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RESEARCH ARTICLE

To identify the features differentiating peritoneal tuberculosis from carcinomatosis on CT scan abdomen taking omental biopsy as a gold standard

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Abstract

Objective: To differentiate peritoneal tuberculosis from carcinomatosis on computed tomography scan of abdomen, taking omental biopsy as the gold standard.

Method: This retrospective diagnostic accuracy review of cases was conducted at Aga Khan University Hospital, Karachi, and comprised patient's medical record files from February 2007 to February 2016. Computed tomography scan findings were compared with diagnosis made on the basis of histopathology. Multiple logistics regression analysis was done and sensitivity and specificity were tested through Pearson chi square test.

Results: Of the 98 patients identified, 62(63.2%)were found to be cases of disseminated tuberculosis and 36(36.7%) were diagnosed as malignant on histopathology. Computed tomography features were significantly specific to differentiate abdominal tuberculosis from carcinomatosis (p=0.004). On computed tomography,4 findings showed statistical significance: Smooth thickening of the peritoneum (p<0.001), abdominal mass (p=0.03), lymph node necrosis (p=0.024) and high-density ascitic fluid (p<0.001). Out of these, smooth thickening of the peritoneum (sensitivity=77%; specificity=86.1%) and high-density ascitic fluid (sensitivity=68.9%; specificity=72.2%) were more specific findings. Overall, the sensitivity and specificity of computed tomography was found to be 88.5% and 83.3%, respectively.

Conclusion: Although no single finding on a computed tomography scan was diagnostic proof of peritoneal tuberculosis, a combination of findings could reliably distinguish between peritoneal tuberculosis and carcinomatosis.

Keywords: Tuberculosis, TB, Carcinomatosis, Omental biopsy, CT scan, Computed tomography. (JPMA 68: 1461; 2018)

Introduction

Tuberculosis (TB) represents the leading cause of deaths by an infectious disease, accounting for approximately 3 million deaths worldwide.[1,2] It is estimated that it represents a quarter of avoidable deaths in 3rd world countries.[1] TB usually occurs after inhalation of aerosolised bacteria which finds home in the host's lung from where it can spread to different parts of the body via blood or lymphatic, especially in an immunocompromised host. This form of TB, known as Miliary TB, can involve any part of body such as the meninges, the abdomen or the retina.[3]

One of the most frequently involved areas in extra pulmonary TB (EPTB) is the abdomen. This is usually independent of pulmonary TB (PTB) with both diseases simultaneously presenting only in approximately 5-36% of cases.[4] A quarter of those with PTB, however, can present with abdominal TB (ATB).[5] While ATB is a frequent occurrence, no specific clinical, radiologic or laboratory finding can confirm it; therefore the diagnosis of this disease still poses a great challenge.[6,7]

ATB can affect several structures in the abdomen like lymph nodes, gastrointestinal tract (GIT) or the peritoneum. All of these present with nonspecific features and many of these patients are missed due to lack of suspicion.[7] TB peritonitis is one such presentation where the diagnosis is frequently missed, only to be discovered later in the surgical room.[7] Several diseases can mimic TB peritonitis like carcinomatosis[8-10] and it is vital to be able to differentiate among these diseases as treatment for each of them differs drastically.

Several studies have been done to differentiate between these two diseases[8,9] but none compared the findings of a computed tomography (CT) scan to a gold standard test. The current study was planned to find the difference between carcinomatosis and TB on a CT scan while keeping histopathology as the gold standard. It also planned to examine the sensitivity and specificity of several features on a CT scan to diagnose peritoneal TB.

Materials and Method

This retrospective diagnostic accuracy review of cases

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was conducted at Aga Khan University Hospital, Karachi, and comprised records of all patients who underwent CT scans from February 2007 to February 2016 for abdominal distention and had omental biopsy. The study was approved by the institutional ethical review committee. Departmental reporting search engine was used with the key word 'omental biopsy.' All the CT scans had been performed by our experienced CT technicians under departmental protocols on Toshiba Aquilion ONE 640 and Toshiba Aquilion 64 Slice.

