Anastomosis in Intestinal Tuberculosis: A Systematic Review

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Anastomosis in Intestinal Tuberculosis: A Systematic Review

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Abstract

Introduction. The heterogeneity of manifestations in intestinal tuberculosis requires different approach. One step or two steps surgical procedure referred to the method of choice to reduce morbidity and mortality. The review aimed to find out the indication to perform primary anastomosis in intestinal tuberculosis.

Method. A systematic review was conducted in accordance with PRISMA guideline in June 2018. Literature searches were performed through online databases sites (PubMed, EBSCO, and Ovid) using keywords “intestinal tuberculosis” AND “surgery” AND “anastomosis”. Intestinal pathology, surgical procedures, anastomosis leaks, enterocutaneous fistula, and mortality were the variables of outcome have been analyzed.

Results. Twelve articles of cohort studies were critically appraised and analyzed. The selection of the surgical procedure depends on condition, extent disease, nutritional status, and surgeon’s preferences. Resection and primary anastomosis are safe in an obstructive lesion with low incidence of enterocutaneous fistula and anastomosis leaks. The two steps procedure is advisable in intra–abdominal sepsis.

Conclusion. In subjects without intra–abdominal sepsis, intestinal resection with primary anastomosis as a definitive procedure might be considered in obstructive lesions and in perforated lesions, with low risk to have anastomosis leaks and enterocutaneous fistulas. In contrast, in septic subjects, two steps procedure is advisable.

Keywords: intestinal tuberculosis, anastomosis, complication

Introduction

Tuberculosis (TB) remains an infectious disease with high mortality rate worldwide and has been declared as a global emergency by World Health Organization, as TB referred to 9th leading cause of death worldwide. It is estimated about 10.4 million population have been infected with TB, about 56% of infected population were live in India, Indonesia, China, Philippines, and Pakistan.1 Extrapulmonary tuberculosis contributes a major problem in TB, particularly intestinal tuberculosis that takes the 6th rank of the most common extrapulmonary TB. Intestinal TB contributes 65–78% of all abdominal TB,2 manifested in either ulcerative, hypertrophic ulcerative, and fibrous stricturing type. The entity mimics common intestinal disorders, particularly inflammatory bowel disease, colonic malignancy, or other gastrointestinal infections.

Intestinal TB usually runs an indolent course and late presented with complications. The complications are especially acute or subacute intestinal obstruction due to mass (tuberculoma) or stricture formation in the small intestines particularly ileocecal region. and intestinal perforation leading to peritonitis. In the obstructive lesion, right hemicolecotomy with ileotransverse anastomosis is the most common surgical procedure proceeded, followed by segmental resection completed with end–to–end anastomosis, adhesiolysis, bypass surgery, ileostomy, and stricturoplasty.3 The procedure recommended on perforated intestinal TB which is primary intestinal resection frequently lead to stenosis. Even though the procedure is an ideal one, it is not feasible to be applied in cases with poor physiological function and extent disease.4 Therefore, options of surgical procedures were found in vary, including drainage, resection and diversion, or resection and anastomosis, based on intraoperative findings.5–6

Primary anastomosis is avoided in those cases mentioned. Complications of surgical intervention on inflamed as well as adhered tissue which is common in intestinal TB is a logic consequence. In this case, anastomosis leaks and enterocutaneous fistula, thus increase the morbidity and mortality. A two steps procedure have been widely performed on perforated intestinal TB. The first procedure is resection and diversion either using stoma or exteriorization of perforated segment. The second procedure i.e. closure of stoma is proceed as the patient stable and antituberculosis treatment has been completed. Currently, there are no standardized procedure and or guideline on emergency surgical treatment for intestinal TB. This review aimed to find out the best option supported by the highest evidence on emergency surgical treatment in obstructed and/or perforated intestinal TB.

Method

This systematic review was conducted in the Department of Surgery, FKUI–RSCM Digestive Surgery Division, June 2018 according with the Preferred Reporting Items for Systematic Reviews and Meta–Analysis (PRISMA) guideline. Literature searches were performed through online databases sites (PubMed, EBSCO, and Ovid) using keywords “intestinal tuberculosis” AND “surgery” AND “anastomosis”. Selected literatures were filtered through an
advanced search, based on the type of study, full text availability, year of publication, and language, full text availability, English, published within the last 20 years, adults (>18–year–old). The excluded articles were correspondence, editorial or commentary, and articles that did not discuss the outcomes (namely enterocutaneous fistula, anastomotic leakage, and mortality). Duplications of literature were set aside. All articles were critically appraised using critical appraisal checklist for systematic review.

