

Infection in Minimal Access Surgery and Glutaraldehyde

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ABSTRACT

Background: With increasing use of MAS for various surgical procedures, the occurrence of port site infection and port site tuberculosis is seen more often as postoperative complication in Bangladesh. Most of the cases present as non-healing port site wounds. The infection has been attributed to improper sterilization of laparoscopy instruments. There is concern about the effectiveness of the high-level disinfection of reusable laparoscopic instruments by immersion in 2% glutaraldehyde (GTA).

Objective: To evaluate the infection and efficacy of glutaraldehyde in MAS.

Materials and Methods: This is a retrospective, observational study carried out during the period of October 2005 to March 2016. Study populations were all the patients underwent various minimal access surgical procedures by our team during this period. Surgeries were performed by Storz standard laparoscopy set. All instruments were immersed in 2% GTA for 15-20 minutes before each use.

Results: Among all the patients (3720), 206 had port site infection which is 5.53%. Seventeen cases were diagnosed as port site tuberculosis which is about .45%. Most of them were within 30-40 years of age groups. Patients presented with port site cellulitis, abscess and discharging sinus. All tuberculous

cases were confirmed by biopsy. Tuberculous patients responded to anti-tubercular therapy. Non-specific infections responded to dressing and antibiotics.

Conclusion: Port site infection is common but tuberculosis is not as common as non-specific infection. Both are troublesome for the patients and surgeons. Proper sterilization of instruments is the key. Use of 2% GTA is not cent percent effective against tuberculosis.

Keywords: Infection, Minimal Access Surgery (MAS), Tuberculosis, Port site, Sterilization, Glutaraldehyde.

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INTRODUCTION

Surgical site infection (SSI) is the most common healthcare-associated infections (HAIs), occurring for 31% of all HAIs among hospitalized patients.¹ Minimal access surgery (MAS) has its unique complications. Port site infections erodes the advantages of MAS, patients become worried with infection and subsequent morbidities like port site incisional hernia and lose confidence on operating surgeons. There occurs increase in the hospital stay and financial loss to the patient. The whole purpose of MAS to achieve utmost cosmesis is turned into an unsightly wound. Preventable complication like port site infection after MAS is not uncommon.² Although tuberculosis is still one of the Bangladesh's public health problems and it also remains among the infectious diseases with the widest range of presentations. But port site tuberculosis is relatively a rare complication following MAS

procedures with only a few isolated cases reported in the literature.³⁻⁶ The source of infection being the contaminated tap water that is used for cleaning and washing the laparoscopic instruments.⁷ Because of the instrument costs and the non-availability of many instruments system, autoclaving of reusable laparoscopic instruments is not practiced in many centers.

So, the most common practice of instrument high-level disinfection or 'sterilization' in Bangladesh, India and many parts of the developing and even in developed world has been to immerse instruments in the 2% GTA for 15-20 minutes.⁸ There is concern about the effectiveness of sterilizing / disinfecting reusable laparoscopic instruments by immersion in 2% GTA. Here we present seventeen cases of biopsy proven port site tuberculosis and non-specific infections.



Figure 1a and 1b: Port site infection after laparoscopic procedures.

MATERIALS AND METHODS

This is a retrospective, cross-sectional, observational study carried out in one of the private hospitals in Chittagong during the period of October 2005 to March 2016. Study populations were all the patients underwent various laparoscopic procedures by our team during this period. It includes laparoscopic cholecystectomy, appendicectomy, ovarian cystectomies, adhesiolysis and hepatic cystectomy. Laparoscopic hernia surgeries were excluded as meshes were used in all cases. Diagnostic laparoscopy was excluded as there were possibilities of abdominal tuberculosis. Surgeries were performed with the help of Storz standard laparoscopy set, made in Germany. Port and hand instruments were adult size, reusable, made by same brand and all were immersed in 2% GTA for 15-20 minutes before each use. 2% GTA has been changed after each 12 to 15 cases intervals. Ten-millimeter primary ports were made by curved infra – umbilical incision in all cases. All other ports were 3 or 5 mm wherever required. Only the infra - umbilical ports (Linea) were stitched with no 1/0 cutting proline made by Ethicon. In all other ports skin were tapped with nichipore. Endo bags were not used to retrieve the specimens in any case. But in some cases, sterile gloves were used to retrieve the specimens and or spilled stones. Specimens removed through infra - umbilical port in all cases. All the specimens were sent for histopathological diagnosis and excluded tuberculosis. More than one surgical procedure has been performed in the same afternoon in most occasions. Single morning dose of 400 mg cefixime were give in all cases on the day of operation.

