

Comparison between Laparoscopy and Noninvasive Tests for the Diagnosis of Abdominal Tuberculosis

Santsevi Prasad¹, Apurva Agarwal², Bhartendu Kumar³

¹Assistant Professor, Department of Surgery, SKMC, Muzaffarpur, Bihar, India

²Specialist Medical Officer, SDH, Pupri, Bihar, India

³Professor and Head, Department of Surgery, SKMC, Muzaffarpur, Bihar, India

Received: 25-02-2024 / Revised: 23-03-2024 / Accepted: 26-04-2024

Corresponding Author: Dr. Bhartendu Kumar

Conflict of interest: Nil

Abstract:

Background: Abdominal tuberculosis (TB) poses a diagnostic challenge due to its nonspecific symptoms and varied clinical presentations. Laparoscopy and noninvasive tests are commonly used diagnostic modalities, but their comparative effectiveness remains debated.

Materials and Methods: A retrospective analysis was conducted on patients presenting with suspected abdominal TB between January 2018 and December 2022. Patients underwent either laparoscopy or noninvasive tests including imaging studies, serological assays, and nucleic acid amplification tests. Diagnostic parameters such as sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and accuracy were calculated.

Results: A total of 150 patients were included in the study, with 75 undergoing laparoscopy and 75 undergoing noninvasive tests. Laparoscopy exhibited a sensitivity of 85%, specificity of 92%, PPV of 88%, NPV of 90%, and accuracy of 89%. Noninvasive tests showed a sensitivity of 70%, specificity of 78%, PPV of 72%, NPV of 76%, and accuracy of 74%. The difference in diagnostic accuracy between laparoscopy and noninvasive tests was statistically significant ($p < 0.05$).

Conclusion: Laparoscopy demonstrates superior diagnostic accuracy compared to noninvasive tests for the diagnosis of abdominal TB. Although noninvasive tests may be less invasive and more cost-effective, their lower sensitivity and specificity may lead to delayed or missed diagnoses. Therefore, laparoscopy should be considered as the preferred diagnostic modality in cases where abdominal TB is suspected, especially in resource-rich settings.

Keywords: abdominal tuberculosis, laparoscopy, noninvasive tests, diagnosis, sensitivity, specificity.

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

Abdominal tuberculosis (TB) remains a significant health concern globally, particularly in regions with high TB prevalence [1]. It presents a diagnostic challenge due to its nonspecific clinical manifestations and varied radiological findings, often mimicking other intra-abdominal pathologies such as malignancy, inflammatory bowel disease, or gastrointestinal infections [2]. Prompt and accurate diagnosis is crucial for initiating timely treatment and preventing disease progression and complications.

In the diagnostic algorithm for abdominal TB, various modalities are utilized, including imaging studies such as computed tomography (CT) and magnetic resonance imaging (MRI), serological assays, nucleic acid amplification tests, and invasive procedures such as laparoscopy [3]. Laparoscopy offers direct visualization of intra-abdominal organs and facilitates obtaining tissue

samples for histopathological examination, thus aiding in definitive diagnosis [4].

Despite the availability of noninvasive tests, the comparative effectiveness of laparoscopy versus noninvasive modalities in diagnosing abdominal TB remains uncertain. Some studies suggest that laparoscopy provides superior diagnostic accuracy compared to noninvasive tests [5], while others report conflicting results [6]. Therefore, a comprehensive evaluation of the diagnostic performance of these modalities is warranted to guide clinical decision-making.

In this study, we aim to compare the diagnostic accuracy of laparoscopy versus noninvasive tests for the diagnosis of abdominal TB, providing insights into the optimal diagnostic approach for this challenging condition.

Materials and Methods

Study Design: This retrospective study involved patients presenting with suspected abdominal tuberculosis (TB) at SKMC, Muzaffarpur between January 2018 and December 2022.

Patient Selection: Patients aged 18 years or older with clinical suspicion of abdominal TB, based on symptoms, imaging findings, or laboratory results, were included in the study.

Patients with a confirmed diagnosis of abdominal TB based on histopathology, microbiology, or clinical response to anti-tubercular therapy were eligible for inclusion.

Diagnostic Modalities: Patients underwent either laparoscopy or noninvasive tests for the diagnosis of abdominal TB. Noninvasive tests included imaging studies such as computed tomography (CT) and magnetic resonance imaging (MRI), serological assays for TB-specific antibodies, and nucleic acid amplification tests (e.g., polymerase chain reaction).

Data Collection: Demographic information, clinical history, laboratory results, imaging findings, and details of diagnostic procedures were collected from electronic medical records.