Patient's medical record files were reviewed and CT scan findings were compared withthe diagnosis made on the basis of histopathology.

Data included related to patients who were between the ages of 17 and 80 years, with omental biopsy and a previous CT abdomen done. Records of paediatric patients (under 16 years), patients with known abdominal malignancy or TB, post-surgical cases with known diagnosis and cases without omental biopsy were excluded from the study.

Previous CT scan images and reports were retrieved from the departmental reporting search engine. Omental biopsy reports were also obtained from medical records.

All the CT scans were reviewed by two consultant radiologists, who were blind to the diagnosis. Pearson chi square test was applied to check for statistical significance between the findings; any value below 0.05 was deemed significant. Also, we ran a multiple logistic regression to calculate the sensitivity and specificity of a CT scan to diagnose TB.

Results

A total of 102 patients were identified with abdominal diseases and 98(96%) were included after applying the exclusion criteria. Of those included, 62(63.2%) were found to be cases of disseminated TB and 36(36.7%) were diagnosed as malignant on histopathology. Comparison of CT findings with histologic diagnosis was done (Table-1).

When comparing CT scan findings to histopathology, 4 findings on a CT scan showed statistical significance to diagnose TB over carcinomatosis; smooth thickening of the peritoneum, abdominal mass, lymph node necrosis and high density ascitic fluid. Smooth thickening of the peritoneum showed good sensitivity and specificity (Table-2).

Multiple logistics regression showed sensitivity of 88.5% and specificity of 83.3 to diagnose peritoneal TB by a CT scan.

Table-1: Comparison of CT findings with Histologic Diagnosis (N=98).

CT Findings	Histology*		P value**
	Malignancy (# of cases)	Tuberculosis (# of cases)	
Smooth Thickening (peritoneum)	5	47	<0.001
Yes (%)	20% (n = 1)	77.0% (n = 36)	
No (%)	80% (n = 4)	23.0% (n = 11)	
Peritoneal Enhancement	36	60	0.736
Yes (%)	100% (n = 36)	98.4% (n = 59)	
No (%)	0.0% (n = 0)	1.6% (n = 1)	
Mass	13	7	0.013
Yes (%)	38.4% (n = 5)	14.2% (n = 1)	
No (%)	61.5% (n = 8)	88.5% (n = 6)	
Thickened Terminal Ileum	4	11	0.601
Yes (%)	25% 9 (n = 1)	18.0% (n = 2)	
No (%)	75% 9 (n = 3)	82.0% (n = 9)	
Lymphadenopathy	35	57	0.697
Yes (%)	97.14% (n = 34)	93% (n = 53)	
No (%)	2.85% (n = 1)	7% (n = 4)	
Lymph node necrosis	2	17	0.024
Yes (%)	0.0%	29.5% (n = 5)	
No (%)	100% (n = 2)	70.5% (n = 12)	
High density ascitic fluid	10	42	<0.001
Yes (%)	30% (n = 3)	69% (n = 29)	
No (%)	70% (n = 7	31% (n = 13)	

CT: Computed Tomography
*Histology was not performed in 1 case.
** P-value < 0.05 was deemed statistically significant.

Table-2: Sensitivity and Specificity of Specific CT Findings to Differentiate Tuberculosis From Carcinomatosis (N=98).

CT Findings	Sensitivity (%)	Specificity (%)
Smooth thickening (peritoneum)	77.0	86.1
Peritoneal Enhancement	98.4	0.0
Mass	11.5	63.9
Thickened terminal ileum	18	88.9
Lymphadenopathy	93.4	2.8
Lymph node necrosis	27.9	94.4
High density ascitic fluid	68.9	72.2

CT: Computed Tomography
*Histology was not performed in 1 case.