Diagnoses were made by culture and sensitivity for non – specific infection. Sometimes proline stitch was removed from Linea to enhance rate of healing in non – specific infections. In one case implanted gall bladder sludge was removed from preperitoneal space. Tuberculosis were diagnosed by doing Acid Fast Bacilli (AFB) stain from wound swab and or by standard biopsy taking granulation tissues from infected ports. These were done in all patients presented with early or late postoperative port site infection and or discharge. Patients with suture material induced infra - umbilical port site infection / discharge were treated with removal of proline stitch. Discharging umbilical ports due to preperitoneal debris were also excluded. Sinus tract were not excised or required in any case. Culture and sensitivity for tuberculosis were not done. All cases of non- specific infections were treated by conventional wound management and with antibiotics according to culture and sensitivity reports.

All the patients with tuberculosis were treated with Rifampicin, INH, Ethambutol, Pyrazinamide for initial 2 months and Ethambutol and Pyrazinamide for next 10 months. Patients were followed for at least 1 year but 3 patients were lost from follow up in the continuation phase of treatment. Data were collected from OT registrar, hospital records and personal files.

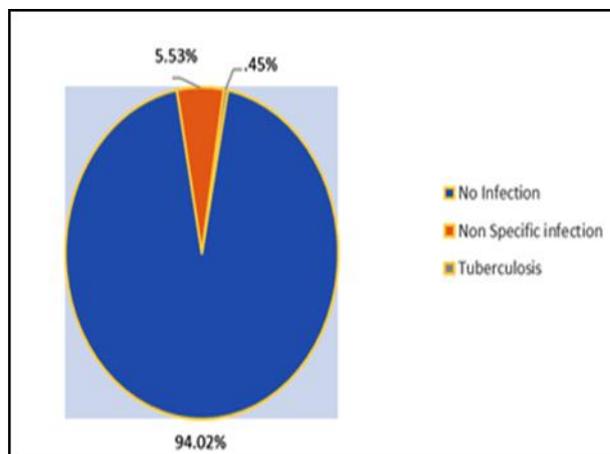


Figure 2: Overall infection rate

RESULTS AND OBSERVATIONS

During the period of October 2005 to March 2016, among all the patients of included laparoscopic surgeries (3720), two hundred and six patients had port site infection which is 5.53%.

These patients came to us with non - specific port site infections and discharge managed by drainage, debridement, dressing and appropriate antibiotics. Proline stitches were removed from Linea to enhance rate of healing in some non – specific infections. In one case implanted gallbladder sludge was removed from preperitoneal space. When the wounds were persisted for more than 4 weeks without any sign of healing with above management, considered non-healing. Wound swabs for AFB stain and tissue for histopathology from port site were taken in all such cases. Seventeen cases in histopathology were reported as consistent with tuberculosis. In other cases, foreign body reaction and non-specific inflammation were reported, not included in the study. Only in three cases Organism were detected on AFB stains.

Among the tuberculous patients 13 were female (76.47%) and 4 were males (23.55%). Age ranging from 21 years to 82 years (mean 48.17 years). Most of them were between 30-40 years.

Laparoscopic cholecystectomy was done in 10 cases (58.82%). Five were laparoscopic appendectomy (29.41%) and remaining two patients were laparoscopic ovarian cystectomy (11.76). None of the adhesiolysis case presented as tuberculosis. Liver cyst surgeries were not presented as port site tuberculosis. Case 7 and case 11 done in other centers in Chittagong, Bangladesh. Case 5 was done in India.

In almost all cases trocar sites were the site of infection except in Indian case where it was an epigastric abscess beside the port. Non-specific infections were common in infra-umbilical ports (94%). Tuberculosis was also commonest in infra – umbilical ports and it was in fifteen cases (88.23%) out of total seventeen cases of tuberculosis. In one beside the epigastric port (5.88%) and in one right hypochondriac port (5.88%) was affected by tuberculosis. Debridement, dressing and removal of proline suture from Linea alba did not showed any clinical benefits in any cases of tuberculosis. Chest X-rays were normal in all cases. There was

no evidence of tuberculosis elsewhere in the body. None of the patients had constitutional symptoms. General wellbeing and nutritional status were satisfactory in all cases.

After the start of four drugs regimens features of healing were noted at variable intervals of time. It varied from one and half months to three and half months. Though three patients were lost from follow up nine patients developed incisional hernia at infra - umbilical port. Hernia was noticed during the course of treatment. Six of them treated by proline mesh hernioplasty during their treatment period. Five patients had no hernia in their follow up period. The data of the tuberculous patients are presented in table 1. In one case epigastric port healed but developed abscess at the vicinity of the port about one and half months after the surgery. Initially tried to manage with drainage and dressing but failed. So, biopsy done it showed tuberculosis. Ultimately healed with antitubercular therapy. During debridement we did not noticed any intra abdominal extension of any sinus tracts.

Table 1: Patient's data with tuberculous infection.

