

## Port Site Chronic Sinuses – A Wisdom of 5 Years and 50 Cases

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### ABSTRACT

**Background:** Laparoscopic surgery has now become an accepted method of minimal invasion of human anatomy but the dreaded problem of port site complications especially the chronic sinuses has rejuvenated the proponents of open techniques. The scope of laparoscopy widened from diagnostic purposes to resecting large tumors in almost all the systems of the body. As the time progressed, the problems associated with use of long instruments and dexterity of movements started creeping in. The vision, which was analogue, to start with, became 3D digital and with the introduction of robotic arm, the problem of dexterity was addressed to some extent. One thing that persisted right through so much of technical development was the problem of infection and sinuses and the enormity of this issue can be gauged by its ever-growing number. **Methods:** Although minimal invasive surgery is here to stay for all intent and purposes, we have decided to study 50 cases of chronic port site sinuses treated and followed up for 5 years in various wards of department of surgery in Guru Nanak Dev Hospital, Amritsar. In this study the authors present their experience and rationale regarding various factors like age and sex distribution, site of infection, results of microscopy and culture/sensitivity, treatment given (both surgical and non surgical), response time and prognosis. **Results:** In the cases where there was discharge culture of the pus yielded skin and soft tissue infections like staphylococcus, streptococcus, pseudomonas, E. coli and klebsiella. Out of 50, 20 cases were treated by appropriate antibiotics after culture sensitivity and quinolones. **Conclusion:** From the above discussion and flow chart, it can be safely concluded that atypical mycobacteria and some of the anaerobes remain the main offending agents.

**Keywords:** chronic port site infections, management, atypical mycobacteria, second line ATT, prognosis.

### INTRODUCTION

When laparoscopy was introduced in the late eighties, it was seen as a great asset and a wonderful tool for achieving the surgical excellence. The scope of laparoscopy widened from diagnostic purposes to resecting large tumors in almost all the systems of the body. As the time progressed, the problems associated with use of long instruments and dexterity of movements started creeping in.

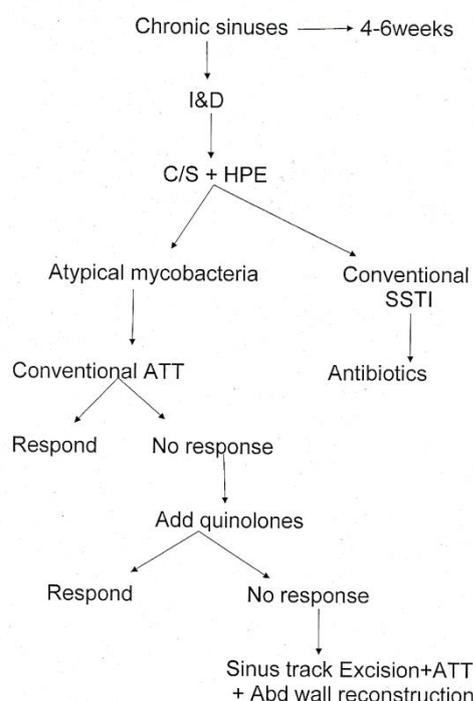
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Acute exacerbation of COPD showed a hospital The vision, which was analogue, to start with, became 3D digital and with the introduction of robotic arm, the problem of dexterity was addressed to some extent. One thing that persisted right through so much of technical development was the problem of infection and sinuses and the enormity of this issue can be gauged by its ever growing number. Even

though many of them go unreported, the non healing sinuses have become achilles heel of all minimal invasive surgeons. Minimal access surgery (MAS) also commonly termed laparoscopic surgery (LS) or keyhole surgery, has caused a paradigm shift in the approach to modern surgery, by limiting the access related morbidities. It has gained popularity due to better aesthesia, lesser pain, early ambulation and discharge from the hospital with early return to work, minimizing the financial burden to the patient. Ever since Philips Mouret reported the first laparoscopic cholecystectomy in 1987, the approach has been adopted for many other surgical procedures including appendectomy, herniorrhaphy, colonic surgery, gastric surgery, urological and gynaecological surgery. PSI erodes the advantages of LS, with the patient becoming worried with the indolent and nagging infection and losing confidence on the operating surgeon. There occurs a significant increase in the morbidity, hospital stay and financial loss to the patient. The whole purpose of MAS to achieve utmost cosmesis is turned into an unsightly wound, and the quality of life of patients is seriously affected. No surgical wound is completely immune

