

A Study of Port Site Infection Following Laparoscopic Cholecystectomy in a Tertiary Care Hospital of Tripura

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Abstract: Port site infection is a bothersome complication which undermines the benefits of minimal access surgery. Despite the advances in the field of antimicrobial agents, sterilization techniques, surgical techniques, operating room ventilation, port site infections still prevail. The emergence of rapid growing atypical mycobacteria with multidrug resistance, which are the causative organism in most of the cases, has further compounded the problem. For prevention of infection, proper sterilization and storage of instruments is recommended. Laparoscopic port site infection is a preventable problem if appropriate measures are taken preoperatively, intra-operatively and post-operatively.

Keywords: Port site infection, ssi, sterilization, atypical mycobacteria, laparoscopic cholecystectomy.

INTRODUCTION

Laparoscopic surgery has now become the procedure of choice for most of surgeries in clinical practice. Minimal access surgical techniques have revolutionized surgical specialties, mainly because of advances in port - access and video instrumentation and the desire to lessen incisional pain, length of hospital stay, bleeding and for cosmetic purposes. Port site infection is a bothersome complication which undermines the benefits of minimal access surgery. Despite the advances in the field of antimicrobial agents, sterilization, surgical techniques, operating room ventilation, port site infections still prevail.

Recently, we found rise in number of port site infections following laparoscopic cholecystectomy in our Agartala Government Medical College (A.G.M.C) & G.B. Pant Hospital (G.B.P.H). So, this study was undertaken to evaluate the proportion of patients affected with infection and also the organisms causing it.

METHODOLOGY

- Study design - Hospital- based observational study.
- Study setting - Department of general surgery, A.G.M.C & G.B.P. Hospital.
- Study population - All patients those who underwent Laparoscopic Cholecystectomy in A.G.M.C & G.B.P. Hospital between October 2016 to September 2017.
- Study duration - October 2016 to september 2017 (1 year).
- Study size - On an average, 60 laparoscopic cholecystectomy has been performed each year in previous 3 years. So, we considered minimum of

60 patients for the study.

- Inclusion criteria - Patients who underwent laparoscopic cholecystectomy in the department of General Surgery of A.G.M.C & G.B.P. Hospital will be included.
- Exclusion criteria - Patients with pre-existing severe infection, immunocompromised, diabetes mellitus.

After Ethical Committee approval, patients who fulfilled the inclusion criteria were enrolled for study following recording of the relevant data in a structured questionnaire and valid consent was taken. Patients were counselled regarding the possibilities of port site infections and thereby advised them to review with the surgeon as early as possible. Follow up of the patients was done for a period of 3 months after surgery for any port site infections. When patients reported with port site infection, pus sample or scrapings from infection site was collected and sent for microbiological studies.

