

Significance of Post-Operative Free Gas in Laparoscopic Surgery

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Abstract: Laparoscopic surgery is routinely performed nowadays at all centers with better patient outcome. But, in post-operative period, if any hollow viscus perforation occurred; either due to underlying pathology, or may be due to iatrogenic injury during laparoscopic surgery, can be missed in early stage due to pneumo-peritoneum created during laparoscopic surgery. We document our study on 50 patients to see patient outcome and time duration of resolution of pneumoperitoneum. We've done serial abdominal/chest x-rays in standing position from post-operative day 1 till the resolution of pneumo-peritoneum, in various laparoscopic procedures. On an average, CO₂ used during total duration of surgery was 98.7 liter of CO₂ in appendicectomy, 136.9 liter of CO₂ in cholecystectomy & 140 liter of CO₂ in hernioplasty. On observation, we didn't find pneumo-peritoneum on x-rays, even on post-operative day 1. In one patient, iatrogenic intra-operative cautery burn was present on anterior wall of stomach during laparoscopic cholecystectomy. But, on post-operative day-1, no pneumo-peritoneum was found. And even on serial abdominal/chest x-rays on subsequent postoperative days also, we didn't find any free gas. That patient recovered better. On conclusion, serial study of abdominal/chest x-rays in standing position during post-operative period following laparoscopic surgery is a better tool, to diagnose any hollow viscera perforation at the earliest, or on the other hand, to rule out any suspected hollow viscus perforation. [Brijesh P NJIRM 2017; 8(4):35-37]

Key Words: Laparoscopy, Pneumo-peritoneum, Free gas under diaphragm, Post-operative X-ray.

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Introduction: Laparoscopic procedures require insufflation of gas into the abdomen in order to facilitate inspection and manipulation of the viscera. The gas currently used is carbon dioxide, as this does not support combustion when intra-abdominal diathermy is used¹, and because of its high solubility gas emboli will be rapidly absorbed. There is a documented risk of hollow viscera perforation during laparoscopic surgery, either during creation of pneumo-peritoneum, or due to intraoperative mechanical or electrical injury. Those hollow viscera perforation should not be missed intra-operatively in the first place. But, if those injuries are missed, then there can be a dilemma in making the diagnosis on bases of the erect x-ray abdomen due to post-operative pain & residual post-operative pneumo-peritoneum due to insufflation of CO₂ during laparoscopic surgery.

Aims & Objectives: In this study, we aimed to determine for how long, following laparoscopic insufflation, residual gas persists. It can help in devising a relative time-frame up to which, post-laparoscopy pneumo-peritoneum can persist. This can help in either rule out or confirm hollow viscera perforation.

Material & Methodology: After obtaining INSTITUTIONAL REVIEW BOARD approval, patients presenting for laparoscopic procedures like Laparoscopic appendicectomy, Laparoscopic

Cholecystectomy & Laparoscopic Hernioplasty were recruited at the pre-operative assessment clinic that took place several days before the planned surgery.

All patients gave signed, informed consent. Mode of anaesthesia administered was general anaesthesia. Total duration of CO₂ insufflation during the operation noted. A total liter of CO₂ insufflated during surgery is also recorded. Pneumo peritoneum was deflated by opening the valve of trocars before removal of all trocars. Pressure is pre-fixed at 12mm of Hg and flow rate is pre fixed at 8 liter per minutes insufflated during all surgeries.

Patients were asked to undergo a limited erect X-ray of abdomen/ chest after they had recovered from anaesthesia for X-ray at 24 h post-surgery. Same x-ray was repeated 48 hours post-surgery.

Exclusion Criteria: Those patients who required conversion from laparoscopic to open surgery were excluded from the study group. Those patients who required drain insertion in laparoscopic surgery were also excluded.

