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The Effect of Analgesics and Physical Therapy on Respiratory Function after Open and Laparoscopic Cholecystectomy

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A B S T R A C T

In this study we present prospective clinical trial included 100 patients. One half of the patients underwent open cholecystectomy, whereas laparoscopic cholecystectomy was performed in the other half. Spirometric parameters, arterial blood gases, acid-base balance, were determined preoperatively, and then at 6 h, 24 h, 72 h and 144 h postoperatively. The impact of physical therapy on the respiratory parameter patterns, VAS-pain score and use of tramadol were studied after cholecystectomy. Significantly lower VAS-pain score and less tramadol use, higher values and faster recovery of ventilation parameters and PaO_2 were recorded after laparoscopic cholecystectomy than after open cholecystectomy ($p=0.001$ for both). Physical therapy resulted in a significant improvement in the values of respiratory parameters in the open cholecystectomy group within a short time (30 min) after therapy was performed. Physical therapy failed to produce any improvement of respiratory parameters in laparoscopic cholecystectomy, whereas in open cholecystectomy group who had a favorable although transient effect, strictly limited to the short time from its application. ($p=0.005$). The patients operated on by open cholecystectomy had statistically significantly more pronounced disturbances including hypoxia, hypocapnia and hyperventilation when compared to the group submitted to laparoscopic cholecystectomy. It is recommended that physical therapy be more frequently performed during the postoperative period in patients submitted to open cholecystectomy.

***Key words**: cholecystectomy, laparoscopic cholecystectomy, postoperative respiratory insufficiency, postoperative analgesia, physical therapy.*

Introduction

Particular surgical incisions, depending on the localization, extent and resection of muscular groups and nerves, lead to postoperative pulmonary complications with a varying intensity and rate[1]. Recently adopted surgical methods using the laparoscopic technique to approach the abdomen entail substantially less severe impairment of the functional integrity of the abdominal wall, thus causing less pain and allowing better patient mobility, which is of utmost importance for the prevention of respiratory complications[2].

In addition to reduced hospitalization[3], lower percentage of surgical complications[4], lower cost of treatment[5], faster resumption of professional activities[6], and better cosmetic effect[7] laparoscopic cholecystectomy has been shown to cause less respiratory function depression and faster respiratory recovery as compared to open cholecystectomy[8].

In this study we explore effect of analgesia and physical therapy at the amelioration of respiratory parameters after open and laparoscopic cholecystectomy, as so far these parameters were not analyzed.

Patients and Methods

Patients

One hundred cholecystectomized patients were included in the prospective randomized clinical trial. Half

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of them (n=50) were operated on by the open cholecystectomy, with the 15 cm right oblique subcostal Kocher's incision. In that open cholecystectomy group were 8 men and 42 women. The other half (n=50) underwent a surgical procedure using the laparoscopic approach to the abdomen through four openings, with the surgeon standing on the left patient's side. In this laparoscopic group were 13 men and 37 women. The mean age of the patients was 46.5±8.8 years. Preoperative comparison of the two patient groups showed that there was no statistically significant difference between them according to sex (χ-square test =1.51; p=0.317), age (t=1.63; p=0.106), height (t= 0.43; p=0.665), and weight (t=1.73; p=0.092). This study was approved by the Ethics Committee of the University Hospital Split. All patients scheduled for elective cholecystectomy gave informed consent to parcipitate in the institutionally approved study protocol. The patients were randomly assigned to surgical teams performing either open or laparoscopic approach for elective cholecystectomy. The patients ordered at Tuesday were assigned for open, and patients ordered at Wednesday were assigned for laparoscopic cholecystectomy.

All study patients were of ASA I, II physical state[9]. Patients with current or previous lung disease and those under treatment for some heart disease were excluded, to prevent the possible impact of previous lung and heart diseases on the study results. Excluded also were patients with abnormal preoperative values of ventilation parameters, as determined by use of the American Thoracic Society criteria[9,10].

