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Original Article

The effect of pain management in laparoscopic cholecystectomy on recovery parameters

Laparoskopik kolesistektomide ağrı yönetiminin derlenme parametreleri üzerine etkisi

Betül Guven AYTAC[1], Ismail AYTAC[2], Ayse LAFCI[2], Aysun POSTACI[2], Bayazit DIKMEN[1]

[1]Etlik Zübeyde Hanım Women's Diseases Education and Research Hospital, Department of Anesthesiology, Ankara/Turkey.
[2]Ankara Numune Training and Research Hospital, Department of Anesthesiology, Ankara/Turkey

ABSTRACT

Aim: We aimed to observe the effects of analgesics used intraoperatively on the postoperative pain and recovery in patients underwent LC .

Material and Methods: ASA I-III group, aged 20-85 patients, who underwent LC surgery were included in the study. We denominated as groups the distribution of analgesics used in eight groups: control group(Group C) for patients without intraoperative analgesia; tramadol (Group T); metamizole (Group M); diclofenac (Group D); paracetamol (Group P); tramadol+metamizol (Group TM); tramadol+diclofenac (Group TD); tramadol+paracetamol (Group TP). Analgesics that can provide visual analog scale (VAS) ≤ 4 was considered effective. Additional analgesics were administered to the patients whom VAS was above 4 in recovery room. Recoveries of patients was determined with Aldrete Score.

Results: 31 patients control group, in 35 patients tramadol, in 36 patients, metamizole, in 32 patients diclofenac and in 31 patients paracetamol, in 56 patients tramadol+metamizol, in 31 patients tramadol+diclofenac and in 32 patients tramadol+paracetamol were used. In all groups used analgesics, VAS≤ 4 could not be provided in first hour. In the patients used one analgesic alone and two analgesics together, lowest need for additional analgesics was in GP and GTP group within the first one hour. Aldrete scores were lowest in whom did not receive analgesics intraoperatively.

Conclusion: We consider that the management of pain in laparoscopic cholecystectomy should be done early postoperative period. All analgesics should be administered on the basis of the knowledge of their pharmacokinetic profiles.

Keywords: laparoscopic cholecystectomy, postoperative pain, non-steroid analgesics

Corresponding author*:: Ayse LAFCI, Ankara Numune Training and Research Hospital, Department of Anesthesiology, Ankara/Turkey
E-mail: ayselafci971@gmail.com
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ÖZ

Amaç: Laparoskopik kolesistektomi ameliyatı geçiren hastalarda intraoperatif kullanılan analjeziklerin postoperatif ağrı ve derlenme üzerine etkilerini gözlemlemeyi amaçladık.

Gereç ve Yöntemler: ASA I-III risk grubunda, 20-85 yaş arası, LK geçiren hastalar çalışmaya dahil edildi. Kullanılan analjeziklerin isimlerine göre gruplar adlandırıldı: İntraoperatif analjezi uygulanmayan hastalar kontrol grubu (Grup C); tramadol (Grup T); metamizol (Grup M); diklofenak (Grup D); parasetamol (Grup P); tramadol + metamizol (Grup TM); tramadol + diklofenak (Grup TD); tramadol + parasetamol (Grup TP). Görsel analog skala (VAS) ≤ 4 sağlayabilen analjezikler etkili olarak kabul edildi. Derlenme odasında VAS 4'den büyük olan hastalara ek analjezikler uygulandı. Hastaların derlenmesi Aldrete Skoru ile belirlendi.

Bulgular: Kontrol grubunda 31 hasta, tramadol grubunda 35 hasta, metamizol grubunda 36 hastada, diklofenak grubunda 32 hasta, parasetamol grubunda 31 hasta, Tramadol + metamizol grubunda 56 hasta, tramadol + diklofenak grubunda 31 hasta ve tramadol + parasetamol grubunda 32 hasta bulunmaktaydı. Analjezik kullanan tüm gruplarda, intraoperatif analjezikler ile ilk saatte VAS≤4 sağlanamadı. Hastalarda tek analjezik veya iki analjezik birlikte kullanıldığında ilk bir saat içinde, en düşük ek analjezik gereksinimi GP ve GTP grubunda idi. İntraoperatif analjezik uygulanmayanlarda Aldrete skorları en düşük düzeyde gözlendi.

