Original Article

Shoulder Tip Pain Following Laparoscopic Cholecystectomy: Incidence and Severity

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ABSTRACT

Objective: To evaluate this problem incidence and severity, and to control this problem.
Study Design: Descriptive / cross-sectional study
Place and Duration of Study: This study was conducted at the Department of General Surgery, Khalifa Gul Nawaz Teaching hospital Bannu from June 2015 to June 2016.
Materials and Methods: Study was conducted on 42 patients aged between 20-52 years with symptomatic gall stone disease. Patients more than 15 years of age having symptomatic gall stone disease were included in the study. A proforma was designed for Operative time, CO_2 pneumoperitoneum pressure and shoulder tip pain and the results were analyzed on SPSS 23.
Results: The mean age was 33.8 years and age range was 20-52 years. There were 7 males and 35 females and male to female ratio was 1:5. The mean operative time was 55 minutes and the mean pressure pneumoperitoneum was 12mmHg. The incidence of shoulder tip pain was 33.3%. The shoulder tip pain was significantly more in patients operated with high pneumoperitoneum pressure.
Conclusion: There were significantly more patients who experienced shoulder tip pain when the CO2 pneumoperitoneum pressure was more and the severity was also more as compared to low pressure.

Key Words: Laparoscopy, cholecystectomy, shouldertippain, CO2 pneumoperitoneum pressure.

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INTRODUCTION

Cholecystitis is the most common disease of the biliary tree. Laparoscopic cholecystectomy is considered superior to open in terms of morbidity, cosmesis and rate of complications[1]. In the United States alone 770,000 laparoscopic cholecystectomies are performed annually[2].Cholecystectomy is being done for more than 100 years by open surgery technique[3]. In 1987 Phillips Moore of France performed first laparoscopic cholecystectomy[3,4]. Since then it became popular amongst general surgeons and now it is considered a gold standard procedure for gall stone disease[4].The incidence of shoulder tip pain was never heard of in the era of open surgery and was first reported after laparoscopic gynecological procedure. Complications similar to open surgery and some complications peculiar to LC occur, like shoulder tip pain. The incidence of shoulder tip pain varies greatly with some studies reporting incidences as high as 30-63%[5,6].

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Various factors have been explored to date of which CO2 pneumoperitoneum pressure is the predominant factor which causes shoulder tip pain, as it increases intra-abdominal pressure, which stretches the diaphragm and liver capsule which causes shoulder tip pain[6,7]. The intensity and duration varies between patients and unpredictable, the prevention and treatment therefore, is also controversial. We have designed in the current study to see the incidence and severity of shoulder tip pain at an average pressure, duration of surgery, age and sex factors too. As studies are going on to see the complications related to this procedure and to establish the efficacy and fruitfulness of this procedure. This study was designed to examine the factors leading to shoulder tip pain. Moreover to make some strategy of eliminating this problem, to make it pain free and we are able to undertake this procedure as a day surgery. This will both reduce the cost and improve patient compliance and finance.

MATERIALS AND METHODS

This existing study was carried out in the department of general surgery department of Khalifa Gul Nawaz teaching hospital Bannu from April 2015 to April 2015. Approval of the study was done from the local ethical committee. Informed consent was taken from the patient and also consents for open procedure if any complication arises during LC (laparoscopic cholecystectomy). Patients with dilated CBD (common bile duct) >8mm diameter, jaundiced patients, mass right hypochondrium, hepatitis B or C positive patients

were excluded from the study. Consecutive Sampling technique was used. Patients were admitted one day before operation, routine laboratory investigations like blood complete, blood urea and sugar, LFTs, Hepatitis B and C were done. Chest X–ray and ECG were done for patients more than 40. Operation was performed through standard 4 port technique, 2 ports were 5mm and two 10mm, one for camera and the other for dissection and extraction of gall bladder. Open technique was adopted for port insertion. Nasogastric tube was inserted to each patient to deflate the stomach facilitating the operation and avoiding injury. Drain was routinely placed postoperatively to drain the gas and also any blood or bile. Patients were discharged the next day routinely if recovered uneventfully. Findings were recorded on a proforma and the data was analyzed with SPSS 23 version.

RESULTS

A total of 42 patients were included in this study. 7(16.6%) were males and 35(83.4%) were females. Male to female ratio was 1:5. Age range was 20-52 years and average age was 33.8 years. Majority of the patients were in fourth decade followed by third decade. Average duration of the operation was 55minutes and the time range was 35-120 minutes.

Table No.1: Demographic characteristics

Age & Sex	No.& range	%age& average
Male	7	17%
Female	35	83%
Age	20-52	33.8%
Surgery Duration	35-120	55 min
CO_2 Pressure	9-16 mmHg	12 mmHg

Table No.2: Complications of Laparoscopic cholecystectomy

Complications	No. of patients	%age
Gall bladder perforation & stone spillage	12	35%
Shoulder tip pain	15	35.7%
CBD injuries and bile leak	1	2.1%
Port site infection	2	4.76%
Bleeding	3	7.1%
Abdominal pain(severe)	10	23.8%

The pressure of CO2 pneumoperitoneum was 9-16 mmHg (average 12 mmHg). 15(35.7%) patients out of 42 developed shoulder tip pain. One patient developed bile leak which was less than 500ml and was treated conservatively. Six (14.2%) patients sustained minor liver injury which was controlled by cautery or gauze pressure. Three (6.6%) patients had diaphragm injury, which was controlled with cautery. Perforation of gall bladder occurred in 12 (35%) patients and stone spillage occurred. Wound infection occurred in 1(2.1 %) patient.

