



**MEDICAL UNIVERSITY - PLOVDIV  
FACULTY OF MEDICINE DEPARTMENT OF "SPECIAL  
SURGERY"**

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**QUALITY OF LIFE AND POST-OPERATIVE  
COMPLICATIONS IN ENDOSCOPIC AND  
CONVENTIONALLY OPERATED PATIENTS WITH  
INGUINAL HERNIAS**

**ABSTRACT**

**of  
DISSERTATION WORK**

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**The dissertation consists of 134 standard pages and is illustrated with 25 tables, 8 graphs and 2 diagrams. The bibliography includes 231 titles in Latin. The dissertation work was discussed and proposed for defense to an extended departmental council of the Department of Special Surgery at the MU - Plovdiv.**

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**The official defense of the dissertation will be held on ..... 2023 from ... : ... at the meeting of the scientific jury in ... auditorium of MU - Plovdiv, city of Plovdiv, Vasil Aprilov Blvd. No. 15 A.**

## CONTENT

<b>ABBREVIATIONS USED</b> .....	6
<b>INTRODUCTION</b> .....	7
<b>1. PURPOSE AND TASKS</b> .....	10
1.1 Purpose .....	10
1.2 Basic tasks.....	10
<b>2. MATERIALS AND METHODS</b> .....	11
2.1 Study design.....	11
2.2 Units (object) of the study.....	11
2.2.1 Logical units.....	11
2.2.2 Technical units.....	12
2.3. Features of the study .....	12
2.4. Research methods.....	13
2.4.1 Non-operative methods .....	13
2.4.1.1. Survey method.....	13
2.4.1.2 Documentary method .....	13
2.4.1.2. Clinical Methods.....	14
2.4.1.4 Laboratory researches.....	15
2.4.1.3. Instrumental methods.....	15
2.4.1.6 Statistical methods .....	15
2.4.2. Operational methods.....	16
2.4.2.1 Open methods of hernioplasty with a prosthesis.....	16
2.4.2.1 Endoscopic methods .....	17
<b>3. RESULTS AND DISCUSSION</b> .....	18

3.1 Preoperative results observations and discussion.....	18
3.1.1. Incidence by sex and age .....	18
3.1.2 Results by location, type of hernia .....	21
3.1.3 Subjective symptoms according to anamnestic data .....	22
3.1.4. Results and discussion according to the type of operative technique .....	23
3.1.5. Preoperative indicators - ASA classification .....	27
3.2. Intraoperative results and discussion.....	29
3.2.1. Surgical and general operating time.. .....	29
3.3. Postoperative results and discussion.....	31
3.3.1.Results and discussion regarding postoperative complications .....	31
3.3.1.1 Results and discussion regarding postoperative pain .....	37
3.3.1.2 Pain registration. ....	37
3.3.1.3 Degree of pain according to COA and EOA.....	39
3.3.1.4 Conservative treatment – analgesic therapy.....	41
3.4. Results and discussion regarding hospital stay and discharge .....	45
3.5 Results regarding the impact of early BMI recovery of the patient.....	48
3.6 Results and discussion of quality of life.....	48
3.7 Results and discussion of costs of operations.....	50
3.8 Future perspectives in inguinal hernia surgery.....	53
<b>ГJABA 4. CONCLUSION .....</b>	<b>55</b>
<b>ГJABA 5. INFERENCE .....</b>	<b>60</b>
<b>ГJABA 6. SCIENTIFIC CONTRIBUTIONS.....</b>	<b>62</b>
6.1 Scientific contributions of an original character .....	62

6.2 Scientific contributions of a practical-applied character ..... 62

**RESEARCH WORKS RELATED TO THE DISSERTATION THESIS ..... 63**

## **ABBREVIATIONS USED IN THE THESIS**

**VAS** – Visual Analogue Scale

**DCC** - Differential Cell Count

**ODS** – One day surgery

**NSAIDs** - Nonsteroidal anti-inflammatory drugs

**CRP** – C reactive protein

**FEO1** – Forced expiratory volume in 1  
second

**FVC** – Forced Vital Capacity

**COA** – Conventional Open Access

**EOA** – Endoscopic Operative Access

**COH** – Conventional open hernioplasty

**EOH** – Endoscopic operative hernioplasty

**COM** – Conventional open method

**EOM** – Endoscopic operative method

**CH** – Conventional/open/hernioplasty

**LH** - Laparoscopic hernioplasty

**TEP** - Total extraperitoneal hernioplasty

**TAPP** - Transabdominal Preperitoneal Hernioplasty

**IPOM** - Intraperitoneal onlay mesh

**RCT** - Randomized Controlled Trial

**SWI** - Surgical wound infection

**CPP** - Chronic postoperative pain

**QOL** - Quality of life

## INTRODUCTION

The problem of inguinal hernias is current and significant. It occupies a large part of modern general planned and emergency surgery worldwide. Due to the high prevalence, the still high frequency of recurrences and early complications, a choice of new operative methods is emerging.

The presence of more than 600 operative methods and modifications of operative techniques for the treatment of inguinal hernias, due to the lack of unified tactics, indicates that there is no surgical technique that guarantees 100% cure. Initially, the focus was on safety and reducing complications, reaching the modern phase where reducing the recurrence rate is a priority.

In the last 20 years, there has been a rapid development of medical technologies, which has led to the creation and application of new methods for the surgical treatment of inguinal hernias.

The use of artificial implants for prosthetics of the inguinal canal according to the Lichtenstein method through tension-free plastic gained great popularity and led to a radical change in surgical interventions for inguinal hernias. I. Lichtenstein's method is based on the concept of tension-free plastic, representing a complete reconstruction of the back wall of the inguinal canal, through the use of polypropylene mesh with a traditional anterior, transinguinal access. The concept of the separation of anterior and posterior inguinal hernioplasty, has changed through "tension free" methods, to mini-invasive ones with trans- and pre-peritoneal approaches.

## INTRODUCTION

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Each of these methods has its advantages and disadvantages, its convinced supporters and opponents.

In modern herniology, laparoscopic mini-invasive methods and prosthetic methods with synthetic materials are considered the main priority for inguinal hernias.

Laparoscopic hernioplasty is a mini-invasive and highly aesthetic surgical intervention with options for surgical treatment of unilateral, bilateral and recurrent inguinal hernias, with a lower number of complications and recurrences. This leads to a shorter hospital stay and rapid socio-work rehabilitation of patients, especially important for people of working age. Disadvantages of laparoscopic operations are: high cost, prolonged operation time, technical complexity, long period of training and learning of the surgeon, expensive equipment, frequent visceral and vascular complications, general endotracheal anesthesia and a higher rate of recurrence compared to conventional methods with a prosthesis for front access.

Therefore, despite the widespread enthusiasm for minimally invasive techniques, in recent years there has been a tendency to limit their indications, mainly to the application for bilateral and recurrent hernias or at the express request of the patient.

Quality of life is of particular importance in patients of working age, but should not be neglected in those in advanced and an old one. It is mainly due to the presence of recurrence and chronic postoperative pain.

Globally, special registries of patients with inguinal hernias have been established, and surgeons have united in national and international societies of herniologists with the aim of formulating consensus opinions, guidelines and

## INTRODUCTION

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recommendations for the future standardization of operative techniques.

Successful surgical treatment of inguinal hernias, taking into account the mass of the disease, the number of recurrences and the age of the patient, has a great socio-economic significance.

## CHAPTER 1. PURPOSE AND TASKS

### 1.1 PURPOSE:

To compare the advantages and disadvantages of laparoscopically and conventionally operated patients with inguinal hernias and the quality of life of these patients.

### 1.2. TASKS

1. To analyze the results of the application of the two groups of operational methods in terms of:
  - 1.1. Operative time and intraoperative outcomes.
  - 1.2. Postoperative complications.
  - 1.3. Length of hospital stay.
  - 1.4. Recovery period - return to the workplace and resocialization in society.
  - 1.5. The cost of operations.
2. Sharing the experience of the application of laparoscopic and conventional operative methods, to highlight their advantages and disadvantages and differentiate the indications for operative treatment.
3. To develop and complete a patient questionnaire at admission, hospital stay and follow-up on the 30th postoperative day, and to conduct telephone interviews at the 3rd, 6th and 12th postoperative months, 2 and 3 years for the long-term results of treatment.
4. To compare the postoperative quality of life in the two groups.

