

Original Research Article

Correlation of shoulder tip pain in case of low pressure and standard pressure pneumoperitoneum post laparoscopic cholecystectomy

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ABSTRACT

Background: Laparoscopic cholecystectomy is gold standard treatment for cholelithiasis now a days. Post-operative shoulder tip pain is common complain after laparoscopic cholecystectomy. The cause of this shoulder tip pain is multifactorial e.g. peritoneal stretching and diaphragmatic irritation. The main cause of this shoulder tip pain is pneumoperitoneum caused by carbon dioxide. Correlation of shoulder tip pain in case of low pressure (7-8 mmHg) and standard pressure (12-14 mmHg) pneumoperitoneum post laparoscopic cholecystectomy.

Methods: A prospective randomized study was done in 100 patients of cholelithiasis in SMS hospital Jaipur Rajasthan. The patients were divided into two groups-Group A patients undergoing laparoscopic cholecystectomy at low pressure (7-8 mmHg) and group B patients undergoing laparoscopic cholecystectomy at standard pressure (12-14 mmHg). The intensity of shoulder tip pain were measured by visual analogue score at 1, 6, 12, 24 and 48 hours. In both of the group results were compared in terms of frequency of pain, intensity of pain and requirement of post-operative analgesics. The duration of hospital stay was also compared.

Results: Post-operative shoulder tip was found to be less in low pressure group (group A) as compare to standard pressure group (group B). Total requirement of post-operative analgesic dose and hospital stay was also found to be less in low pressure group as compared to standard pressure group. This was statistically significant (p value<0.05).

Conclusions: There is less intensity, frequency of shoulder tip pain, less post-operative analgesics requirement and less post-operative hospital stay after laparoscopic cholecystectomy done under low pressure pneumoperitoneum (7-8 mmHg).

Keywords: Laparoscopic cholecystectomy, Low pressure, Post-operative shoulder pain, Standard pressure

INTRODUCTION

Laparoscopic cholecystectomy is gold standard technique for cholelithiasis nowadays.¹ After laparoscopic cholecystectomy many patients complain of significant shoulder tip pain which prolongs the hospital stay of the patient. Intra-abdominal pressure created by pneumoperitoneum is thought to be one reason for post-operative shoulder tip pain. Peritoneal stretching and diaphragmatic irritation by high pressure pneumoperitoneum or by carbon dioxide absorption from the peritoneal cavity are responsible for post-operative

shoulder tip pain.² Other reason proposed for shoulder tip pain is sympathetic nervous system stimulation by hypercarbia.³ For post-operative pain analgesics like diclofenac sodium, fentanyl, morphine and ibuprofen have been used but none of them showed complete analgesia.⁴ Complete pain relief after laparoscopic cholecystectomy needs multimodal analgesia.

Various authors have concluded that there is less post-operative shoulder tip pain when laparoscopic cholecystectomy done under low pressure pneumoperitoneum (7-8 mmHg).⁵⁻¹⁰

Aim and objectives

Correlation of shoulder tip pain in case of low pressure (7-8 mmHg) and standard pressure (12-14 mmHg) pneumoperitoneum post laparoscopic cholecystectomy. To choose the ideal working pressure for laparoscopic cholecystectomy to reduce the significant post-operative shoulder tip pain.

METHODS

A prospective randomized study was done in the department of general surgery at SMS Medical College and Hospital, Jaipur, Rajasthan, India, after taking approval from hospital ethical committee. 100 patients of age group 18-60 years underwent elective laparoscopic cholecystectomy for uncomplicated gallstone disease. Patients were divided into two groups of 50 each. Group A patients underwent laparoscopic cholecystectomy with low pressure pneumoperitoneum (7-8 mmHg) while group B underwent laparoscopic cholecystectomy with standard pressure pneumoperitoneum (12-14 mmHg). A written informed consent was taken from all the patients. All the patients were educated about the visual analogue scale (VAS) at the time of pre-anaesthetic check-up.

Post-operative pain was recorded at 1 hour, 6 hours, 12 hours, 24 hours and 48 hours. Post-operative pain was assessed using visual analogue scale (VAS) of pain. Patients marked the intensity of pain with a vertical line on a 10 cm scale with the left end described 'no pain' and right end described as worst pain. Patients complaining of pain were treated by rescue analgesic in the form of intravenous doses of injection tramadol 100 mg. Rescue analgesic was repeated on request by patient with minimum interval of 20 minutes. The dosage of injection tramadol and time of administration were recorded by staff nurse.

Study period

The study was conducted from March 2019 to December 2020.

