

**CHRONIC SINUS INFECTIONS IN PATIENTS AFTER LAPAROSCOPIC
CHOLECYSTECTOMY**

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ABSTRACT

Introduction: A laparoscopic cholecystectomy is a surgical procedure in which the gall bladder of the patient is removed via minimal intrusion into the human body; it is a procedure in which four incisions are given, of 0.5-1.0 cm in length, special instruments are used to manipulate the internal organs and eventually remove the gall bladder of the patient. Under inadequate aseptic techniques these incision sites may become infected and it was observed that chronic sinuses developed at these port sites. A tunneling wound or a sinus tract is a narrow opening or passageway in any direction through soft tissue and results in dead space with potential for abscess formation. Port site infection is a commonly occurring surgical site infection that complicates laparoscopic surgery and has a vital role in the outcome of laparoscopic cholecystectomy. **Objective:** The objective of this study was to determine the cause of development of port-site infections and to determine the most appropriate management of such patients. **Study Design:** Prospective, descriptive, qualitative study. **Setting:** Surgical Special Unit, Services Hospital, Lahore **Duration of study:** 20th October 2017 to 19th April 2018.

KEYWORDS: port site infection, surgical site infection, laparoscopic cholecystectomy, causative factors.

INTRODUCTION

Laparoscopic surgery, also termed as minimally invasive surgery, was initially presented in the late twentieth century and, over a short span of time, has become the mainstay of surgical procedures in multiple disciplines of medicine.^[1] A National Institutes of Health consensus statement in 1992 stated that laparoscopic cholecystectomy provides a safe and effective treatment for most patients with symptomatic gallstones and has become the gold standard of treatment.^[2] Laparoscopic cholecystectomy is more advantageous as it decreases post-operative pain, decreases the requirement of post-operative analgesia, reduces the duration of hospital stay and enables the individual to resume full functional activity within a week after the surgery.^[3,4] Alongside all these advantages, laparoscopic procedures also provide better cosmetic outcome and a much higher level of patient satisfaction. Therefore, laparoscopic cholecystectomy supplanted open cholecystectomy, as well as, diminished the attempt of using non-invasive management techniques such as extracorporeal shock wave therapy and bile salt therapy.^[5] Some of the common post-operative complications include Veress needle injury, hemorrhage, post-cholecystectomy syndrome, bile duct injury and infection. Infections can be classified in multiple ways; one based on whether the infections are intrinsic or extrinsic. The other classification is specific for port site infections; these can

be of three types. The first is the superficial surgical site infection, it occurs within 30 days after surgery and is an infection involving the skin and subcutaneous tissue only; the patient will present with the complains of at least one of the following: a purulent discharge from the superficial incision, or an organism isolated from aseptically obtained culture of fluid or tissue from superficial incision. The second type of infection is the deep surgical site infection which may present after 30 days of surgery and involves the deep soft tissues including fascia and muscles deep to the incision; the patient presents with at least two of the following: a purulent discharge from the deep incision, dehiscence of the deep incision or an abscess. The third type of infection is organ/space infection in which the infection spreads to organs and spaces other than the incision which was opened or manipulated during surgery.^[6] The rate of occurrence of surgical site infections is much higher in open cholecystectomies as opposed to laparoscopic cholecystectomies; however, since the accumulative number of laparoscopic cholecystectomies has immensely increased, along with it the occurrence of port site infections has increased as well This results in poor cosmetic results, increased patient stay at the hospital, and increased costs.

MATERIALS AND METHODS

In this study, 27 patients who underwent laparoscopic cholecystectomies were included, all the patients had been given injectable Ceftriaxone 1g pre-operatively followed by 1g Ceftriaxone twice daily for six days post-operatively to ensure a broad-spectrum antibiotic cover. All the surgeries were performed by experienced surgeons, using the four-port method. The gallbladder was extracted from the umbilical port in six patients and from the epigastric port in four patients, without using a retrieval bag. A sub-hepatic tube drain was placed in all the patients and removed 24 to 48 hours post-operatively. The stitch material used was proline in all the patients and the stitches were removed on the seventh post-operative day, at which time no signs or symptoms of infection were present. Once the patient presented with an infected port site wound, swabs were taken from the wound site and sent for culture and sensitivity; under general anesthesia, a tissue biopsy was taken from the discharging sinus and sent for tissue histopathology and culture for mycobacterium tuberculosis. The wound was then debrided and left open to heal by secondary intention. Out of the 27 surgical cases, 10 patients developed an infection; this infection was labelled as a chronic sinus infection based on its duration lasting more than three months and based on an abscess and sinus tract observed during ultrasonography of the abdominal wall, respectively. Medication was initially started based on the culture reports of the patients; two out of the ten infected patients' culture reports showed MSSA (methicillin sensitive staphylococcus aureus) and the result of the remaining patients revealed no growth.

The histological examination of seven out of ten cases showed multinucleated foreign body giant cells and poorly formed epithelioid granulomas suggestive of tuberculosis. These patients were administered anti-tuberculous therapy orally (Myrin-p forte tablets based on weight of each individual) for 9 months; these patients showed improvement within 6 weeks of administration of ATT.