Results

Out of 704 articles (PubMed 20 articles, EBSCO 135 articles, Ovid 547 articles), there were 12 articles analyzed (see Figure 1). Data extraction were summarized on table 1. Data extraction were summarized on table 1.

Discussion

All studies in these articles are cohort studies with level of evidence (LoE) 3. Thus, this review provides that level of evidence. These studies present a variation of manifestation of intestinal TB, namely, intestinal obstruction with stricture and adhesion, as well as perforation with peritonitis. The problem encountered depends on pathological site and the extent of the disease, nutrition and patients’ condition, expertise availability, local protocols and surgeon’s preferences. Thus, the choice of surgical procedure is based on the problem encountered. The most surgical intervention indicated to remove the focus of infection and to treat the mechanical impacts leading to morbidity. There are surgical procedures were carried out including segmental resection of the affected segment, right hemicolectomy, band and adhesion release, repair of perforated area, stricturoplasty, exteriorization of the perforated loop, or creating stoma. The procedure of right hemicolectomy is proceeded in ileocolic involvement i.e. stricture or tuberculoma. Segmental small intestinal resection and primary anastomosis is indicated in multiple ileal strictures or long tubular stricture. The pathologic stricture segment is removed with low potency of leakage and fistula formation. In cases with diffuse peritonitis and severe sepsis, ileostomy following segmental resection or exteriorization of perforated segment is a safe procedure rather than a primary anastomosis. In cases with diffuse peritonitis and severe sepsis, ileostomy following segmental resection or exteriorization of perforated segment is a safe procedure rather than a primary anastomosis.8

In many studies of intestinal TB, it has been shown that intestinal resection and primary anastomosis is indicated in cases with diffuse peritonitis and severe sepsis, ileostomy following segmental resection or exteriorization of perforated segment is a safe procedure rather than a primary anastomosis. In many studies of intestinal TB, it has been shown that intestinal resection and primary anastomosis is indicated in cases with diffuse peritonitis and severe sepsis, ileostomy following segmental resection or exteriorization of perforated segment is a safe procedure rather than a primary anastomosis.

Enterocutaneous fistula and mortality as the outcome is not conclusive as former studies were not specifically focused on the anastomosis, and the design of these studies in not comparative. However, is was noted that the incidence of enterocutaneous fistula is 0.06–10.7%. In primary anastomosis following intestinal obstruction, Chalya et al.14 reported that enterocutaneous fistula found in 10.7% subjects and burst abdomen in 7.1% with no anastomosis leaks, while as Rajput et al. found enterocutaneous fistula in 3.52% subjects with no anastomosis leaks. In the study, it has been reported that the ileostomy proceeded in management of enterocutaneous fistula in four subjects, two subjects were successfully managed with conservative treatment, and the other two subjects were not survived due to high output stoma.7 Akbar et al.15 reported that enterocutaneous fistula found in 6.66% following strictureplasty with end–to–end anastomosis. Anastomosis leaks found in a subject who underwent bypass anastomosis for a severe adhesion, as resection is not possible to proceed. Pathak et al.13 reported one enterocutaneous fistula out of 49.9% resection and anastomosis. Charokar et al.16 found no anastomotic leakage in primary perforation repair. There was 2.6% enterocutaneous fistula. Perforations were managed by primary anastomosis in 33.2 % subjects and primary sutured in 16.6% subjects, in diffuse peritonitis, temporary ileostomy is the method of choice.

Pathak et al reported the procedure of anastomosis in 83.8% subjects with no leakage. In this study, 61.2% subjects presented with obstruction and 29% with peritonitis.13 On the study of Afriadi et al, only 16% subjects treated with anastomosis and found 12.5% subjects with anastomosis leaks.14 On study of Islam et al, there out of 37 subjects with peritonitis and ten subjects with frozen abdomen, three subjects treated with anastomosis and all were found leaks.15