Surgery

In all patients anesthesia was induced with thiopental (3–5 mg/kg). After infusion of vencuronium bromide (Norcuron®, Organon, Cambridge, UK) (0.1 mg/kg) and fentanyl (Fentanyl®, Janssen-Cilag, Saunderton, UK) (5 μg/kg) the tracheal intubation was performed. Anesthesia was maintained with nitrous oxide (N_2O) and oxygen (O_2). Neuromuscular blockade was reversed with neostigmine (Neostigmine, Rotex medica Gmbh, Trittau, Germany) (0.03 g/kg) and atropine (Atropini sulfas, Belupo, Koprivnica, Croatia) (0.01 mg/kg). The controlled ventilation was performed by respirators (Sulla 808V, Dräger; Lübeck, Germany) with frequency 12–15/minute. The blood pressure, electrocardiogram, pulse, tidal volume, percutane oxygen saturation and partial carbon dioxide pressure were monitored on capnograf (Ohmeda 250, RGM, Copenhagen, Denmark).

On the day before the scheduled procedure, a cannula was placed into radial artery. Potency of the cannula throughout the six-day blood sampling was maintained by heparin solution. The following parameters were determined in the arterial blood samples: partial oxygen pressure (PaO_2), oxygen saturation (SaO_2), partial carbon dioxide pressure ($PaCO_2$), bicarbonates (HCO_3), base buffer (pH), and base excess or deficiency (BE). Arterial blood gases and acid-base balance were determined on a Radiometer ABL-2 analyzer (Ohmeda 250, RGM, Copenhagen, Denmark).

Spirometric testing including forced vital capacity (FVC), forced expiratory volume in first second (FEV_1), Tiffeneau index (FEV_1/FVC), respiration rate (RR), tidal volume (TV) and minute ventilation (MV) were determined on a mobile Vicatest-4 vitalograph (Mijnhardt, Odjik, The Netherlands). The patients were tested on five occasions, as follows: 12 h before the operation, to obtain baseline values of the studied parameters, then at 6 h, 24 h, 72 h and 144 h following cholecystectomy. All measurements were performed in patient rooms, with the patients fully oriented and cooperative. During the measurements, the patients were in a semisupine position, with the legs and trunk at an angle of 45°.

The effect of analgesic on the rate of respiratory disturbance recovery was assessed by the administration of tramadol (Tramal, Grünenthal Gmbh, Aachen, Germany) on the very first signal of pain after cholecystectomy. The visual analogue scale (VAS)[11] was used to estimate the severity of postoperative pain. Tramadol was administered intramuscularly in a dose of 1.5 mg/kg body weight, when the pain severity exceeded 30 mm on the horizontal line between 0 and 100 mm.

Physical therapy included massage of the chest with a vibrator, inflating rubber surgical gloves, and 20-min breathing exercise three times daily, assisted and surveyed by a physiotherapist during the six days. Spirometric variables were measured before and after physical therapy.

Outcome measures

Respiration parameters indicating the development of relevant respiratory impairment were: PaO_2 decline to <10.5 kPa, $PaCO_2$ increase to >6.0 kPa, and reduction of spirometric values by 20% from normal values.

Statistics

Student's t-test for independent samples, and χ-square test were used in statistical analysis, employing the SPSS for Windows, version 8,0 (Statistical Package for Social Sciences, Copyright© SPSS Inc., 1989–1997). The level of significance was set at $p<0.05$.

Results

A significant decrease in the value of FVC as compared to the baseline preoperative value was recorded 6h after cholecystectomy in both groups of patients. FVC decrease was statistically significantly greater in the group with open cholecystectomy (OC) compared with laparoscopic cholecystectomy (LC). In the LC group the FVC value returned statistically significantly faster to the preoperative level compared with OC (Table 1).

Determinations performed at 24 h, 72 h and 144 h postoperatively also showed a statistically significantly greater decrease of FEV_1 values in the group with OC than in the group with LC. The time needed for FEV_1 recovery was statistically significantly shorter in the LC group (Table 1).

