

**ORIGINAL RESEARCH**

# Efficacy of Intravenous Diclofenac and Dexmedetomidine on Preoperative Hemodynamics and Post Operative Analgesia for Patient Undergoing Laparoscopic Cholecystectomy

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**ABSTRACT**

**Background:** In the early days, acute cholecystitis (AC) was listed as a contraindication to laparoscopic cholecystectomy (LC). Presence of acute inflammation, difficulty in dissection, and higher chances of complications were initial apprehensions. the present study was conducted for evaluating the effectiveness of Diclofenac and Dexmedetomidine on Preoperative Hemodynamics and Post Operative Analgesia for Patient Undergoing Laparoscopic Cholecystectomy. **Materials & Methods:** A total of 50 patients belonging to either sex with American Society of Anesthesiologists (ASA) physical status I/ II and scheduled for elective laparoscopic cholecystectomy were enrolled. Complete demographic and clinical details of all the patients were obtained. The intensity of the pain was assessed using visual analogue scale (VAS) at 0.5 h, 1 h, 4 h, 6 h. Where zero score corresponds to 'no pain' and 10 corresponds to the 'maximum' or 'worst pain'. Rescue analgesia was given in the form of inj. diclofenac sodium 75 mg i.v. at VAS >3. Total analgesic consumption in the first 24 h postoperatively and occurrence of nausea, vomiting and sedation were also recorded. **Results:** Mean duration of surgery of the patients was 40.65±10.70min. Although, heart rate also decreased, it remained nearer to the baseline values and returned to baseline at 6-hours. Systolic BP started decreasing significantly in comparison to baseline (P<0.01). It came back to baseline at 4-hours. Diastolic BP started decreasing in comparison to baseline (P<0.01). VAS score significantly improved over postoperative time. **Conclusion:** Diclofenac combination with dexmedetomidine showed hemodynamic maintenance and significant reduction in pain score.

**Key words:** Diclofenac, Laparoscopic cholecystectomy, Dexmedetomidine.

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**INTRODUCTION**

In the early days, acute cholecystitis (AC) was listed as a contraindication to laparoscopic cholecystectomy (LC). Presence of acute inflammation, difficulty in dissection, and higher chances of complications were initial apprehensions. With increasing experience, it is now well established that LC is safe. In addition, it is more advantageous than open cholecystectomy. Surgery was recommended within 72 hours of attack. This time frame was called the 'golden period.' It was subsequently realized that the limit of 'early cholecystectomy' could be safely stretched up to one

week to 10 days, which formed the basis of the most recent guideline. LC in the second week is considered formidable. Therefore, LC is recommended to be deferred beyond six weeks called 'late cholecystectomy.' This is done to allow inflammation to subside so that the procedure can be performed electively. Pre-planned analgesic tactics and enhanced strategy of analgesia need to remain precise for surgery.<sup>1-3</sup> In addition, / growing proof shows multimodal and opioid-sparing to boost up recuperation and reduce potential consequences post operatively. Using opioids will increase the

occurrence of post-operative nausea and vomiting (PONV) in laparoscopic cholecystectomy, that is already a prime concern in patients. To lessen the need of opioids, dexmedetomidine is given during intra operatively and to avoid respiratory depression post operatively. Dexmedetomidine, an alpha 2 agonist has been introduced to the anesthesia practice since 1990 by abott pharma USA. It's widely known for its sedative, analgesic, opioid sparing properties. Known to have 16 times more specificity for  $\alpha_2$  receptor than clonidine. It may provide dose-specific sedation, anxiolysis and spinal and supraspinal site analgesia with less respiratory sedation.<sup>4-6</sup> Hence; the present study was conducted for evaluating the effectiveness of Diclofenac and Dexmedetomidine on Preoperative Hemodynamics and Post Operative Analgesia for Patient Undergoing Laparoscopic Cholecystectomy.

### MATERIALS & METHODS

The present study was conducted for evaluating the effectiveness of Diclofenac and Dexmedetomidine on Preoperative Hemodynamics and Post Operative Analgesia for Patient Undergoing Laparoscopic Cholecystectomy. A total of 50 patients belonging to either sex with American Society of Anesthesiologists (ASA) physical status I/ II and scheduled for elective laparoscopic cholecystectomy were enrolled. Complete demographic and clinical details of all the patients was obtained. The study was conducted for a period of 18 months including data collection, data organization, presentation, data analysis and data interpretation. All the patients were premedicated with midazolam 0.02 mg/kg, inj glycopyrrolate 4mcg/kg and fentanyl in dose of 2  $\mu$ g/kg intravenously and anaesthesia induction done was done using propofol 2 mg/kg and vecuronium 0.1 mg/kg i.v. All patients were intubated with appropriately sized oral cuffed endotracheal tube. Anaesthesia was maintained with nitrous oxide and oxygen mixture (50:50) with