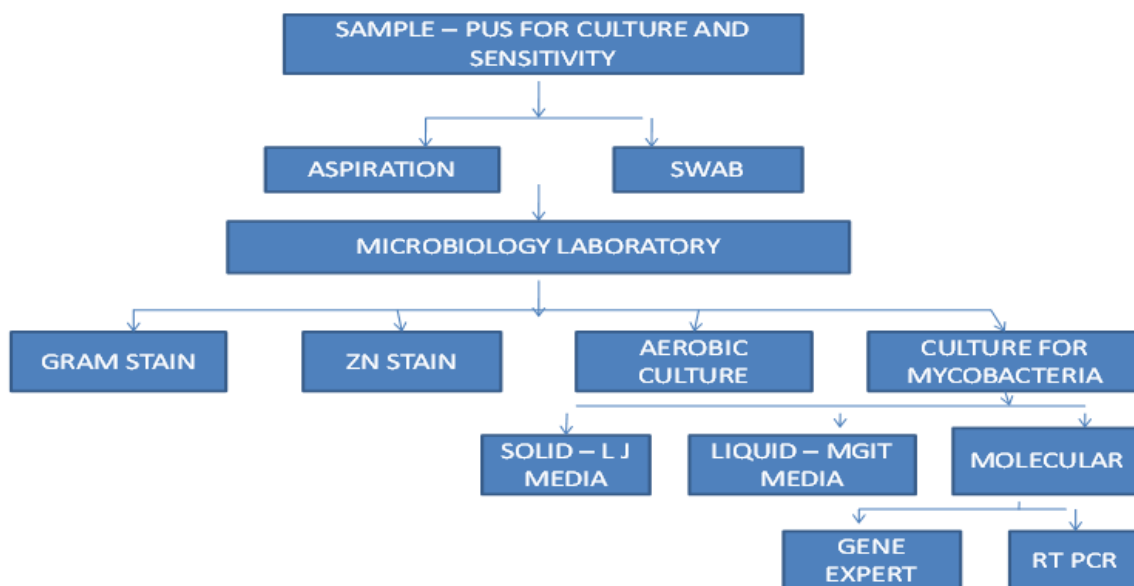


Fig-1: Study design

RESULTS

1. Total number of laparoscopic cholecystectomy performed in 2016 -17 – 64
2. Evidence of port site infection – 15
3. Number of positive pus cultures – 11
4. Number of pus cultures exhibiting atypical mycobacterium – 6
5. Remaining 5 pus cultures revealed staphylococcus aureus, micrococci
6. Atypical mycobacteria demonstrated resistance to 1st line anti tubercular drugs.

Staphylococcus aureus was sensitive to linezolid.