### CHAPTER 2. MATERIALS AND METHODS

#### 2.1 Design of the study - organization, implementation and period of study (investigation)

The current dissertation consists of two separate descriptive studies on the main modern operative methods for the treatment of inguinal hernias:

A: Prospective study conducted from December 2016 to December 2017;

B: Retrospective study from January 2013 to December 2016.

#### 2.2 Units / object / of research

**2.2.1 Logical units** - all patients with clinically proven inguinal hernia were operated and followed up in the Department of General Surgery at the Shtip Clinical Hospital and the Clinic for Digestive Surgery at the Department of Special Surgery at the Medical University of Skopje, Republic of North Macedonia during the period.

The clinical material includes 227/210 men and 17 women/patients with anamnestic symptoms of inguinal hernias, confirmed by clinical examination and operated in inpatient settings. Patients are divided into two main groups. In the group with conventional hernioplasty, 182 patients were included, of which 165 men and 17 women with an average age of 55 years  $\pm$  15 years. (18 – 93 years). The laparoscopic hernioplasty group consisted of 45 patients, all male with a mean age of 45  $\pm$  15 years (24–69).

### 2.2.2 Technical data - place of study

The technical unit of the study is the health facility where the cases were registered and the separate area where the logical units were observed and data were collected for the time interval 2013-2017, as follows:

- Republic of North Macedonia (2013-2017).
- Department of General Surgery at Shtip Clinical Hospital (2013-2016).
- The Abdominal Surgery Clinic at the Department of Special Surgery of the Medical University of Skopje (2016-2017).

### 2.3 Features of the study

The present study investigated and analyzed the correlation between some main perioperative characteristics of patients with inguinal hernias.

- ❖ The main factorial signs in the observed group of patients are:
  - Age and gender - their influence was analyzed as a continuous variable;
  - Leading subjective symptoms, clinical signs and type of inguinal hernia;
  - Somatic status, preoperative ASA status and type of anesthesia;
  - Type and volume of surgical intervention – Conventional Lichtenstein type hernioplasty, Laparoscopic hernioplasty – TAPP or TEP.
  
- ❖ Main outcome measures were considered:

## MATERIALS AND METHODS

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Perioperative complications and mortality, operative time, hospital stay, convalescence, rehospitalizations, presence of recurrences, acute and chronic postoperative pain, quality of life, cost-effectiveness, cost of operations.

### **2.4 Methods applied to realize the purpose and tasks of the study:**

#### **2.4.1 Non-operative methods:**

**2.4.1.1 Survey method** – telephone interviews, survey information cards.

**2.4.1.2 Documentary method** - collection of data for the patients included in the study from the history of the disease (HD), operative protocols, operative logs, anesthesiology sheets, epicrisis, outpatient logs.

To calculate and evaluate the results, we used the SF 36 scale, created to study the health status and quality of life of patients. The scale is constructed from a multi-item scale that assesses eight health indicators:

**1.(PF) Physical Functioning** – limitation in physical activities due to health difficulties (walking, climbing stairs, self-care, etc.).

**2.(RP) Role-Physical** – limited usual activities due to physical health problems.

**3.(BP) Bodily Pain** – pain in the body;

**4.(GH) General Health** – instant assessment of patients' health status.

## MATERIALS AND METHODS

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**5.(VT) Vitality** (energy and fatigue).

**6.(SF) Social Functioning.**

**7.(RE) Role-Emotional** – assessment of the degree to which the emotional state interferes with daily activities.

**8.(MH) Mental Health** - general mental health

**2.4.1.3 Clinical methods** – history, physical clinical examination, control examinations. During the history and physical examination, attention is directed to the following factors:

**2.4.1.3.1 Habitual factors** – sex, age, overweight, evidence of connective tissue and muscle atrophy, increased intra-abdominal pressure, evidence of connective tissue diathesis (hemorrhoids, varicose veins of the lower extremities and suspected expression of collagen III), primary and recurrent hernias, duration of the disease, previous surgery, length of recurrence and complications after the first surgery.

**2.4.1.3.2 Concomitant diseases** - COPD and evidence of increased intra-abdominal pressure, chronic cardiovascular diseases, diabetes mellitus, urological diseases, cerebrovascular disease and evidence of inactivity of muscle hypotrophy, GIT diseases and a combination of the concomitant diseases.

### 2.4.1.4 Laboratory researches

- Complete blood count (CBC).
- Coagulation status.
- Blood sugar.
- Other biochemical indicators as necessary and at discretion.
- Urine – routine.

### 2.4.1.5 Instrumental methods

- ECG and consultation with a cardiologist.
- If necessary - functional diagnosis of the heart and lungs (EchoCG, coronary angiography, functional breathing test (FTD)).
- X-ray diagnostics; Invasive methods - according to indication: Echotomography, x-ray studies, contrast x-ray studies, computed tomography, magnetic resonance, upper and/or lower endoscopy of the GIT.

### 2.4.1.6 Statistical methods

Based on the main aim and tasks of the study, as well as the volume and type of data, the following statistical methods were used:

- Variation analysis – when describing quantitative indicators (signs) with a normal or close to normal distribution.

## MATERIALS AND METHODS

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- Results are presented as arithmetic mean and standard error (mean  $\pm$  SE);
- t-criterion for testing hypotheses for the presence of a statistically significant difference between the studied indicators. A significance level of the null hypothesis  $P = 0.05$  was used. The critical region for the indicated p values is two-sided;
- Non-parametric analysis – when comparing a given empirical and the expected theoretical distribution of the data. When testing the hypotheses of insignificant (random) influence of a given factor, the Fisher's exact test was used for quadruple tables and the criterion for multiple tables;
- Non-parametric tests for comparison of survival in two or more samples;
- Graphical analysis – for visual representation of the results.
- The statistical processing of the data was carried out using the SPSS v.19.0 software package, and their graphical presentation using Microsoft Excel 2018.

### 2.4.2 OPERATING METHODS

#### 2.4.2.1 Open / conventional / CH / methods of hernioplasty with prosthesis

- **Lichtenstein method.**

### **2.4.2.2 Endoscopic methods**

#### **2.4.2.2.1 Method of transabdominal preperitoneal hernioplasty - TAPP**

#### **2.4.2.2.2 Method of total extraperitoneal hernioplasty – TEP**

To solve the set tasks, the operated patients were grouped into 2 categories according to the type of surgical intervention:

1. Patients operated only with standard open conventional surgical methods;
2. Patients operated with endoscopic (laparoscopic) surgical methods.

We created anonymous survey cards with 37 questions, grouped in several areas, using also the questions from the quality of life tables: RAND – 36 and Final score. We consider the result and the opinion of the patient to be an important evaluation for the application of the various operative methods.

# RESULTS and DISCUSSION

## CHAPTER 3. RESULTS and DISCUSSION

### 3.1 Preoperative results, observations and discussion

#### 3.1.1 Disease according to gender and age

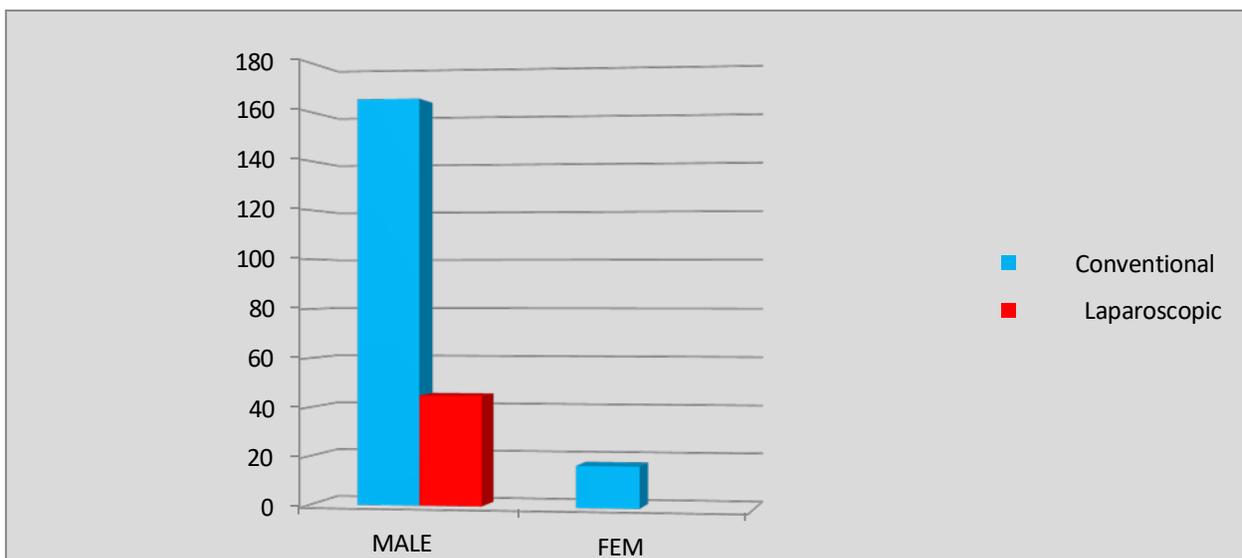
From the total of 227 patients presented in the dissertation work, there are 182 patients in the group with CH, while there are 45 patients in the group with LH/ Table No. 1/

