

# The Study of Postoperative, Port-site Mycobacterium Tuberculosis Infection in Laparoscopic Surgeries in Jammu

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## Abstract

Laparoscopic surgeries are being preferred over open surgeries, and the number of these is increasing day by day. Meanwhile, the postoperative port-site infections, mainly due to non-tuberculous Mycobacterium (NTM) and tuberculous Mycobacterium (TM) are also being reported from different parts of the world. The present study pertains to 112 patients from Jammu province of Jammu and Kashmir state, India, who underwent laparoscopic surgeries in a Medical College hospital. Of these patients 6 showed PSIs. Among these PSIs, 5 had undergone laparoscopic cholecystectomies. Interestingly in the present study all the PSIs were diagnosed to be due to *M. tuberculosis*. It has been concluded that the main source of infection of *M. tuberculosis* is exogenous and is caused due to the reusable laparoscopic instruments which probably are the main source of infection. It has been reported that NTM and MT have become resistant to sterilization with glutaraldehyde. It is suggested that the use of disposable laparoscopic instruments be encouraged to control this infection, as is being done in various developed countries.

## Key Words

Laparoscopic cholecystectomy, ATT, Port-site, NTM

## Introduction

Whenever there is a wound received accidentally, traumatically or surgically, the possibilities of its getting infected by different agents vary from situation to situation. If a wound is a minor one or a major type, the chances of its getting infected increase accordingly, the usual agents causing infection being bacteria (1). Although ultramodern aseptic techniques and highly sophisticated methods of sterilization are employed now-a-days, yet it has been noted that in many cases there is post operative infection of these wounds. The frequency of these infections depends on a number of important factors. According to Waqar A Jan *et al.* 2008 (2), although the frequency and risk factors for wound infection, following conventional open cholecystectomy

have extensively been studied in literature, they have not been thoroughly evaluated for laparoscopic cholecystectomy (2). During the last few decades the techniques of surgery have made a lot of strides and advancements from the older methods of open surgery to the modern methods of minimal access surgery, referred to as laparoscopic surgery or robotic surgery. It is astonishing to note that even by practising this type of surgery the chances of wound infection have no doubt been reduced but not all together eliminated. Now a days the laparoscopic surgery is commonly done with respect to cholecystectomy, appendectomy, urology, gynaecology, pancreatotomy, gastrectomy, colorectal surgeries, hernias and even to oncosurgery (3-5).

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On comparison of open versus laparoscopic surgery it has been noted that in the Jammu province of J &K state the latter type has become more popular both with the surgeons and the patients. It is interesting to note that patients in Jammu frequently seek the option of laparoscopic surgery. Initially it was restricted to cholecystectomies but now they are utilised for other surgical problems also. Review of literature shows that the problem of port-site infection is a global one and not restricted to developing countries only, no doubt the incidence in developed countries is far less in comparison to developing nations (1). In the present study, out of 112 cases of laparoscopic surgeries, 6 cases are being reported with port-site infection by Mycobacterium tuberculosis.

### Material and Methods

The present study includes 112 patients who underwent laparoscopic surgeries for various indications in surgical unit of a Medical College hospital in Jammu. This study was conducted for a period of 17 months, from Jan. 2015 to May 2016. All those patients who underwent laparoscopic surgeries during the above period were included in the study and those patients, who were converted to open procedures were excluded from the study. In all the patients, the preoperative preparations were done by complete bath prior to surgery using antiseptic soap and the concerned areas of skin were prepared by shaving method. The patients were admitted a day prior to surgery and one preoperative dose of ceftriaxone 1gm at the time of induction and two subsequent postoperative doses of the same were given 12 hours apart.

All surgeries were done under General anaesthesia. Pneumoperitoneum was created using veress needle in supra or infraumbilical incision. Through the same incision, 10mm safety trocar (primary trocar) was introduced into the abdominal cavity. The time duration from abdominal incision to end of surgery was calculated. All the specimens like gallbladder, appendix and ovarian cyst were extracted with endobag. The gall bladders were extracted through epigastric port, whereas, appendix and ovary were taken out from the umbilical port. All 10mm port closures were done by single non-absorbable suture. All laparoscopic instruments were sterilized by

2% glutaraldehyde solution with a contact time of 30 minutes. Before surgery, all the instruments were washed with warm saline. Glutaraldehyde solution was replaced after every two weeks.

The patients were monitored for PSI. The PSI's were classified into superficial and deep and the wounds were classified into clean, clean contaminated and contaminated, using standard National Nosocomial Infections Surveillance System (NNIS), given by United States Centre for disease Control and Prevention (CDC)<sup>3</sup> which defines, PSI's as those occurring within 30 days of an operation<sup>4</sup>. Wounds were assessed clinically a week after surgery. In case infection had occurred, pus was sent for culture and sensitivity. Dressing and cleaning of the wounds was done and a course of empirical antibiotic was started till the culture/sensitivity report was received. The said wounds were re-examined once weekly for four weeks or more depending on the response. If no response was seen, pus was sent for AFB staining. In case of AFB positivity, pus was sent for culture in Lowenstein Jensen media to rule out Mycobacterium tuberculosis. In case of sinuses and nodules, in addition to above, excision of sinus tract was done and sent for histopathology.

