

## Distinctive shoulder-tip pain post laparoscopic cholecystectomy: retrospective survey

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### Abstract

**Background:** Laparoscopic cholecystectomy is the par excellence surgical treatment for gall-stone disease. In spite of numerous benefits on top of open cholecystectomy, some patients had pain around the shoulder tip after laparoscopic cholecystectomy. The goal of our study was to assess frequency, significant or non-significant factors may affect on incidence or severity and distinct surgical techniques to keep down shoulder tip pain.

**Material and Methods:** A retrospective single centre study in Ziauddin University Hospital Karachi. In one year period from January 2016-December 2016, total 280 laparoscopic cholecystectomy patients were included.

**Results:** Total 280 patients underwent for surgery with a standard pressure pneumo-peritoneum at 12-14 mmHg in a one year period. We found 3 (1.07%) patients with shoulder tip pain. 2 were male, 1 was female with average age was 34+6.5 (range 13). All patients dealt with the proper suction irrigation and gas aspiration, abdomen pressed down for forced out gas at the end of procedure. Average pain score+SD was 8.3± 0.57 (range 1), 5.3±1.15 (range 2), 0.3+0.57 at 6,12 and 24 hours respectively with average time duration of surgery was 51+7.6 minutes (range 15 minutes).

**Conclusion:** The shoulder tip pain after laparoscopic cholecystectomy is dependent on a multiple factors. Some surgical techniques and interventions can reduce pain by gas aspiration with suction irrigation. The pressure of pneumo-peritoneum, increase intraoperative time duration had no effect on the incidence or severity of shoulder tip pain. Female pre-ponderance but no role of age as a cause of shoulder tip pain.

**Keywords:** Laparoscopic cholecystectomy; post-operative shoulder tip pain; Pneumo-peritoneum; insufflation; low pressure pneumo-peritoneum; high pressure pneumo-peritoneum; retrospective study.

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### Introduction:

Throughout the duration of surgery sufficient operating field is needed in the abdominal cavity for better exposure that gives to good enough patient's protection and outcome. General techniques to make working field in the abdominal cavity are pneumo-peritoneum by CO<sub>2</sub> gas and abdominal wall lifting techniques. Pneumo-peritoneum maintained at a continual gas pressure up to the end of procedure.<sup>1,2</sup> That is unique shoulder tip pain post-laparoscopic cholecystectomy due to the irritation of phrenic nerve in the diaphragm caused by the pneumo-peritoneum

gas (CO<sub>2</sub>) residues left over in the abdomen at the end of the surgery. The gas migrate higher when patient sits up, gas irritates the diaphragm and cause shoulder tip pain.<sup>2,3</sup> Return in normal state after surgery it rely on number of factors like abdominal pain, shoulder tip pain, fatigue, nausea and vomiting. A variety of adverse effects are because of abdominal wall stretching and irritation of diaphragm created by high pneumoperitoneum pressure by CO<sub>2</sub> gas.<sup>4</sup> Remain aware, it was supposed that low pneumo-peritoneum pressure will reduce surgery related complications. Usually the CO<sub>2</sub> pressure used to cre-

Table 1: Average of age and time duration of surgery

	Mean + SD	Range
Age	34+6.5	13
Time duration of surgery	51+ 7.6	15

Table 2: Pain Assessment by VAS (Visual analog scale)

Pain Assessment by VAS(visual analog scale)	Mean + SD	Range
At 6 hours	8.3± 0.57	1
At 12 hours	5.3 ± 1.15	2
At 24 hours	0.6+ 0.57	1

ate pneumo-peritoneum is approximately 15 mm Hg.<sup>5</sup> In few previous studies revealed low pressure pneumo-peritoneum (<12 mm Hg) lead to reduce post operative pain.<sup>4,6,7</sup> Despite that all study trials had no similar findings related to low pressure pneumo-peritoneum.<sup>7,8</sup> Additionally the protection of low pressure pneumo-peritoneum is not fully accepted. We designed a study to assess significant and non significant factors like pneumo-peritoneum pressure, suction drainage, abdominal wall lifting, time duration of surgery may effect on incidence or severity and distinct surgical techniques used to lessen shoulder tip pain after laparoscopic cholecystectomy.

#### Material and Methods:

A single centre Ziauddin University hospital Karachi, retrospective study carried out in one year period from January 2016 to December 2016. Retrospective database searched and reviewed patients record for shoulder tip pain, trial comprises 280 consecutive patients with symptomatic gallstone disease who experienced laparoscopic cholecystectomy. All patients were dealt with standard pressure pneumo-peritoneum (12-14mm Hg) during the surgery. The surgeries were performed by four skilled surgeons. A conventional four ports laparoscopic cholecystectomy was performed with the standard pressure (12-14mm Hg). Non-invasive steady monitoring of heart rate and blood pressure was performed during whole surgery. Assess significant and non significant factors like pneumo-peritoneum pressure, suction drainage, abdominal wall lift, saline irrigation effect on incidence or severity and distinct surgical techniques used

to lessen shoulder tip pain after laparoscopic cholecystectomy. Proper suctioned of gas by putting the suction irrigation on the upper part of the liver. At the end of the surgery usually tried to force out all pneumo-peritoneum CO<sub>2</sub> gas by press down the abdomen. Skin was approximated at all port sites wounds with absorbable sutures, and closure of the rectus sheath only at umbilicus site 10 mm ports. All port site wounds infiltrated by bupivacaine at the end of surgery. Analgesia was administered in the form of diclofenac 8 hourly with further doses if required. Post-operative incidence of shoulder tip pain was noted. Post-operative pain was calculated by using visual analog scale (VAS) at 6, 12 and 24 hours. Patients mobilized as early as conscious, allowed orally at six hours and discharged on next day of surgery.