**Table No. 1: Distribution by gender**

GENDER	COM	%	EOM	%
MALE	165	90.1 %	45	100%
FEMALE	17	9.34 %	–	–
GENERAL	182	100%	45	100%

p value > 0.05

The demographic distribution includes 165 men and 17 women with CH and 45 men with LH /Chart № 1/.



**Chart no. 1: Results in terms of disease by gender.**

## RESULTS and DISCUSSION

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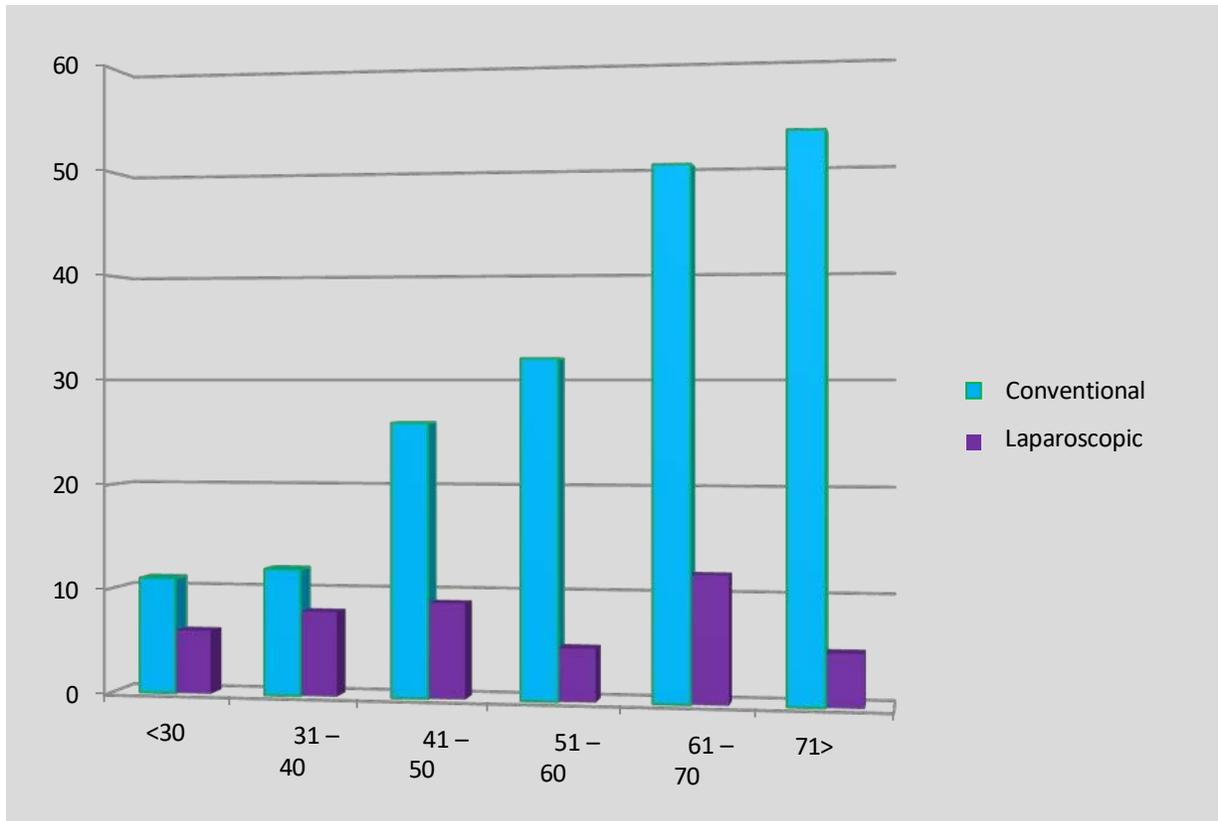
The age presentation of the patients in absolute values by completed years covers 6 periods / Table No. 2/

**Table no. 2: Age representation of participants in absolute values.**

<b>AGE</b>	<b>CH</b> <b>n (%)</b>	<b>LH</b> <b>n (%)</b>
<30	11 (6.04)	6 (13.33)
31 – 40	12 (6.59)	8 (17.78)
41 – 50	26 (14.28)	9 (20)
51 – 60	30 (16.48)	5 (11.11)
61 – 70	50 (27.47)	12 (26.67)
71>	53 (29.12)	5 (11.11)
<b>TOTAL</b>	<b>182</b>	<b>45</b>

The average age of the patients is 55 years (18 - 93 years) for the conventionally operated, while in the group of laparoscopically operated patients the average age is 46 years (24 - 68 years) /Graph No. 2/.

## RESULTS and DISCUSSION



**Chart No. 2 : Age range of the study participants.**

No statistically significant difference was found between the two groups.

The number of patients included in the present study amounted to 227, which is sufficient for statistical analysis. Of all the patients, 182 refer to the conventional open type and 45 to the endoscopic type hernioplasty group. The results obtained by us in terms of the number of patients included in the study are close to those indicated in the clinical randomized trials of Hallen M and co-authors 2008. as well as Gong K and co-authors 2011. Of 164 patients followed over a period of 3 years, 62 underwent open hernioplasty, 50 patients underwent TAPP, and 52 underwent TEP. Patients were then followed for  $15.6 \pm 8.5$  months.

A level of p Value  $< 0.05$  does not indicate a statistically significant advantage between the two groups. In the long-term follow-up study, the response rate was high - more than 80% of patients in both groups were included, which can be considered a good result.

## RESULTS and DISCUSSION

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### 3.1.2 Results regarding location, type of hernia

Right-sided inguinal hernia is more common, found in 130 patients/57.27%. There were 9 patients with bilateral inguinal hernia /3.96%/, and with left-sided - 88 patients/38.7%/Table No. 3/.

**Table No. 3: Distribution of inguinal hernias based on topographic-anatomical localization.**

<b>Localization</b>	<b>No</b>	<b>%</b>
<b>Unilateral right side</b>	130	57.27
<b>Unilateral left side</b>	88	38.7
<b>Bilateral (both side)</b>	9	3.96
<b>Total</b>	227	100

Of 227 patients with inguinal hernias, 216 (95.2%) were reducible, while 11 (4.8%) were non-reducible.

According to urgency, incarcerated inguinal hernia was present in 11 (4.8%) patients, all of whom were men. Depending on the course of the disease, two clinical forms have been established - uncomplicated and complicated form of inguinal incarceration.

In uncomplicated forms of inguinal incarceration after hospitalization, the

## RESULTS and DISCUSSION

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patient's complaints decrease due to spontaneous reposition or after successful taxis. A total of 7 patients (3.1%) had an uncomplicated course of incarceration.

After the manual reduction,(taxis) the patients were monitored for up to 24 hours and, at their own request, underwent surgery. In the case of a successful taxis with reposition, a delayed operation follows, and in the case of complicated incarceration, an urgent emergency operation follows. The preoperative clinical diagnosis was made during a clinical examination and palpation with the establishment of a painful irreponible swelling at the site of a previous inguinal hernia.

