Diagnosis of abdominal tuberculosis in Christchurch New Zealand: a case series

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ABSTRACT

AIM: Abdominal tuberculosis presents with non-specific symptoms, including generalised abdominal pain. Prompt and accurate diagnosis is critical to improving outcomes and avoiding complications. We conducted a retrospective review of cases of abdominal tuberculosis presenting to Christchurch Hospital to explore the epidemiology, clinical features and diagnostic modalities used.

METHOD: Cases were identified by searching for relevant ICD discharge codes from January 1996 to January 2016. Data on age, clinical presentation, investigations and microbiological results were obtained.

RESULTS: There were 20 patients diagnosed with abdominal tuberculosis over the study period. The median age was 34. Thirteen patients were male (65%), seven female (35%). The majority (11) were from Asia (predominantly India), five were African, and three were New Zealand Europeans. Abdominal pain was the most common presenting symptom (70%) followed by fevers (50%) and night sweats (50%). The C-reactive protein was elevated in 15 patients (75%), anaemia was found in 11 (55%) and nine had abnormal liver function tests (45%). Abdominal ultrasound (US) and computed tomography (CT) showed generic inflammatory change in all patients in this series (100%). Laparoscopy was undertaken in 10 (50%) patients, all of which had positive laparoscopic biopsies. Ascitic fluid was obtained in nine, with stains for acid-fast bacilli uniformly negative, however three (33%) had mycobacterial growth from culture. Six colonoscopies were performed: in three (50%) culture and/or histology was positive. Three lymph node biopsies and two formal laparotomies were the remaining diagnostic techniques employed with two biopsies and one laparotomy yielding positive results. Overall, of the 20 cases, 15 (75%) were able to be definitively confirmed, with the remaining five treated presumptively for probable abdominal tuberculosis.

CONCLUSION: Abdominal tuberculosis is an uncommon presentation at our institution, with an average of one case each year. The typical patient was a young immigrant from Asia or Africa. Diagnostic laparoscopy was the most common and uniformly reliable means of obtaining a definitive diagnosis.

Prior to the 1960s, tuberculosis (TB) was more commonly found in New Zealand than it is today.¹ This decline in incidence was bought about by increasing standards of living, control of bovine tuberculosis through slaughter of reactive animals, pasteurisation of milk and the introduction of anti-tuberculous medications. However, it has not been eradicated as anticipated, largely due to rising migrant populations, poverty, inadequate access to healthcare and overcrowded housing.² In comparison to the pulmonary form of the disease, abdominal manifestations of tuberculosis are infrequent and the clinical presentation tends to be ambiguous with non-specific abdominal pain and a constellation of systemic features. It lends itself to a wide ranging differential that can include infection, inflammatory bowel disease and malignancy.³ Prompt and accurate diagnosis leads to earlier tuberculosis treatment, which creates advantages not only with regard to patient prognosis but also in savings to the health system. As such, major institutions should be well-equipped to deal with abdominal tuberculosis.

This series aims to establish how cases of abdominal tuberculosis have both presented and been diagnosed at Christchurch Public Hospital and whether this is in line with current practice elsewhere.
Method

A retrospective study of patients admitted to Christchurch Public Hospital from January 1996 to January 2016 was carried out. Patients were identified by code for discharge diagnosis A183: “Tuberculosis of intestines, peritoneum or mesenteric glands”. Data on age, clinical presentation, investigations and treatment were obtained from a combination of clinical records and electronic patient information databases. Ethical approval for this study was obtained from the New Zealand Health and Disability Ethics Committees (HDEC).

Results

Twenty patients were diagnosed with abdominal TB between 1996 and 2016. Thirteen patients were male, seven were female. The median age was 34. Six patients were of Indian origin, five Asian, five African, three New Zealand European and one Melanesian. The three New Zealand Europeans were the only members of our cohort who had not recently immigrated.

Presenting features

Abdominal pain was the predominant presenting feature. Fourteen patients reported a history of generalised abdominal pain. Fevers and night sweats were the next most common complaint in 10 patients, followed by associated weight loss in eight, diarrhoea in five and anorexia in four patients. One patient presented with urinary incontinence, which was later found to be from an inflammatory mass making contact with the bladder.

On examination, only 10 of the 20 patients had a generalised tender abdomen. Of these, six abdomens were also noted to be grossly distended. Only three patients had other examination findings, including a mass found on palpation of the abdomen.

Six patients gave a history of pulmonary TB, however no information was available regarding prior treatment for this. Another six reported possible contact with TB in the past.

Investigations

A CRP over 5mg/L (75%) was the most consistent finding. Other findings including anaemia (55%), elevated transaminases (45%) and elevated white cell count (10%) were less frequent.

On abdominal ultrasound, TB is suggested by the presence of one or more of the following features: lymphadenopathy, ascites, free fluid or thickened small bowel loops. An ultrasound scan of the abdomen was performed in 10 of the patients and all had at least one of the findings consistent with abdominal tuberculosis.