to infections. Despite the advances in the fields of antimicrobial agents, sterilization techniques, surgical techniques, and operating room ventilation, PSIs still prevail. Incidence of SSI after elective laparoscopic cholecystectomy is less than that after open elective cholecystectomy due to shorter length of incision. The technique of primary port entry to the peritoneum does not show any difference in umbilical PSIs in patients undergoing laparoscopic cholecystectomy. The umbilical PSI rate in LS has been reported to be 8% with 89% of the infections occurring after laparoscopic cholecystectomy, whereas 11% after laparoscopic appendectomy. In this study we report our experience of 50 cases of chronic port site infections regarding its pattern and how they were investigated and treated, both surgically and non surgically.



**Figure 1: Showing algorithm of management of chronic port site infections.**

### Review of Literature

Vijayaraghavan et al<sup>[1]</sup> reported an outbreak of laparoscopic PSIs due to *M. Chelonae* at their center. They had 145 PSIs 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. A series of eight cases of port site tuberculosis after laparoscopy was reported by Ramesh et al<sup>[2]</sup> from India, caused by *M. tuberculosis*. A case of PSI following laparoscopic cholecystectomy caused by *M. flavescens* has been reported<sup>[3]</sup>. Duarte et al<sup>[4]</sup> reported an epidemic (74 cases) of postsurgical infections in Brazil, due to *M.*

*massiliense*, after video assisted surgery, which had similar characteristics to *M. abscessus*. Recently, there have been reports of rapid growing mycobacterial infection following laparoscopic gastric banding in obesity<sup>[5,6]</sup>. Atypical mycobacteria infections following surgery, although rare, are known to occur when a prosthetic material has been used<sup>[7]</sup>. Samel et al<sup>[8]</sup> reported a case of gas gangrene of the abdominal wall due to Clostridial agents centering around right lateral port following laparoscopic cholecystectomy

## MATERIALS AND METHODS

### Patient Selection:

In this study, 50 cases of port site chronic sinuses were studied over the period of 5 years from 2010 to 2015 who underwent any form of laparoscopic surgery in GURU NANAK DEV HOSPITAL, AMRITSAR. All age groups were included in this study without any sex distribution. Acute infections were not included in the study. Only chronic non-healing sinuses were included. Recurrent or previously treated sinuses were not included in the study.

### Microscopy and C/S of Sinus Scrapings:

Before undergoing any form of treatment (either surgical or medical), the scrapings of all the port site sinuses were sent for microscopy and culture/sensitivity. For microscopy, conventional Gram's stain and ZN stain was used. Cultures for both tubercular and non tubercular bacteria were undertaken.

### Histopathology of Resected Specimens:

All patients who undergo any form of surgical intervention, the resected specimens were sent for histopathologic examination. All resected specimens were fixed in neutral buffered 10% formalin. Histopathological findings show either tubercular (both typical or atypical mycobacteria) or non tubercular chronic granulation tissue.

