



*Original Contribution*

**BILATERAL TRANSVERSUS ABDOMINIS PLANE BLOCK REDUCES  
POSTOPERATIVE NSAIDS USE AFTER LAPAROSCOPIC  
HERNIA REPAIR**

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**ABSTRACT**

**INTRODUCTION:** Bilateral peripheral block (TAP - block) is usually performed under ultrasonography (US) guidance in the plane between the inner oblique abdominal muscle and the transversal abdominal muscle, and it aims to block the thoracoabdominal nerves from Th6 to L1 by infiltrating local anesthetic. TAP block is effective tool of managing pain control, especially in the first twenty-four hours after surgery. It improves recovery pathway following minimally invasive surgery and reduces narcotic and non-steroidal anti-inflammatory drugs (NSAIDs) use for postoperative pain management in various different abdominal surgery.

**AIM:** The purpose of this research was to assess the analgesic efficacy of TAP block in regard to used NSAIDs concentrations during the first 24 hours following laparoscopic inguinal hernioplasty.

**METHODS:** The study was conducted with 60 patients, who were randomized into two groups. Control group – were patients who received general anesthesia (GA), and experimental group, were patients who have received GA and a bilateral TAP block. All patients received NSAIDs in the postoperative period.

**RESULTS:** From the acquired data, during the first postoperative hour (POH) only 20% of the experimental group required Paracetamol in a dosage of 1000 mg. Control patients used three times more NSAIDs (60%). Compared to the control group, 63.3% of TAP-block patients did not require analgesia from the 6th to the 12th POH. In the control group average amount of paracetamol was 5167 mg, while in experimental group it was twice lower. Similar finding was established in regard to Ketonal consumption. The control group (without TAP-block) consumes around twice as many NSAIDs as the experimental group at all post-operative time intervals.

**CONCLUSION:** The findings of our research demonstrate that patients undergoing bilateral laparoscopic inguinal repair, administering ropivacaine as part of an US-guided bilateral TAP-block decreases the requirement of NSAIDs in the first twenty-four hours after surgery. TAP-block is a component of multimodal anesthesia and an adjuvant for intraoperative and postoperative analgesia.

**Key words:** Regional anesthesia, US-guided transversus abdominis plane block, NSAIDs, Ketonal, Paracetamol

**INTRODUCTION**

The anesthesia community around the globe tends to achieve postoperative analgesia as an endpoint of successful abdominal surgery. Therefore, the usage of abdominal wall blocks for various different interventions has gaining the momentum (1-3). As part of this postoperative pain management, transversus abdominal plane (TAP) block is a well-known

technique for analgesia following abdominal surgery (4, 5). In recent decades, a TAP block plays an important role in a multimodal approach of pain-relief treatment after colonic, gynecological, obstetric and urology surgery (6-8). In these specific circumstances, it was shown that a TAP block is effective tool of managing pain control, especially in the first twenty-four hours after surgery (9, 11). This locoregional technique is usually performed under ultrasonography (US) guidance in the plane between the inner oblique abdominal muscle and the transversal abdominal muscle, and it aims to block the thoracoabdominal

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nerves from Th6 to L1 by infiltrating local anesthetic (12, 13). It improves recovery pathway following minimally invasive surgery and reduces narcotic and non-steroidal anti-inflammatory drugs (NSAIDs) use for postoperative pain management. Shorter hospital stays, reduced expenses, and patient satisfaction are another important benefit from this technique (14-17). Thus, the purpose of this research was to assess the analgesic efficacy of TAP block in regard to used NSAIDs concentrations during the first 24 hours following laparoscopic inguinal hernioplasty.

## MATERIAL AND METHODS

In this research were included 60 male patients within age range 24–55, ASA (American Society of Anesthesiologists) class I and II, who underwent bilateral laparoscopic inguinal hernia repair. All patients gave informed consent after thoughtful explanation of the procedure. The patients were divided into two groups: experimental and control. Group I or control one included 30 patients, who received general anesthesia (GA), whereas Group II or experimental (n = 30) received GA with TAP block. Multimodal GA included propofol, lysthenon, fentanyl, and sevoflurane. Patients were premedicated with a dosage of 0.05 mg / kg of midazolam that was administered intraorally forty minutes before their operations. In both groups of patients, we used inhalation anesthetic Sevoflurane, Tracrium and bolus doses of opioid analgesic Fentanyl at 0.5 mcg/kg.

In the experimental group, following induction of anesthesia and intubation, bilateral TAP-block with lateral approach was performed under US control. Approximately time for conducting TAP- block was 10-15min. A portable US equipment with a linear transducer

5-11 MHz's was used. Under real-time US visual control, 20 ml of 0.375% ropivacaine was bilaterally administered with intermittent aspiration using a 22G needle (Stimuplex D Plus 22G × 80 mm). This local anesthetic was injected between the aponeurosis of the transversus abdominis and internal oblique muscles. Ultrasonographical, the correct placement of the local anesthetic was determined by a black shadow, the "stratification" of the aponeurosis between the inner oblique and transverse muscle.

