

Management of Infections with Mycobacterium Other Than Tuberculosis (Mott) As a Complication of Surgical Procedures

Debasis Ray¹, Bikash Naskar², Sudeb Saha³, Susmita Bhattacharya⁴

¹Associate Professor & MS in the Department Of Surgery, Nil Ratan Sirkar Medical College, Kolkata, West Bengal India

²MS 3rd Year Post Graduate student, in the Department Of Surgery, Nil Ratan Sirkar Medical College, Kolkata, West Bengal India

³Professor & MS in the Department Of Surgery, Nil Ratan Sirkar Medical College, Kolkata, West Bengal India

⁴Professor & MD in the Department of Microbiology, Nil Ratan Sirkar Medical College, Kolkata, West Bengal India

Corresponding Author: Debasis Ray

Abstract: Atypical mycobacterial infections at the surgical site particularly the laparoscopic port site are a frequent problem encountered in patients undergoing surgery. In this study we concentrate on the clinical diagnosis, management and prevention of this problem. In this series we assess 28 patients presenting with surgical site infection with atypical Mycobacteria (MOTT).

The study was done in a tertiary care hospital of Eastern India over a 1and half year period which included surgical site infection (SSI) cases with delayed onset not responding to conventional antibiotics.

Total twenty eight patients with post-operative delayed wound infection with MOTT were identified. All patients had undergone in different surgeries like laparoscopic cholecystectomy (n=13), laparoscopic appendectomy (n=3), laparoscopic hernioplasty (n=2), open appendectomy (n=2), open mesh hernioplasty (n= 7), exploratory laparotomy (n=1). All patients had cultured- confirmed MOTT except one who was only AFB positive by ZN stain. Species identified were Mycobacterium fortuitum and M chelonae. Following identification of the causative organism, the patients were treated with combination antibiotics (clarithromycin, linezolid and ofloxacin) for 3- months.

Key words: Surgical site infection, MYCOBACTERIUM OTHER THAN TUBERCULOSIS (MOTT), Rapid growers, Mycobacterium abscesses, Mycobacterium chelonae

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I. Introduction

Postoperative infections caused by saprophytic Mycobacterium are not uncommon, and their prevalence is increasing. The clinical presentation includes cellulitis, abscess formation, draining sinuses, and postoperative wound infection. Patients often do not have fever, chills, or other manifestations that are characteristic of a systemic infection, which makes clinical diagnosis difficult. Mycobacteria are ubiquitous and have been found in both tap water and soil as well as skin surfaces on man and animals [1]. There are controversies regarding the pathways of infection. It is believed that contaminated surgical instruments, reusable surgical instruments in particular, such as the Laparoscopic instruments might be the possible sources of infection [2]. Mycobacteria usually cannot be thoroughly killed with the usual disinfectants, and surgical equipment must be autoclaved. Although autoclaving surgical instruments is the best method for preventing Mycobacterial contamination of wounds, reusable instruments such as cannulas, tubings, and fiberoptic cables that can be damaged by autoclaving should be immersed completely in 2% activated glutaraldehyde for minimum 10 minutes to destroy vegetative organisms or minimum 10 hours it will destroy all forms of microbes and or ortho-PTHALALDEHYDE solution for minimum 5 minutes(for high level disinfection) or sterilized with ethelene oxide gas(36 to 48 hours). In addition, mucus or residue from cells on surgical instruments may lead to a significant decrease in disinfecting activity, which means that decontaminating baths must be renewed according to their frequency of use. Rinsing instruments in sterilized distilled water or with 70% alcohol after disinfection and before use is an excellent method of preventing instrument colonization. Because most MYCOBACTERIA OTHER THAN TUBERCULOSIS infections are iatrogenic, adequate sterilization of surgical instruments are needed.

It is known that effective treatment of MOTT infection includes surgical treatment concurrent with combination antibiotic therapy [3]. An antibiotic combination based on susceptibility of individual isolates must

be administered for a sufficiently long period of time to ensure complete wound healing and no recurrence. Conventional anti-tubercular drugs have been reported to be ineffective.