Mortality were in range of 2.3% to 34.4%. Chalya et al.14 revealed that the predictors of mortality in intestinal TB were the comorbid (OR = 4.5, 95% CI (2.5–8.9), p = 0.001), delayed presentation (OR = 11.3, 95% CI (7.9–18.4), p = 0.023), HIV–positive (OR = 5.9, 95% CI (3.1–8.9), p = 0.002), low CD4 count (<200 cells/µL) (OR = 7.0, 95% CI (3.9–10.5), p = 0.000), high ASA class (OR = 8.1, 95% CI (3.1–19.8), p = 0.000).
(5.6–12.9), p = 0.014], and surgical site infection [OR = 1.5, 95% CI (1.1–4.6), p = 0.026].
<table>
<thead>
<tr>
<th>Author/Year/ Subject (n)</th>
<th>Study design</th>
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<th>Intraoperative Findings</th>
<th>Surgical procedure (n/%)</th>
<th>Complication (%</th>
<th>Length of stay</th>
<th>LoE</th>
</tr>
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<td>Rajput et al 2015 112</td>
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<td>Ulcerostenotic (41.7%) - Perforation and ulcerostenotic (14) - Stenosis and adhesion (30.35%)</td>
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<td>Anastomotic leakage (0) - Enterocutaneous fistula (1/10.75%) - Sepsis (0/3.75%) - Mortality (0/3.57%) - Sepsis (delayed presentation) (2) - Enterocutaneous fistula (2)</td>
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<td>Chalya et al 2013 118</td>
<td>Prospective cohort without comparison</td>
<td>Acute obstruction (62.51%) - Subacute obstruction (34/28.8%) - Peritonitis (16/13.6%) - Abdominal mass (65.1%)</td>
<td>Ileocelecal (57.6%) - Terminal ileum (28.8%) - Jejunum (10.2%) - Colon (3.4%) - Single or multiple stricture (72.9%) - Adhesions and bands (16.9%) - Stricture and perforation (5.1%) - Ileocecal mass (3.4%) - Enlarged lymph nodes of mesenteric (1.7%)</td>
<td>Anastomosis (94/79.6%) - Right hemicolectomy and ileo transverse anastomosis (55.9%) - Segmental resection and end-to-end anastomosis (23.7%) - Adhesiolysis (16.9%) - Ileocecal bypass (1.7%) - Ileostomy (1.8%) - Strictureplasty (1.8%)</td>
<td>Enterocutaneous fistula (6/10.7%) - Burst abdomen (4/7.1%) - Intra-abdominal abscess (4/7.1%) - Mortality (28.8%) due to - Delayed presentation - HIV-positive - Low CD4 - High ASA - Complication</td>
<td>Median 24 days</td>
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<td>Bali et al 2017 76</td>
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<td>Anastomotic leakage (3) - 15% of total anastomotic procedure - Enterocutaneous fistula (4) - Mortality (11/14.5%) → (sepsis, shock, two of them due to anastomosis leaks)</td>
<td>3</td>
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<tr>
<td>Arif et al 2008 48</td>
<td>Prospective cohort without comparison</td>
<td>Subacute obstruction (23/46%) - Acute obstruction (13/26%) - Peritonitis (12/24%) - Abdominal mass (24%)</td>
<td>Lesion on the gut and associated lymph nodes with or without peritoneum involvement (42/64%) - Plastic-type tuberculous peritonitis (14/26%) - Perforation proximal to the obstruction (14/26%)</td>
<td>Anastomosis (30/62.5%) - Right limited hemicolectomy and ileostomy (5/10%) - Small bowel resection and ileo ileal anastomosis (86/12.9%) - Right limited hemicolectomy and ileocolic anastomosis (14/30%) - Ileal resection and ileostomy (36/25%) - Strictureplasty (4/7.5%) - Biopsy (4/7.5%)</td>
<td>Enterocutaneous fistula (0%) - Anastomosis leaks (0%) - Subacute mortality (0%) - Obstruction (4%) - Prolapsed stoma (2%)</td>
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<tr>
<td>Baloch et al 2008 86</td>
<td>Retrospective cohort without comparison</td>
<td>Acute obstruction and subacute (72%) - Right lower abdomen mass (27.9%)</td>
<td>Distal ileum (59.3%) - Ileocecal (37.2%) - Jejunum (3.8%) - Stricture (45/52.3%) - Ileocecal mass (24/27%)</td>
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<td>Anastomotic leakage (6) - Abscess residue (13.9%) - Wound dehiscence (5) - Sepsis due to chest infection and wound infection (4)</td>
<td>3</td>
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<td>Author/Year/Subject (n)</td>
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<tr>