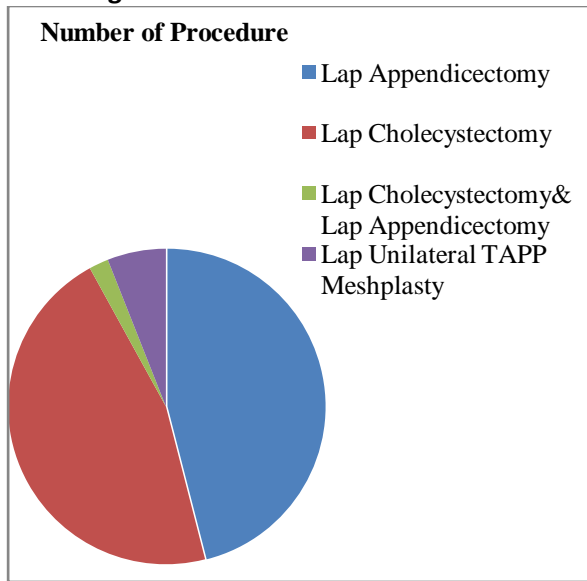
Observations & Results: Total 50 patients were enrolled for the research project. Out of which 23 patients (46%) required laparoscopic appendicectomy, 23 patients (46%) required laparoscopic cholecystectomy. 3 patients (6%) underwent Laparoscopic Unilateral TAPP Meshplasty. 1 patient

required simultaneous Laparoscopic Cholecystectomy & Appendectomy.

Table 1: Total number of procedures

| Name of Procedure | Number of Procedure |
|--|---------------------|
| Lap Appendectomy | 23 |
| Lap Cholecystectomy | 23 |
| Lap Cholecystectomy & Lap Appendectomy | 1 |
| Lap Unilateral TAPP Meshplasty | 3 |

Figure1: Distribution of Procedures

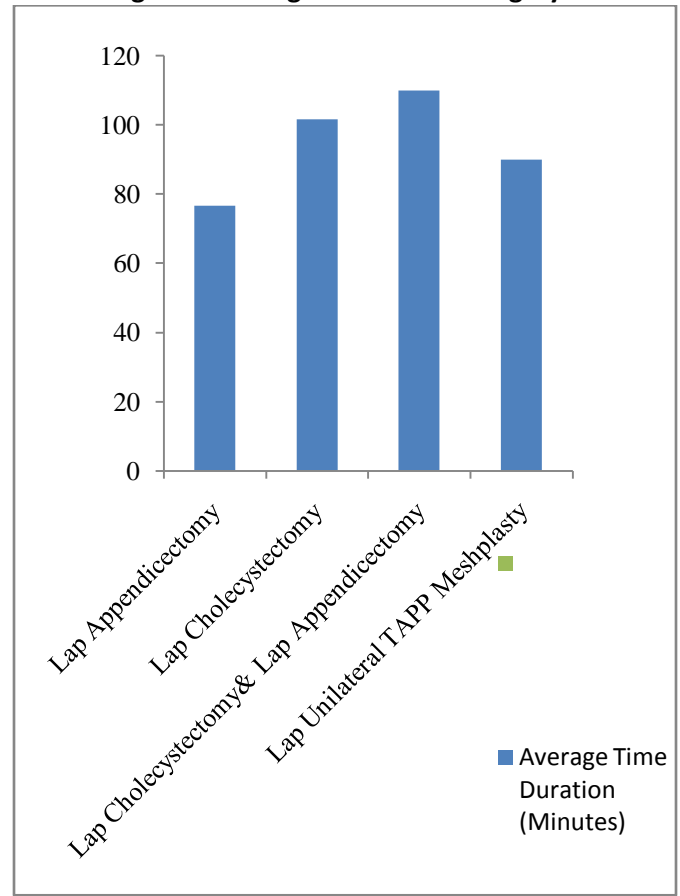


Out of these patients, average time taken during laparoscopic appendectomy was around 77 minutes. Laparoscopic Cholecystectomy took on average 102 minutes & laparoscopic cholecystectomy plus appendectomy took 110 minutes. Average time for Lap Unilateral TAPP Meshplasty was 90 minutes.