Data on complicated inguinal incarceration were observed in 3 patients (1.3%). The patients were operated with the classic open method of Lichtenstein. Intraoperatively, after opening the hernial sac as incarcerated (contents), a large omentum was established on the hernial sac, after which a partial resection of the omentum and plastic with Polypropylene mesh was performed. The patients were discharged on the 5th postoperative day in good general condition.

Regarding recurrences, 18 patients (7.9%) had one recurrence, while 3 patients (1.3%) had 2 recurrences, and 2 patients (0.9%) had 3 or more recurrences.

### **3.1.3 Subjective symptoms according to anamnestic data**

Local pain and/or heaviness (pulling) in the inguinal region or lower abdominal quadrant, with or without irradiation to the corresponding testicle and swelling in the inguinal region, were found as the most common subjective complaints based on anamnestic data in 69 (30.4%) of all patients. an area that retracts in the supine position or in manual reposition.

## RESULTS and DISCUSSION

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Table no. 4: Symptoms according to anamnestic data

PAIN	Lichtenstein n (%)	TAPP n (%)	TEP n (%)
<b>A</b>	21 (50)	5 (29.41)	2 (20)
<b>B</b>	8 (19.05)	3 (17.65)	1 (10)
<b>A+B</b>	6 (14.28)	4 (23.53)	3 (30)
<b>C</b>	7 (16.67)	5 (29.41)	4 (40)

(A) pain when lifting a load (lifting heavy objects, during defecation).

(B) during prolonged sitting, walking, changing position.

(A) + (B)

(C) during sports (cycling, running, etc.).

In their study, M.P Simons et al. (2009) also reported similar results and estimated rates for most common subjective complaints.

### 3.1.4 Results and discussion according to type of operative technique

According to the open conventional method, 182 patients were operated on, of which 165 were men and 17 were women, all of whom were operated on according to the Lichtenstein method./Table No. 15/.

## RESULTS and DISCUSSION

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**Table No. 5: Operative techniques for inguinal hernias:**

<b>Open Conventional Method</b>	<b>Number of patients M/F</b>	
Lichtenstein	165 M	17 F

A total of 45 patients were operated on after the endoscopic type of inguinal hernioplasty - all of them were males.

Patients with bilateral inguinal hernia were operated in one act. 5 patients were operated on according to the Lichtenstein method, TAPP 3 patients and TEP 1 patient. Regarding the bilateral localization, the results of our study are in favor of EOM of hernioplasty in which the patients they have a better postoperative recovery, smaller incisions with a better cosmetic result and a faster return to daily activities and work.

/Table № 6; Diagram № 1/.

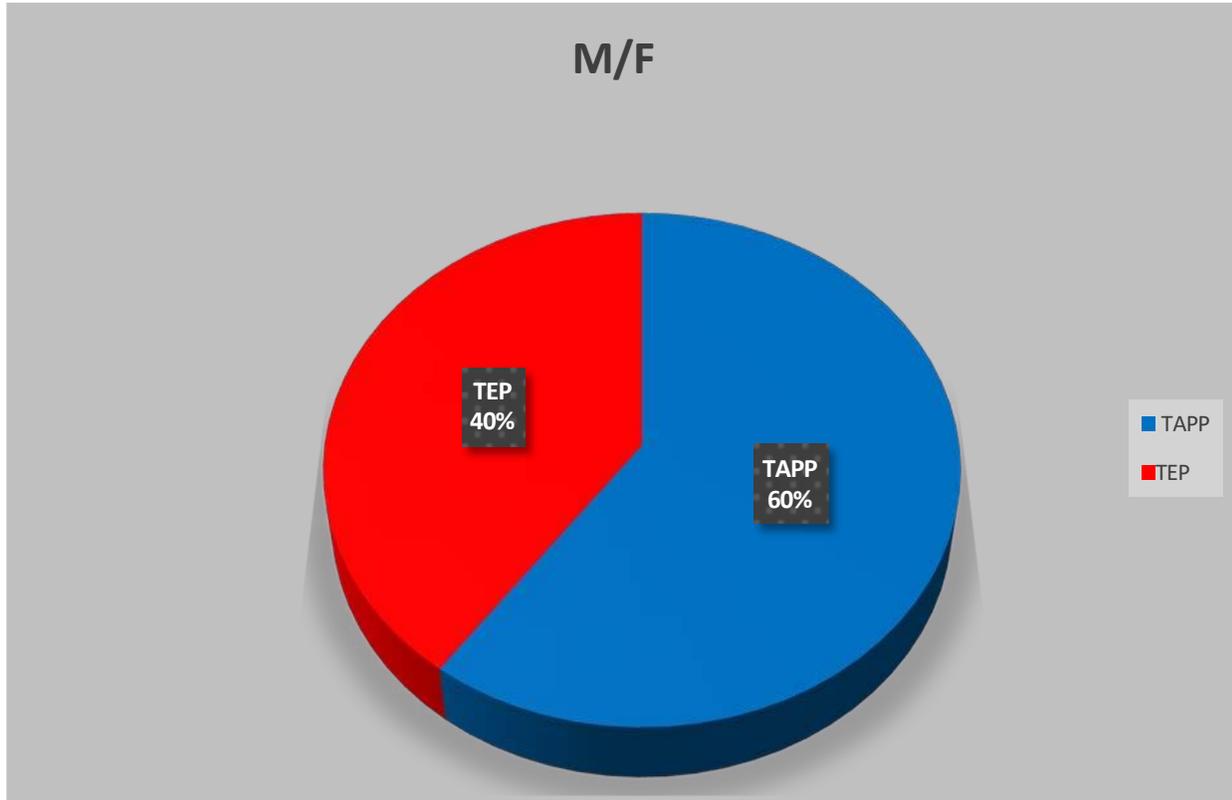
**Table No.6: Endoscopic method of hernioplasty**

<b>Endoscopic method</b>	<b>Number of patients M/F</b>
Transabdominal preperitoneal (TAPP) repair	27 M
Total extraperitoneal (TEP) repair	18 M

## RESULTS and DISCUSSION

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**Diagram No. 1: Number of patients, operated by endoscopic method**



From the literature search at the beginning of the study, several comparative analyzes between the conventional and the endoscopic approach to inguinal hernioplasty were found, including the randomized studies of: Abbas 2012, David C Brooks 2018, Elma Anna O'Reilly 2012, F. Kockerling 2015, Fong Voon Yen 2017, G.G. Koning 2013, Hamza Y 2010, Jacob DA 2012, Jacobs VR 2008, Pokorny H 2008, Uwe Scheuermann 2017, most of them with contradictory mutual results.

## RESULTS and DISCUSSION

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Since the analysis made by these studies and researches is different, from the purpose of our study, our task was to determine whether there are significant differences between the open conventional approach (Lichtenstein) and the endo-laparoscopic method of inguinal hernioplasty.

In the last few years, during the repeated analyzes and studies on CH and LH by F. V. Yen 2017, I. S. Mohamad 2017,

G.G. Koning 2013, J. Wetterslev 2013, U. Scheuermann 2017, S. Niebisch 2017, found that no significant differences occurred between patients operated on by both methods.

Endoscopic hernioplasty had some advantages in studies D. C. Brooks, 2018, M. Rosen, 2018, S. Bringman, 2003, S. Ramel, 2003, while open conventional hernioplasty had advantages in studies E. A. O'Reilly 2012, P.R. O'Connell 2012, Neumayer et al. 2004, Sgourakis G. 2013, Wellwood et al. 1998.

The results of our study are in favor of the open conventional approach of hernioplasty, in which patients have a shorter stay in our hospital and a faster postoperative recovery compared to LH. Endoscopic methods of hernioplasty have a specific learning curve and represent a new method in our hospital. The selection of the team involved in our study requires a surgeon with good professional experience and good qualifications in TAPP and TEP. To calculate and evaluate the results, we used the SF 36 scale, created to study the health status and quality of life of patients.

## RESULTS and DISCUSSION

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### 3.1.5 Preoperative indicators - classification according to ASA

The American Surgical Association - ASA based on physical status implements a classification system that is used to determine the physical status and severity of comorbidities in patients undergoing surgery.