In the postoperative period, the amount of used NSAIDs was monitored at 6, 12 and 24 post-operative hours (POH). In order to alleviate any discomfort felt after surgery, all patients reported moderate pain, defined as a VAS score of 5 or above, were given a combination of NSAIDs (1000 mg paracetamol and 100 mg ketoprofen).

### *Statistical applications*

SPSS Statistics 17.0, Sigma Plot for Windows 12.0, and Microsoft Office Excel were used for biostatistical analysis and graphical display. Statistical significance was defined at  $p < 0.05$  (significance level  $\alpha > 95\%$ ).

## RESULTS

Demographic differences across groups were not statistically significant, as well as the duration of anesthesia and operational procedure. In both groups, the average duration of anesthesia was 149 minutes, while the estimated duration of surgery was 130 minutes. However, it is important to underline that the experimental group (TAP-block recipients) used 98.3  $\mu$ g of Fentanyl (SD = 24.5) with a 4.5 standard deviation margin of error, whereas the control group used 190  $\mu$ g opioid (SD = 30.5) with a 5.6 standard deviation.

**Table 1.** Comparison of the preoperative Fentanyl dose between the experimental and control groups based on baseline sample parameters

Group	min	max	Mean	St. Err.	SD	Me
Experimental	50	150	98,3	4,5	24,5	100
Control	150	250	190	5,6	30,5	200

Tables 2 and 3 show the quantity of NSAIDs used from the 0-24th POH in patients with applied TAP-block (experimental group) and those without (control group). From the

acquired data, it is obvious that during the first postoperative hour (POH) only 20% of the experimental group required Paracetamol in a dosage of 1000 mg.

**Table 2.** Frequency of use of Paracetamol in number and % of patients

Postoperative hours	Group	Frequency	Paracetamol (mg)			
			0	1000	2000	3000
0 - 1	Experimental	number	24	6		
		%	80,00%	20,00%		
	Control	number	12	18		
		%	40,00%	60,00%		
1 - 6	Experimental	number	15	15		
		%	50,00%	50,00%		
	Control	number	10	17	3	
		%	33,30%	56,70%	10,00%	
6 - 12	Experimental	number	19	11		
		%	63,30%	36,70%		
	Control	number	10	19	1	
		%	33,30%	63,30%	3,30%	
12 - 24	Experimental	number	11	14	5	
		%	36,70%	46,70%	16,70%	
	Control	number	2	20	7	1
		%	6,70%	66,70%	23,30%	3,30%

**Table 3.** Frequency of use of Ketonal in number and % of patients

Postoperative hours	Group	Frequency	Ketonal (mg)	
			0	100
0 - 1	Experimental	number	26	4
		%	86,70%	13,30%
	Control	number	13	17
		%	43,30%	56,70%
1 - 6	Experimental	number	15	15
		%	50,00%	50,00%
	Control	number	17	13
		%	56,70%	43,30%
6 - 12	Experimental	number	24	6
		%	80,00%	20,00%
	Control	number	10	19
		%	33,30%	63,30%
12 - 24	Experimental	number	22	8
		%	73,30%	26,70%
	Control	number	12	18
		%	40,00%	60,00%

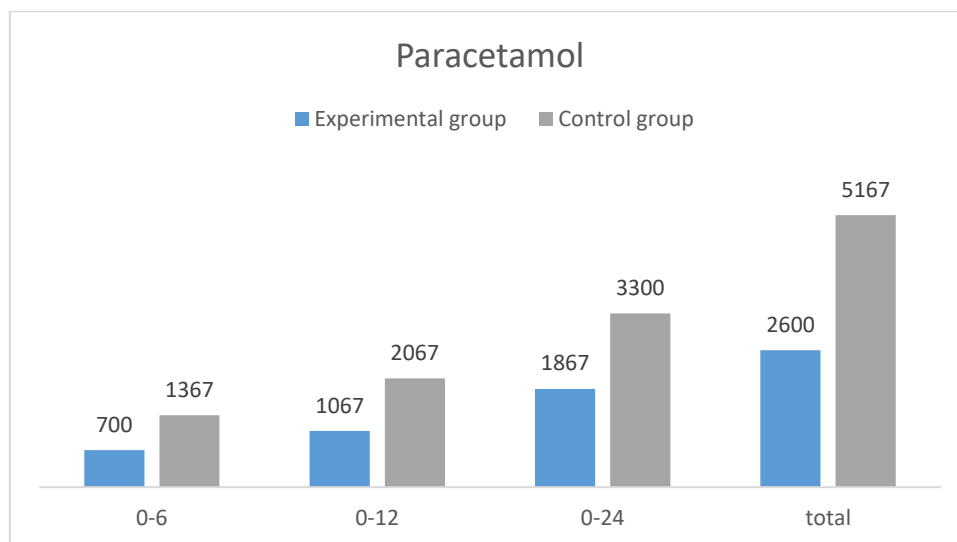
Control group patients had three times bigger NSAIDs usage (60%). Half of the TAP-block patients received 1000 mg of paracetamol from the 1st to the 6th POH. In the control group,

56.7% got 1000 mg and 10% 2000 mg of paracetamol. Compared to the control group, 63.3% of TAP-block patients did not require analgesia from the 6th to the 12th POH.

