

Original Research

Efficacy of dexmedetomidine on hemodynamic stability in patients undergoing laparoscopic cholecystectomy

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ABSTRACT:

Background: Cholelithiasis is one of the most common digestive tract diseases and constitutes an important health problem. The present study was conducted to evaluate efficacy of dexmedetomidine on hemodynamic stability in patients undergoing laparoscopic cholecystectomy. **Materials & Methods:** 50 patients selected for laparoscopic cholecystectomy of both genders were divided into 2 groups. Group I patients received dexmedetomidine 200 mcg (2ml) in 38 ml of 0.9% NS @ 0.2 µg/kg/hr infusion and group II patients received 0.9% saline was given at same rate. Parameters such as pulse rate, mean arterial pressure, oxygen saturation, EtCO₂ and isoflurane requirement was recorded. **Results:** Group I had 13 males and 12 females and group II had 10 males and 15 females. The mean duration of surgery in group I was 50.2 hours and in group II was 48.9 hours, heart rate was 84.2 beats/min and in group II was 86.2 beats/min, SBP was 126.4 mm Hg in group I and 124.2 mm Hg in group II, DBP was 80.6 mm Hg in group I and 78.4 mm Hg in group II, MBP was 94.5 mm Hg in group I and 92.1 mm Hg in group II, SpO₂% was 97.2% in group I and 98.4% in group II and EtCO₂ in group I was 36.1 and in group II was 35.7. The difference was non-significant (P > 0.05). **Conclusion:** Dexmedetomidine infusion in the dose of 0.2 µg/kg/hr effectively attenuates haemodynamic stress response to pneumoperitoneum during laparoscopic surgery.

Key words: Dexmedetomidine, laparoscopic surgery, pneumoperitoneum

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INTRODUCTION

Cholelithiasis is one of the most common digestive tract diseases and constitutes an important health problem in developed countries. It is estimated that 10-15% of the adult population accounting for 20 to 25 million americans have or will have gallstones.¹ The third National Health and Nutrition Assessment estimates that 6.3 million of men and 14.2 millions of women aged between 20 and 74 years in the United States had gallbladder disease. Besides the problems related to health, cholelithiasis also brings significant costs, estimated at around 6.2 million dollars annually in the same country.²

Laparoscopic technique minimizes trauma and stress response of the interventional procedure. Other advantages include reduced postoperative pain and analgesic requirement, rapid return of gastrointestinal function, shorter hospital stay, and improved postoperative pulmonary function.³ The operative technique involves insufflations of a gas into the

abdominal cavity. An intra-abdominal pressure of 10-15 mmHg is created. Carbon-dioxide (CO₂) is usually used.⁴

Dexmedetomidine, an imidazole derivative, is a adrenoceptor agonist with high selectivity for α₂-compared with α₁-adrenergic receptors. It causes a dose-dependent decrease in arterial blood pressure and heart rate associated with a decrease in serum noradrenaline concentration.⁵ Dexmedetomidine, in a single pre-anesthetic intravenous dose of up to 0.6 µg/kg, has been shown to reduce the requirements for supplementary isoflurane administration during nitrous oxide/oxygen, fentanyl anaesthesia and also lessen the haemodynamic reaction to stressful intra-operative events, while causing few side-effects.⁶ The present study was conducted to evaluate efficacy of dexmedetomidine on hemodynamic stability in patients undergoing laparoscopic cholecystectomy.

MATERIALS & METHODS

The present study comprised of 50 patients selected for laproscopic cholecystectomy of both genders. Enrolment of patients in the study was done after they gave their written consent.

Data related to age, gender etc. was recorded. They were divided into 2 groups. Group I patients received dexmedetomidine 200 mcg (2ml) in 38 ml of 0.9%

NS @ 0.2 µg/kg/hr infusion and group II patients received 0.9% saline was given at same rate. Parameters such as pulse rate, mean arterial pressure, oxygen saturation, EtCO₂ and isoflurane requirement was recorded. Results thus obtained were assessed using appropriate tests. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Groups	Group I	Group II
Agent	dexmedetomidine 200 mcg	0.9% saline
M:F	13:12	10:15

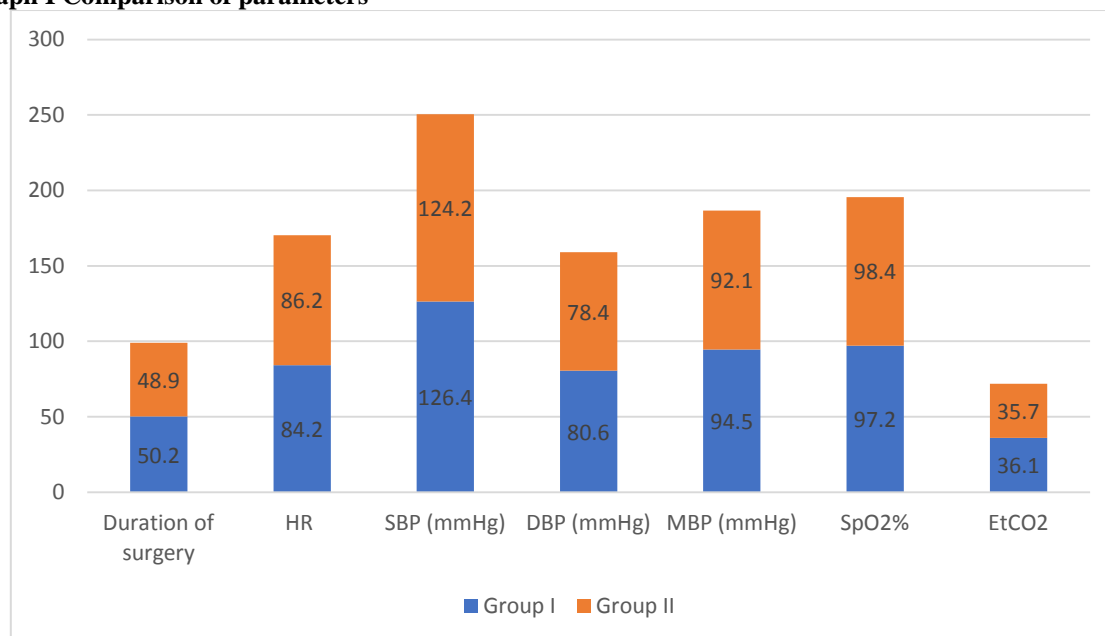
Table I shows that group I had 13 males and 12 females and group II had 10 males and 15 females.