Sample size and sample technique

Sample size was calculated at 80% study power and α -error 0.05 assuming proportion of patient having shoulder tip pain undergoing low pressure pneumoperitoneum and standard pressure pneumoperitoneum laparoscopic cholecystectomy for cholelithiasis is 8% and 32% respectively. The minimum sample size required was 44 patient undergoing laparoscopic cholecystectomy for cholelithiasis in each group which is further enhanced and rounded off 50 such patients in each group.

Visual analogue scale

Laparoscopic cholecystectomy was done in all 100 cases. Standard statistical methods were used for analysing the

outcome of study p value<0.05 showed statistically significant value.

Inclusion criteria

Age 18 to 60 years, cases giving written informed consent.

Exclusion criteria

Pregnancy, patient having pre-existing shoulder pain, acute cholecystitis.

RESULTS

The study was done at SMS medical college and hospital Jaipur, Rajasthan. The study was conducted on 100 patient underwent laparoscopic cholecystectomy. 50 patients (group A) underwent laparoscopic cholecystectomy at low pressure pneumoperitoneum (7-8 mmHg) and 50 patients (group B) underwent laparoscopic cholecystectomy at standard pressure pneumoperitoneum (12-14 mmHg).

Table 1: Postoperative shoulder tip pain in low and standard pressure groups.

Group	Postoperative shoulder tip pain		Total
	No	Yes	
Low pressure count	43	7	50
% within group	86	14	100
Standard pressure count	31	19	50
% within group	62	38	100
Total count	74	26	100
% within group	74	26	100

Table 2: Postoperative shoulder tip pain score of low and standard pressure groups.

Group	Mean visual analogue score of postoperative shoulder tip pain			
	1 hr	6 hr	12 hr	24 hr
Low pressure	0.00	0.40	0.20	0.13
Std. pressure	0.10	1.94	1.24	0.92
p value	0.159	0.00024	0.00022	0.00004

Table 3: Analgesic requirements of low and standard pressure groups.

Group	Analgesic required		Total
	No	Yes	
Low pressure count	23	27	50
% within group	46	54	100
Standard pressure count	14	36	50
% within group	28	72	100
Total count	37	63	100
% within group	37	63	100

Table 4: Total analgesic requirement of low and standard group.

Group	Total analgesic requirement (ampoules of tramadol)	
	N	Mean±SD
Low pressure group	50	1.11±0.32
Standard pressure group	50	1.69±0.78

Table 5: Post-operative hospital stay of low pressure and standard pressure group.

Group	Duration of postoperative stay (days)	
	N	Mean±SD
Low pressure group	50	1.42±0.81
Standard pressure group	50	1.49±0.56

Both of group compared for post-operative shoulder tip pain and analgesics requirement and post-operative hospital stay (Table 1-5).

Post-operative shoulder tip pain was significantly less in low pressure group (group A).

Visual analogue score was significantly less in low pressure group (group A).

Post-operative analgesics requirement was significantly less in low pressure group (group A).

Post-operative hospital was significantly less in low pressure group (group A).

DISCUSSION

Laparoscopic cholecystectomy has major benefits like less post-operative pain, less morbidity related to upper abdominal incision and earlier post-operative recovery but significant patients have post-operative shoulder tip pain after laparoscopic cholecystectomy. Peritoneal stretching and diaphragmatic irritation by high pressure pneumoperitoneum or by carbon dioxide absorption from the peritoneal cavity are responsible for post-operative shoulder tip pain.²

In our study post-operative shoulder tip pain frequency and intensity was found significantly less in group A that underwent laparoscopic cholecystectomy at low pressure pneumoperitoneum (7-8 mmHg).

Only 7 patients (14%) in group A and 19 patients (38%) in group B suffered from shoulder tip pain which is statistically significant with $p < 0.05$. The intensity of shoulder tip pain was significantly lower in group A at 1, 6, 12, and 24 hours than group B (recorded on VAS). Post-operative analgesics requirement and hospital stay was also significantly lower in group A than group B.

Our findings are similar to the study carried out by Barczynski et al, Sarli et al and Sandhu et al.^{5,8,9}

Limitations

There is a limitation of the study. All surgeries performed by different surgeon with different years of experience, so outcomes may differ.

CONCLUSION

This study demonstrates that use of simple expedient of reducing the pressure of the pneumoperitoneum to 7-8 mmHg results in significant reduction in both frequency and intensity of post-operative shoulder tip pain, less requirement of post-operative analgesics and less post-operative hospital stay.

On the basis of these results, the widespread use of low pressure pneumoperitoneum for laparoscopic cholecystectomy can be used in uncomplicated gall stone disease.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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