Table2: Average Duration of Surgery

| Name of Procedure | Average Time Duration (Minutes)±Std Deviation |
|--|---|
| Lap Appendectomy | 76.73±25 |
| Lap Cholecystectomy | 101.7±35 |
| Lap Cholecystectomy & Lap Appendectomy | 110 |
| Lap Unilateral TAPP Meshplasty | 90±15 |

Figure2: Average Duration of Surgery



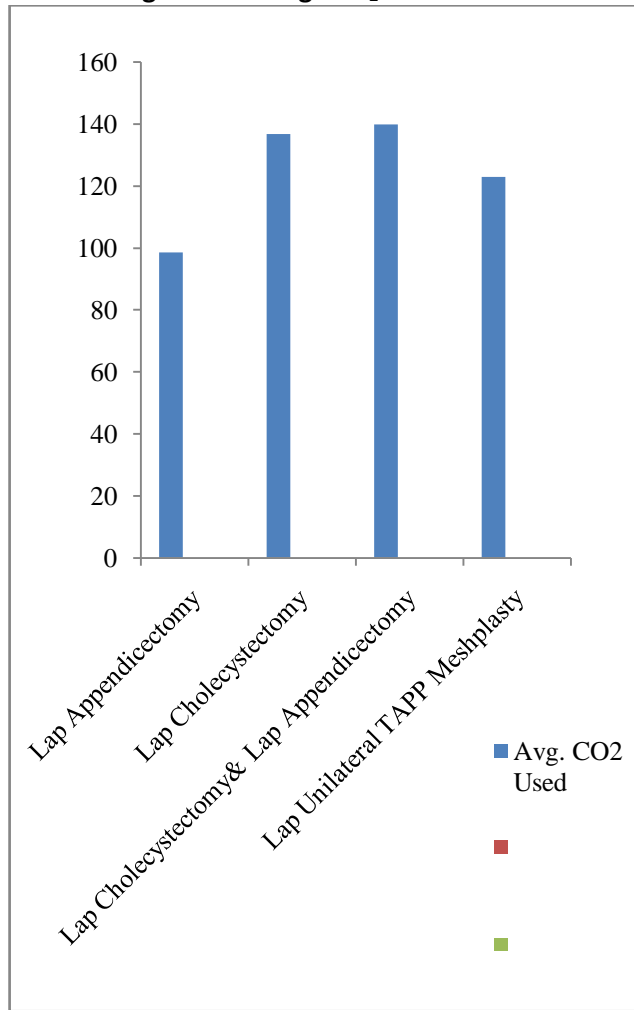
Average CO₂ used during laparoscopic appendectomy was 98.7 liters, whereas in laparoscopic cholecystectomy it was 136.9 liters. In Lap. Cholecystectomy & appendectomy average CO₂ used was 140 liters, and in Lap. Unilateral TAPP Hernioplasty, 123 liters of CO₂ was used.

Table3: Average CO₂ Insufflation

| Name of Procedure | Avg. CO ₂ Used |
|--|---------------------------|
| Lap Appendectomy | 98.7 |
| Lap Cholecystectomy | 136.9 |
| Lap Cholecystectomy & Lap Appendectomy | 140 |
| Lap Unilateral TAPP Meshplasty | 123 |

Discussion: In our study, we found no free gas under diaphragm on Abdominal X-ray standing, 24 hours post laparoscopy. Thus, the x-ray can be stated to have highly sensitivity. This can be due to smaller sample size.

Figure3: Average CO₂ Insufflation



pneumoperitoneum 24 hours post laparoscopy. So, we can at the earliest, or on the other hand, to rule out any suspected hollow viscus perforation.

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Draper et al² found in his study that the residual pneumoperitoneum following laparoscopic surgery resolves within 3 days in 81% of patients and within 7 days in 96% of patients. Postoperatively, retained carbon dioxide may serve as a diaphragmatic irritant, but rarely lasting beyond 36 hours, according to Fischer’s Mastery of surgery³. Whereas, in our study, we found no residual pneumoperitoneum 24 hours post laparoscopy.

Also, the post laparoscopy residual pneumoperitoneum has no significant correlation with the amount of CO₂ insufflated or duration of laparoscopy.

Conclusion : In our study, we found that after serial study of abdominal/chest x-rays in standing position during post-operative period following laparoscopic surgery is a better tool, to diagnose any hollow viscera perforation. As results show, there was no residual