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EVALUATION OF DURATION OF POST LAPAROSCOPIC PNEUMOPERITONIUM IN A TERTIARY CENTRE

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ABSTRACT

Aim of the study: This study is aimed at determining the frequency and duration of pneumoperitoneum in patients undergoing laparoscopic surgeries.

Material & methods: This is a prospective observational study done in SCB medical College, Cuttack .The study was done on a sample of 144 patients .Serial chest x ray in erect posture was performed from POD-1 till pneumoperitoneum persists.

Results: No evidence of pneumoperitoneum was seen on chest radiographs taken on POD-day 1 in 52(36%) of the 144 patients who completed the study. Pneumoperitoneum diminished in all of the remaining 92 patients within the first week.

Conclusion: Pneumoperitoneum vanished with 3days in most of the patients. The pneumoperitoneum vanished early in patients having

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laparoscopic surgeries in comparison to laparotomy. Gas under diaphragm in early post operative period should not be considered as an indication for laparotomy.

Keywords: pneumoperitoneum, laparoscopic, laparotomy, diaphragm

INTRODUCTION

Hans Christian jacobaues, a Swedish physician performed the first clinical laparoscopy in men in 1910 for diagnosis purpose. Prof Kurt semm, gynaecologist performed the world's first laparoscopic appendicectomy in 30 Sept 1980. [1]Laparoscopic cholecystectomy, first performed in 1987 by Mouret, has become the operation of choice for patients requiring cholecystectomy.[2] Despite the popularity of laparoscopic surgery, the frequency and duration of postoperative pneumoperitoneum are not well established.

Laparoscopic surgery is performed by the insufflation of carbon dioxide into the peritoneal cavity. Carbon dioxide is the standard gas used, largely because it does not support combustion. After absorption from the peritoneum, it is readily excreted via the lungs.[3]

Carbon dioxide is 20 times more soluble in serum than room air or oxygen and has been shown to be absorbed 32 times more quickly than room air when used for double-contrast barium enema. Pneumoperitoneum is likely to be smaller in volume and shorter in duration after laparoscopic surgery than after open laparotomy.

AIMS AND OBJECTIVES OF THE STUDY

This study aimed to determine the frequency and duration of pneumoperitoneum after laparoscopic surgeries, as free air under diaphragm detected on upright posterior anterior chest radiographs.

MATERIALS AND METHODOLOGY

Patients admitted to the department of general surgery, S.C.B medical college, Cuttack who underwent any kind of laparoscopic surgery and fulfilling the criteria's of patient selections were included in this study. The study was conducted for a period of 1 year from august 2022 to August 2023 and the sample size was 144. It was a prospective observational study.

Patients are selected as per following criteria–

INCLUSION CRITERIA

- Patients above 18 years of age and less than 80 years of age
- Patients undergoing any kind of elective laparoscopic surgery
- Patients willing to participate on the study after informed written consent

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EXCLUSION CRITERIA

- Patients undergoing emergency laparoscopic surgery
- Patients who were given abdominal drainage after laparoscopic surgery

Upright posterior anterior (PA) chest radiographs were obtained 24hr after surgery (day 1); additional radiographs were obtained on day 2, 3, 7 and 14, if required, until the pneumoperitoneum resolved. A perpendicular measurement of any pneumoperitoneum detected between the diaphragm and the liver was obtained. The pneumoperitoneum was graded as absent, trace (1-5 mm), mild (6-10 mm), or moderate (10-15 mm).[10,11]