Abdominal CT was performed in every patient in this series and all had some or all of the following positive findings suggested in the literature: retroperitoneal or mesenteric lymphadenopathy, thickened small bowel, free fluid or mesenteric stranding. Of the 20 CT scans, only 12 reports contained TB in the differential diagnosis. These 12 cases were the patients with known or potential TB contact in the history. The other eight cases of abdominal TB (without reported TB exposure) had only malignancy and/or inflammatory bowel disease considered in the radiological reports.

Ascitic fluid samples were taken in nine cases; Ziehl-Neelsen (ZN) stains were uniformly negative and culture was positive in only three. Colonoscopy was performed in six patients. In four of these inflammation and ulceration was found. Histology showed granulomatous inflammation. Culture of the biopsy was positive for Mycobacterium tuberculosis in three and negative in one. The other two colonoscopies were reported as normal.

Typical macroscopic findings of abdominal TB include diffuse involvement of the visceral and parietal peritoneum, white ‘miliary’ nodules, mesenteric lymph nodes, ‘violin string’ fibrinous strands, omental thickening and small bowel lesions. Laparoscopy was performed in 10 of the 20 cases and nine patients had these macroscopic findings. The remaining laparoscopy was converted to laparotomy due to small bowel injury from insertion of the trocar. In this case the appearance of the bowel was suggestive of tuberculosis. All 10 patients were later diagnosed with tuberculosis; confirmed on histology and culture from intra-abdominal lymph nodes or omental/peritoneal tuberculous nodules.

Three cases had image-guided lymph node biopsies. Central low attenuation and peripheral enhancement were consistent imaging findings. Two cases were of abdominal nodes; the first demonstrated granulomatous inflammation on cytology.
and was both culture and PCR positive for M. tuberculosis, whereas the second had limited cellular material and was culture negative. The final image-guided lymph node biopsy was from a cervical node with granulomatous inflammation seen on cytology and subsequent growth of M. tuberculosis from culture. The latter two cases were treated as presumed abdominal TB based on consistent imaging findings in the terminal ileum and peritoneum.

All 20 cases had specimens sent for sent for histology/cytology—all but one of these demonstrated granulomatous inflammation. Furthermore, all cases had TB culture requested—M. tuberculosis was isolated from culture in 14 cases. In one other case M. tuberculosis was detected by PCR with no subsequent growth from culture. All 14 positive cultures were uniformly susceptible to standard anti-tuberculous medications with no drug resistance identified.

Overall, of the 20 cases, 15 were able to be definitively confirmed, with the remaining five treated presumptively for probable abdominal tuberculosis.

### Discussion

Tuberculosis remains a global scourge and unfortunately the symptoms can be non-specific.2

The clinical presentations and positive findings of investigations from various published case series are summarised in Table 1. The most common symptom of abdominal pain in our series was also the leading symptom in two other series from the UK and Saudi Arabia.6,8 The number of presentations with abdominal pain in every series reviewed was similar to the 70% of patients in our series—the only exception to this being a publication from India in which only 29% had presented with abdominal pain.7 A Turkish study listed weight loss as the most common presentation finding in 81% of cases—nearly double our experience.5 Furthermore, the series from the UK by Rai et al had a high proportion of weight loss, whereas Muneef et al in Saudi Arabia found a lower proportion more in line with our findings.6,8

Night sweats and fevers were never the most frequent presenting symptom at any

### Table 1: Comparison of case series for positive findings on investigations and clinical presentations.

<table>
<thead>
<tr>
<th>S Rai '95–'01</th>
<th>Krishnan et al '99–'05</th>
<th>Uzunkoy et al '96–'03</th>
<th>Muneef et al '04–'07</th>
<th>Islam et al '08–'10</th>
<th>Bevin et al CPH '96–'15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of cases</td>
<td>24</td>
<td>41</td>
<td>11</td>
<td>46</td>
<td>81</td>
</tr>
<tr>
<td>Country</td>
<td>UK</td>
<td>India</td>
<td>Turkey</td>
<td>Saudi Arabia</td>
<td>South Africa</td>
</tr>
<tr>
<td>Weight loss</td>
<td>87%</td>
<td>81%</td>
<td>68%</td>
<td>40%</td>
<td></td>
</tr>
<tr>
<td>Abdominal pain</td>
<td>88%</td>
<td>29%</td>
<td>72%</td>
<td>70%</td>
<td>70%</td>
</tr>
<tr>
<td>Night sweats/fever</td>
<td>55%</td>
<td>36%</td>
<td>70%</td>
<td>50%</td>
<td></td>
</tr>
<tr>
<td>Elevated CRP/ESR</td>
<td>&gt;90%</td>
<td></td>
<td>78%</td>
<td>75%</td>
<td></td>
</tr>
<tr>
<td>Elevated white cell count</td>
<td></td>
<td></td>
<td>33%</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Anaemia</td>
<td>&gt;90%</td>
<td>63%</td>
<td>55%</td>
<td>55%</td>
<td></td>
</tr>
<tr>
<td>Mantoux</td>
<td>22%</td>
<td>18%</td>
<td>27%</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Abdomen x-ray</td>
<td>21%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>USS abdomen</td>
<td>32%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>CT scan abdomen</td>
<td>55%</td>
<td>100%</td>
<td>100%</td>
<td>90%</td>
<td>100%</td>
</tr>
<tr>
<td>Culture ascitic fluid</td>
<td>0%</td>
<td>100%</td>
<td>100%</td>
<td>7%</td>
<td>35%</td>
</tr>
<tr>
<td>Laparoscopy/laparotomy</td>
<td>92%</td>
<td>95%</td>
<td>100%</td>
<td>96.4%</td>
<td>94%</td>
</tr>
<tr>
<td>Colonoscopy</td>
<td></td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>
institution. Half of our patients experienced night sweats and/or fevers and this proportion is similar to all other case series reviewed.\textsuperscript{5,6,8}