## RESULTS

In our study, 50 cases of port site complications were studied over the last 5 years. In this study, we found that the majority of cases (45 cases) were between 20-50 years of age. Majority of them were females (35 cases). The socioeconomic strata were equally divided between middle and lower class. Umbilical port was involved in 40 cases out of 50. In 30 cases both umbilical and epigastric port sites were involved. 10 cases were purely with umbilical port site infections. Out of 40 port site sinuses around umbilicus 25 cases had multiple openings with a common track. One case with overgrown granulation tissue in the epigastric port was

diagnosed to be a case of adenocarcinoma. On tracing the histopathology of the same case it was found that it was a case of adenocarcinoma of gall bladder, probably unsuspected that's why may be no endobag was used and the tumor cells were planted in the epigastric port while extracting the specimen. Mode of sterilisation in all the cases was formalin chamber and cidex for tubings and lenses and autoclave for metallic instruments. Out of 50 cases, 10 cases were from outside our institution where the probability of EtO was likely. Atypical/Typical mycobacteria could be isolated only in 5 cases of culture/histopathology of scrapings. While the majority of cases (45 cases) with negative culture showed chronic granulomatous tissue with giant cell reaction on microscopy [Table 1]. In the cases where there was discharge culture of the pus yielded skin and soft tissue infections like staphylococcus, streptococcus, pseudomonas, E. coli and klebsiella. Out of 50, 20 cases were treated by appropriate antibiotics after culture sensitivity and quinolones. 5 cases which did not respond to conventional antibiotics and second line ATT were treated with standard 4 drug ATT for 6 months. In 30 cases some kind of surgical intervention like I and D, curettage and excision of sinus had to be resorted to, followed by antibiotics and second line ATT [Table 2]. 10 cases had to be put on prolonged ATT for 9-12 months [Table 3]. 2 cases out of 50 were treated with major excision of the sinus complex around the umbilicus along with fascia and primary closure of the defect was done [Table 4]. Out of 30 cases where excised specimen was sent for HPE, 9 were proven to be positive for tubercular granulomas while rest of the 21 cases non tubercular chronic granulomatous tissue was reported [Table 5]. At the end of 1 year, all cases were cured. The treatment varied from a minimum period of 3 months to a maximum period of 12 months.

**Table 1: Showing Results of Scraping and Culture /Sensitivity.**

Results	No.	%age
Atypical/Typical mycobacteria	5	10.0
Non specific chronic granulation tissue	45	90.0
Total	50	100.0

**Table 2: Showing Treatment Given.**

Treatment	No.	%age
Antibiotics	15	30.0
Anti-tubercular therapy	5	10.0
Surgery + Anti-tubercular therapy	30	60.0
Total	50	100.0

**Table 3: Showing Duration of Anti-Tubercular Therapy (n=35).**

Duration	No.	%age
Standard ATT (6 months)	25	71.43
Prolonged ATT (9-12 months)	10	28.57
Total	35	100.0

**Table 4: Showing Surgical Intervention (n=30).**

Surgical intervention	No.	%age
Incision and drainage	28	93.34
Major surgical excision with abdominal wall reconstruction	2	6.66
Total	30	100.0

**Table 5: Showing Histopathology (n=30).**

Histopathology	No.	%age
Tubercular	9	30.0
Non tubercular	21	70.0
Total	30	100.0

## DISCUSSION

Chronic port site sinuses are a cause of morbidity in a significant number of cases even though these have not been a cause of mortality. With the advent of laparoscopic surgery and use of interventional procedures in all kinds of surgeries the incidence of port site infections (PSI) is rising by the day. Also the increase in number of cases is putting a lot of pressure on the sterilisation resource and the time needed for the same. Since sterilisation of tubings and plastic material is not possible in high temperature and under high pressure, the alternative sources like glutaraldehyde, EtO or formalin chambers are put to extensive use. Its been seen over the decades that there is no credible alternatives to autoclaving but the nature of instruments used in laparoscopy and their vulnerability to heat and pressure has brought to light the deficiencies of excessive adventurism in minimal access surgeries. It has been seen that of all the deficiencies of glutaraldehyde formalin and EtO, the inadequate time of exposure and improper and inadequate cleaning of instruments has been the main reason for the rising number of port site infections. It has also been seen that infrequent change of glutaraldehyde, which starts harbouring atypical mycobacteria when it has outlived the shelf life, also contributes significantly to rise in port site infections.

Although prevention is the best defence against rising number of port site infections, still the number of reported port site complications is rising by the day. In our experience of 50 cases in the last 5 years, we have come to the following conclusion, which has been given below as a flow chart [Figure 1].