Age in years	Sex	Types of surgery	Days until healing	Development of incisional hernia
41	M	Laparoscopic cholecystectomy	45	No
38	F	Laparoscopic appendectomy	54	Yes
76	F	Laparoscopic cholecystectomy	50	Lost follow up
21	F	Laparoscopic ovarian cystectomy	91	Yes
32	F	Laparoscopic appendectomy	44	No
36	M	Laparoscopic appendectomy	96	No
38	F	Laparoscopic cholecystectomy	82	Yes
46	F	Laparoscopic ovarian cystectomy	76	Yes
39	F	Laparoscopic appendectomy	140	Yes
35	M	Laparoscopic cholecystectomy	115	No
82	F	Laparoscopic cholecystectomy	96	Lost follow up
29	F	Laparoscopic cholecystectomy	68	Yes
58	F	Laparoscopic cholecystectomy	102	Yes
63	M	Laparoscopic cholecystectomy	139	Lost follow up
72	F	Laparoscopic cholecystectomy	46	Yes
52	F	Laparoscopic cholecystectomy	78	Yes
61	F	Laparoscopic appendectomy	86	No

DISCUSSION

All surgical wounds may prone to infection. Many authors have found that surgical site infection rate is much higher in conventional surgical procedures than MAS. 9-11 Incidence of surgical site infection after minimal access surgery is less than that after open surgical procedures due to shorter hospital stay. 12 The umbilical port site infection rate in MAS after laparoscopic cholecystectomy is 8% and 11% after laparoscopic appendectomy. 13 Our result is close to this data.

Port site tuberculosis is very rare and described in literature mostly as case reports. A 14-year-old girl had port site tuberculosis after laparoscopic cholecystectomy reported by Bhandekar et al. 14 A case report was published by Leo Francis Tauro et al having multiple port sites discharging sinus after surgery for chronic calculous cholecystitis with evidence of caseous necrosis on histopathology. 15 Tubercular intra abdominal and abdominal wall abscess developed following laparoscopic

cholecystectomy, found in Seith A et al report. 16 A series of eight cases described by Ramesh et al. 3 They found three cases of *Mycobacterium tuberculosis* in the culture. We did not study for the culture. In their series five were gynecological procedures whereas only two in our series. Other three were laparoscopic cholecystectomy, hernia repair and adhesiolysis one each. We did not find in adhesiolysis or diagnostic laparoscopy group.

Hand and port instruments used in laparoscopy are the source of infection in most cases. 6 It was concluded by Jagadish et al that laparoscopic instruments were the source in their case. 6 *Mycobacterium fortuitum* was found after laparoscopic cholecystectomy by Sethi et al. 17 Though we did not have laparoscopic hysterectomy in our series Singhi has reported tuberculosis in such a case. 18 Proper sterilization of laparoscopic instruments is the key. 2% GTA for 15-20 minutes is used widely for sterilization of laparoscopic instruments.

ESGE (European Society of Gastrointestinal Endoscopy) and European Society of Gastrointestinal Endoscopy Nurses and Associates revealed Glutaraldehyde fails to eliminate all atypical mycobacterium using 15-20 minutes.¹⁹ Even up to 7% GTA is resistant to mycobacterium reported by Lorena et al.²⁰ They suggested to use orthophthaldehyde (OPA) and peracetic-acid (PA) based solution. But their efficacy should be evaluated further. The American Society of Gastrointestinal Endoscopy published their recommendations for the reprocessing of flexible endoscope in 1988 and These were revised and updated in 1996.^{21,22} However, guidelines for reprocessing laparoscopic instruments have not been standardized. The minimal access therapy Decontamination Working Group has recommended only a 10-minutes soak for laparoscopic instruments, with longer times if tuberculosis is suspected.²³

Proper cleaning of instruments before immersion into GTA is also important. Dismantling of instruments should be considered. Blood clot and tissues from instruments should be cleaned by washing under running water. Concentration of GTA is reduced with subsequent uses. So, instruments should be dried before immersion into GTA. Moreover, glutaraldehyde should be changed at regular intervals. Autoclave is the best method for metallic instruments. Abdominal tuberculosis may also be implanted in port sites. Such a case was reported by Narayanan et al.²⁴ They found port site tuberculosis after laparoscopy for primary infertility due to abdominal tuberculosis. Jain SK. et al.²⁵ reported a case of young man who developed tubercular abscess at mid clavicular port site following laparoscopic cholecystectomy.²⁴ Diagnosis of port site tuberculosis depends on clinical suspicion. If patients present with non-healing wounds or port site discharge tuberculosis should be kept in mind. Histopathology is the main stay of diagnosis. Excision of sinus tracts and or debridement of non-healing port site wounds with four drugs antitubercular therapy is the standard treatment.

CONCLUSION

For the sterilization of the laparoscopic instruments proper method should be followed. Instruments must be dismantled and thoroughly cleaned between the uses to remove the blood clots and tissues before sterilization. Current practice of immersing laparoscopic instruments into 2% glutaraldehyde for 15-20 minutes is to be evaluated further.

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