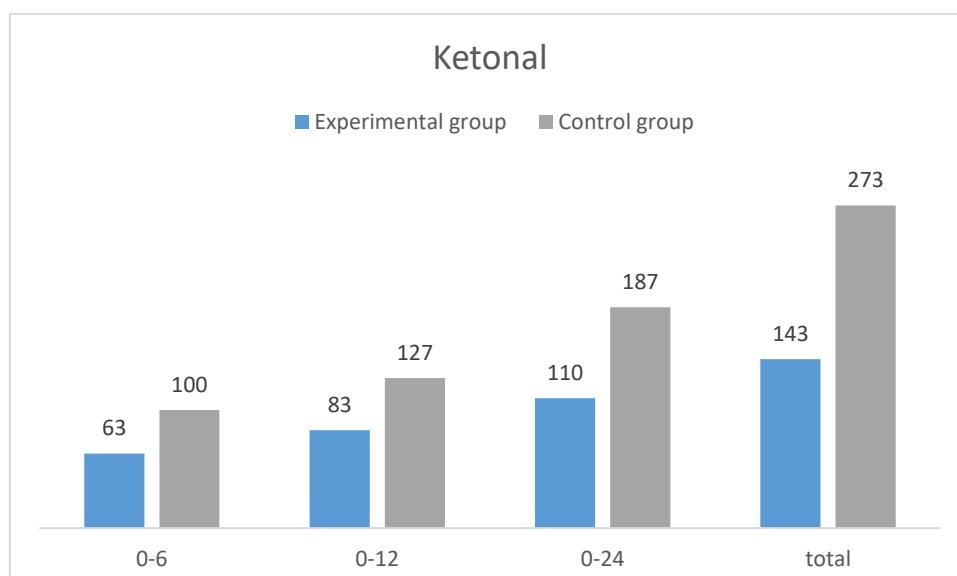
Furthermore, in the 12-24th POH, only 5 patients (16.7%) in the experimental group got 2000 mg of paracetamol, compared to 23.3% of the control group and 3.3% who received 3000 mg. In regard to Ketonal usage, it was revealed that during the first POH in the experimental group, 86.7% of patients did not need analgesia, while the other 4% got 100 mg of the medication intravenously. Significantly more patients (56.7%) in the control group got 100 mg of Ketonal in the first postoperative hour after receiving the drug. Between the 1st and 6th POH, 50% of experimental patients and 43.3% of control patients received a single dose of Ketonal for analgesia. Between the 12th and 24th POH, however, there was a significant percentage difference between the two groups of patients: 73.3% of the experimental group and 40% of the control group did not need further analgesics. Unlike the control group,

where five patients got the maximal dosage of Ketonal between 24 and 48 POH, just one patient in the experimental group received 200 mg of Ketonal.

The average values of the amounts of Paracetamol and Ketonal used are presented in the **Figure 1 and 2**. The statistics given in **Figure 1** indicate that the experimental group consumed 2600 mg of Paracetamol on average, compared to 5167 mg in the control group. A difference in outcomes was also seen with Ketonal (**Figure 2**), where the total quantity provided was 273 mg in patients without TAP block and approximately 50% less in those with TAP block (143 mg). At all post-operative time intervals, the control group (without TAP-block) uses almost twice the average quantity of NSAIDs compared to the experimental group.



**Figure 1.** Average consumption of Paracetamol in first 24 hours



**Figure 2.** Average consumption of Ketonal in first 24 hours

**Table 4.** Comparison between the experimental and control groups on the average pain score according to the WBF scale in post-operative period

2 <sup>nd</sup> hour	Experimental group		Control group		Mann-Whitney's test	
	Me	(min - max)	Me	(min - max)	U*	P
WBF	0	(0 - 6)	4	(0 - 6)	161	<0,001
6 <sup>th</sup> hour	Experimental group		Control group		Mann-Whitney's test	
	Me	(min - max)	Me	(min - max)	U*	P
WBF	2	(0 - 6)	2	(0 - 8)	427	0,720
12 <sup>th</sup> hour	Experimental group		Control group		Mann-Whitney's test	
	Me	(min - max)	Me	(min - max)	U*	P
WBF	2	(0 - 8)	4	(0 - 6)	254	0,002
24 <sup>th</sup> hour	Experimental group		Control group		Mann-Whitney's test	
	Me	(min - max)	Me	(min - max)	U*	P
WBF	2	(0 - 6)	2	(0 - 6)	365	0,128

According to the data presented in **Table 4**, a statistically significant difference was found between the two groups regarding the general perception of pain according to the WBF scale in almost all-time intervals studied.

Our results in respect with postoperative pain management with TAP – block are similar with other scientific publications (18-21).

## CONCLUSION

The findings of our research demonstrate that patients undergoing bilateral laparoscopic inguinal repair, administering ropivacaine as part of an US-guided bilateral TAP-block decreases the requirement of NSAIDs in the first twenty-four hours after surgery. TAP-block is a component of multimodal anesthesia and an adjuvant for intraoperative and postoperative analgesia. However, to determine the optimal use of this approach, more investigation is necessary.

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