Port site infection

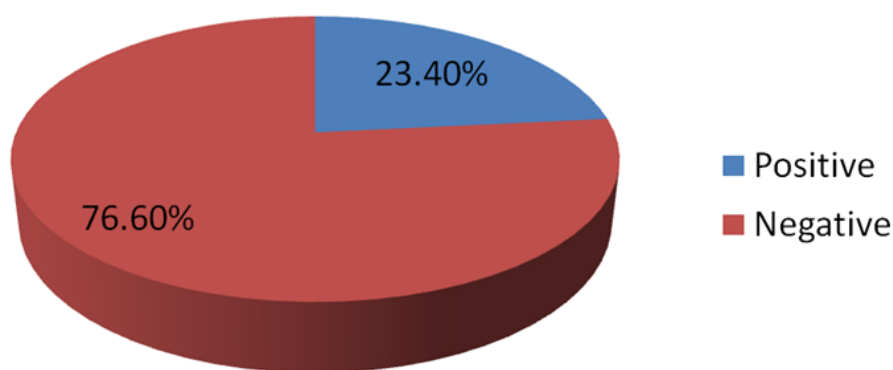


Fig-2: Port site infection

Pus culture

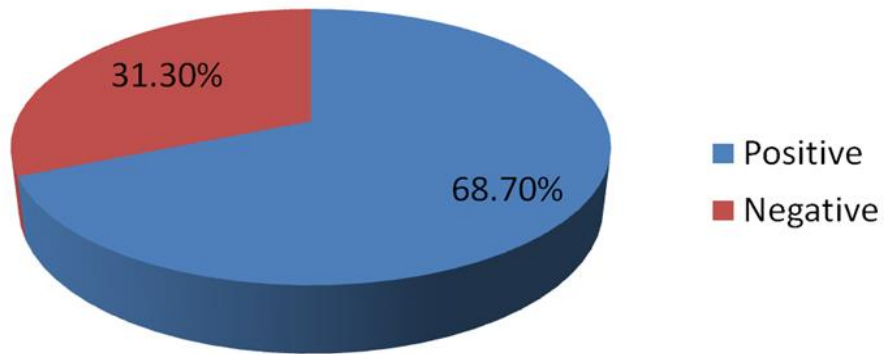


Fig-3: Pus Culture

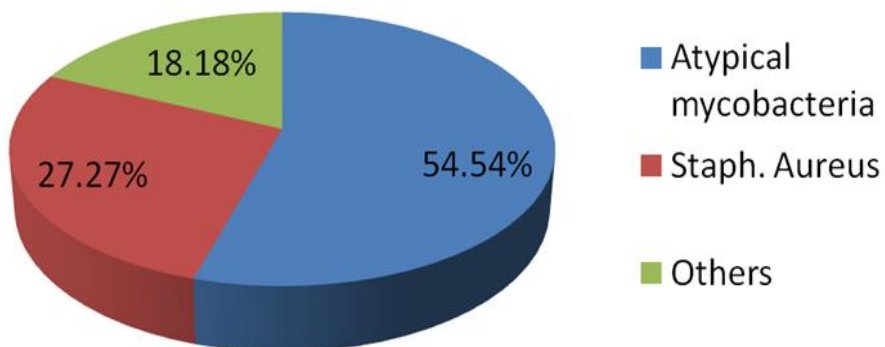


Fig-4: Type of Microorganism



Fig-5: Pictures of port site infection

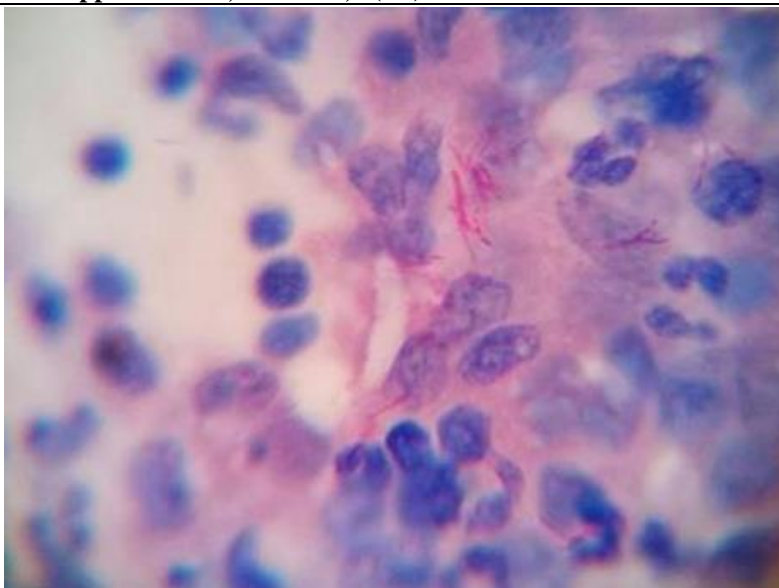


Fig-6: Microscopic view of Atypical mycobacteria

DISCUSSION

A series of laparoscopic port site infections due to *Mycobacterium chelonae* were found in thirty five patients following laparoscopy at a single hospital over a six-week period. The contaminating source was ultimately identified as the rinsing water used for washing chemically disinfected instruments [1, 2].

Port site tuberculosis following laparoscopic cholecystectomy has also been reported in a study

which concluded that the source of infection is usually a nosocomial with the laparoscopic instrument or its accessories [3, 4]. Amongst the port sites, epigastric port (88.2%) is commonly affected and is more than umbilical port (11.7%) [5, 6, 7]. Wasim memon *et al.*, reported that the causes of port site infection were gross spillage of infected bile, obesity and umbilical stitch sinus [8].

Table-1: Studies showing frequency of port site infection following laparoscopic cholecystectomy

Reference	Year of Publication	Type of study	Total number of patients	Frequency of infection
Karthik <i>et al.</i> , [9]	2013	Prospective	570	10(1.8%)
Mir <i>et al.</i> , [10]	2013	Prospective	675	45(6.7%)
Yanni <i>et al.</i> , [11]	2013	Prospective	100	4(4%)
Taj <i>et al.</i> , [12]	2012	Observational	492	27(5.48%)
Yi <i>et al.</i> , [13]	2012	Na	400	11(2.75%)
Trianta <i>et al.</i> , [14]	2009	Retrospective	1009	14(1.39%)
Chuang <i>et al.</i> , [15]	2004	Na	420	6(1.4%)

Risk factors for port site infections

Preoperative stay in hospital: Lilani *et al.*, [16] reported a significant increase in the incidence of surgical site infections with preoperative stay of more than 2 days for open surgical procedures.