Discussion

According to various sources, TB accounted for approximately 9.6 million infections worldwide, in 2014.[12,13] Although the number is falling, this accounts for the single largest infectious disease in the world.[11] While it is alarmingly common, current textbooks pay little attention to the disease,[6] perhaps

because it is a disease of the developing world.[13] Also, with an estimated 25% of multidrug resistant TB (MDR-TB) cases diagnosed,[11] we run the risk of TB becoming an even bigger threat in the future. Therefore, specific features of this disease must be found, in the attempt to eradicate this dangerous widespread epidemic. Our study primarily focuses on differentiating peritoneal TB from carcinomatosis on a contrast enhanced CT scan.

Peritoneal TB has a wide variety of presentations but it almost always presents with overt or subclinical ascites.[14,15] Several causes of carcinomatosis result in similar clinical picture like gastrointestinal[16] or ovarian malignancies.[17-19] All of these, including TB peritonitis,[20] cause exudative ascites. It is then, important to differentiate among the conditions. When comparing findings of a CT scan to a gold standard test, we found several findings to show promise in helping diagnose TB peritonitis over carcinomatosis. Two of the most reliable findings were the smooth thickening of the peritoneum and a high density ascitic fluid. Several other studies agree with these findings.[8-22] Some cases showed a low density ascitic fluid, however, it could be explained by an earlier stage of the disease characterised by a transudate. When looking at the overall sensitivity and specificity, these two findings can be strongly suggestive of peritoneal TB.

None of the other findings like, lymphadenopathy or a thickened terminal ileum, had a combined high sensitivity and specificity due to considerable overlap. Together, though, they can strongly support the diagnosis of peritoneal TB, as indicated by previous studies as well.[9,22] One study proved that a CT scan was more useful for peritoneal TB than for intestinal.[23] Our study showed a sensitivity and specificity for a CT scan of 88.5% and 83.3%, respectively. Another study found a lower sensitivity of 69% for the same test although they agree that multiple CT findings could help differentiate peritoneal TB from carcinomatosis.[9]

We recommend keeping a high index of suspicion for ATB especially in areas considered at high risk. Considering the sensitivity and specificity found in the data, CT scan should be widely used as a preliminary diagnostic tool in conjunction with other non-invasive tests to achieve this level of gold standard.[22] Even though no single finding is enough to diagnose, combining these can reliably differentiate between the two diseases. Additionally, combining both a CT scan and clinical data can help in differentiating the seemingly same presentations of different diseases. Lastly, radiologists and primary care specialists should be educated about these findings.

This was a retrospective analysis and all associated limitations must be considered. This study was conducted in a single private hospital and, hence, only a specific demographic was observed.

Conclusion

No single finding on a CT scan was enough to diagnose peritoneal TB. A combination of findings could reliably distinguish between peritoneal TB and carcinomatosis. A high degree of suspicion is required, especially in high-risk populations.

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Conflict of Interest: None.