II. Aims and Objectives

To identify patients with MOTT infection following surgery between January 2017 to June 2018.
To record the details (age, sex, type of surgery, other risk factors etc) of patients who develop infection by MOTT
To identify the species of MOTT causing wound infection
To record the management details (antibiotics and/or debridement) of these patients
Follow up of the patients with wound infection by MOTT

III. Methods

This is a Prospective study conducted in the Department of General surgery between January 2017 to June 2018.

Patients who underwent surgery in the Department and presented with signs of persistent inflammation at the incision site, not responding to abscess drainage and antibiotics for pyogenic infection with a positive acid fast staining or a positive culture for *Mycobacteria* sp in samples collected from the surgical wound or surrounding tissues were included in the study

Study tools

- a) Detailed history and physical examination
- b) Routine Investigations: Haemoglobin, Total Leukocyte Count, Differential Count, Blood urea, Creatinine, fasting blood glucose, LFT, viral markers.
- c) Special investigations: Gram staining, AFB staining, AFB culture from the surgical wound

IV. Results

28 patients who met inclusion criteria were selected in the study after obtaining written consent. The age of the patients were between 18- 70 years with a median distribution of 45.5 years. 16 of the patients who developed MOTT infection were females and 12 were male patients.

The table (TABLE 1) below depicts the type of surgery following which the patients developed surgical site infection with MOTT.

TYPE OF SURGERY	NO
LAPAROSCOPIC CHOLECYSTECTOMY	13
LAPAROSCOPIC APPENDICECTOMY	3
LAPAROSCOPIC MESH HERNIOPLASTY	2
OPEN MESH INGUINAL HERNIOPLASTY	7
OPEN APPENDICECTOMY	2
EXPLORATORY LAPAROTOMY	1

Total twenty eight patients with post-operative delayed wound infection with MOTT were identified. All patients had undergone in different surgeries like laparoscopic cholecystectomy (n=13), laparoscopic appendicectomy (n=3), laparoscopic hernioplasty (n=2), open appendicectomy (n=2), open mesh hernioplasty (n= 7), exploratory laparotomy (n=1). No major disease comorbidities or causes of immunosuppression (e.g., HIV infection) were identified except three patients were diabetic and two were hypertensive.

All the patients were initially treated with repeated incision and drainage and were started with conventional antibiotics like amoxicillin/ clavulanic acid or second or third generation cephalosporin until culture and sensitivity report available.

Skin findings varied widely, including sinus tracts, non-healing ulcers, subcutaneous abscesses or firm nodules of varying size and erythema or chronic discharge from prior surgical wound.

All patients had cultured- confirmed MOTT except one who was only AFB positive by ZN stain. Species identified were *Mycobacterium fortuitum* and *M chelonae*.

After getting the culture and sensitivity reports, combination antibiotics (clarithromycin, linezolid and ofloxacin) given for initial 3 months. 12 out of 28 patients responded with 3 months of treatment. 9 patients required additional few months to get complete cure. Four patients still on treatment and three patients did not come for follow up. Antibiotics were continued for additional three months after patient got cured to prevent relapse of infection.

V. Discussion

Atypical *mycobacteria* (MOTT) have emerged as significant human pathogens, causing various infections in healthy and immune-compromised hosts. Majority of cases, these infections arise following intramuscular injections, surgery, penetrating trauma in conditions exposed to contamination of the wound with disinfectants, soil and water. These organisms have been increasingly reported in post-surgical and post traumatic wound infections.

Postoperative wound infections caused by MOTT generally appear few weeks to some months following the procedure [4]. Similarly in our case series the incubation period ranged from 20 to 66 days. On the contrary infections due to other pyogenic bacteria have a shorter incubation period as compared to MOTT which have a longer incubation period ranging from several days to several months [5]. The absence of clinical response after the administration of antimicrobial agents against commonly invading bacteria (e.g., Staphylococci, Streptococci) and the sterility of routine cultures of samples taken from the infected sites were clues for MOTT infection.

Time between the onset of symptoms and the microbiological diagnosis also took long time. Therefore, a high index of suspicion is imperative to make the diagnosis. A study by Joon Young Song *et al.*, [6] stated that since the symptoms are relatively mild and indolent, the clinical diagnosis of atypical mycobacterium is often delayed and took more than two months from initial manifestation. Also, in the revised literature, most publications conclude that clinical diagnosis of mycobacterial skin and soft tissue infections is not easy to perform and that the diagnosis is often delayed. Delays of more than one year have been reported. A high degree of clinical suspicion and appropriate microbiological techniques are necessary to avoid delays in diagnosis [7].

