Port Site Tuberculosis Presenting as Nonhealing Sinus After Laparoscopic Appendicectomy

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Abstract With increasing use of laparoscopy for various surgical procedures, the occurrence of port site tuberculosis is seen more often as a postoperative complication. However, lack of awareness of this entity leads to prolonged morbidity and repeat surgical interventions. In case of nonhealing sinus following laparoscopic surgery, keeping this possibility in mind will lead to early diagnosis and treatment. In recent times, various diagnostic tests have come up for confirming the diagnosis of tuberculosis.

Keywords Laparoscopic appendicectomy · Nonhealing sinus · Port site tuberculosis

Introduction

A 23-year-old-female underwent laparoscopic appendicectomy for acute appendicitis 1 year ago. Biopsy report of the specimen was acute appendicitis. One month later, she develops discharging sinus at port site on abdominal wall. Sinus tract was curetted multiple times, but it persisted. The discharge was seropurulent in nature and its culture was sterile.

Ultrasound abdomen revealed a hypoechoic sinus tract in subcutaneous fat and abdominal wall without any intra-abdominal collection. Contrast-enhanced CT scan and sinugram revealed a long irregular branching sinus tract in

anterior abdominal wall not communicating with abdominal viscera (Figs. 1 and 2). Wide excision of sinus tract was done under general anesthesia. It was found to extend up to the peritoneal cavity. However, the sinus recurred at lateral end of the incision on 11th postoperative day. The biopsy report of the excised tract made definite diagnosis of port site tuberculosis and the patient responded to medical management.

Discussion

Port site tuberculosis is a rare complication of laparoscopic surgery. It is usually a nosocomial infection caused by incompletely sterilized laparoscopic instruments [1]. The organism in most cases is *Mycobacterium fortuitum*, an atypical mycobacterium that colonizes in soil and tap water. Its incubation period is 3–4 weeks and it presents as port site infection after 1 month of surgery [2]. Various factors responsible for causation of the infection are:

1. Improper instrument cleaning leading to retained clots and charred tissues in the joints.
2. Sterilization of reusable laparoscopic instruments with 2 % glutaraldehyde for 20 min that achieves disinfection, but not sterilization [3].
3. Rinsing instruments with boiled tap water that is a source of tubercular infection [4].

Following are the recommendations to prevent port site tuberculosis:

1. Thorough mechanical cleaning of instruments by ultrasonic technology.
2. ETO gas sterilization or gas plasma sterilization of instruments is better than glutaraldehyde [5].
3. If glutaraldehyde is used, 3.4 % solution should be used for 8–12 h for sporicidal action.

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Fig. 1 CECT pelvis showing sinus tract involving full thickness of abdominal wall on the right side (arrow). There is no involvement of intra-abdominal organs

4. Metallic cannulas should be autoclaved or use disposable port cannulas.
5. Use autoclaved water for rinsing instruments.

Early diagnosis of port site tuberculosis is possible only with high index of suspicion. If this possibility is kept in mind in cases of nonhealing/recurrent sinuses after laparoscopic surgery, some of the recent diagnostic tests are helpful in confirming the diagnosis.

The gold standard for the diagnosis of tuberculosis is demonstration of acid-fast bacillus under microscope, but only 50 % of the cases are smear positive [6].

Nucleic acid amplification (NAA) tests are based on decoding of the genome of *Mycobacterium tuberculosis*. The basic principle is exponential amplification of a specific sequence of nucleic acid. Amplified nucleic acid product is detected by specific DNA probe or analyzed by DNA sequence analysis. NAA helps to increase the sensitivity of the assay especially when only a few organisms are present. Thus, the tubercular bacilli are directly detected from the

Fig. 2 Sinogram showing a long, branching, and oblique sinus tract in the abdominal wall. Dye is seen spilling in to the pelvic cavity

clinical specimen and the report is available within 24 to 48 h. Two most common types are polymerase chain reaction and transcription-mediated amplification.

Another method of diagnosing active tubercular disease is the culture of *M. tuberculosis* from tissue or fluid from the affected area. The culture is positive when 10–100 bacilli/ml are present and it takes 6–8 weeks to culture in solid media like Lowenstein–Jensen media. Presently, broth-based culture media like BACTEC 460 are available for more rapid recovery of tubercular bacilli. It is a radiometric technique for automated detection of *M. tuberculosis* by metabolism rather than growth. In comparison with conventional culture medium, it can have a great impact and thrust on an early diagnosis with sensitivity of 87–96 % within 7–14 days [7].

Luciferase reporter assay is a very useful technique in screening of multidrug resistance tuberculosis and it has approximately 100 % sensitivity in detecting INH and rifampicin resistance [8, 9]. The basic principle of luciferase reporter assay is that ligase reporter phages having specific genes that encode firefly luciferase emit light in the presence of luciferin and ATP that is detected by a luminometer. The light emission is proportionate to the viability of mycobacteria.

Ligase chain reaction is a semi-automated system for direct detection of *M. tuberculosis* within 24 h in clinical specimen. This technique involves amplification and detection of specific regions of mycobacterial DNA which encodes protein antigen b. It is based on the joining, catalyzed sequentially by ligase and polymerase, of two oligonucleotide probes specific for adjacent sequences in the target DNA. It is specifically useful in extrapulmonary tuberculosis with sensitivity of 50–90.4 % and specificity of 98.5–100 % [10].

Microscopic observation drug susceptibility is another novel technique used for diagnosis and detection of drug resistance better than other methods. This assay is based on the fact that mycobacteria grow faster in liquid media than traditional solid media. The selective 7H9 liquid culture medium is inoculated with a sputum specimen that is subjected to digestion and decontamination procedures by *N*-acetyl-L-cysteine and NaOH, respectively. It takes shorter time and has much higher sensitivity (97.8 %) in diagnosing tubercular infection in comparison to automated *M. tuberculosis* culture (89 %) and culture on L-J medium (84 %) [11].

Mycobacterial lipoarabinomannan (LAM), a heat-stable glycolipid, is a biomarker specific to mycobacteria and is released by metabolically active bacilli. It is filtered by the kidney and hence detectable in urine. The urinary LAM can be measured using ELISA technology. Research so far suggests that it is a specific test for the diagnosis of active TB, but lacks sensitivity, particularly in areas with low HIV prevalence; in areas with high incidences of HIV infection, it may be more clinically useful, as the test appears to perform better with increasing immunosuppression [12].

Recently, Xpert MTB/RIF has been introduced that is a self-contained cassette-based test which does not require intensive training or advanced laboratory facilities and gives results within 2 h. Importantly, it is highly specific and is able to diagnose 98.2 % of smear-positive patients and 72.5 % of smear-negative, culture-positive patients [13]. Crucially, it correctly identified 97.6 % of rifampicin-resistant bacilli. This holds considerable potential and could potentially even replace standard smear microscopy. WHO has recommended this test as the first-line test in individuals suspected of having MDR-TB or HIV-associated TB and as a follow-on test for smear-negative samples in other patients [14].

In conclusion, the diagnosis of port site tuberculosis is based on high index of suspicion and presently, apart from histopathological examination of biopsy of the sinus margin, various diagnostic tests are available for the confirmation of the diagnosis. The treatment of such cases requires second-line antitubercular drugs for 6 months.

Conflict of Interest Nil

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