Duration of operation: the study by Lilani *et al.*, [16] reported a nil infection rate in surgeries of less than 30 min duration. There was a significant increase in surgical site infections for operations of prolonged duration for two hours or more.

Other factors: obesity, prophylactic antibiotics, and drains have no effect on the rate of surgical site infections following laparoscopic cholecystectomy [19]. Factors like emergency/multi-procedure surgery and surgery in acutely inflamed

organs adversely affect the rate of surgical site infections [17, 18]. The risk of surgical site infections increases in patients with a history of nicotine or steroid usage, diabetes, malnutrition, long preoperative hospital stay, preoperative colonization of nares with *Staphylococcus aureus*, or perioperative blood transfusion [20, 21].

Mycobacterial isolates

Several reports have established the role of rapid growing mycobacteria, particularly *M. fortuitum* and *M. chelonae* which together have been termed as *M. fortuitum-chelonae* complex that is known to cause disease in humans as well as animals [22]. The endospores of this non-tuberculous mycobacterial complex are usually considered saprophytes which colonize in sewage, soil and even tap water. This often

cause localized skin infections 3-4 week post-surgery [23, 24]. These atypical mycobacteria have a predilection to involve the skin and subcutaneous tissue.

M. chelonae and *M. abscessus* have similar characteristics, and hence together were addressed as *M. chelonae* /*abscessus* group. Vijayaraghavan et al., [24] reported an outbreak of laparoscopic port site infections due to *M. chelonae* at their center. They had 145 port site infections in 35 patients in a period of 6 week. The contaminating source was found to be the water being used for washing instruments after chemical disinfection [25]. A series of eight cases of port site tuberculosis after laparoscopy was reported by Ramesh et al., [26] from India, caused by *M. tuberculosis*.

Clinical presentations of port site infection

There are five clinical stages of atypical mycobacterial port site infection [27].

- First stage: a tender nodule appears in the vicinity of the port site, and its usual timing of appearance is around four weeks following the surgery.
- Second stage: increase in the size of the nodule, and increased tenderness of the site along with other signs of inflammation with eventual formation of a discharging sinus.
- Third stage: reduced pain sensation following discharge of the purulent material and necrosis of the skin surrounding the port site.
- Fourth stage: chronic sinus discharging white or serous fluid.
- Fifth stage: hyper-pigmentation of the skin surrounding the sinus and appearance of multiple nodules at different places.

Treatment of port site infections

Early port site infections, with bacterial isolates, are best managed with local wound care and antibiotics as per antibiogram. The study by Lilani et al., [16] in clean and clean contaminated cases revealed staphylococcal species as the most common isolate, which was resistant to penicillin. The isolates of *Pseudomonas aeruginosa* were totally resistant to gentamicin [16]. Mir et al., [10] found most of the isolated strains of organisms causing surgical site infection in elective laparoscopic cholecystectomy were resistant to antibiotics used in the hospital. They found the *Pseudomonas* species to be sensitive to imipenem in 89.47% of cases, but there was complete resistance to the combination of ampicillin and sulbactam and ceftriaxone [10].

Atypical mycobacteria respond poorly to first line anti-tubercular drug treatment. Second line anti-tubercular drugs including macrolides (clarithromycin), quinolones (ciprofloxacin), tetracyclines (doxycycline) and aminoglycosides (amikacin and tobramycin) in various combinations have been used with promising results. Macrolides including clarithromycin are the

only group of antimicrobials active against *M. chelonae* and *M. abscessus* [28]. *Mycobacterium fortium-chelonae* complex has shown resistance to antibiotics because of mutation in the porin channels present in the bacterial wall, which is the site for entry of antibiotic molecules for antimicrobial activity [29]. Linezolid was found to be active against *M. chelonae* and has been successfully used for treatment, alone or as combination therapy [30].

CONCLUSION

In laparoscopic port site infections there is emergence of rapid growing atypical mycobacteria with multidrug resistance in majority of cases, compounding the problem.

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