own.

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