**Table No. 7: Distribution of patients by ASA**

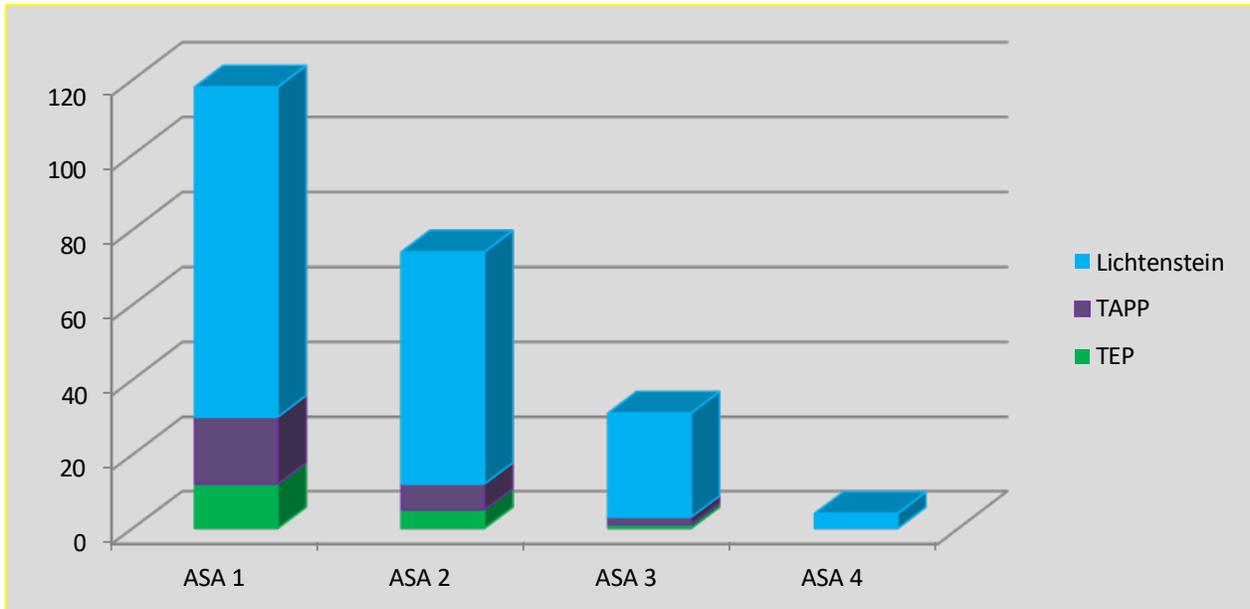
<b>Classification by ASA</b>	<b>Lichtenstein</b>	<b>TAPP</b>	<b>TEP</b>
<b>ASA 1</b>	88	18	12
<b>ASA 2</b>	62	7	5
<b>ASA 3</b>	28	2	1
<b>ASA 4</b>	4	—	—

( p < 0,05 )

The processed data showed a statistically significant difference between the groups of the studied patients, especially between the patients who underwent an open conventional surgical approach (Lichtenstein) compared to the patients who underwent an endoscopic surgical approach.

## RESULTS and DISCUSSION

**Graph No. 3: Distribution of patients according to ASA**



The group of the open conventional method of hernioplasty statistically differed in terms of significant and frequent comorbidities compared to patients who underwent endoscopic method of inguinal hernioplasty operations.

In the 227 operated patients with inguinal hernias, the most common anesthesia applied was spinal block; general intubation, as well as local infiltration with Lidocain. Intubation anesthesia is applied mainly in LH, mentally unstable patients and/or at the discretion of the anesthesiologist /Table No. 8/.

**Table no. 8: Types of anesthesia in the treatment of inguinal hernias**

	Local	Spinal Block	OETA
<b>CH</b>	<b>3</b>	<b>136</b>	<b>43</b>
<b>LH</b>	—	—	<b>45</b>

## RESULTS and DISCUSSION

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The data and results of our study and analysis regarding the distribution of patients according to ASA show results similar to the studies of Eklund A et al. 2006. Endoscopic hernioplasty TEP (n= 665) ASA I 584 (87-8);ASA II 66 (9-9);ASA III (0-8);ASA unknown 10 (1-5);

Conventional Lichtenstein Hernioplasty (n=706) ASA I 633(89-7); ASAII 57 (8-1); ASAIII 5(0-7) ASA unknown 11 (1-6); While the type of anesthesia in the treatment of inguinal hernias shows similar results to Pär Nordin MD et al. 2012.

### 3.2. Intraoperative results and discussion.

#### 3.2.1 Surgical and total operative time

In the conducted study, the open conventional method was statistically significantly faster to perform, as operative time compared to LH. The total operative time was significantly shorter in the COM group due to the lack of preparation of the complex medical equipment/Table No. 9/.

**Table No. 9: Surgical operative and general operative time**

Procedure /Method/	Operating time (min.)	General operating time (min.)
Lichtenstein	69 [50–150]	65–180
TAPP	123 [85–195]	150–225
TEP	128 [90–200]	160–238

\* P < 0.0001 (Mann-Whitney U-test) for operative time and for the entire time in the operating room.

## RESULTS and DISCUSSION

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A statistically significant difference was observed between LH and CH, both in terms of pure surgical times and in terms of general operating times.

These results correspond approximately to the results of studies by Michael LCDR 2009 et al., who reported 72.7 (39–155) minutes for LH and 52.6 (25–142) minutes for CH, as well as H.H. Eker et al. who reported 100 minutes for LH with 76 minutes for CH. Similarly, S. Bringman et al. 2003 reported that LH took 10–15 minutes longer than CH.

At the beginning of our study, we were concerned that obesity might emerge as a problem especially in the CH group. The mean operative time was found to be shorter in obese patients in the COH group than in normal weight patients operated endoscopically. At the end of the study, there was no significant difference between overweight patients (BMI > 30 kg/m<sup>2</sup>) and normal weight patients. We found that the operating time for CH in obese patients is longer than in those of normal weight. This shows that obesity increases the difficulties of COH.

In the future, with the development and technical improvement of laparoscopic equipment and the development of new technologies, it is possible to reduce the total operating time, but for now, the results of the study show that the open conventional method of hernioplasty represents an operating method in which the total operating time is more short compared to LH.

The UK Medical Research Council study concluded that laparoscopic hernioplasty has a long learning curve and should only be performed by those with significant experience of the technique.

### 3.3 Postoperative results and discussion

#### 3.3.1 Results and discussion regarding postoperative complications

Clinical observation, analysis and evaluation of basic parameters during general and specific surgical complications after conventional and endoscopic inguinal hernioplasty were performed, and their frequency, type, severity, course, diagnosis were recorded..

Complications usually occur in the first days of hospital stay (1-3 days) and are most often related to the surgical wound. They lead to different duration of treatment, reduction of physical activities and loss of work capacity. In all complications, various clinical symptoms such as pain, heaviness, fatigue, infiltrate of the surgical wound, etc. were diagnosed.

Three main groups of early postoperative complications have been identified:

- Wound complications - seroma, infiltrate, hematoma and suppuration of the wound;
- Ischemic complications - hydrocele, orchostasis, orchiepididymitis, ligature neuropathy;
- Functional complications – discomfort in the inguinal region, dysejaculation, urine retention, etc.

Postoperatively, there was mild surgical wound infection in 2 cases in CH and 3 in TAPP/TEP, and severe SWI (Surgical wound infection) were not observed in any patient in either group. Postoperative hematoma was found in 3 cases from the open conventional approach and 6 from TAPP/TEP. A fever up to 37.8 C appeared in 1 man with LH on the 3rd postoperative day.

## RESULTS and DISCUSSION

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This complication was accompanied by serous exudate of the surgical wound, general fatigue and pain at the site of the surgical intervention. ICD samples were taken and the results were negative (cultures sterile). Proceed to remove the suture material. During the performed manipulation, a small amount of serous secretion was released. A swab was taken for microbiological examination - again negative (cultures sterile), then a secondary surgical revision of the wound was performed and later secondary sutures were placed. Laboratory tests showed signs of inflammation: increased WBC, ESR, CRP.

After treatment with broad-spectrum antibiotics and high doses of NSAIDs, the patient's symptoms resolved within 5-6 days. At discharge, the patient was afebrile.

The occurrence of postoperative hematoma as a complication was observed in a total of 9 patients (3.97%). Most often, it is formed in case of rough and traumatic release of the hernial sac from adhesions, damage to the elements of the spermatic cord, imprecise hemostasis and blood coagulation disorders. In order to prevent the formation of postoperative hematomas, exact intraoperative hemostasis and timely discontinuation of anticoagulant therapy are of great importance. Smaller hematomas usually spontaneously resorb, while larger and tense ones require surgical intervention.