Sonuç: Laparoskopik kolesistektomide ağrının erken postoperatif dönemde yapılması gerektiğini düşünüyoruz. Tüm analjezikler, farmakokinetik profillerinin bilgisi temelinde uygulanmalıdır.

Anahtar kelimeler: laparoskopik kolesistektomi, postoperatif ağrı, non-steroid analjezikler

Introduction

Laparoscopic cholecystectomy (LC) is one of the day-case elective surgical procedures commonly administered and is the first choice in the treatment of symptomatic gallstone disease. Time of recovery and discharge after non-complicated LC is mostly associated with intense pain on the first postoperative day, nausea-vomiting, fatigue-asthenia etc [1,2].

Patient convenience and early discharge from hospital should be provided after this short procedure considered as day case anesthesia. LC has a complex structure. Due to surgical incision, abdominal distension caused by intraperitoneal CO2 insufflation, local trauma related to gallbladder bed dissection and chemical peritonitis caused by leakage of bile, tissue injury, nociceptor sensitization and central pain pathways activation occurs. Parietal pain occurs due to little abdominal incisions and abdominal wall injury. Visceral inflammation, and peritoneal stress and irritation caused by insufflation of CO2 are responsible for development of visceral pain. Patients typically complain about a deep pain which is difficult to determine localization. This intense pain and nausea-vomiting which has a high incidence in laparoscopic interventions adversely affect early postoperative recovery of patients [3,4].

In our study, we aimed to observe the effects of analgesics used intraoperatively on the postoperative pain and recovery in patients underwent LC.

Material and Methods

The study was a single-center, prospective observationaltrial conducted at a 1100 bed tertiary care hospital. After getting approval of Scientific Research Evaluation Commission of our hospital (Decision number is 2012-332) and informed consents; consecutive, ASA I-III group, aged 20-85 patients, who underwent LC surgery were enrolled between June 1 and September 30, 2012.

Exclusion criteria: patients with renal (creatinine >1.6 mg/dL) or hepatic impairment (aspartate aminotransferase or alanine aminotransferase levels are higher than twice the normal value), patients who have psychiatric and neurologic disease, who take medication for chronic pain, who have analgesic allergia or who need laparotomy during the operation.

Premedication was not administered to any subjects. The patients were provided with verbal information about how to evaluate postoperative pain. Visual Analogue Scale (VAS) begins with absence of pain (0) and ends with unbearable pain level (10). ECG, systolic, diastolic and mean blood pressures, heart rate and peripheral oxygen saturation was monitored in patients who brought to operating room. The intravenous catheter was inserted from the dorsum of the hand in all subjects. 5-10 ml/kg 0.9 % saline infusion was started. In all subjects standard anesthesia induction was performed with 4

to 6 mg/kg thiopental sodium, 0.1 mg/kg vecuronium bromide and 2 µg/kg fentanyl. Endotracheal intubation following efficient muscle relaxation was performed. Anesthesia maintenance was established with 1 MAC of sevoflurane within 50% oxygen in nitrous oxide. Intraperitoneal CO2 pressure was recorded. Standard analgesic orders included tramadol 100 mg iv., diclofenac 75 mg im., metamizol 1,000 mg iv., paracetamol 1,000 mg iv. were administered during wound sealing.

In the end of operation the effect of muscle-relaxant is antagonized by 0.01mg/kg atropine sulfate and 0.05 mg/kg neostigmine. Tracheal extubation was performed when adequate ventilation was maintained. In recovery room, the patients who said his/her name correctly were considered awake. Analgesic agent that can provide VAS ≤ 4 was considered effective. In all patients operation time, hemodynamic changes, VAS scores were recorded at baseline, 30th min and first, 4th, 12th and 24th hours postoperatively. Aldrete scores, the need for postoperative additional analgesics and additional analgesic agent preferred by the anesthetist, its dose, administration time and nausea-vomiting were recorded.