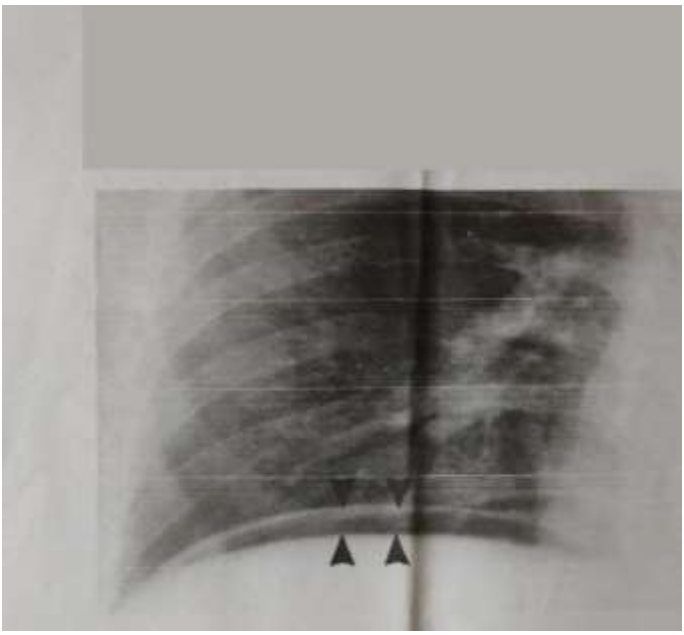

Fig. 1—Poster anterior radiograph of right hemi diaphragm showing the most extensive pneumoperitoneum detected in our series after laparoscopic cholecystectomy. Perpendicular measurement between diaphragm and liver (arrowheads) is 9 mm, corresponding to mild pneumoperitoneum.

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RESULTS

Table 1 summarizes the findings for the 144 patients in this study. 52 (36%) of the 144 patients had no evidence of pneumoperitoneum on the initial chest radiograph obtained on post-operative day 1. For the remaining 92 patients (64%), pneumoperitoneum was detected postoperatively for various lengths of time. Pneumoperitoneum vanished in 133(92%) of patients within post operative day 3.

For all patients, the pneumoperitoneum resolved in the first week after surgery. The study showed an inverse correlation between body weight and the duration of pneumoperitoneum (Spearman correlation coefficient = -.48; $p < .001$).

Thin Patients showed more extensive pneumoperitoneum that lasted longer. Obese patients, on the other hand, had less extensive pneumoperitoneum (if they had any at all) that disappeared sooner. Only 21 (27%) of 76 obese and pre-obese patients had postoperative pneumoperitoneum. In comparison, 40(59%) of 68 thin or average weight patients had postoperative pneumoperitoneum.

TABLE 1: Duration of Pneumoperitoneum Seen on Chest Radiographs after Laparoscopic surgeries

DAYS OF RESOLUTION	NO. OF PATIENTS
1	52
2	20
3	61
4	09
5	02

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Table 2 : represents the relationship between BMI and time taking for resolution of pneumoperitoneum post laparoscopic abdominal surgery.

BMI (Kg/m2)	No. of patient	Days of resolution
< 18.5	09	5
18.5- 24.9	59	4
25-29.9	64	3
30-34.9	12	1

DISCUSSION

Postoperative pneumoperitoneum is a common phenomenon after abdominal surgeries. The air is most often residual and not a sign of disruption of the gastrointestinal tract.[4,12] The presence of free air in the peritoneal cavity makes it difficult to differentiate it from hollow viscus perforation on radiological investigation .Therefore, it is of paramount importance to determine the duration to which post operative pneumoperitoneum persists. The duration of pneumoperitoneum is well documented in case of laparotomy.

In 1961, Bevan [5] reported that 77% of his patients had pneumoperitoneum after a variety of abdominal operations. The duration of pneumoperitoneum was directly related to the volume of air seen on the initial chest radiograph in the first 24 hr. He found that pneumoperitoneum after laparotomy generally resolved by 10 days but could last significantly longer. Keiser and Lemmertz [8,9] found that 50% of their patients had pneumoperitoneum after open cholecystectomy and that the pneumoperitoneum lasted for an average of 4.9 days. A smaller volume of free air and a shorter duration of pneumoperitoneum are expected after laparoscopic compared with open laparotomy.

The frequency of pneumoperitoneum after Laparoscopic surgeries in our 144 patients, as seen on chest radiographs, was 64%, as determined from the initial radiograph taken on Post operative day

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1 .

Pneumoperitoneum vanished in 92% of patients on post operative day 3 & by 5days the pneumoperitoneum vanished in all patients. This is possibly due to the use of C02 for inflation in Laparoscopic surgeries which is absorbed better in comparison to room air.[7]

Pneumoperitoneum was seen less frequently in obese patients in the study and, when present, was often less extensive and resorbed faster than in average-weight and thin individuals. Only 27% of our obese and pre obese patients had pneumoperitoneum postoperatively; in comparison, 59% of patients who were thin or normal BMI had this condition. It has been proposed that for asthenic patients, more air is trapped beneath the lower part of the rib cage (partial roof of the peritoneal cavity) when the abdominal muscles are relaxed and the peritoneum is pulled up to close the incision [5, 6].

CONCLUSION

This study has shown that the pneumoperitoneum persists postoperatively for few days following laparoscopic abdominal surgery .This finding is important for patients in whom perforation is suspected in postoperative period .In the event of a complicated postoperative course, the radiological demonstration of free air in itself should not play a major role in the clinical decision whether or not a laparotomy is indicated.

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