Clinically the infections caused by MOTT in post-operative wound infections are almost similar to pyogenic abscesses with induration, micro-abscesses, and discharge from sinuses and erythema. Systemic manifestations like fever and chills are rare [8]. The clinical features in our study were also similar [9], with erythematous nodules, indurations, micro-abscesses and discharging sinuses. All our patients presented with only local manifestations that started with painful nodules which gradually increased in size, which then would fistulize and open on the skin draining pus while none of them had any systemic manifestations.

All our patients with postoperative wound infections had repeated sterile aerobic and anaerobic cultures. Hence, it is very difficult to clinically diagnose MOTT infections because they lack characteristic clinical features. Surgical site infections with abscess and chronic inflammation should be initially managed with conventional antibiotics, however if there is no response and gram stain and routine culture are negative then Mycobacterial infection should be strongly suspected. Hence, AFB staining and culture for Mycobacterium should be done when sterile culture is obtained.

The source of infection in our case series is not clear. As per latest article by Maurer *et al.*, a number of sources could have been the possible source of infections which included contaminated gentian violet, rinsing solutions, antiseptic solutions, injectable medications, unsterile surgical instruments or poor wound care [10]. However in case of hernioplasty patients in our study as the organisms were also isolated from mesh, the source could be either the mesh or the transient presence of the mycobacteria in the surgical environment [11].

In other patients who had undergone caesarean section it is theoretically possible as per other study that nontuberculous mycobacteria might have gained access to the surgical wound from the public water system at the time of showering or it is equally possible that these organisms are present on the skin and are not eliminated by skin preparation preoperatively, thus gaining access through the skin incision [11].

In our current series the source of infection in patients who had undergone laparoscopy is primarily attributed to inadequate disinfection of laparoscope instruments. The possible reason is, the layer of insulation in the instrument restricts sterilization by autoclave. Moreover, mechanical cleaning of blood and charred tissue that accumulates in the joints of the instruments may be not done properly after surgery. Thus, these contaminated instruments used during the surgical procedures might have left microorganisms implanted on the subcutaneous tissue which germinates and after an incubation period of 3-4 weeks giving rise to clinical symptoms [12].

Although many patients had underwent surgery in the same hospital under the same environmental conditions, it is not clearly known why only few cases or only sporadic cases have acquired the infection with normal immune systems and no other predisposing medical conditions.

Successful treatment of MOTT requires both surgical treatment and combination of antibiotics [13]. This Combination of antibiotics as determined by susceptibility should be prescribed for an adequately long time so that the wound heals and also to ensure that no recurrence occurs. It has been reported that conventional anti-tubercular drugs are ineffective in treating these cases. Antibiotics should be given based on their susceptibility report and also combination of antibiotics is preferable over single regimen [14]. *M. fortuitum* responds to antibiotics like amikacin, quinolones, doxycycline and sulphamethaxole. Latest studies reveal that clarithromycin, cefoxitin and imipenem were useful for treating MOTT [15,16,17]. Almost all the patients in our study were cured with a combined approach of drainage and clarithromycin based combination therapy. In

hernioplasty patients mesh was removed. In one female patient who developed incisional hernia as a complication of this infection, underwent hernia repair and excision of abscess cavity.

It has been recommended that in order to prevent recurrence, antibiotic treatment should be given for a minimum of at least three months, or to be continued for at least 3 to 6 weeks after the wound get healed. Recent research work has also recommended that antibiotic treatment should be given for 6 to 12 months though the optimal length of treatment has not been yet established [18,19].

VI. Conclusion

It is important to re-emphasize upon the surgeons about the importance of following strict sterilization protocols including cleaning laparoscope instruments as per the manufacturer's instructions. Proper sterilization of medical equipments, proper skin cleansing preoperatively are essential prerequisite to prevent these infections. Clinicians should be aware to include MOTT in the differential diagnosis of surgical site infections in order to make early diagnosis and prompt treatment

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