

## **Original Article**

# **Effects of Xylocard pretreatment on hemodynamics in patients undergoing laparoscopic cholecystectomy**

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## **ABSTRACT**

### **Objective**

To evaluate the efficacy of single bolus dose of xylocard before induction to provide perioperative hemodynamic stability in patients undergoing laparoscopic cholecystectomy.

### **Patients and Methods**

Fifty patients of either sex, 18-65 years of age, undergoing elective laparoscopic cholecystectomy were randomly allocated in one of the two groups comprising of 25 patients each. Group D received intravenous xylocard 1.5 mg/kg body weight five minutes before induction and Group S received 0.9% saline in the same volume with a similar syringe by a different observer. Changes in mean arterial pressure, heart rate and recovery time of the patients were observed at different intervals.

### **Results**

Mean arterial pressure and heart rate in Group D were significantly lower after intubation and throughout the period of pneumoperitoneum than the Group S. No significant difference in the parameters of recovery were observed between the two

groups.

## **Conclusion**

Pretreatment with xylocard improves intra and post-operative hemodynamic stability during laparoscopic surgery without prolongation of recovery.

## **Keywords**

Xylocard, laparoscopy, pneumoperitoneum.

## **INTRODUCTION**

In 1940, Reid & Brace first described the hemodynamic response to laryngoscopy and intubation.<sup>1</sup> As these changes may be fatal in some patients, to attenuate these responses various methods including adrenergic blockers, vasodilators, calcium channel blockers and  $\alpha$ -2 agonist have been tried.<sup>2</sup> Narcotics and inhalational anesthesia too may obtund these responses by increasing depth of anesthesia. Xylocard also provides improved hemodynamic stability during intraoperative period.

Pneumoperitoneum produced by administration of carbon dioxide (CO<sub>2</sub>) during laparoscopic surgical procedures,<sup>3</sup> cause adverse cardiovascular effects.<sup>4</sup> Some of these effects are related to CO<sub>2</sub> and some are due to cephaloid movement of the intra-abdominal content pressing upon diaphragm. Immediately after pneumoperitoneum, plasma levels of norepinephrine, epinephrine and plasma renin activity increase.<sup>5</sup> These changes contribute to elevated arterial pressure, increased systemic and pulmonary vascular resistance and reduced cardiac output.<sup>6</sup> Apart from that, laparoscopic cholecystectomy (LC) is performed in reverse Trendelenburg position, which leads to diminished venous return and thereby further reduction in cardiac output.<sup>7</sup> This placebo controlled, double blind prospective study was designed to

evaluate the efficacy of xylocard to provide hemodynamic stability in patients undergoing LC.

## **PATIENTS AND METHODS**

Fifty ASA grade I and II patients, aged 18-65 years, undergoing elective LC were randomly assigned to two groups (each containing 25 patients): Group D (Xylocard group) and Group S (Control group). Patients with hypertension, morbid obesity and with severe hepatic, renal, endocrine and cardiac dysfunction were excluded from the study. Informed consent was taken from all patients.

On arrival to operation theater, routine monitoring (ECG, Pulse oxymetry, NIBP) was started and baseline parameters like heart rate, mean arterial blood pressure (MAP) and arterial oxygen saturation (SpO<sub>2</sub>) were recorded. An intravenous line was started. Group D patients received xylocard (Astra Zeneca, Bangalore, India) i.v 1.5mg/kg body weight. Group S patients were given 0.9% saline in the same volume with similar syringe by a different observer. Five minutes after giving xylocard, patients were induced with propofol (Neon, Mumbai, India) i.v 2 mg/kg body weight. Endotracheal intubation was facilitated by muscle relaxant vecuronium bromide (Neon, Mumbai, India) 0.1 mg/kg. Anesthesia was maintained with O<sub>2</sub> in N<sub>2</sub>O, intermittent bolus of vecuronium. CO<sub>2</sub> was insufflated by the surgeon into the peritoneal cavity to create pneumoperitoneum. Intra-abdominal pressure was maintained to 14 mmHg throughout the laparoscopic procedure. The patients were mechanically ventilated.