TABLE 1
LUNG VOLUMES WHILE IN SEMI-SUPINE POSITION IN THE LAPAROSCOPIC AND OPEN CHOLECYSTECTOMY GROUPS

		Values (X ± SD) in patients		
Group	Time after operation (h)	LC	OC	P‡
FVC (L)	preoperative	3.8±0.8	3.7±0.7	
	6	2.3±0.7 (0.015)†	1.9±0.7 (0.002)†	0.002
	24	2.9±0.7 (0.030)†	2.5±0.5 (0.022)†	0.001
	72	3.4±0.8 (0.027)†	2.8±0.8 (0.012)†	0.002
	144	3.6±0.9 (0.420)†	2.9±0.8 (0.041)†	0.015
FEV_1 (L)	preoperative	3.1±0.7	3.0±0.6	
	6	1.6±0.5 (0.001)†	1.6±0.4 (0.001)†	0.056
	24	2.0±0.8 (0.001)†	1.5±0.6 (0.021)†	0.029
	72	2.4±1.0 (0.015)†	1.6±0.8 (0.026)†	0.029
	144	3.0±0.8 (0.121)†	2.4±0.7 (0.041)†	0.036
FEV_1/FVC (%)	preoperative	83.0±7.5	85.1±7.8	
	6	62.1±15.8 (0.035)†	60.9±21.3 (0.003)†	0.056
	24	66.6±20.4 (0.041)†	60.5±23.5 (0.012)†	0.074
	72	68.2±16.2 (0.045)†	63.8±19.8 (0.026)†	0.091
	144	88.1±9.3 (1.000)†	84.6±8.3 (0.751)†	0.936

FVC – forced vital capacity; FEV_1 – forced expiratory volume on 1 s; FEV_1/FVC – Tiffeneau index;
† Comparison to preoperative value; ‡ For group comparison

In both groups of patients, a statistically significant decrease in FEV_1/FVC values compared to the baseline preoperative value occurred 6h after cholecystectomy. In the group of LC, however, this value returned to the preoperative value within 144h, whereas in the OC group a statistically significantly decreased FEV_1/FVC value persisted even after 144h postoperatively (Table 1).

In the LC group, no statistically significant changes from the baseline preoperative value of the PaO_2 variable were recorded during the period of observation (Table 2). In the group of patients with OC, however, there was a statistically significant decrease of PaO_2 value at 6h postoperatively, which reached its baseline preoperative value only at 144 h postoperatively.

The group of laparoscopically cholecystectomized patients showed no statistically significant SaO_2 changes either. The group of patients who underwent OC was found to have a statistically significantly greater SaO_2 decrease compared to the values measured in the LC group (Table 2).

The study showed no statistically significant differences in the values of $PaCO_2$, pH, bicarbonates and base alterations between the two patient groups (Table 2).

Hyperventilation was present in both groups of patients during the postoperative course. In the group of LC, it was observed during the first 6 h after the procedure. In the group of OC, hyperventilation was statistically significantly more pronounced during 24 h and persisted for 72 h (Table 3). Hyperventilation increases minute ventilation, which was significantly higher at 6 h, 24 h and 72 h in the OC patients as compared to the LC group (Table 3).

The LC patients had a statistically significantly lower VAS pain score at 24 h, 72 h and 144 h postoperatively than the patients from the OC group (Table 4). The use of tramadol was statistically significantly lower in the group of patients with LC (Figure 1).

After physical therapy no statistically significant improvements of the spirometric parameters were recorded at 24 h and 72 h following the LC group (Figure 2).

In the group of OC patients, however, physical therapy led to a statistically significant increase in the values of spirometric parameters, and this for up to 30 min after

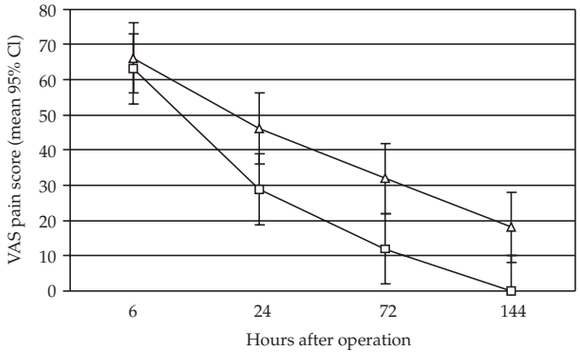

Fig. 1. Self reported pain intensity (VAS score, possible range X-Y) after surgery in patients with performed cholecystectomy. Squares – laparoscopic cholecystectomy (n=50); triangles – open cholecystectomy (n=50).