sevoflurane. Intermittent boluses of vecuronium were used to achieve muscle relaxation. Minute ventilation was adjusted to maintain normocapnia (end tidal carbon-dioxide [EtCO<sub>2</sub>] between 35- and 40-mm Hg). Patients were placed in 15-20° reverse Trendelenburg position. Pneumoperitoneum pressure was kept between 10-14 mm of Hg throughout the surgery. Intraoperative pulse, mean blood pressure (MBP), SpO<sub>2</sub> and EtCO<sub>2</sub> were monitored. Patients received intravenous diclofenac 75 mg, 15 min prior to induction. Diluted in 100 ml normal saline infused over 15 min. Dexmedetomidine infusion started 1mcg/kg over 10 min -bolus 0.3 to 0.7 mcg/kg till 15 min prior to closure. The intensity of the pain was assessed using visual analogue scale (VAS) at 0.5 h, 1 h, 4 h, 6 h. Where zero score corresponds to 'no pain' and 10 corresponds to the 'maximum' or 'worst pain'. Rescue analgesia was given in the form of inj. diclofenac sodium 75 mg i.v. at VAS >3. Total analgesic consumption in the first 24 h postoperatively and occurrence of nausea, vomiting and sedation were also recorded. Data were presented as frequency, percentages, mean, or standard deviation wherever applicable. Chi square test was used to assess categorical variables between the groups.

### RESULTS

The mean age of the patients was 39.74±12.62 years. Females predominated males with a ratio of 3:1. Mean BMI of the patients was 21.63±1.78kg/m<sup>2</sup> respectively. The mean duration of surgery of the patients was 40.65±10.70min. Although, heart rate also decreased, it remained nearer to the baseline values and returned to baseline at 6-hours. Systolic BP started decreasing significantly in comparison to baseline (P<0.01). It came back to baseline at 4-hours. Diastolic BP started decreasing in comparison to baseline (P<0.01). VAS score significant remains below 3 over postoperative time.

**Table 1: Comparison of mean heart rate at different intervals**

| Time interval  | Group D (n=50) |
|----------------|----------------|
| Baseline       | 73.60 ± 4.04   |
| Induction      | 74.88 ± 4.50   |
| Post Inflation | 74.98 ± 5.74   |
| 5 Min          | 74.46 ± 5.59   |
| 10 Min         | 73.42 ± 6.10   |
| 15 Min         | 71.86 ± 5.13   |
| 30 Min         | 74.10 ± 4.74   |
| 45 Min         | 73.18 ± 4.13   |
| 1 Hour         | 73.42 ± 6.10   |
| 2 Hour         | 71.86 ± 5.13   |
| 4 Hour         | 74.10 ± 4.74   |
| 6 Hour         | 73.18 ± 4.13   |

**Table 2: Comparison of mean systolic BP at different intervals**

| Time interval         | Group D (n=50) |
|-----------------------|----------------|
| <b>Baseline</b>       | 123.54 ± 6.17  |
| <b>Induction</b>      | 121.46 ± 5.87  |
| <b>Post Inflation</b> | 116.90 ± 5.98  |
| <b>5 Min</b>          | 112.32 ± 5.81  |
| <b>10 Min</b>         | 107.30 ± 7.69  |
| <b>15 Min</b>         | 102.72 ± 6.76  |
| <b>30 Min</b>         | 100.32 ± 4.74  |
| <b>45 Min</b>         | 96.42 ± 4.78   |
| <b>1 Hour</b>         | 107.30 ± 7.69  |
| <b>2 Hour</b>         | 112.72 ± 6.76  |
| <b>4 Hour</b>         | 122.32 ± 4.74  |
| <b>6 Hour</b>         | 122.42 ± 4.78  |

**Table 3: Comparison of mean diastolic BP at different intervals**

| Time interval         | Group D (n=50) |
|-----------------------|----------------|
| <b>Baseline</b>       | 78.60 ± 5.36   |
| <b>Induction</b>      | 76.46 ± 5.20   |
| <b>Post Inflation</b> | 73.64 ± 5.05   |
| <b>5 Min</b>          | 70.28 ± 4.84   |
| <b>10 Min</b>         | 71.0 ± 7.64    |
| <b>15 Min</b>         | 63.82 ± 5.36   |
| <b>30 Min</b>         | 62.78 ± 4.51   |
| <b>45 Min</b>         | 66.98 ± 4.49   |
| <b>1 Hour</b>         | 68.4 ± 6.08    |
| <b>2 Hour</b>         | 71.82 ± 5.36   |
| <b>4 Hour</b>         | 62.48 ± 4.94   |
| <b>6 Hour</b>         | 73.98 ± 4.49   |

**Table 4: Comparison of mean VAS at different intervals**

| VAS           | Group D (n=50) | P-Value             |
|---------------|----------------|---------------------|
| <b>15 Min</b> | 2.88 ± 1.00    | 0.001 (Significant) |
| <b>30 Min</b> | 2.56 ± 0.91    |                     |
| <b>45 Min</b> | 2.32 ± 0.74    |                     |
| <b>1 Hour</b> | 1.96 ± 0.86    |                     |
| <b>2 Hour</b> | 1.60 ± 0.90    |                     |
| <b>3 Hour</b> | 1.36 ± 0.94    |                     |
| <b>4 Hour</b> | 1.96 ± 0.86    |                     |
| <b>5 Hour</b> | 1.60 ± 0.90    |                     |
| <b>6 Hour</b> | 1.36 ± 0.94    |                     |