Data analysis was done by SPSS for Windows 11.5 package program. While descriptive statistics were indicated as mean ± standard deviation for continuous variables and median (not less than - not more than) for orderable variables, nominal variables were indicated as number of subject and (%).

Within groups the importance of the difference between monitoring times in terms of VAS scores was evaluated by using Wilcoxon's Sign test. The importance of the difference in amount of changes in VAS scores against time by the analgesics used during operation was investigated by Mann Whitney U test. Nominal variables were analyzed by Pearson's Chi-square and Fisher's Exact Chi-Square test. To check whether there is an statistically significant relation between changes in VAS scores and PCO2 Spearman's Correlation test was used.

For $p<0.05$ the results were considered statistically significant.

Results

284 patients were included whose ages ranged from 22 to 84. Mean age was 51.8±13.8 years and mean body weight was 74.8±12.0 kg (Table 1). Median operation time was 60 min with an operation time ranged from 30 to 180 min. Intraabdominal pressure (IAP) level was 13.3±1.5 mm Hg and median Aldrete score was detected as 8. In 148 subjects were administered steroids for nausea vomiting prophylaxis (52.1%).

Table 1. Demographic and Clinical Characteristics of Patients

Variables	n=284
Age (years)	51.8±13.8
Body Weight (kg)	74.8±12.0
Operation Time (min)	60 (30-180)
Intraabdominal pressure (mmHg)	13.3±1.5
Aldrete Score	8 (7-9)
Use of Steroids (n)	148 (52.1%)

Patients according to analgesic drug type were divided into 8 groups. While in 31 patients analgesics were not used during operation (the group of control; Group C), in 134 patients one analgesic alone was used and in 119 patientstwo analgesics were co-administered. When the distribution of analgesics used alone was investigated; in 35 patients tramadol (the group of patients given tramadol; Group T), in 36 patients, metamizole (the group of patients given metamizole; Group M), in 32 patients diclofenac (the group of patients given diclofenac; Group D) and in 31 patients paracetamol (the group of patients given paracetamol; Group P) were used. When use of two analgesics together was investigated; in 56 patients tramadol+metamizol (Group TM), in 31 patients tramadol+diclofenac (Group TD) and in 32 patients tramadol+paracetamol (Group TP) were used (Table 2).

Table 2. Distribution of The Analgesics Used During The Operation

Analgesic drug type	n=284
Without analgesic administration	31 (10.9%)
Tramadol	35 (12.3%)
Metamizole	36 (12.7%)
Diclofenac	32 (11.3%)
Paracetamol	31 (10.9%)
Tramadol + Metamizole	56 (19.7%)
Tramadol + Diclofenac	31 (10.9%)
Tramadol + Paracetamol	32 (11.3%)

The comparison of VAS scores in the patients used one analgesic alone, VAS values were above 4. The lowest VAS value (4.5±1.2) was found in Group M ($P<0.01$). In the patients used two analgesics, VAS values was less than the Group C. At baseline, the lowest VAS value (4.31±1.2) was detected in TP group ($P<0.05$). When compared the VAS values of patients used tramadol, metamizole or tramadol/metamizole the lowest VAS value (4.39±1.1) at baseline was in TM group ($P<0.01$). When we compare the tramadol group, diclofenac

group or tramadol/diclofenac group with each other, the lowest VAS value (4.51±0.7) at baseline was in tramadol/diclofenac group (P< 0.05). The comparison of VAS values of the patients used tramadol, paracetamol and tramadol/paracetamol the lowest VAS value (4.31±1.2) at baseline was in TP group (P<0.05). Additional analgesic requirement was lowest in the TP group (n=4; 12.5%) (P<0.01).

Aldrete scores were lowest in the patients who did not receive analgesics (7.5±0.6) (P<0.05).

There was not a statistically significant correlation between VAS change and IAP levels (Table 3).