Table II Comparison of parameters

Parameters	Group I	Group II	P value
Duration of surgery	50.2	48.9	0.13
HR	84.2	86.2	0.80
SBP (mmHg)	126.4	124.2	0.91
DBP (mmHg)	80.6	78.4	0.88
MBP (mmHg)	94.5	92.1	0.71
SpO ₂ %	97.2	98.4	0.12
EtCO ₂	36.1	35.7	0.15

Table II, graph I shows that mean duration of surgery in group I was 50.2 hours and in group II was 48.9 hours, heart rate was 84.2 beats/min and in group II was 86.2 beats/min, SBP was 126.4 mm Hg in group I and 124.2 mm Hg in group II, DBP was 80.6 mm Hg in group I and 78.4 mm Hg in group II, MBP was 94.5 mm Hg in group I and 92.1 mm Hg in group II, SpO₂% was 97.2% in group I and 98.4% in group II and EtCO₂ in group I was 36.1 and in group II was 35.7. The difference was non-significant (P> 0.05).

Graph I Comparison of parameters



DISCUSSION

The introduction of the laparoscopic technique in 1985, first made by Mühe was an important factor for the large increase in the cholecystectomy, since it represented a less invasive technique, generated better esthetic result and provided a lower surgical risk

compared to the conventional procedure.^{7,8} Dubois and Barthelot introduced in 1982, minimally invasive technique for conventional cholecystectomy, the minilaparotomy cholecystectomy, and Tyagi et al, in 1994, described a new technique for minimally invasive cholecystectomy, and this has recently

challenged the role of laparoscopic cholecystectomy.⁹ The present study was conducted to evaluate efficacy of dexmedetomidine on hemodynamic stability in patients undergoing laparoscopic cholecystectomy. In present study, group I had 13 males and 12 females and group II had 10 males and 15 females. Bansal et al¹⁰ in their study 100 patients of ASA I- II undergoing laparoscopic cholecystectomy were randomly allocated into two groups of 50 patients each. Group I patients received dexmedetomidine infusion at 0.2µg/kg/hr and Group II patients received normal saline infusion at 0.2µg/kg/h starting after intubation and continued till peritoneal deflation. Parameters noted were pulse rate, mean arterial pressure, oxygen saturation, EtCO₂ and isoflurane requirement. In dexmedetomidine group, the haemodynamic response was significantly attenuated. The anaesthetic requirement was also less with dexmedetomidine group without any desaturation.

We found that mean duration of surgery in group I was 50.2 hours and in group II was 48.9 hours, heart rate was 84.2 beats/min and in group II was 86.2 beats/min, SBP was 126.4 mm Hg in group I and 124.2 mm Hg in group II, DBP was 80.6 mm Hg in group I and 78.4 mm Hg in group II, MBP was 94.5 mm Hg in group I and 92.1 mm Hg in group II, SpO₂% was 97.2% in group I and 98.4% in group II and EtCO₂ in group I was 36.1 and in group II was 35.7. Bhattacharjee D. P. et al¹¹ showed the effects of dexmedetomidine infusion (0.2 µg/kg/hour) for haemodynamic stability in patients undergoing laparoscopic cholecystectomy and found that heart rate in Dexmedetomidine group was significantly less after intubation and throughout the period of pneumoperitoneum.

Laparoscopic cholecystectomy (LC) has become the approach of choice for elective cholecystectomy, 48.7% of acute cholecystitis are nowadays still operated with the open technique. To our knowledge there are no meta-analysis comparing these techniques in AC. Some authors consider the presence of inflammation, edema, and necrosis as unfavorable conditions for safe dissection. As a consequence, the suspected increased rate of complications leads numerous surgeons, in the laparoscopic era to postpone cholecystectomy after resolution of acute inflammation.

Aho M. S. et al¹² concluded that dexmedetomidine doesn't effect oxygen saturation. In his study, the patients who were treated with dexmedetomidine, showed higher oxygen saturation as compared to other groups. He postulated that by using dexmedetomidine, it is possible to reduce the amount of opiate narcotics needed for analgesia and to avoid some side effects of opioid treatment such as respiratory depression. Changes in EtCO₂ were almost comparable in both the groups (p>0.05) except at few time intervals. Two patients in dexmedetomidine group had rapid rise in EtCO₂ after pneumoperitoneum. Laparoscopic

cholecystectomy was abandoned in both the cases and was converted to open cholecystectomy. In dexmedetomidine group values were comparable to the pre-operative values throughout the period of pneumoperitoneum, after deflation and extubation.

CONCLUSION

Authors found that dexmedetomidine infusion in the dose of 0.2µg/kg/h effectively attenuates haemodynamic stress response to pneumoperitoneum during laparoscopic surgery.

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