Hydrocele, orchostasis and orchiepididymitis are complications that are characterized by ischemic-vascular disorders, which are often observed in inguinal hernias. In total, they were observed in 7 patients (30.1%). The patients were treated conservatively with compresses and analgesics, and the symptoms subsided in 4-9 days.

## RESULTS and DISCUSSION

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Urinary retention as a functional complication in the postoperative period was found in a total of 3 patients (1.32%) with prostatic hypertrophy requiring placement of a urinary catheter.

Postoperatively, we observed neurological pain in a total of 47 patients, which resolved after treatment with analgesics and NSAIDs. No other structures were affected intraoperatively.

In our four-year study in all 227 operated patients with inguinal hernia, we had no iatrogenic intraoperative complications such as lesions of the bowel, bladder, damage to intra-abdominal organs and trunk vessels. Regardless of the multitude of accompanying diseases, the advanced age of the operated patients we do not have a case with a fatal outcome.

Postoperative complications in the studied groups are presented in Table No. 10:

<b>Complications</b>	<b>COH</b>	<b>EOH</b>	<b>TOTAL</b>	<b>P</b>
No complications	170 / 85%	30 / 15%	200 / 100%	0.000
Serom	4 / 66,7%	2 / 33,3%	6 / 100%	
Hematoma	3 / 33,3%	6 / 66,7%	9 / 100%	
Infection	2 / 40%	3 / 60%	5 / 100%	
Orchostasis	3 / 43%	4 / 57,1%	7 / 100%	
General	182 / 80,1%	45 / 19,9%	227 / 100%	

**Table No. 10. Types of postoperative complications in the studied groups**

## RESULTS and DISCUSSION

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The total number of postoperative complications in COH patients was 12 (6.6%) and in EOH patients was 16 (35.5%). In terms of complications, the Lichtenstein group had a statistically significant reduction in early postoperative complications compared to the EOH group (TAP/TEPP).

Seromas were found in 4 patients from the COH group and in 2 patients from EOH, and surgical wound infections were observed in 2 in the COH group and 3 in EOH. All of them were cured with conservative treatment.

Postoperative hematomas in the inguinal region were identified in 3 patients (33.3%) from COH. There were 3 patients with evidence of a limited hematoma, all of whom were treated conservatively, without surgical revision.

In the comparable EOH group, 6 cases (66.7%) with hematomas were diagnosed - 5 patients with limited hematomas were treated conservatively, and operative revision was performed in 1 patient with a tense hematoma.

When comparing the two groups regarding basic parameters (gender, age, accompanying diseases) it was found that they had differences according to the frequency and type of early postoperative complications.

Ischemic complications are the next most frequent complications, as they are superior in the EOH group, due to the principles of the operative methodology itself, which aims to close the weak points and defects endolaparoscopically. Orthostasis was observed in KOH in 3 patients (43%), and in EOH in 4 patients (57.1%), i.e. it is less common with conventional tension free techniques.

Of the functional complications, urinary retention was found in 1 (33.3%) patients from the conventional group and in 2 (66.7%) patients from the

## RESULTS and DISCUSSION

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endoscopic group - treated with the placement of a urinary catheter.

In the results of their study, H. Pokorny et al. 2006 reported no serious intra- or postoperative complications. There was no death and no case of major blood vessel or organ injury during the operative intervention. Complications such as wound infection; wound hematoma, neuralgia, hypesthesia, urinary retention, ischemic orchitis, testicular atrophy, postoperative recurrence the authors noted in both groups, but the difference was not statistically significant.

In their study, M.Abou Khalil et al. 2013 also reported similar results for postoperative complications and approximately the same rates and differences between the two groups.

Our reported postoperative complications correspond approximately to those of J. Wellwood et al. 1998. And in us, as in him, significant differences were found in the frequency and type of complications between the two groups of COA and EOA.

In our COH group, postoperative complications were found in 12 patients (6.6%), including seromas in 4 patients (66.7) similar to the study by Schmedt CG et al.[193] and hematomas in 3 patients (33.3%), and in 37 (20.3%) patients postoperative pain. Urinary retention was observed in 1 patient (66.7%). In the EOH group, postoperative complications were observed in 15 patients (33.3%), including seromas in 2 patients (33.3%), hematomas 6 (66.7%) in 10 patients (22.2%), postoperative pain, 2 patients (66.7%) urinary retention, There was no fatal outcome.

In the randomized controlled clinical trials of Wu JJ et al. 2018 of 1310 patients operated on TAPP and 1331 patients operated on open type hernioplasty,

## RESULTS and DISCUSSION

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there was no difference between the two groups regarding the incidence of hematoma (RR 0.92, 95% CI 0.49–1.71,  $P = 0.78$ ), seroma (RR 1.90, 95% CI 0.87–4.14,  $P = 0.10$ ), urinary retention 0.99, 95% CI 0.36–2.76,  $P = 0.99$ ), infection (RR 0.61, 95% CI 0.29–1.28,  $P = 0.19$ ) and hernia recurrence (RR 0.67; 95% CI 0.42–1.07;  $P = 0.10$ ).

Silva et al. 2017 published a prospective study with a series of 80 patients /98.7% men/ with unilateral primary inguinal /majority with indirect/ right-sided hernias operated on electively at the surgical clinic of the Gaffrée e Guinle University Hospital (HUGG). Patients were divided into two groups of 40 each, SF group (conventional technique using polypropylene mesh) and LP group (laparoscopic polypropylene mesh technique). At the follow-up of several months, there was no significant difference in the studied groups in terms of postoperative results, such as pain, operative time, etc.

F. Köckerling and B. Stechemesser et al. 2015 prospectively compared the data of patients with primary unilateral inguinal hernia hernioplasty using TEP or open Lichtenstein method. Inclusion criteria were age over 16 years, male with primary unilateral inguinal hernia, elective treatment, and 1-year follow-up data. From a total of 17,388 patients included in the study, 10,555 (60.70%) had Lichtenstein type hernioplasty and 6833 (39.30%) - TEP hernioplasty. From the analysis, it was found that the type of surgical technique did not have a significant effect on the time of recurrence ( $p = 0.146$ ), the frequency of reoperation related to complications ( $p = 0.084$ ) and chronic postoperative pain ( $p = 0.560$ ). The data of our study, similar to the above, showed that there was no difference between the two groups in terms of postoperative complications, disturbances in local sensitivity, and chronic postoperative pain.

## RESULTS and DISCUSSION

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Recurrences in our study were not observed in both groups, while sensory disturbances in the open type occurred in 8 (4.4%) patients and in the laparoscopic group - in 3 (6.7%) patients. In both groups symptoms resolve after the first year.

### **3.3.1.1 Results and discussion regarding postoperative pain**

In order to determine one of the more specific and important indicators – post-operative pain, several tests were performed pre-operatively, during and post-operatively on the patients in both groups of COA and EOA. The perception, intensity of pain and the patients' resistance to it were evaluated. carried out through a subjective assessment of the perception of pain (VAS scale) and through the reduction of pain from analgesics in a certain dose. Strong and longer pain in patients operated on by COH was found in 37 patients (20.3%) and in 10 (22, 2%) from EOH.

### **3.3.1.2 Pain registration**

The subjective assessment of the patient's pain intensity, as well as its perception, was measured with the Visual Analogue Scale - VAS

=VAS scale.