Statistical Analysis: Diagnostic parameters including sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and accuracy were calculated for laparoscopy and noninvasive tests.

Comparative analysis of diagnostic accuracy between the two modalities was performed using appropriate statistical tests.

Results

A total of 150 patients with suspected abdominal tuberculosis (TB) were included in the study, with 75 patients undergoing laparoscopy and 75 patients undergoing noninvasive tests.

Demographic Characteristics: The demographic characteristics of the study population are summarized in Table 1 and 2.

Comparison of Diagnostic Accuracy: The diagnostic accuracy of laparoscopy was significantly higher compared to noninvasive tests ($p < 0.05$). There were no major complications associated with either laparoscopy or noninvasive tests in the study population. The results of the study indicate that laparoscopy demonstrates superior diagnostic accuracy compared to noninvasive tests for the diagnosis of abdominal TB.

Table 1: Demographic Characteristics of the Study Population

Characteristic	Laparoscopy (n=75)	Noninvasive Tests (n=75)
Age (years), mean (SD)	42.5 (± 8.3)	41.8 (± 7.9)
Gender (Male/Female)	40/35	38/37

Table 2: Diagnostic Performance of Laparoscopy and Noninvasive Tests

Diagnostic Modality	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)	Accuracy (%)
Laparoscopy	85	92	88	90	89
Noninvasive Tests	70	78	72	76	74

These results support the use of laparoscopy as the preferred diagnostic modality for abdominal TB, especially in cases where noninvasive tests yield inconclusive results.

Discussion: The diagnosis of abdominal tuberculosis (TB) remains challenging due to its nonspecific clinical presentation and varied radiological findings.

In this study, we compared the diagnostic performance of laparoscopy with noninvasive tests for the diagnosis of abdominal TB. Our findings indicate that laparoscopy demonstrates superior diagnostic accuracy compared to noninvasive tests. Specifically, laparoscopy showed a sensitivity of 85%, specificity of 92%, positive predictive value (PPV) of 88%, negative predictive value (NPV) of 90%, and accuracy of 89%. In contrast, noninvasive tests exhibited a sensitivity of 70%, specificity of 78%, PPV of 72%, NPV of 76%, and accuracy of 74%.

These results are consistent with previous studies that have demonstrated the utility of laparoscopy in diagnosing abdominal TB [1,2]. Laparoscopy offers several advantages, including direct visualization of intra-abdominal organs, the ability to obtain tissue samples for histopathological examination, and the potential to identify subtle abnormalities that may be missed on imaging studies alone [3].

Noninvasive tests such as imaging studies, serological assays, and nucleic acid amplification tests are commonly used in the diagnostic workup of abdominal TB. While these tests are less invasive and more cost-effective than laparoscopy, our findings suggest that they may have limitations in terms of diagnostic accuracy. This is consistent with previous literature highlighting the challenges associated with noninvasive tests in diagnosing abdominal TB, particularly in cases with atypical

presentations or extrapulmonary involvement [4,5]. It is important to note that laparoscopy is an invasive procedure associated with potential risks such as bleeding, infection, and organ injury. However, in experienced hands, the risk of complications is low, and the benefits of accurate diagnosis and timely initiation of treatment often outweigh the risks [6].

Conclusion

In conclusion, our study provides evidence supporting the use of laparoscopy as the preferred diagnostic modality for abdominal TB, especially in cases where noninvasive tests yield inconclusive results. Future research should focus on refining diagnostic algorithms and evaluating the cost-effectiveness of different diagnostic approaches in diverse clinical settings.

References

1. Bhargava DK, Shriniwas, Chopra P, et al. Abdominal tuberculosis: diagnosis by laparoscopy and colonoscopy. *GastrointestEndosc.* 1991; 37(6):620-2.
2. Kapoor VK. Abdominal tuberculosis. *Postgrad Med J.* 1998; 74(874):459-67.
3. Raut AA, Nagar AM, More SA, et al. Role of laparoscopy in evaluation of chronic abdominal pain. *Indian J Gastroenterol.* 2004; 23(2):50-2.
4. Sharma V, Mandavdhare HS, Lamoria S, et al. Abdominal tuberculosis: A gastrointestinal masquerader. *Clin Exp Gastroenterol.* 2018; 11:81-92.
5. Sanai FM, Bzeizi KI, Systematic review: tuberculous peritonitis--presenting features, diagnostic strategies and treatment. *Aliment Pharmacol Ther.* 2005; 22(8):685-700.
6. Raut AA, Nagar AM, More SA, et al. Role of laparoscopy in evaluation of chronic abdominal pain. *Indian J Gastroenterol.* 2004; 23(2):50-2.