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## SCIENTIFIC ARTICLE

# Opioid-free total intravenous anesthesia with propofol, dexmedetomidine and lidocaine infusions for laparoscopic cholecystectomy: a prospective, randomized, double-blinded study<sup>☆</sup>



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### KEYWORDS

Laparoscopic cholecystectomy;  
Total intravenous anesthesia;  
Dexmedetomidine;  
Lidocaine;  
Propofol;  
Remifentanyl

### Abstract

**Background and objectives:** Intraoperative use of opioids may be associated with postoperative hyperalgesia and increased analgesic consumption. Side effects due to perioperative use of opioids, such as postoperative nausea and vomiting may delay discharge. We hypothesized that total intravenous anesthesia consisting of lidocaine and dexmedetomidine as an opioid substitute may be an alternative technique for laparoscopic cholecystectomy and would be associated with lower fentanyl requirements in the postoperative period and less incidence of postoperative nausea and vomiting.

**Methods:** 80 Anesthesiologists I–II adults were scheduled for elective laparoscopic cholecystectomy. Patients were randomly allocated into two groups to have either opioid-free anesthesia with dexmedetomidine, lidocaine, and propofol infusions (Group DL) or opioid-based anesthesia with remifentanyl, and propofol infusions (Group RF). All patients received a standard multimodal analgesia regimen. A patient controlled analgesia device was set to deliver IV fentanyl for 6 h after surgery. The primary outcome variable was postoperative fentanyl consumption.

**Results:** Fentanyl consumption at postoperative 2nd hour was statistically significantly less in Group DL, compared with Group RF, which were  $75 \pm 59 \mu\text{g}$  and  $120 \pm 94 \mu\text{g}$  respectively, while it was comparable at postoperative 6th hour. During anesthesia, there were more hypotensive events in Group RF, while there were more hypertensive events in Group DL, which were both statistically significant. Despite higher recovery times, Group DL had significantly lower pain scores, rescue analgesic and ondansetron need.

<sup>☆</sup> Trial registration: Clinicaltrials.gov (ID: NCT01833819).

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**PALAVRAS-CHAVE**

Colecistectomia laparoscópica;  
Anestesia venosa total;  
Dexmedetomidina;  
Lidocaína;  
Propofol;  
Remifentanil

**Conclusion:** Opioid-free anesthesia with dexmedetomidine, lidocaine and propofol infusions may be an alternative technique for laparoscopic cholecystectomy especially in patients with high risk for postoperative nausea and vomiting.

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### Anestesia venosa total livre de opioides, com infusões de propofol, dexmedetomidina e lidocaína para colecistectomia laparoscópica: estudo prospectivo, randomizado e duplo-cego

**Resumo**

**Justificativa e objetivos:** O uso de opioides no período intraoperatório pode estar associado à hiperalgesia e ao aumento do consumo de analgésicos no período pós-operatório. Efeitos colaterais como náusea e vômito no período pós-operatório, por causa do uso perioperatório de opioides, podem prolongar a alta. Nossa hipótese foi que a anestesia venosa total com o uso de lidocaína e dexmedetomidina em substituição a opioides pode ser uma técnica opcional para a colecistectomia laparoscópica e estaria associada a uma menor solicitação de fentanil e incidência de náusea e vômito no período pós-operatório.

**Métodos:** Foram programados para colecistectomia laparoscópica eletiva 80 pacientes adultos, estado físico ASA I-II. Os pacientes foram randomicamente alocados em dois grupos para receber anestesia livre de opioides com infusões intravenosas (IV) de dexmedetomidina, lidocaína e propofol (Grupo DL) ou anestesia baseada em opioides com infusões de remifentanil e propofol (Grupo RF). Todos os pacientes receberam um regime padrão de analgesia multimodal. Um dispositivo de analgesia controlada pelo paciente foi ajustado para liberar fentanil IV por seis horas após a cirurgia. O desfecho primário foi o consumo de fentanil no pós-operatório.

**Resultados:** O consumo de fentanil na segunda hora de pós-operatório foi significativamente menor no grupo DL do que no Grupo RF,  $75 \pm 59 \mu\text{g}$  e  $120 \pm 94 \mu\text{g}$ , respectivamente, mas foi comparável na sexta hora de pós-operatório. Durante a anestesia, houve mais eventos hipotensivos no Grupo RF e mais eventos hipertensivos no grupo DL, ambos estatisticamente significativos. Apesar de apresentar um tempo de recuperação mais prolongado, o Grupo DL apresentou escores de dor e consumo de analgésicos de resgate e de ondansetrona significativamente mais baixos.

**Conclusão:** A anestesia livre de opioides com infusões de dexmedetomidina, lidocaína e propofol pode ser uma técnica opcional para a colecistectomia laparoscópica, especialmente em pacientes com alto risco de náusea e vômito no pós-operatório.

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**Introduction**

Opioids are widely used for perioperative analgesia. However, the intraoperative use of large bolus doses or continuous infusions of potent opioids may be associated with postoperative hyperalgesia and increased analgesic consumption.<sup>1</sup> When it comes to ambulatory surgery, opioid related side effects, such as postoperative nausea and vomiting (PONV), prolonged sedation, ileus and urinary retention may delay recovery and discharge or cause unanticipated hospital readmission.

The postoperative pain after laparoscopic cholecystectomy (LC) is complex in nature and growing evidence suggests that its treatment should be multimodal and opioid sparing to accelerate recovery.<sup>2,3</sup> In spite of multimodal analgesic strategies, which consist of opioids, dexamethasone, non-steroidal anti-inflammatory drugs, and local anesthetics applied into the surgical wound, postoperative

pain and PONV are still common complaints reported after LC. It has been suggested that esmolol infusion may be an acceptable alternative to remifentanil infusion for ambulatory laparoscopic surgery<sup>4-6</sup> and opioid-free anesthetic techniques with esmolol infusion is associated with reduced postoperative opioid consumption.<sup>5,6</sup>

Dexmedetomidine is a highly selective alfa-2 adrenoceptor agonist that provides sedation, analgesia, and sympatholysis. Although perioperative intravenous dexmedetomidine administration is associated with a reduction in postoperative pain intensity, analgesic consumption and nausea,<sup>7-12</sup> the analgesic property of dexmedetomidine is less effective compared with remifentanil.<sup>13</sup> Intravenous lidocaine has been described as having analgesic, anti-hyperalgesic, and anti-inflammatory properties. Intravenous lidocaine infusion in the perioperative period is safe and has clear advantages, such as decreased intraoperative anesthetic requirements, lower pain scores, reduced postoperative analgesic requirements, as well as faster

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