<td>Akbar et al 2010 30</td>
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<td>Anastomosis (11/36.3%): - Segmental resection and end-to-end anastomosis (4/13.33%) - Right hemicolectomy (3/10%) - Limited right hemicolectomy and segmental resection (1/3.33%) - Limited right hemicolectomy and strictureplasty (1/10%) Adhesion and band adhesion (3/10%)</td>
<td>Entero-cutaneous fistula (26.66%) - Anastomotic leakage (19% of total anastomosis) - Intra-abdominal abscess (26.66) - Mortality (3/10%) - Uncontrolled sepsis (2) - Anastomotic leakage (1)</td>
<td>7-45 days</td>
<td>3</td>
</tr>
<tr>
<td>Mukhopadhay et al 2014 70</td>
<td>Prospective cohort without comparison</td>
<td>Acute obstruction</td>
<td>Perforation of the gut (12/40%)</td>
<td>Anastomosis (11/36.3%): - Segmental resection and end-to-end anastomosis (4/13.33%) - Right hemicolectomy (3/10%) - Limited right hemicolectomy and segmental resection (1/3.33%) - Limited right hemicolectomy and strictureplasty (1/10%) Adhesion and band adhesion (3/10%)</td>
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<tr>
<td>Pathak et al 2016 31</td>
<td>Prospective cohort without comparison</td>
<td>Acute obstruction</td>
<td>Perforation of the gut (12/40%)</td>
<td>Anastomosis (11/36.3%): - Segmental resection and end-to-end anastomosis (4/13.33%) - Right hemicolectomy (3/10%) - Limited right hemicolectomy and segmental resection (1/3.33%) - Limited right hemicolectomy and strictureplasty (1/10%) Adhesion and band adhesion (3/10%)</td>
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<tr>
<td>Afridi et al 2016 100</td>
<td>Prospective cross-sectional without comparison</td>
<td>Peritonitis (61%)</td>
<td>Multiple ileal strictures (13%) Ileal stricture and perforation (10%) Multiple ileal perforation (8%)</td>
<td>Anastomosis ileo-ileal + end ileostomy (2/33.33%)</td>
<td>Leaks anastomosis ileo-ileal and Anastomosis (2/33.33%)</td>
<td>–</td>
<td>3</td>
</tr>
<tr>
<td>Islam et al 2011 49</td>
<td>Prospective cohort without comparison</td>
<td>Peritonitis (37/75.5%) Obstruction (12/24.5%)</td>
<td>Small bowel stricture (50%) Obstruction (7/14.2%) Ileal perforation (13/26.5%) Mass (19/38.7%) Frozen abdomen (10)</td>
<td>Resection anastomosis (3) Small bowel resection (11) Right hemicolectomy (8) Biopsy (30) Anastomosis (2) Stoma (18)</td>
<td>Enterocutaneous fistula (3) Anastomotic leakage (3) (100% of total anastomosis) Mortality 34.4%</td>
<td>14</td>
<td>3</td>
</tr>
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<td>Charokar et al 2017 72</td>
<td>Prospective cohort without comparison</td>
<td>Perforation (24/33.3%) – Ileum (23/91.7%) – Colon (1/1.3%)</td>
<td>Anastomosis (24/33.3%): Right hemicolectomy and primary anastomosis (14/19.4%) – Primary anastomosis (12/16.6%) – Segmental resection with primary anastomosis (10/13.8%) Segmental resection with ileostomy (9/12.5%) Adhesive and band release (22/30.5%) Perforation repair of the colon with ileostomy (1/1.3%)</td>
<td>Anastomotic leakage (0%) Sepsis (8/11%) Intra-abdominal abscess (5.5%) Wound dehiscence (22.6%) Enterocutaneous fistula (22.6%) after reverse stoma Mortality (2.6%) due to multiorgan dysfunction</td>
<td>4-45 days Median 14 days</td>
<td>3</td>
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</tbody>
</table>
The highest mortality rate (34.3%) found in the study of Islam et al. and found to have anastomosis leaks.\textsuperscript{15} Anastomosis leaks contributes as factor increasing the morbidity and mortality. Hence, a decision to perform primary anastomosis need to be considered carefully

**Conclusion**

In subjects without intra–abdominal sepsis, intestinal resection with primary anastomosis as a definitive procedure might be considered in obstructive lesions and in perforated lesions, with low risk to have anastomosis leaks and enterocutaneous fistulas. In contrast, in septic subjects, two steps procedure is advisable. The mortality in intestinal TB is associated with sepsis, delayed presented and extent disease.

**Conflict of interest**

Author disclose there was no conflict of interest.

**References**