

Comparison of Low Pressure and High Pressure Pneumoperitoneum in Patients Undergoing Laparoscopic Cholecystectomy-A Randomized Prospective Study.

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ABSTRACT

Background: Pneumoperitoneum of 12-16mmHg is created by instillation of carbon dioxide during laparoscopic cholecystectomy. Nowadays low pressure pneumoperitoneum of 8-10 mmHg is used to decrease the side effects. In our study we have compared the two methods. **Methods:** Eighty patients with gallstones admitted in Government Hospital Gandhinagar (district hospital Jammu) for laparoscopic cholecystectomy were divided into two groups of forty each. Forty patients were subjected to standard pressure pneumoperitoneum during the procedure and forty patients to low pressure pneumoperitoneum. **Results:** Very slight difference in operating time of two groups was seen. No significant change in postoperative blood pressure and heart rate seen. Only two patients had shoulder tip pain and required more analgesics. **Conclusion:** High pressure pneumoperitoneum has no effect on intra operative and post operative hemodynamics but can lead to increase in post operative pain.

Keywords: Laparoscopic cholecystectomy, low pressure pneumoperitoneum, high pressure pneumoperitoneum, shoulder pain.

INTRODUCTION

Laparoscopic cholecystectomy has been the gold standard treatment for gallbladder stones since its inception in 1988.^[1] The main aim was to improve the cosmetic and postoperative outcome. A large number of changes have been made in the technique of laparoscopic cholecystectomy since its inception, like conversion of four ports, to three ports, or to the most recent single site laparoscopic cholecystectomy. Laparoscopic cholecystectomy involves creation of high pressure pneumoperitoneum, in which carbon dioxide is introduced under pressure into the abdomen, to lift the abdomen wall, for clear visualisation of abdominal structures and easy manipulation of instruments. Pneumoperitoneum of 12 to 16 mm Hg is generally created by closed Veress needle or via a port.^[2,3] High pressure carbondioxide has its own side effects like hypercapnia, acidosis, decreased pulmonary compliance, increase peak airway pressure and increased venous return.^[4] Healthy people are not much affected by these side effects,

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but people with compromised cardiorespiratory reserve are not able to cope with these haemodynamic changes. Moreover some patients also complain of shoulder tip pain after the laparoscopic cholecystectomy due to irritation of phrenic nerve by insufflated carbon dioxide. Most of these side effects can be minimized by creating low pressure pneumoperitoneum that is by decreasing the pressure of carbon dioxide to 8-10 mm of Hg. This has the limitation of increasing the intraoperative time, as the working space becomes less, thus compromising the patient safety. A number of studies have been conducted to see the impact of standard pressure and low pressure peritoneum following laparoscopic cholecystectomy but their findings remain inconclusive. The present study has been undertaken to compare the advantages and disadvantages of low pressure to standard pressure pneumoperitoneum during laparoscopic cholecystectomy in a district hospital of Jammu region as this has an effect on the morbidity postoperatively.

MATERIALS AND METHODS

The present study was a randomized prospective study, which was carried out in the Department of

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Surgery of Government Hospital Gandhinagar (District Hospital) Jammu from January, 2018 to October 2018. Eighty patients with cholelithiasis admitted for laparoscopic cholecystectomy were included in the study. All of the patients were married females in the age group of 35 to 50 years. None of the patients had any previous history of cardiorespiratory disease. The patients with recent (4-6 weeks) history of acute attack of cholecystitis were excluded from the study. A detailed explanation of the procedure was explained to the patients and verbal informed consent taken. Ethical clearance from the Institutional Ethical Committee was taken. All the patients were divided into two equal groups of forty each, which were called as Group 1 and Group 2. In Group 1 of forty patients, laparoscopic cholecystectomy was done by creating standard pressure pneumoperitoneum of 12-16 mm of Hg while in Group 2 (forty patients) it was done by creating low pressure pneumoperitoneum ranging from 08-10 mm of Hg. The surgical and anaesthesiologist team was same in all the eighty patients. The cardiorespiratory parameters like pulse rate, blood pressure, oxygen saturation were noted at the time of admission and were compared with the same taken after surgery. Post operative pain was noted by the amount of analgesics consumed by the patients during and after the procedure. All the findings were analysed and tabulated.

RESULTS

Laparoscopic cholecystectomy is the gold standard in the treatment of cholelithiasis by minimal access surgery.^[5] In this procedure carbon dioxide gas is insufflated under pressure, in the peritoneal cavity, to create pneumoperitoneum. This lifts the abdominal wall and creates a space for dissection. The insufflations of carbon dioxide under pressure is not devoid of side effects.^[6,7] To counteract these side effects there has been a recent trend to create pneumoperitoneum at low pressure during laparoscopic cholecystectomy. In the present study a total of 80 patients were divided into two groups. In only one patient of Group 1 the, laparoscopic cholecystectomy had to be converted to open cholecystectomy. This was due to redundant gallbladder. This incidence of conversion to open cholecystectomy is 1 in 40 patients and is therefore not statistically significant. Time taken to perform laparoscopic cholecystectomy in Group 1 ranged from 30-35 minutes while in Group 2 the range was from 35-40 minutes. There was no significant change in heart rate and blood pressure in patients of both the groups [Table 1]. The minimal difference in these parameters between the two groups is statistically insignificant. The response to pain was however statistically significant as two patients of Group 1 complained of more postoperative pain. They consumed more analgesics and had a longer hospital stay as contrast to other patients of Group 1 and Group 2. The same two patients of Group 1 also complained of shoulder tip pain postoperatively, but postoperative period of Group 2 patients was uneventful.