#### Results:

Total 280 patients underwent for laparoscopic cholecystectomy with a standard pressure pneumo-peritoneum at 12-14 mmHg in a one year period. We found total three (1.07%) patients, had reported post operative referred right shoulder tip pain in two patients and one had left shoulder tip pain during first 6 hours after surgery. Two were male, one was female with average age was 34+6.5 (range 13)(Table 1). Investigated the effect of pressure of pneumo-peritoneum, active gas aspiration through suction irrigator, total time duration of surgery on shoulder tip pain after laparoscopic cholecystectomy. All patients dealt with the proper suction irrigation with saline and gas aspiration. All patients abdomen were pressed down for forced out pneumo-peritoneum gas at the end of procedure. At 6 hours, average pain score was 8.3± 0.57 with a range is 1. At 12 hours, pain score was 5.3 ± 1.15 with a range of 2. At 24 hours, average pain score was 0.6+ 0.57 with range 1 (Table 2). Average time duration of surgery was 51+ 7.6 minutes, range was 15 minutes (Table 1).

#### Discussion:

The laparoscopic cholecystectomy is an innovative approach attained in both the management

of gallstone disease and in minimal access surgery advancement<sup>1,2</sup> The purpose of laparoscopic cholecystectomy was to decrease the damage in course of access (port insertion) and carry on with suitable exposure throughout procedure.<sup>1,2</sup> Surgeons usually relied on generating a pneumo-peritoneum of up to 14-15 mm Hg by insufflating carbon dioxide gas into the peritoneal cavity. Necessary effect of pneumo-peritoneum to elevate the abdominal wall aside from the viscera put up free space to envision the gallbladder and all around the viscera, permit free movement of instruments and in addition permitting the intestine to move aside from the sub-hepatic space in left lateral position of the patient.<sup>2</sup> In literature compare the effects of intra-abdominal pressures on pain after laparoscopic cholecystectomy.<sup>9,10</sup> Previous studies had shown that low level pain in low pressure pneumo-peritoneum after laparoscopic cholecystectomy.<sup>11</sup> Little need of analgesia in low pressure technique. Some other benefits of low pressure pneumo-peritoneum specially in cardiac disease patients such as no or low hemodynamic fluctuation.<sup>9,12</sup> In literature, studies showed multiple factors such as pneumoperitoneum related pain after laparoscopic cholecystectomy. In addition, few contributing factors such as tissue damage at port sites during insertion, injury of liver bed during surgery, peritoneal and diaphragmatic stretch, irritation of phrenic nerve by CO<sub>2</sub> gas and stimulation of the sympathetic nervous system by excess gas.<sup>13</sup> Some studies reported that the post-operative shoulder tip pain was markedly less in low pressure pneumo-peritoneum as compared to standard pressure pneumo-peritoneum.<sup>12-16</sup> One more study shows low occurrence of shoulder tip pain and pain is three types, incisional wound site pain, referred shoulder tip pain and intra-abdominal pain.<sup>17</sup> Shoulder tip referred pain is due to pneumoperitoneum gas induced, or leftover gas pockets in the abdomen.<sup>9,18</sup> Intra-abdominal deep pain is pre-dominantly caused by the traction of bowel, abdominal wall stretching, and by pressing the abdominal viscera. Previous various studies showed the value of a clinically great mitigation in pain post-operatively.<sup>19-22</sup> Some other studies showed the strategy to decrease

the degree of pain after laparoscopic cholecystectomy. Numerous approaches can be applied like intra-peritoneal local anaesthetic infiltration, expel out left over gas prior to closure of ports, peritoneal washout with saline, ultrasound guided local anaesthetic block in transverse abdominis plane<sup>22,23</sup> In our study trial similar approaches used and no patient had any serious intra-operative or post-operative complications apart from shoulder tip pain only in few patients. In our study, almost all patients had unremarkable post-operative course. There is a need of big sample size trial with added complex arrangement.

#### **Conclusion:**

The onset of shoulder tip pain after laparoscopic cholecystectomy is dependent on a multiple factors. Some surgical techniques and interventions that usually revealed as pronounced reduction in occurrence rate or intensity of shoulder tip pain by gas aspiration with suction irrigation. The pressure of pneumo-peritoneum gas during the operation, increase intra-operative time duration had no effect on the incidence or severity of shoulder tip pain after laparoscopic cholecystectomy. Female pre-ponderance but no exact role of age as a cause of shoulder tip pain.

**Conflict of interest:** None

**Funding source:** None

#### **Role and contribution of authors:**

Dr Irum Masood, Ziauddin University Hospital Karachi, Design the study, data collection, tabulate and write-up intro, discussion, result, conclusion

Dr Haris Rasheed Consultant and laparoscopic General surgeon Ziauddin University hospital Karachi, Supervise, Design the study, initial methodology, Review

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