DISCUSSION

Shoulder tip pain is a common symptom following laparoscopic cholecystectomy. As the cause for shoulder tip pain is not definitely known and different factors are thought to be responsible for this symptom. The most probable causes may be neuraprexia of the phrenic nerve, overstretching of the diaphragmatic fibers, CO_2 pneumoperitoneum, increased stretching of the liver capsule by the abdominal distention and displacement of the liver and traumatic injury, chemical or ischemic trauma[7]. In the current study the incidence of shoulder tip pain was 35.7% at an average pressure of 12mmHg. This is well within the range of other studies conducted on this topic and varies between 30-63% [5, 6]. However surgery at low pressure have low incidence of STP without compromising the safety and efficacy of the surgical procedure as evident from the literature[7, 8, 9]. Past studies show that to reduce the incidence of shoulder tip pain various procedures are used, which may be removal of CO2 at the end of the procedure or reducing the pneumoperitoneum pressure as evident from study by Sattar Z et.al and Chundrigar T et. al[8, 5]. This not only reduce the shoulder tip pain but also improve ventilation, less pulmonary complications, early mobilization and recovery, short hospital stay, early discharge and hence less cost[8]. Low pressure does not affect the surgeon's visibility and surgery could be performed without compromising the safety and efficacy of the surgical procedure[9]. Khan F et.al, in his study, highlighted technical difficulties encountered by the surgeon under LPP[6]. Instillation of local anesthetic to right sub diaphragmatic area has no effect on pain[10]. However the exact remedy for pain reduction is still a mystery to be found.

The average time taken in this study to perform laparoscopic cholecystectomy was 55 min, but the incidence of complications like shoulder tip pain and CBD injuries were not more than other studies with less operative times[4,] . One study claims that more the time taken more will be the injuries[11]. However the duration of surgery have no influence on postoperative pain[12]. The incidence of iatrogenic biliary injuries was 2.1%in this study. However the reported incidence in the literature was 0-2% which is comparable to this study[13]. Some studies report a very low incidence of 0.3% to 0.6%[13,14]. One study from china shows an incidence of 0.2-0.7%[15]. This contrast may be due to the experience of the surgeon. The high incidence in this study may be due to the fact that we were in the learning phase and not experienced. The injury was avoidable as it occurred due to diathermy in the vicinity of CBD and the patient was obese. It is in consistence with other

studies who pointed out that diathermy close to vital structures is the major underlying mechanism of biliary tree trauma[12, 13, and 16]. Other factors which predispose to biliary injury are obscured anatomy, poor dissection of CBD, acute cholecystitis and distended thickened gallbladder. A parallel increase in the incidence of iatrogenic bile duct injuries are reported in the literature during laparoscopic cholecystectomy as compared to open cholecystectomy[16]. However it is now decreasing as the experience with procedure advances[13]. To minimize the injuries to CBD three rules should be observed throughout the surgery; Full dissection of Calot's triangle, Dissection of cystic duct to display T-junction with CBD; Low threshold for conversion to open cholecystectomy. To avoid injuries good training on VR simulator should be done and a novice surgeon should not operate on a surgical patient until prescribed proficiency criteria has been achieved[17]. Bleeding or hemorrhage from vascular injury is the most lethal complication of LC as hemostasis with diathermy is the major factor in causing CBD injury. It was 7.1%% in this study which is within the range of 0.25-8% incurred in other studies[13,18]. Gall bladder perforation and stone spillage also occurs but of no practical significance. However sometimes abscesses and fistula may result which delays discharge from hospital[20]. The incidence of gall bladder perforation in this study was 35% which is not different from literature 16-50%[20]. The type of shoulder tip pain, its intensity and duration of varies between different patients and is largely unpredictable. The prevention and treatment of such pain, therefore, is also to reduce the incidence and severity of shoulder pain following laparoscopic surgery. Many studies have been carried out to examine the procedure related complications and for establishing the efficacy and fruitfulness of the procedure. However, to study the incidence and severity of shoulder tip pain at average pressure are limited. This research is different from the past studies and covers the research gap in three different directions, which signifies the current study. Firstly, the current study examines the incidence and severity of shoulder tip pain at an average pressure. Secondly some of the responsible factors of shoulder tip pain such as duration, age and sex were also considered. Thirdly, the study was designed to suggest a strategy which can make this procedure pain free and may be undertaken as day case surgery.

CONCLUSION

We can say that the STP and other complications we mentioned in this study are not so clearly related to single causative factor, however CO_2 pneumo-peritoneum is the most probable factor considered to be responsible for shoulder tip pain.

Conflict of Interest: The study has no conflict of interest to declare by any author.

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