TABLE 2
GAS EXCHANGE WHILE BREATHING ROOM AIR IN THE LAPAROSCOPIC AND OPEN CHOLECYSTECTOMY GROUPS

		Values (X ± SD) in patients		
Group	Time after operation (h)	LC	OC	P‡
PaO_2 (kPa)	preoperative	12.7±0.8	12.3±1.3	
	6	11.8±3.3 (0.059)†	9.5±2.7 (0.012)†	0.038
	24	11.5±1.5 (0.062)†	9.7±1.6 (0.009)†	0.011
	72	11.6±2.7 (0.068)†	10.1±2.1 (0.003)†	0.021
	144	12.2±1.4 (0.254)†	11.7±1.7 (0.062)†	0.090
$PaCO_2$ (kPa)	preoperative	4.9±0.5	4.9±0.4	
	6	4,3±0.9 (0.044)†	4.5±0.7 (0.039)†	0.056
	24	4,9±0.4 (0.896)†	4.7±0.5 (0.046)†	0.044
	72	4,8±0.4 (0.754)†	4.8±0.8 (0.058)†	0.052
	144	4.9±0.5 (0.966)†	5.1±0.4 (1.000)†	1.000
pH	preoperative	7.4±0.03	7.4±0.02	
	6	7.4±0.03 (1.000)†	7.3±0.03 (1.000)†	1.000
	24	7.4±0.02 (1.000)†	7.4±0.03 (1.000)†	1.000
	72	7.4±0.03 (1.000)†	7.4±0.02 (1.000)†	1.000
	144	7.4±0.02 (1.000)†	7.4±0.01 (1.000)†	1.000

PaO_2 – arterial O_2 tension; $PaCO_2$ – arterial CO_2 tension;
† Comparison to preoperative value; ‡ For group comparison

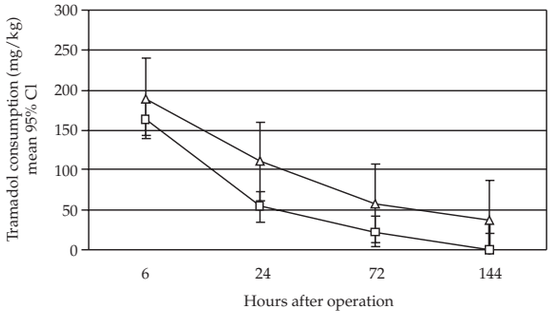

Fig. 2. Tramadol consumption (mg/kg; possible range X-Y) after surgery in patients with performed cholecystectomy. Squares – laparoscopic cholecystectomy (n=50); triangles – open cholecystectomy (n=50).

the session. The values of spirometric parameters measured 2 h after the session showed no statistically significant changes when compared to those determined before physical therapy (Table 5).

Discussion

The patients operated on by OC had statistically significantly more pronounced disturbances including hypoxia, hypocapnia and hyperventilation when compared to the group submitted to LC. At 6 h postoperatively, the investigated ventilation parameters were lowered by 40–50% on an average compared to the baseline preoperative values. A slow postoperative recovery of the ventilation parameters was recorded, they did not return to the baseline preoperative values even at 144 h after the operation. Therefore, deep anesthesia, neuromuscular relaxation, analgesia, corrected level of arterial blood gases, and appropriate mechanical ventilation, along with proper monitoring and patient position, are important factors for anesthesia in LC. A statistically significantly higher VAS-pain score and greater use of tramadol were recorded during the postoperative period in the group of OC patients compared to LC group.