### Results

Out of 112 laparoscopic surgeries, 100 were of laparoscopic cholecystectomy, 7 of laparoscopic appendectomy and 5 of laparoscopic ovarian cystectomy. Only 6 (5.3 %) of these patients developed PSIs, of which 5 had undergone laparoscopic cholecystectomies and 1 had undergone appendectomy (*Table 1*). No PSI was found in cases of laparoscopic ovarian cystectomy. Out of 6, 5 infections were seen as an outbreak in the month of April -2015 whereas, 1 was seen in the following month.

Superficial infection involving skin and subcutaneous tissue was seen in 4 cases (66.6%) and deep surgical infection involving fascia and muscle layers, in 2 (33.3%). The patients with superficial infection presented with pus discharge, erythema, induration with mild tenderness. The patients with deep infection, had developed nodules around the incisional scar area and were having discharging sinuses. The sinuses involved the muscle plane and did not involve the peritoneum. They were all clean wounds. The PSI did not respond to second and third

**Table.1 Types of Laparoscopic Surgeries Done**

LAP Surgeries	No of Surgeries
Cholecystectomies	100
Appendicectomies	7
Ovarian cystectomies	5

**Table.3 Operative Findings In Cases of Port Site Infections**

Operative Finding	Frequency N=6	Percentage (%)
Acute cholecystitis	1	16.6%
Empyema gall bladder	1	16.6%
Chronic cholecystitis with thick walled gall bladder	3	50%
Acute appendicitis	1	16.6%

generation cephalosporins.

The most common presentation was pus discharge, erythema, induration and mild tenderness at the site of infected port. No fever was reported by the patients. Haemogram done was also within normal limits.

The epigastric port, from which gallbladder was extracted, showed infection in 3 (50 %) cases, thus being the most frequent. This was followed by double port involvement, epigastric and umbilical in 1 (16.6 %) patient, both lateral ports showed infection in 1 (16.6 %) patient and umbilical port only was infected in 1(16.6 %) case. In the case of laparoscopic appendectomy, the umbilical port used for extraction of appendix was involved in infection (Table-2).

The operative findings in cases of PSI in laparoscopic cholecystectomies and appendectomies (Table- 3) included acute cholecystitis in 1 (16.6%), empyema of gallbladder in 1 (16.6%) case, chronic cholecystitis with thick walled gallbladder in 3(50%) patients and acute appendicitis in 1 case only ( 16.6%).

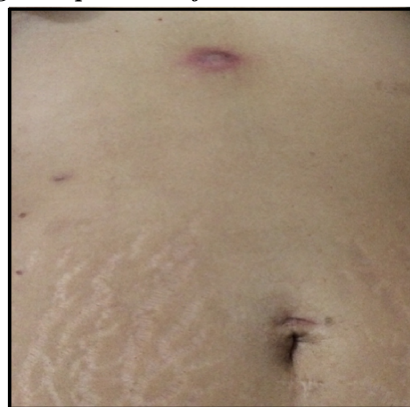
In all the patients with PSI or without PSI the operative time varied from 30-45 minutes. Thus the duration of surgical procedure had no bearing on the outcome.

Pus for culture was taken from superficial and deep infected scars. Culture and sensitivity done were negative for gram positive and gram negative bacteria. AFB staining of the same was positive for acid fast bacilli. In cultures done on L J media, Mycobacteriumtuberculosis

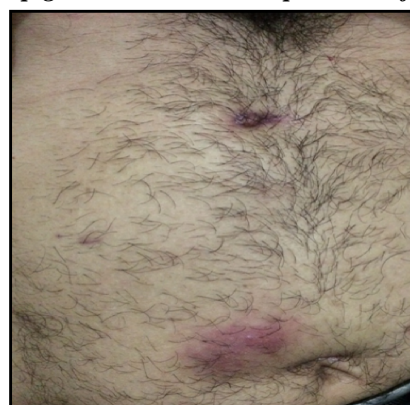
**Table.2 Port Site Affected In The Cases With Infection**

Port Site	Frequency (n=6)	Percentage
Single epigastric port	3	50%
Epigastric and umbilical ports	1	16.6%
Both Lateral ports	1	16.6%
Umbilical port	1	16.6%