Table 1: Showing the findings of comparison of low and high pressure pneumoperitoneum in laparoscopic cholecystectomy

Group	No Of Patients	Mortality	Conversion To Open	Hospital Stay (Days)	Operative Time (Minutes)	Cvs Side Effects	Pain Port Site(No Of Patients)	Shoulder Tip Pain (No Of Ppatients)
Group i (high pressure)	40	NIL	NIL	2	30-35	NIL	2	2
Group ii (low pressure)	40	NIL	1	2	35-40	NIL	NIL	NIL

DISCUSSION

High pressure carbon dioxide is introduced into the abdomen, while performing laparoscopic cholecystectomy, to view the structures within the abdomen and easy dissection. The changes which it causes in the blood circulation may be detrimental. So, nowadays high pressure is being replaced by low pressure carbon dioxide insufflations which has its own limitation of causing less distention of the abdomen. This would lead to limitation in the dissection field, which further leads to inadvertent damage to the structures. The intraoperative time may also increase. A number of authors like Barczynski M 2002 and Barczynski M 2003 have

observed improved postoperative quality of life and reduced intensity of surgical pain by creating low pressure pneumoperitoneum with carbon dioxide.^[8,9] This holds true in the present study also where Group 2 patients had less pain postoperatively. Some workers like Hemanga K et al 2017 noted that,^[10] incidence of shoulder tip pain after laparoscopic cholecystectomy performed at low pressure pneumoperitoneum, is significantly less, as compared to standard or high pressure pneumoperitoneum. This holds true in our study also where 2 patients of Group 1 complained of shoulder tip pain postoperatively. The postoperative haemodynamic status of the patients did not show any significant change in both the groups. This finding of ours is not in accordance with Perrakis E

et al,^[11] 2003 who proposed that low pressure pneumoperitoneum results in lesser hemodynamic changes but goes hand in hand with the observations of Dexter SP et al 1999,^[12] in which there was no statistical difference in change in blood pressure and heart rate in low pressure and high pressure pneumoperitoneum groups. In our study, the post operative period of both the groups was uneventful.

CONCLUSION

Our study compared the outcome of low pressure and standard pressure pneumoperitoneum in laparoscopic cholecystectomy patients. Serious adverse events were not reported in our study. The difference in the operating time of two groups was less than five minutes and hence was not significant clinically. Only two patients complained of port site pain and shoulder tip pain post operatively. No cardio pulmonary complications were observed. Therefore clinical benefit of low pressure pneumoperitoneum was not apparent in our study though we conclude that it may have detrimental effects on patients with any comorbidity.

REFERENCES

1. Brockmann JG, Kocher T, Senninger NJ, Schurmann GM. Complications due to gall stones lost during laparoscopic cholecystectomy. An analysis of incidence, clinical course and management. *Surg Endosc* 2002;16:1226-32.
2. Casati A, Valentini G, Ferrari S, Senatore R, Zangrillo A, Torri G. Cardiorespiratory changes during gynaecological laparoscopy by abdominal wall elevation: comparison with carbon dioxide pneumoperitoneum. *British Journal of Anaesthesia* 1997;78(1):51-4.
3. Alijani A, Hanna G B, Cuschieri A. Abdominal wall lift versus positive pressure capnoperitoneum for laparoscopic cholecystectomy-Randomized controlled trial. *Annals of Surgery* 2004;239(3):388-94.
4. Henny C P, Hofland J. Laparoscopic surgery: pitfalls due to anaesthesia, positioning, and pneumoperitoneum. *Surgical Endoscopy* 2005;19(9):1163-71.
5. Uen Y H, Chen Y, Kuo C Y, Wen K C, Koay L B. Randomized trial of low pressure carbondioxide elicited pneumoperitoneum versus abdominal wall lifting for laparoscopic cholecystectomy. *J Chin Med Assoc* 2007;70:324-30.
6. Koc M, Ertan T, Tez M, Kocpinar M A, Kilic M, Gocmen E, et al. Randomized prospective comparison of postoperative pain in low versus high pressure pneumoperitoneum. *ANZ J Surg* 2005;75:693-6.
7. Esmat ME, Elsebae MM, Nasr MM, Elsebaie SB. Combined low pressure pneumoperitoneum and intraperitoneal infusion of normal saline for reducing shoulder tip pain following laparoscopic cholecystectomy. *World J Surg* 2006;30:1969-73.
8. Barczynski M, Herman RM. The usefulness of low pressure pneumoperitoneum in laparoscopic surgery. *Folia Med Cracow* 2002;43:43-50 (Abstract).
9. Barczynski M, Herman RM. A prospective randomized trial on comparison of low pressure and standard pressure pneumoperitoneum for laparoscopic cholecystectomy. *Surg Endosc* 2003;17:533-8.
10. Hemanga K, Azarudeen J, Virinder B, Asuri K, Subodh K, Rajeshwari S, Rashmi R, Mahesh M. Impact of standard

pressure and low pressure pneumoperitoneum on shoulder pain following laparoscopic cholecystectomy: a randomized controlled trial. *Surg Endosc* 2017;31(3):1287-95.

11. Perrakis E, Vezakis A, Velimexis G, Savanis G, Deverakis S, Antoniadis J et al. Randomized comparison between different insufflations pressure for laparoscopic cholecystectomy. *Surg Laparosc Percutan Tech* 2003;13:245-9.
12. Dexter S P, Vucevic M, Gibson J, McMahon MJ. Hemodynamic consequences of high and low pressure capnoperitoneum during laparoscopic cholecystectomy. *Surg Endosc* 1999;13:376-81.

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