Many authors point to the important role of a number of factors in the genesis of respiratory insufficiency after upper abdominal surgery. These factors include: surgical incision localization[12], extent of abdominal wall damage, abdominal pain and distention[13], diaphragmal dysfunction[14], local irritation on operative manipulation, and the effect of splanchnic and vagal reflexes inhibiting the phrenic nerve during the operation[15]. In addition the importance of residual pneumoperitoneum as a factor of impaired diaphragmal function during the postoperative course after LC has also been underlined[16]. An increased intra-abdominal pressure (>20 mmHg) producing an inhibitory reflex upon the phrenic nerve is required for the pneumoperitoneum to cause diaphragmal dysfunction, or it may reduce diaphragmal excursions by mechanical pressure. Elevated diaphragm cannot ventilate all segments of the lungs, which leads to regional hypoxemia and hypercarbia with respiratory acidosis, decreased lung ventilation and cardiovascular complications[17]. Many authors have investigated the favorable role of analgesia in diminishing respiratory disturbances following cholecystectomy. Effective pain control will improve respiration.

TABLE 3
RESPIRATION RATE, TIDAL VOLUME AND MINUTE VENTILATION IN THE LAPAROSCOPIC AND OPEN CHOLECYSTECTOMY GROUPS

	Values (X ± SD) in patients			
Group	Time after operation (h)	LC	OC	P‡
RR (L/s)	preoperative	17.6±3.7	17.7±4.2	
	6	18.4±2.1 (0.042)†	20.8±5.3 (0.004)†	0.144
	24	17.3±3.1 (1.000)†	19.9±5.1 (0.013)†	0.027
	72	17.5±2.9 (1.000)†	18.1±4.1 (0.034)†	0.056
	144	17.7±2.9 (1.000)†	17.3±4.2 (0.645)†	0.064
TV (L/s)	preoperative	0.8±0.2	0.8±0.3	
	6	0.7±0.2 (0.042)†	0.5±0.5 (0.002)†	0.008
	24	0.7±0.4 (0.038)†	0.5±0.4 (0.002)†	0.011
	72	0.8±0.2 (1.000)†	0.6±0.2 (0.019)†	0.023
	144	0.8±0.2 (1.000)†	0.7±0.2 (0.059)†	0.077
MV (L/s)	preoperative	13.7±4.7	13.5±4.2	
	6	14.6±3.8 (0.044)†	16.7±4.9 (0.004)†	0.005
	24	13.5±3.2 (0.088)†	16.5±3.8 (0.004)†	0.006
	72	13.7±2.8 (1.000)†	15.8±4.2 (0.015)†	0.020
	144	13.7±3.8 (1.000)†	14.1±3.6 (0.062)†	0.066

RR – respiration rate; TV – tidal volume; MV – minute ventilation;
† Comparison to preoperative value; ‡ For group comparison

TABLE 4
LUNG VOLUMES IMMEDIATELY BEFORE AND 30 MIN AFTER PHYSICAL THERAPY IN 50 PATIENTS IN THE TWENTY-FOUR AND SEVENTY-TWO HOURS AFTER THE LAPAROSCOPIC CHOLECYSTECTOMY

	Findings (X ± SD)					
Function parameters	24 hours after operation			72 hours after operation		
	Before physical therapy	½ h after physical therapy	P†	Before physical therapy	½ h after physical therapy	P†
FVC (L)	3.03±1.12	3.12±1.07	0.844	3.58±1.02	3.64±0.98	0.812
FEV_1 (L)	2.06±0.84	2.16±0.99	0.911	2.38±1.05	2.42±0.89	0.562
FEV_1/FVC (%)	68.32±16.02	69.84±15.30	0.644	66.70±20.09	70.91±13.53	0.200
RR (L/s)	17.32±3.10	17.65±3.23	0.699	17.55±2.93	17.83±3.26	0.405
TV (L/s)	0.73±0.161	0.79±0.43	0.120	0.77±0.19	0.78±0.39	1.000
MV (L/s)	13.50±3.221	13.69±3.14	1.000	13.71±3.82	13.92±3.54	1.000

FVC – forced vital capacity; FEV_1 – forced expiratory volume on 1 s; FEV_1/FVC – Tiffeneau index; RR – respiration rate; TV – tidal volume; MV – minute ventilation;
† Comparison before and ½ h after physical therapy

The presence of pain during the postoperative period leads to the occurrence of atelectasis due to impossible deep breathing, insufficient coughing and thus pulmonary infection induced by retention of bronchial secretion[18]. Although Reed[19] and Liu[20] reports on a similar pain score after laparoscopic and open cholecystectomy, our study generally confirmed the results of Cigarini[21] and Schulze[22], who found statistically significant pain score differences between the groups treated with laparoscopic and open cholecystectomy.