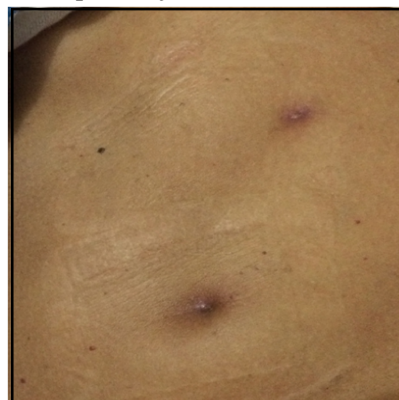
**Fig. 1. Epigastric port site infection**



**Fig. 2. Both epigastric and umbilical port site infection**



**Fig. 3. Both lateral ports infected**



was isolated from all the 6 cases of PSIs. Histopathology of the excised sinuses revealed typical granulomas formed of central caseation necrosis surrounded by epithelioid cells and lymphocytes. The Langhan's giant cells were also seen.

All the patients with PSI recovered within two months of starting first line ATT drugs, but the treatment was continued for six months.

### Discussion

On a review of available literature, it has been noted that port-site infection has been reported with respect to laparoscopic surgeries from different parts of the world viz. Egypt (5), Pakistan (4), China (6), Turkey (7), Georgia (8) including India (9). However, there was only one reference available from Jammu & Kashmir State pertaining to only Kashmir valley (10). As far as the author is aware no such studies have been undertaken in Jammu province of Jammu and Kashmir State, the present study being the first report. It is pertinent to mention here that PSIs in laparoscopic surgeries have been reported, more from developing countries as compared to developed countries (6).

The frequency of PSI as reviewed in the literature has been seen to be variable. It has been reported as low as 2.3% from Israel (2) as high as 9.2% in Cairo, Egypt (5). In the present study, it was recorded as 5.3% which is similar to the one reported by Waqar J Alam 5.7% (2), Den Hoed PT 5.3% (11), slightly higher percentage has been reported by Shindholimath V V 6.3% (14).

The CDC classification of SSI, categorizes these wounds into two subtypes, superficial and deep. The superficial ones include those involving skin and subcutaneous tissue, whereas, deep ones pertain to fascia, muscles and organ or space infection (3). In the present case, the wounds predominantly belonged to the superficial category 66.6%.

The percentage of deep infections extending into muscle planes was 33.3% which is slightly higher than the one reported by Waqar A Jan *et al.* 2008 (2), being 75.5% for superficial and 29.5% for deep infection respectively in their studies (2). Overall it has been noted that port site infections are mostly restricted to superficial skin infection. It may be because of the early diagnosis and management. The causative agents of these PSIs

are mostly Mycobacteria of which over hundred species are known (5). Most of these are NTM which are regarded to be the causative agents of serious port site infections (2). Of these *M. fortuitum* is known to cause pyogenic infection in soft tissues whereas, *M. chelonae* abscessus complex is known to cause many wound infections. The PSI by these Mycobacterial organisms is of common occurrence, having been mostly reported in developing countries (5). It is interesting to note, that in the present study *M. tuberculosis* was encountered in all PSI's. Earlier also *M. tuberculosis* has been reported to cause PSI by Ramesh *et al* (13). Nader A Elhamid *et al* 2012 in their study, report NTM in 4 cases out of 75.

The cause of such infection in port site can be exogenous or endogenous. Some authors believed that microbial contamination may occur at the time of washing of reusable laparoscopic instruments. It is reported that some strains of Mycobacteria grow in PVC pipes, even in sterilized water (5). It is believed by Sharma *et al* 2013 (14), that, the practice of rinsing the instruments with boiled tap water to remove glutaraldehyde may be the source of reinfection (14), with which the present author agrees. However, in the present study normal saline was used instead of boiled tap water which in the opinion of the present author seems to have made no difference. Some authors even describe glutaraldehyde resistant strains of *M. chelonae* (5). The authors believe that in the present cases PSI was due to exogenous source as most of the infections had occurred in one month only during which the patients were operated. It seems that same glutaraldehyde solution was being used for all the patients during the said period. This is in conformity with the conclusions of Sharma *et al*, 2013 (14).

In the present study the epigastric port showed infection in maximum cases (50%) which is in conformity with the findings of Waqar *et al* 2008 (2), whereas, some authors report maximum infection in umbilical port (8, 15). It is suggested by some authors that the port used for extraction of specimens is the most commonly involved port in infection because of the spillage (16). But in the present surgeries endobags were used for extraction, so there was no spillage of bile which is considered as one of the risk factors for infection. Therefore, the cause of infection seems to be exogenous and most probably the

contaminated instruments. Similar conclusions have also been drawn by Leo Francis et.al 2005 and Jagadish et al 2002 (17,18) . Time taken for all the surgeries in the present study was almost the same, hence this factor is not regarded to be involved in causing the infection in the present case.

The following statement of Nader 20125 gives credence to our suggestion," by using new laparoscopic set of instrument resulted in disappearance of such complications"-the complication being PSIs.

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