After completion of the operation residual neuromuscular block was reversed by neostigmine (Neon, Mumbai, India) and glycopyrrolate (Neon, Mumbai, India) and patients were extubated. Postoperative oxygen (100%) was given by mask

for 5 minutes. Time of tracheal extubation, time taken to respond to verbal commands and orientation time were recorded. Heart rate, MAP and SPO<sub>2</sub> were also recorded throughout the procedure at an interval of 15 minutes. Patients were observed for any adverse event during postoperative period in post anesthesia care unit (PACU).

**Statistical Analysis:** The results are expressed as Mean $\pm$ SD. Comparison between groups were made by using student's unpaired 't' test where the corresponding p value of less than 0.05 was considered significant, less than 0.01 was highly significant and values more than 0.05 were considered insignificant (NS).

## RESULTS

Both the groups were comparable with respect to age, gender, weight and duration of surgery (Table 1).

**Table 1. Patient's characteristics and duration of surgery (Mean  $\pm$  SD).**

	<b>Group D (n=25)</b>	<b>Group S (n=25)</b>	<b>P Value</b>
Age (Year)	43 $\pm$ 6.11	45.6 $\pm$ 8.42	0.45
Gender (M/F)	13/12	14/11	
Weight (kg)	58.26 $\pm$ 10.18	56.82 $\pm$ 10.3	0.51
Duration of surgery (min)	45.31 $\pm$ 7.11	50.16 $\pm$ 7.82	0.58

There was no significant difference in the preoperative MAP values between the two groups. After the intervention, MAP values were significantly lower in group D than in group S, significantly lower after intubation and after creation of

pneumoperitoneum and remained lower throughout the condition of pneumoperitoneum and in the postoperative period ( $P < 0.01$ , Table 2).

**Table 2. Changes in Mean Arterial Pressure (Mean  $\pm$  SD).**

	<b>Group D (mm Hg)</b>	<b>Group S (mm Hg)</b>	<b>Statistical Significance</b>
Preoperative MAP	98.3 $\pm$ 11.1	100.1 $\pm$ 10.6	P>0.05; NS
5 min after xylocard/ saline	80.6 $\pm$ 10.1	103.1 $\pm$ 12.1	P<0.05; S
1 min after induction	68 $\pm$ 7.7	96 $\pm$ 12.3	P<0.05; S
1 min after intubation	85.4 $\pm$ 10.2	110.6 $\pm$ 16.42	P<0.05; S
After pneumoperitoneum	92.1 $\pm$ 10.8	126.1 $\pm$ 19.42	P<0.01; HS
15 min	91 $\pm$ 12.9	118 $\pm$ 14.2	P<0.05; S
30 min	92.8 $\pm$ 12.4	122 $\pm$ 18.1	P<0.01; HS
45 min	87 $\pm$ 13.2	120 $\pm$ 15.4	P<0.01; HS
End of pneuoperitoneum	82.4 $\pm$ 12.6	106 $\pm$ 11.8	P<0.05; S
15 min Postoperatively	82.2 $\pm$ 9.2	108..2 $\pm$ 15.3	P<0.05; S

S-Significant; NS-Not Significant; HS-Highly Significant

There was no significant difference in the preoperative heart rate between the two groups (Table 3).