The VAS scale consists of several levels according to which:

0 – means no pain,

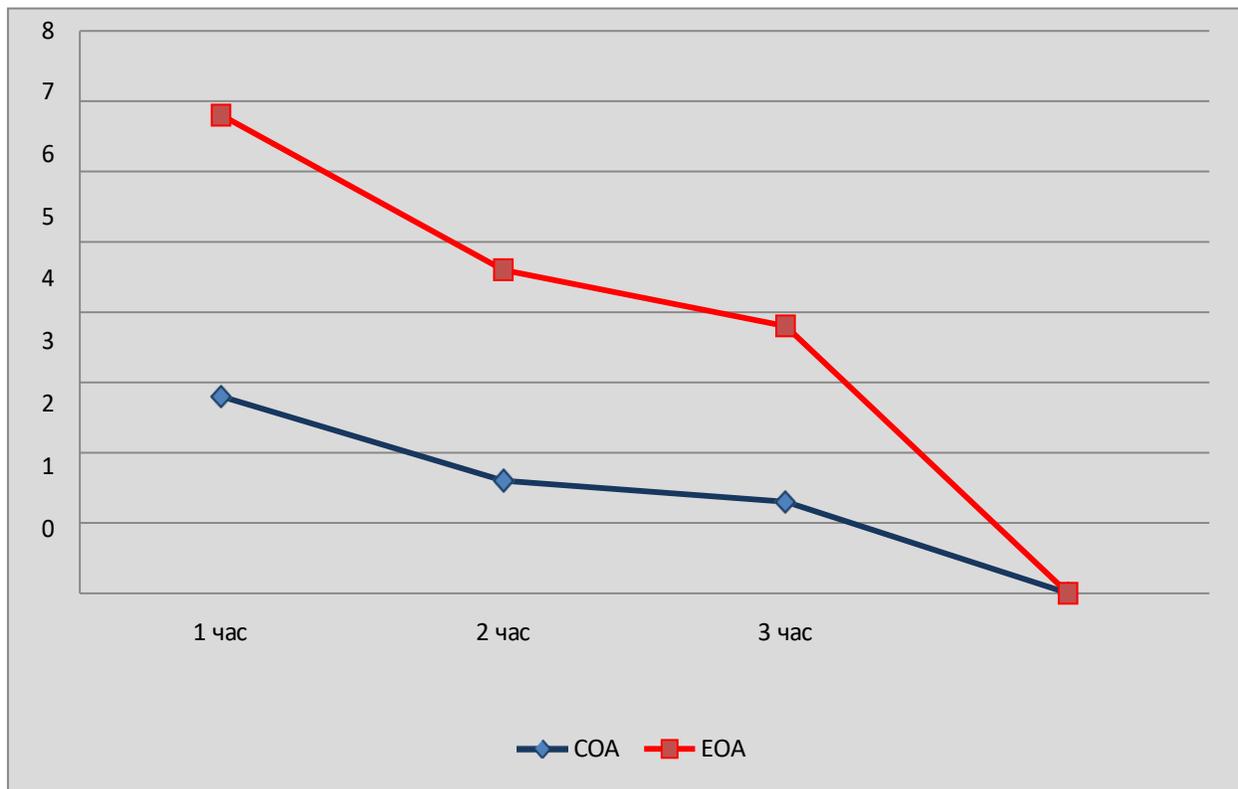
5 – represents a strong feeling of pain,

10 – represents the maximum intensity of pain /Diagram No. 2/.

## RESULTS and DISCUSSION

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**Chart No. 2: Graphical comparison of pain perception on the VAS scale on the 1st; 2nd and 3rd hours (in points):**



Pain registration was measured by asking questions, with the patients themselves previously receiving instructions and explanations about the test itself, as well as monitoring the patient for pain in the recovery room and in the patient's room in the ward /Table No. 11/.

## RESULTS and DISCUSSION

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**Table No. 11: Postoperative pain in the first hours of both groups**

<b>PAIN</b>	<b>COA</b>	<b>EOA</b>
1. час	2.8 ±1.8	4.0 ±2.6
2. час	1.6 ±1.5	3.0 ±2.7
3. час	1.3 ±1.7	2.5 ±2.0

\* P < 0.005 (Mann-Whitney U-тест)

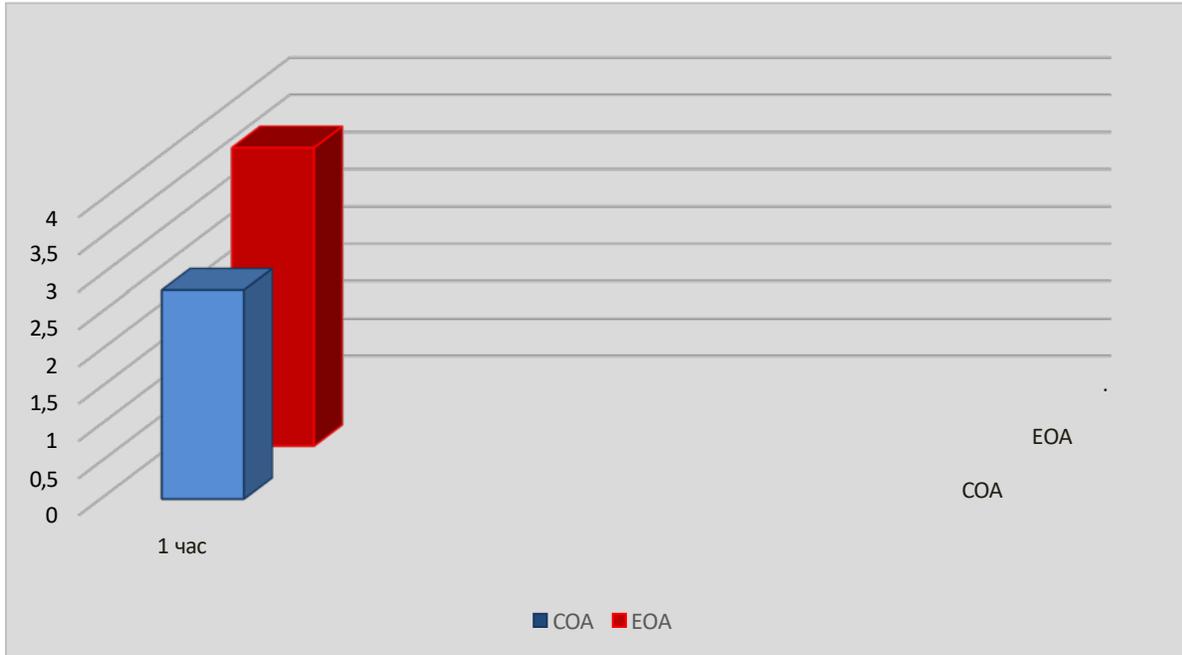
Later follow-up continued at hourly intervals up to four hours after surgery and on the first and second postoperative days. Assessments on the third and fourth postoperative day in a discharged patient were carried out by asking questions in telephone interviews and survey information cards. One month after the surgical intervention, a control examination of the operated patients was carried out, while at the same time they filled out a questionnaire.

### **3.3.1.3 Degree of pain after COA and EOA**

The degree of pain measured with the visual analog scale VAS in patients after COPD (Lichtenstein) and EOP (TAP, TEPP) on the first postoperative day is presented in Graph No.4.

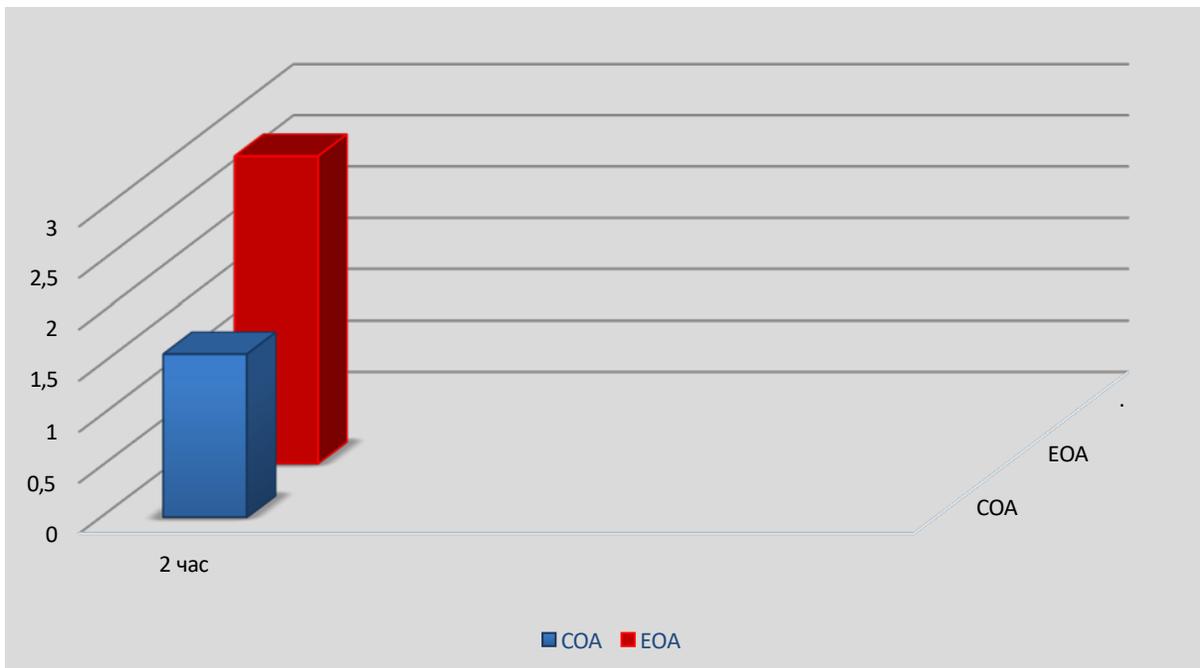
## RESULTS and DISCUSSION

**Graph no. 4: Pain on the 1st postoperative day**



On the second postoperative day, the pain decreases and is more intense with EOA, compared to COA /Chart No. 5/.