Overall, the presenting symptoms found in this series are broadly similar to those identified overseas. Likewise, other studies have also found the majority of patients to have an elevated inflammatory marker.\textsuperscript{6,8} No other study found any diagnostic utility in other blood tests, however Rai et al also found over 90\% of their cases had anaemia.\textsuperscript{6} All studies agreed that the blood derangements commonly found could not reliably make a rapid diagnosis of abdominal tuberculosis.

This is also true of imaging—over 90\% of cases in three other series had generic inflammatory changes on CT or ultrasound that could not distinguish between differential diagnoses.\textsuperscript{4,5,8}

Rapid distinction from the major alternate diagnoses of inflammatory bowel disease and malignancy is critical as there is evidence that delaying treatment, even by as little as 30 days, can have a detrimental effect on the patient’s prognosis.\textsuperscript{9} A delay of up to eight weeks for microbiological confirmation from culture before initiating treatment is therefore undesirable. As such a more efficient alternative means of diagnosis is required without losing the specificity of microbiology.

The use of laparoscopy and culture of a surgical specimen is widely accepted as the investigation of choice for abdominal tuberculosis.\textsuperscript{6} The appearance of the bowel in laparoscopy is one potential way to presumptively diagnose tuberculosis. To recognise the appearance it is important to understand the mechanism of spread of this disease. The main methods of gastrointestinal infection of \textit{M. tuberculosis} are swallowing infected sputum from active lung disease and local invasion from adjacent viscera.\textsuperscript{2} As shown in Table 1, laparoscopy has excellent diagnostic yield. It is suggested that this is because direct observation of the entire peritoneal space is feasible and biopsies of specific nodules can be easily carried out. A review of the literature suggests rates ranging from 92–100\% presumed diagnosis on laparoscopy being confirmed later by microbiology. Our series showed that diagnostic laparoscopy was the most common means of obtaining a definitive diagnosis and was successful in every case.

One case at Christchurch Hospital resulted in a small bowel injury during a diagnostic laparoscopy—this is the only reported adverse outcome from the 10 diagnostic laparoscopies reviewed there were 10 adverse outcomes leading to conversions to laparotomy. Two of these were for bowel perforation during trocar insertions, one for omental haematoma during trocar insertion, three for intra-operative bleeding, two for adhesions and two for ‘technical difficulties’ with laparoscopy.\textsuperscript{4,8} Laparoscopy in these patients is challenging and if used indiscriminately could result in a far greater number of surgical complications, particularly as TB infection in the abdomen will produce highly vascularised adhesions, which are friable and difficult to manipulate restricting mobilisation of the bowel. As such, the presence of adhesions will usually indicate conversion to laparotomy. Surgical expertise is required when continuing this operation via laparotomy as these patients are chronically ill and complications are best avoided.

The Canterbury Inflammatory Bowel Disease (IBD) project has previously shown that Canterbury has high levels of IBD compared to the rest of the New Zealand.\textsuperscript{11} The typical IBD patient is also approximately the same age as someone likely to be suffering from abdominal TB. The median age of Ulcerative Colitis and Crohn’s was found to be 43.7 and 39.9 respectively.\textsuperscript{11} They both present with similar vague complaints and inflammatory changes on imaging. Our data revealed 13 out of 20 admission notes and radiology reports listing abdominal TB in the differential diagnosis; in comparison, IBD was listed in 17 of the 20 cases. It may be that the large burden of IBD in our region has led healthcare staff into aggressive and early diagnosis of IBD while not fully exploring other potential differential diagnoses. As colonoscopy is a commonly used diagnostic tool in IBD, this reasoning could also explain why our series was the only series to use colonoscopy as a diagnostic method.

Overall, Christchurch Public Hospital has had a low volume case load of abdominal tuberculosis with one case per year on
average. Patients have vague presenting symptoms and generic inflammatory changes on imaging which makes efficient diagnosis of TB difficult. The literature indicates that laparoscopy followed by a positive microbiological result has the best diagnostic utility and we found that diagnostic laparoscopy was the most common means of obtaining a diagnosis of abdominal TB in Christchurch with excellent diagnostic yield similar to other published series.

Due to there being only one discharge diagnosis code applying to this set of patients, it is reasonable to believe we have underestimated the sample size by not including those who were not coded correctly and those simply misdiagnosed. This study is further limited by a small sample size and technological advances over the 20 years of the series which has changed the accuracy of most microbiological and biochemical tests.

Competing interests:
Nil.

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