Table 3. Correlation Coefficient Between VAS Change and IAP

Variables	Correlation Coefficient	p-value
Baseline	0.028	0.6
30 min	0.073	0.2
60 min	0.060	0.3
4 hr	0.008	0.9
12 hr	0.037	0.5

Discussion

In this observational study, we aimed firstly to observe if routinely used analgesic drugs in our clinic is efficient enough and their effects on recovery profile in the patients who underwent laparoscopic cholecystectomy. We detected that both one analgesic alone and concomitant use of two analgesics did not provide sufficient analgesia in early postoperative period.

Studies on the effectiveness of tramadol become controversial. Although we observed that tramadol can not provide adequate postoperative analgesia; in contrast to our results, Pang et al. found that tramadol provided effective postoperative analgesia with minimal sedation in the patients underwent knee arthroplasty.[5] We consider that this variance may be related to different pain mechanism of additional visceral pain of cholecystectomy or the difference dose of administered tramadol in two study. However, De Witte et al. showed that tramadol was not efficient to reduce the pain in patients underwent laparoscopic surgery despite of high doses (3 mg/kg) [6]. Vickers et al. and Naguib et al. reported that tramadol provided effective analgesia if it was used postoperatively without respiratory depression compared to morphine[7,8]. This is attributed to short term efficacy of tramadol.

We observed that in the paracetamol group the need for additional analgesics was found significantly lower than in the control group within first hour postoperatively. Kehlet et al. showed that intraoperative usage of intravenous paracetamol reduced postoperative opioid consumption as well as increased patient satisfaction [9]. It is stated [10] that fast and high-quality recovery was maintained with routine use of NSAI drugs and COX2 inhibitors and paracetamol with low-dose opioids in laparoscopic cholecystectomy. It was shown that paracetamol was a better analgesic compared to placebo and combination of paracetamol with the other NSAI drugs and COX2 inhibitors was proposed.

NSAI drugs and paracetamol were found not to be effective as opioids in post-laparoscopic pain. In particular, short-acting opioids were found more effective in shoulder pain following laparoscopy. Postoperative side-effects of NSAI drugs were found less than opioids. However it was found that opioid-related side effects were not to a level that affect patient discharge and use of single dose short-acting opioid provided more effective analgesia [11]. However, as it extends recovery time and has side effects, routine use of opioids in pain treatment following laparoscopic cholecystectomy is not recommended. Use of short-acting opioids was proposed only in case of need in addition to the main analgesic treatment.

The absence of significant difference in postoperative VAS scores between analgesic agents used intraoperatively and the combinations of them can be attributed to presence of many factors (operation duration, intraabdominal PCO2 pressure, use of drain in the end of operation) reducing and increasing the pain and coexistence of several pain mechanisms in laparoscopic cholecystectomy [12]. In a study conducted by Barczynski et al. the advantages and disadvantages of pneumoperitonium CO2 pressure used during laparoscopy in the patients underwent LC surgery [13]. According to the study lower CO2 pressure (7 mmHg) was found more effective for postoperative pain, postoperative shoulder pain and 5-day quality of life compared to standard pressure (12mmHg). In our study it was observed that pneumoperitonium CO2 pressure was used averagely 13.3±1.5 mmHg. However in the patients used lower or higher pressure there were no significant difference in postoperative analgesia. This situation can be due to CO2 pressures used in the patients observed in our study being more close to standard pressures and not preferring lower CO2 pressures.

Steroids are occasionally used intraoperatively for the purposes of nausea-vomiting prophylaxis. Dexametazone is effective in reduction of postoperative pain [14]. In our study the effect of steroid usage on postoperative pain was not be shown clearly.

Conclusion

In patients undergoing laparoscopic cholecystectomy intraoperative analgesics are not adequate to relief postoperative pain. We consider that the management of pain in laparoscopic cholecystectomy should be done early postoperative period. All analgesics should be administered on the basis of the knowledge of their pharmacokinetic profiles.

Declaration of conflict of interest

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