Even though some authors[23] suggest that physical therapy has a favorable effect on respiratory disturbance recovery after elective cholecystectomy, results of our study demonstrated that physical therapy, performed along with analgesia, failed to produce statistically significant improvements in the values of respiratory parameters following LC. In the group of patients submitted to OC, physical therapy was found to have a beneficial effect on the respiratory parameter improvement during the postoperative course. However, this effect was transient and limited to the period of physical therapy performance.

Postoperative physical therapy, performed three times daily for 20 min with the assistance of a physiothera-

TABLE 5
LUNG VOLUMES IMMEDIATELY BEFORE AND 30 MIN AFTER PHYSICAL THERAPY IN 50 PATIENTS IN THE TWENTY-FOUR AND SEVENTY-TWO HOURS AFTER THE OPEN CHOLECYSTECTOMY

	Findings (X ± SD)				
Function parameters	Before physical therapy	½ h after physical therapy	P†	2 h after physical therapy	P‡
24 hours after operation					
FVC (L)	2.51±0.3	3.56±0.58	0.002	2.71±0.76	0.057
FEV_1 (L)	1.44±0.65	2.68±0.48	0.005	1.72±0.86	0.066
FEV_1/FVC (%)	60.46±23.58	72.07±22.05	0.005	62.88±16.76	0.753
RR (L/s)	19.93±5.14	17.01±4.32	0.021	18.66±5.09	0.565
TV (L/s)	0.51±0.35	0.76±0.26	0.012	0.53±0.38	0.511
MV (L/s)	16.58±3.82	13.88±4.22	0.001	15.84±4.91	0.091
72 hours after operation					
FVC (L)	2.69±0.56	3.78±0.44	0.003	2.92±0.68	0.094
FEV_1 (L)	1.52±0.82	2.24±0.81	0.001	1.68±0.86	0.154
FEV_1/FVC (%)	63.01±19.94	75.22±16.34	0.001	66.32±19.80	0.159
RR (L/s)	18.03±3.13	15.15±4.36	0.002	17.28±3.88	0.288
TV (L/s)	0.50±0.31	0.78±0.26	0.002	0.61±0.38	0.064
MV (L/s)	16.84±3.56	13.48±3.82	0.001	15.26±2.88	0.241

FVC – forced vital capacity; FEV_1 – forced expiratory volume on 1 s; FEV_1/FVC – Tiffeneau index; RR – respiration rate; TV – tidal volume; MV – minute ventilation

† Comparison before and ½ h after physical therapy; ‡ Comparison before and 2 h after physical therapy

pist failed to produce any significant improvement of spirometric values in the patients operated on by the laparoscopic approach to the abdomen. In OC group it had a transient beneficial effect that lasted for about half an hour after the session. Therefore, it is recommended that physical therapy be more frequently performed during the postoperative period in patients submitted to OC.