Before concluding, the role of glutaraldehyde, formalin and EtO and their applicability must be seen from the point of view of modern day surgical practice. In India disposable instruments and tubings remain as dream, the use of these sterilising agents must be done with full knowledge of their chemical properties, time of exposure, reusability and health hazards. A brief insight into the properties of these chemicals is as under:

### Glutaraldehyde

2% aqueous glutaraldehyde buffered to pH 7.5-8.5 with NaHCO<sub>3</sub> effectively killed<sup>[9]</sup>:

- Vegetative bacteria in less than 2 min
- Tubercle bacilli fungi and viruses in less than 10min.
- Spores of bacillus and clostridium species in 3hrs.
- Spores of clostridium difficile in less than 3 hrs.
- Microorganisms reported to have resistance to glutaraldehyde:
  1. Mycobacterium (M. chelonae, M. aviumintracellulare, M. xenopi)
  2. Methylobacterium mesophyllicum
  3. Trichosporon
  4. Fungal ascospores (microascuscinerus, cheatomiumglobosum)
  5. Cryptosporidium.

The shelf life of activated solution is 14 days. The contact time required is 15min.

#### Formalin:

Formalin is 37% formaldehyde by weight and it is bactericidal, fungicidal, tuberculocidal, virucidal and sporicidal. Varying concentrations of aqueous formaldehyde solutions destroys a wide range of organisms<sup>[10]</sup>:

- Inactivation of polio virus in 10 min with 8% of formalin
- 4% formaldehyde is tuberculocidal in 2 min
- 2.5% formaldehyde inactivated S. typhi in 10 min

Formaldehyde is potential carcinogen and its ingestion can be fatal. Its inhalation can cause asthma like respiratory problems and skin contact can cause contact dermatitis. The contact time required is 2hrs in case of formaldehyde.

Para formaldehyde, a solid polymer of formaldehyde, can be vaporised by heat for the gaseous decontamination of the laminar flow biologic safety cabinets.

#### EtO:

EtO gas is carcinogenic, explosive and mutagenic and should be limited to sterilising products for which no alternative methods are available. EtO (ethylene oxide) is a common gas used for low temperature sterilisation EtO process temperature from 25-55 degree are used. A lower temp. Results in a less efficient process, which leads to longer exposure time. It includes:

- Preconditioning
- Sterilisation
- Aeration (degassing)

The total cycle time is 14 hrs<sup>[11,12]</sup>.

## CONCLUSION

From the above discussion and flow chart, it can be safely concluded that atypical mycobacteria and some of the anaerobes remain the main offending

agents. Normal skin and soft tissue pathogens usually respond to conventional antibiotic therapy or occasionally to incision and drainage. Chronic sinuses, which are due to atypical mycobacteria, are more prevalent in and around the umbilical port and they are usually multiple in numbers with a typical centrifugal branching pattern. The mainstay of treating chronic sinuses is by striking a fine balance between multiple incision and drainages, excision of tracts and application of ATT both 1<sup>st</sup> and 2<sup>nd</sup> line. Some patients may require a major resection of the tracts along with the removal of sheath and muscle and followed by reconstruction. Many a times for such large defects prosthetic reinforcement is required to cover the defect. Although these port site infections are not fatal they still cause a significant morbidity in a good number of patients. All cases eventually respond to these measures, the response time can vary from 6 weeks to over a year. Persistence with the surgical principles and reassurance to the patients goes a long way in soothing the nerves of the suffering patient. Last but not the least, keeping in mind the importance of impeccable sterilization, the methods used to sterilize the tubings and other sensitive laparoscopic instruments in large volume setups, the available agents must be thoroughly explored and used in the best interest of the patient. EtO is being extensively used now a days and is probably going to be the main stay of sterilization for laparoscopic instruments. The use of formaldehyde and glutaraldehyde should be limited and these agents should be changed at regular intervals for avoiding port site contamination.

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