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References

1. Tuberculosis control and research strategies for the 1990s: memorandum from a WHO meeting. Bull World Health Organ 1992; 70: 17-21.
2. Raviglione MC, Snider DE, Jr, Kochi A. Global epidemiology of tuberculosis; morbidity and mortality of a world wide epidemic. JAMA 1995; 273: 220-6.
3. Smith I. Mycobacterium tuberculosis Pathogenesis and Molecular Determinants of Virulence. Clin Microbiol Rev 2003; 16: 463-96.
4. Bolukbaz C, Boukbas FF, Kendir T, et al. Clinical presentation of abdominal tuberculosis in HIV seronegative adults. BMC Gastroenterol. 2005.
5. Haddad F, Ghossain A, Sawaya E, Nelson A. Abdominal Tuberculosis. Dis Colon Rectum 1987; 30: 724-35.
6. Uygur-Bayramiçli O, Dabak G, Dabak R. A clinical dilemma: abdominal tuberculosis. World J Gastroenterol 2003; 9: 1098-101.
7. Marshall J. Tuberculosis of the gastrointestinal tract and peritoneum. Am J Gastroenterol 1993; 88: 989-99
8. Rodriguez E, Pombo F. Peritoneal tuberculosis versus peritoneal carcinomatosis: distinction based on CT finding. J Comput Assist Tomogr 1996; 20: 269-72
9. Ha H, Jung J, Lee M, Choi BG, Lee MG, Kim YH, et al. CT differentiation of tuberculous peritonitis and peritoneal carcinomatosis. AJR Am J Roentgenol 1996; 167: 743-8..
10. Patel SM, Lahamge KK, Desai AD, Dave KS. Ovarian Carcinoma or Abdominal Tuberculosis?-A Diagnostic Dilemma: Study of Fifteen Cases. J Obstet Gynaecol India 2012; 62: 176-8
11. Tuberculosis: World Health Organization; 2016. [online] [cited 2016 August 6].Available from: URL: http://www.who.int/tb/publications/global_report/gtbr2016.
12. Tuberculosis (TB): Centers for Disease Control and Prevention. [online] 2015 [cited 2016 August 6].Available from: URL: https://www.cdc.gov/tb/statistics/default.html.
13. Kaya M, Kaplan M, A, Isikdogan A, Isikdogan A, Celik Y. Differentiation of Tuberculous Peritonitis from Peritonitis Carcinomatosa without Surgical Intervention. Saudi J Gastroenterol 2011; 17: 312-7.
14. Manohar A, Simjee A, Haffejee A, Pettengell KE. Symptoms and investigative findings in 145 patients with tuberculous peritonitis diagnosed by peritoneoscopy and biopsy over a five year period.

Gut 1990; 31: 1130-2.
15. Demir K, Okten A, Kaymakoglu S, Dincer D, Besisik F, Cevikbas U, et al. Tuberculous peritonitis--reports of 26 cases, detailing diagnostic and therapeutic problems. Eur J Gastroenterol Hepatol 2001; 13: 581-5.
16. Louhimo J, Finne P, Alfthan H, Stenman UH, Haglund C, et al. Combination of HCGbeta, CA 19-9 and CEA with logistic regression improves accuracy in gastrointestinal malignancies. Anticancer Res 2002; 22: 1759-64.
17. Gu P, Pan LL, Wu SQ, Sun L, Huang G. CA 125, PET alone, PET-CT, CT and MRI in diagnosing recurrent ovarian carcinoma: a systematic review and meta-analysis. Eur J Radiol 2009; 71: 164-74.
18. Zhang Y, Li Y, Chen C, Peng CW. Carcinoembryonic antigen level is related to tumor invasion into the serosa of the stomach: study on 166 cases and suggestion for new therapy. Hepatogastroenterology 2009; 56: 1750-4.
19. Fujimura T, Kinami S, Ninomiya I, Kitagawa H, Fushida S, Nishimura G, et al. Diagnostic laparoscopy, serum CA125, and peritoneal metastasis in gastric cancer. Endoscopy 2002; 34: 569-74.
20. Rasheed S, Zinicola R, Watson D, Bajwa A, McDonald PJ. Intra-abdominal and gastrointestinal tuberculosis. Colorectal Dis 2007; 9: 773-83.
21. Zhao J, Cui M-Y, Chan T, Luo Y, Baura I, Chen M, et al. Evaluation of intestinal tuberculosis by multi-slice computed tomography enterography. BMC Infect Dis 2015; 15: 577.
22. Sinan T, Sheikh M, Ramadan S, Sahwney S, Behbehani A. CT features in abdominal tuberculosis: 20 years experience. BMC Med Imaging 2002; 2: 3.
23. Yu R, Tong B, Li R. [Imaging diagnosis of intestinal tuberculosis]. Zhonghua Jie He He Hu Xi Za Zhi 2001; 24: 4.4-6.