REFERENCES

1. LINDELL P, HEDENSTIERNA G, Acta Chir Scand, 142 (1986) 561. — 2. MCMAHON AJ, RUSSELL IT, RAMSAY G, SUNDERLAND G, BAXTER JN, ANDERSON JR, GALLOWAY D, O'DWYER PJ, Surgery, 115 (1994) 533. — 3. REDDICK EJ, OLSEN D, Am J Surg, 160 (1990) 485. — 4. MCLAUGHLIN JG, BONELLI BW, SCHEERES DE, DEAN RJ, Anaesthesiology, 77 (1992) 70. — 5. BARKUN JS, BARKUN AN, SAMPALIS JS, Lancet, 69 (1992) 1. — 6. MELY KH, GALLAGHER M, BARRY M, LENNON F, HYLAND J, Br J Surg, 79 (1992) 1061. — 7. REDDICK EJ, OLSEN DO, Surg Endosc, 3 (1989) 131. — 8. WILLIAMS MD, SULENTICH SM, MURR PC, Surg Endosc, 7 (1993) 489. — 9. UJEVIĆ D, ROGALE D, DRENOVAC D, PEZELJ D, HRASTINSKI M, SMOLEJ N, International Jurnal of Clothing Science and Technology, 18 (2006) 200. — 10. AMERICAN THORACIC SOCIETY, Am Rev Respir Dis, 136 (1987) 1285. — 11. GILT AG, Nurs Res, 38 (1989) 286. — 12. O'DWYER PJ, MCGREGOR JR, MCDERMOTT EW, MURPHY JJ, O'HIGGINS NJ, Postgrad Med J, 68 (1992) 817. — 13. RADEMAKER BMP, SIH IL, KALKMAN CJ, Anaesthesiol Scand, 35 (1991) 108. — 14. ERICE F, FOX GS, SALIB YM, ROMANO E, MAKINS JL, MAGDER SA, Anesthesiology, 79 (1993) 966. — 15. FORD GT, GRANT DA, RIDEOUT KS, DAVIDSON JS, WHITELAW WA, J Appl Physiol, 65 (1988) 72. — 16. PETERS JH, ORTEGA A, LEHNERD SL, CAMPBELL AJ, SCHWARTZ DC, ELLISON EC, Surg Laparosc Endosc, 3 (1993) 370. — 17. SHULMAN S, CHUTER BM, WEISMAN C, Anesthesiology, 75 (1991) 136. — 18. SCOTT NB, MOGENSEN T, BIGLER D, KEHLET H, Acta Anaesthesiol Scand, 33 (1989) 535. — 19. REED AP, HAN D, SAMPSON IH, Anesthesiology, 75 (1991) 3. — 20. LIU J, DING Y, WHITE PF, FEINSTEIN R, SHEAR JM, Anesth. Analg, 76 (1993) 1061. — 21. CIGARINI I, JORIS N, JACQUET N, LAMY M, Anesthesiology, 75 (1991) 122. — 22. SHULZE S, THORUP J, Eur J Surg, 159 (1993) 361. — 23. CELLI BR, RODRIGUEZ KS, SNIDER GL, Am Rev Respir Dis, 130 (1984) 12.

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UČINAK ANALGEZIJE I FIZIKALNE TERAPIJE NA RESPIRACIJSKE FUNKCIJE NAKON KLASIČNE I LAPAROSKOPSKE KOLECISTEKTOMIJE

S A Ž E T A K

U ovoj studiji prezentiramo prospektivno kliničko ispitivanje u koje je bilo uključeno 100 kolecistektomiranih pacijenata. Polovina pacijenata podvrgnuta je klasičnoj kolecistektomiji, dok je kod druge polovine učinjena laparoskopska kolecistektomija. Spirometrijski testovi, plinovi u arterijskoj krvi, te acidobazni status određivani su prijeoperacijski, te 6, 24, 72 i 144 sati nakon operacijskog zahvata. Nakon kolecistektomije pračeni su učinak fizikalne terapije na respiracijske funkcije, zbroj na vizualno-analognoj skali boli, kao i upotreba tramadola. Signifikantno niži »VAS pain score«, više vrijednosti i brži oporavak respiracijskih parametara i PaO_2 zabilježeni su u skupini laparoskopski operiranih bolesnika ($p=0,001$). Fizikalna terapija rezultira u signifikantnom poboljšanju respiracijskih parametara u skupini bolesnika operiranih klasičnim načinom i to već kratko vrijeme (30 min) nakon što je terapija provedena. Nema poboljšanja respiracijskih parametara nakon fizikalne terapije u skupini bolesnika operiranih laparoskopskim načinom. Pacijenti koji su operirani klasičnim načinom imaju statistički značajno češće izražene poremećaje respiracijskih funkcija, uključujući hipoksiju, hipokapniju i hiperventilaciju, u usporedbi s pacijentima koji su operirani laparoskopski. Preporučamo provođenje fizikalne terapije mnogo češće u poslijeoperacijskom periodu kod bolesnika operiranih klasičnim načinom.