## DISCUSSION

New technologies and surgical approaches continue to advance the field of minimally invasive surgery. Laparoscopy has revolutionized approaches to general surgical problems with improved outcomes of decreased postoperative pain and patients' quicker return to work. In large part because of these successes, natural orifice and single-site approaches have been adopted. Although enthusiasm for transvisceral approaches has waned, single-site operations have increased significantly. Dexmedetomidine enhances anaesthesia produced by different anaesthetic drugs, causes peri operative sympatholytic and reduces blood pressure via acting on central  $\alpha_2$  and inhibit release of norepinephrine and reduce the pain stimuli and also by inhibiting imidazoline receptors. Laparoscopic surgeries are

prone to hemodynamic alteration under general anesthesia. such as elevated SVR, causing hypertension, compelling the anesthesiologist to deepen the analgesic depth, and instances even demands need for vasodilators to address the increased arterial pressure. Diclofenac sodium is an analgesic, antipyretic, and anti-inflammatory drug which specifically inhibits prostaglandins. Also, it is one of the most cost effective analgesics available in hospital setup. Dexmedetomidine because of its unique properties used as an anaesthetic ancillary in iv infusion.<sup>7- 10</sup> Hence; the present study was conducted for evaluating the effectiveness of Diclofenac and Dexmedetomidine on Preoperative Hemodynamics and Post Operative Analgesia for Patient Undergoing Laparoscopic Cholecystectomy.

The mean age of the patients was  $39.74 \pm 12.62$  years. Females predominated males with a ratio of 3:1. Mean BMI of the patients was  $21.63 \pm 1.78 \text{ kg/m}^2$  respectively. The mean duration of surgery of the patients was  $40.65 \pm 10.70 \text{ min}$ . Although, heart rate also decreased, it remained nearer to the baseline values and returned to baseline at 6-hours. Systolic BP started decreasing significantly in comparison to baseline ( $P < 0.01$ ). It came back to baseline at 4-hours. Diastolic BP started decreasing in comparison to baseline ( $P < 0.01$ ). VAS score significantly improved over postoperative time. Kharbuja K et al compared the effectiveness of intravenous paracetamol and diclofenac as postoperative analgesia in laparoscopic cholecystectomy. One hundred and twenty-eight patients of American Society of Anesthesiologists (ASA) categories I and II included in this study were divided into two groups. Anesthesia induction and maintenance were standardized. The first group received 15mg/kg (maximum 1gm) intravenous paracetamol and the second group received 2mg/kg (maximum 75mg) intravenous diclofenac 30 minutes prior to ending of surgery. Profiles of hemodynamic changes were almost similar in both groups with respect to heart rate and blood pressure. However, paracetamol infusion provided hemodynamic stability in post-operative period. We observed statistically significant differences in visual analogue scale between the two groups. Most of the patients in paracetamol group had low mean pain scores in post-operative period and provided an extended analgesia compared to diclofenac. No serious postoperative complication was observed in paracetamol group.<sup>11</sup> Anil et al compared the effects of intravenous single-dosedexketoprofen trometamol and diclofenac sodium 30 minutes before the end of the surgery on relief of postoperative pain in patients undergoing laparoscopic cholecystectomy. Sixty (American Society of Anesthesiologist class I-II) patients undergoing laparoscopic cholecystectomy were divided into 2 groups Patients in group DT received 50 mg dexketoprofen trometamol, whereas patients in group DS received 75 mg diclofenac sodium, intravenously 30 minutes before the end of surgery. Postoperative pain intensity, morphine consumption with patient-controlled analgesia, time to first analgesic requirement, complications, rescue analgesic (intravenous tenoxicam 20 mg) requirement, and duration of hospital stay were recorded. Postoperative pain visual analog scale scores were similar in the follow-up periods ( $P > .05$ ). Patient-controlled analgesia morphine consumption was significantly less in group DT compared with group DS in all postoperative follow-up periods (2 and 4 hours:  $P < .01$ ; 8, 12, 18, and 24 hours:  $P < .001$ ). In the postoperative period, the first analgesic requirement time was significantly longer in group DT compared with group DS ( $P < .01$ ). In addition, the number of patients requiring rescue analgesic was higher in group DS compared with group DT ( $P <$

.01). Other follow-up parameters were similar. Administration of intravenous single-dosedexketoprofen trometamol 30 minutes before the end of surgery provided effective analgesia with reduced consumption of opioids and requirement for rescue analgesic compared with diclofenac sodium in patients undergoing laparoscopic cholecystectomy.<sup>12</sup>

## CONCLUSION

Diclofenac combination with dexmedetomidine showed hemodynamic maintenance and significant reduction in pain score.

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