**Table 3. Changes in Heart Rate (Mean  $\pm$  SD).**

	<b>Group D Beat/min</b>	<b>Group S Beat/min</b>	<b>Statistical Significance</b>
Preoperative	80.2 $\pm$ 10.8	81.1 $\pm$ 9.1	P>0.05; NS
5 min after xylocard / saline	76.2 $\pm$ 10.1	83.2 $\pm$ 9.2	P<0.05 S
1 min after induction	68.3 $\pm$ 9.6	76.4 $\pm$ 11.4	P<0.05; S

1 min after intubation	75.6 ± 11	96.2 ± 12.8	P<0.01; HS
After pneumoperitoneum	74.8 ± 9.4	96 ± 14.6	P<0.01; HS
15 min	76 ± 10.4	96 ± 12.9	P<0.01; HS
30 min	74 ± 11.8	95 ± 14.4	P<0.01; HS
45 min	75 ± 9.6	93 ± 12.5	P.0.01; HS
End of pneumoperitoneum	72 ± 10.8	86 ± 10.6	P<0.05; S
Postoperative period	76 ± 9.7	91 ± 15.7	P<0.01; HS

S-Significant; NS-Not Significant; HS-Highly Significant

In group D, heart rate decreased significantly after intubation and pneumoperitoneum (P<0.01) and remained lower throughout the continuation of pneumoperitoneum and even postoperatively in comparison to group S (Table 3).

**Table 4. Recovery time (Mean ± SD).**

	<b>Group D (min)</b>	<b>Group S (min)</b>	<b>Statistical Significance</b>
Extubation time	5.12 ± 0.77	6.28 ± 1.34	P>0.05; NS
Response to verbal command	7.26 ± 1.47	7.88 ± 1.38	P>0.05; NS
Time for orientation	8.50 ± 1.48	7.2 ± 1.22	P>0.05; NS

NS-Not Significant

There was no significant difference in the parameters of recovery between the two groups (Table 4).

## DISCUSSION

Xylocaine has been tried as viscous lignocaine,<sup>8</sup> aerosol<sup>9</sup> and oro-laryngeal spray

before induction of anesthesia.<sup>10</sup> In laparoscopic surgery, CO<sub>2</sub> is routinely used to create pneumoperitoneum,<sup>11</sup> which elevates intra abdominal pressure and produces some adverse effects on the cardiovascular system.<sup>12</sup> Increased catecholamine level activates renin-angiotensin-aldosterone-system (RAAS) leading to some characteristic hemodynamic alterations which include decreased cardiac output (25-35%), elevated arterial pressure and increased systemic/pulmonary vascular resistance.<sup>13</sup> Trendelenburg position causes diminished venous return which leads to further decrease in cardiac output.<sup>14</sup> Normal heart can cope with the increase in afterload under physiologic conditions. But patients with compromised cardiac function may not be able to tolerate the changes in afterload produced by pneumoperitoneum and it may have deleterious effects on their hemodynamics. We noted that xylocard improved intraoperative and postoperative haemodynamic stability by stabilizing the changes in arterial pressure, heart rate and cardiac output.

The mechanism behind these beneficial effects of xylocard on hemodynamic stability is possibly by direct myocardial depressant effect, a peripheral vasodilating effect and effect on synaptic transmission.<sup>15</sup> Moreover, xylocard may have another vital role to play in the haemodynamic stability through its anti-inflammatory activity.<sup>16</sup> Peri-operative administration of i.v. lidocaine has been shown to improve gastrointestinal motility, shorten the length of hospital stay,<sup>17</sup> and decrease post-operative pain but cannot be used as sole analgesic post-operatively.<sup>18</sup> Another study concluded that intra-operative lidocaine infusion reduces opioid consumption in PACU and intra-operative requirement of Desflurane.<sup>19</sup> Our study showed that hemodynamic changes were attenuated by xylocard premedication before LC. We did not observe significant incidence of hypotension or bradycardia. Since xylocard does not cause sedation, it did not cause any delay in recovery of our patients after surgery.

## CONCLUSION

Xylocard attenuated elevation of mean arterial pressure and heart rate during and after pneumoperitoneum, thereby improving perioperative hemodynamic stability during laparoscopic surgery. This hemodynamic stability provided by xylocard may be helpful in patients with compromised cardiac function by allowing these patients to get the benefits of the laparoscopic approach. Further, xylocard may be tried to shorten length of hospital stay by virtue of its anti-inflammatory activity modulating the surgery induced stress response.

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Received: July 12, 2010 Accepted: August 10, 2010

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