Statistical analysis

All the data was collected in a preformed format and the following statistical analysis was done. The Chi square

	Streptomycin and gentamicin given	Streptomycin and gentamicin not given
Infected	1	10
Not infected	14	2

DISCUSSION

Laparoscopic cholecystectomy is a minimally invasive technique; therefore, it has a significantly smaller impact on the immune system resulting in a decreased possibility of infection.^[7] Port site infectious agents can be gram positive or gram-negative bacteria, which present within a week after the surgery; the other type of infectious agents can be mycobacteria, these present 3 to

test was used to decide the significance of the association between related variables, with a $P \leq 0.05$ considered as the cutoff point.

RESULTS

Out of the 35 patients that underwent laparoscopic cholecystectomy, 27 patients were included in our study, their ages ranged from 25- 60 years with a mean age of 44.4 years. Port site infection was found in 10/27 (37%) patients. All patients included in our study were female and all the patients were suffering from chronic cholecystitis due to cholelithiasis.

Based on the site of port infection 9 patients (90%) developed infection at the umbilical port, 7 patients (70%) developed infection at the epigastric port. According to the above data the p value is 0.264 therefore the test is not significant.

	Infected	Not infected
Umbilical port	9	1
Epigastric port	7	3

An important factor that played a role in spread of infection was the repetitive use of disposable ports. It was observed that out of the 27 patients, 11 patients were operated using ports the were previously used and out of those 11, 8 people were infected, a staggering 72%. The value of P is 0.001451 which proves a significant correlation between the multiple use of ports and the incidence of infection.

	Re-used ports	Once used ports
Infected	8	2
Not infected	3	14

Another factor included in the research was the pre-operative use of injectable Streptomycin and intra-operative use of Gentamicin in 15 out of the 27 patients. Out of these 15 only one developed port site infection. The value of p for this test was 0.000056 indicating that pre-operative cover of streptomycin and intraoperative cover of gentamicin aided in reducing the incidence of port site infection postoperatively.

4 weeks after the surgery. In our study the patients presented after 3 or 4 weeks with the complain of tenderness at the wound site with a purulent discharge; the wound margins were inflamed, red in color and an ultrasound of the wound site showed a sinus tract and an underlying abscess.

In a study by S. Chaudhuri, he mentions that the most common mycobacteria involved in laparoscopic

surgeries are the atypical mycobacteria such as *M. chelonae* and *M. fortuitum*.^[8] An important variable in the spread of infection is the sterilization technique of the ports and instruments used; in Pakistan the instruments are sterilized using 2.5% glutaraldehyde and then rinsed with tap water, this process re-introduces mycobacterium to the instruments leading to port site contamination.^[9] The laparoscopic instruments have a layer of insulation that restricts the use of autoclave in the sterilization process.

There is also deposition of blood and charred tissue that collects in the joints of the instruments and this debris is often not cleaned properly. These contaminated instruments deposit endospores on to the subcutaneous tissue during the surgery, thus, resulting in a port site infection. The use of disposable laparoscopic instruments is the gold standard method applied, however, it was observed that some of those disposable instruments were reused and resulted in a higher risk of infection as mentioned above. The standard sterilization procedure for laparoscopic instruments, currently in practice, is the immersion of the instruments in 2.5% glutaraldehyde for 20 minutes followed by a rinsing of the instruments with tap water before use. The laparoscopic instruments cannot be autoclaved as they have a layer of insulation around them which may be damaged by autoclaving. At the current exposure time the solution of glutaraldehyde acts as a high-level disinfectant and allows bacterial endospores to survive.^[10]

Current guidelines on infection control recommend a minimum of 8-12 hours exposure time and the use of higher concentrations of glutaraldehyde disinfectants. Another factor is the proper disposal of the disinfectant solution; these chemicals can only be used for a maximum of 100 cycles or a period of 2 weeks (2.5 % glutaraldehyde) or 4 weeks (3.4% glutaraldehyde), however, often no such account is kept the solutions are used for a longer duration of time or for cycles greater than the limit. Finally, the practice of rinsing the instruments with tap water or boiled tap water, further limits the efficacy of the use of this system of sterilization.^[11]

In light of recent events, certain precautions and preventive measures need to be taken for proper sterilization of the instruments. Firstly, the instruments need to be mechanically cleaned after dismantling the parts of the instruments to ensure maximum spore removal. This is best achieved by using ultrasonic technology. Secondly, the use of glutaraldehyde disinfectants need to be limited and replaced with ethylene oxide gas sterilization.^[12] furthermore, the water used to rinse the instruments should be autoclaved to prevent recontamination with spores after sterilization. the use of advanced sterilization systems such as STERRAD is strongly recommended for sterilization of insulated laparoscopic instruments. this technology uses gas plasma technology at low temperatures. another

technique is to keep instruments 24 hours in formalin gas chambers.^[13]

CONCLUSION

Port site infections are a common problem encountered by surgeons in developing countries; they can be prevented by adequate sterilization techniques and appropriate intra-operative and pre-operative antibiotic cover. These infections can be treated through early clinical diagnosis and prompt medical treatment.

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