**Chart No. 5: Pain on the 2nd postoperative day**

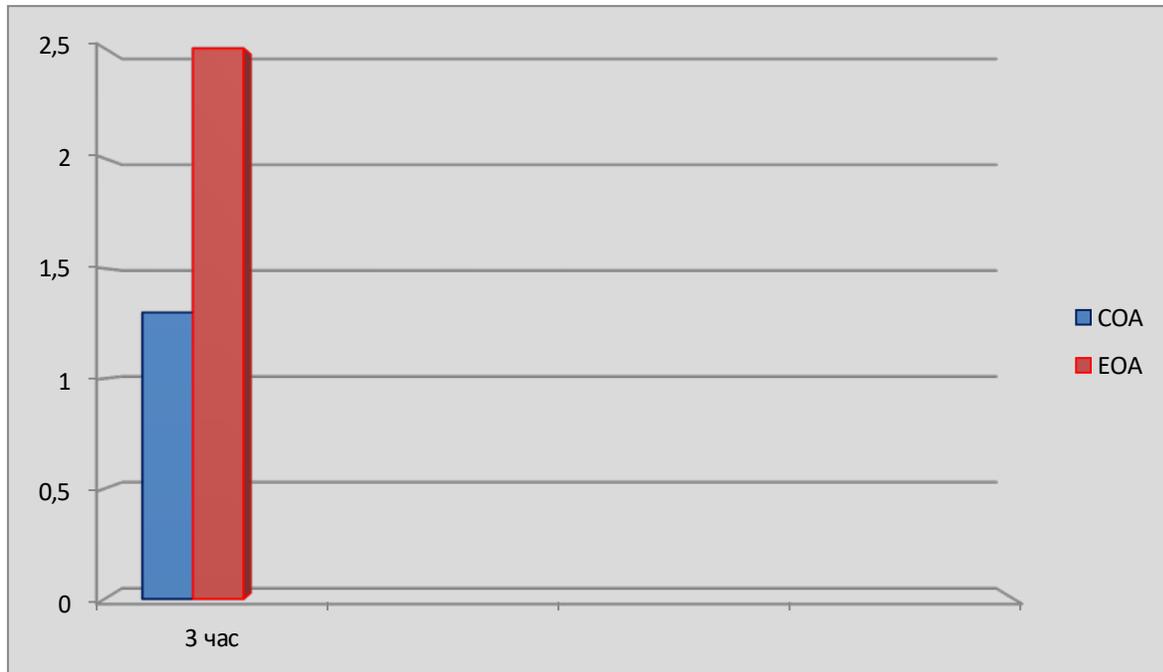


## RESULTS and DISCUSSION

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On the third postoperative day, the intensity of pain was slightly increased in the EOA group compared to the COA /Chart No. 6/.

**Chart no. 6: Pain on the 3rd postoperative day**



### 3.3.1.4 Conservative treatment – analgesic therapy

Conservative postoperative analgesic treatment depended on the degree of postoperative pain. To assess the use of pain medication, a model was created to measure pain versus analgesic use, including type of analgesic, dosage in the 24-hour time interval after the surgical intervention, as well as the next few postoperative days (second and third).

## RESULTS and DISCUSSION

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Samples were performed at 3 levels:

**Level 0** – The patient does not report, i.e. does not feel pain and is not subject to analgesic therapy (0 points).

**Level I** – Intramuscular application of 1 Amp. Analgin of 5 ml for pain relief with a maximum daily dosage of 3 applications (1–3 points at 1 point per application). Level I depends on the intensity of pain, which is determined for each application of Analgin with one point. Accordingly, in the case of triple anesthesia - 3 points.

**Level II** – Postoperative pain does not decrease, i.e. is not affected by the applications of analgesics and the application of intravenous NSAID (Ketonal) is required - (4 points) - if the three-time application of Analgin (Level I) has insufficient analgesic effect and the application of additional drugs is required, then the patients score 4 points and are categorized as Level II.

Statistical analysis showed a slight increase in the level of pain on the first postoperative day in patients from the EOA group. Patients in the COA group reported a decrease in pain level on the first day after surgery relative to EOA. Patients in this group reported a decrease in pain perception level compared to pain perception in the EOA group. Patients in the COA and EOA groups there is a statistically significant difference regarding the perception of pain for the first postoperative day, which decreases on the second and third postoperative days.

## RESULTS and DISCUSSION

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**Table No. 12: Perception of pain and use of analgesics in COA and EOA for the 1st to 3rd postoperative day**

INDICATORS	COA	EOA	P
Pain intensity according to VAS (0 – 10)	3(2–4)	4(2-5)	< 0.05
Duration of pain (days)	2(1–3)	3(2-4)	< 0.05
Reception of analgesics for pain relief (points 0 – 4)	2(2–3)	3(3-4)	< 0.05

The tests done and the VAS results obtained showed a statistically insignificant difference between the perception of pain in the two groups on the 1st, 2nd and 3rd postoperative days.

The pain in most of the patients in the COA and EOA group was during the first two postoperative days, when analgesics were required for a mean duration of 3 days (2–4) in both groups.

A statistically insignificant difference was found between the intensity of pain in the patients operated on by COA and EOA, where it was more intense in the OP group compared to the pain in the patients in the COA group.

Analyzes performed on the first and second day after surgery showed insignificant intake of pain-relieving drugs in both COP and EOP groups.

## RESULTS and DISCUSSION

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The tests carried out on the third and fourth day after the operation showed a significantly lower level in the intake of painkillers - from 1 - 2 ampoules of Analgin, to no intake of painkillers in both groups.

Pain is a difficult parameter to assess. Individual variations, personal expectations, and social consequences affect the perception and expression of pain.

In our study, patients with COA reported less pain in comparison to EOA and lasting less than 1 - 2 days on average, which was a statistically insignificant difference. Analgesic intake was also marginally less in patients, operated with COA, corresponding to less postoperative pain in the group. An insignificant difference was found regarding the better general condition in the postoperative period of patients with COA.

Similar to our study and analyzes are the results of studies by Wellwood et al. 1998 who reported the presence of less postoperative pain in COP compared to EOP, but only up to one week after surgery. At the second week and at the first month after surgery, there was no statistically significant difference between the perception of pain in the two groups. Similar are the studies of F. Ciftci et al. 2015 [62]. COP (N=75) 0 ; EOP (N=33) 1(3.0%); P Value NS. The difference in the performed analyzes is most likely due to the differences in the operative approaches as well as the type of anesthesia.

## RESULTS and DISCUSSION

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### 3.4 Results and discussion regarding hospital stay and discharge

The hospital stay and discharge are directly dependent on the presence of early postoperative complications, the type and size of the inguinal hernia, the applied surgical technique and the nature of the accompanying diseases.

Hospital stay after surgery ranged between 4.0 days for COA and 3.8 days for EOA /Table No. 13/.

**Table No. 13: Postoperative stay**

STAY IN DAYS	COA	EOA
1 – 3 days	150 (82.42%)	30 (68.18%)
4 – 6 days	32 (17.58%)	14 (31.82%)
> 7 days	0	1
Total	182 (100%)	44 (100%)
Discharge	3.1 days	3.8 days

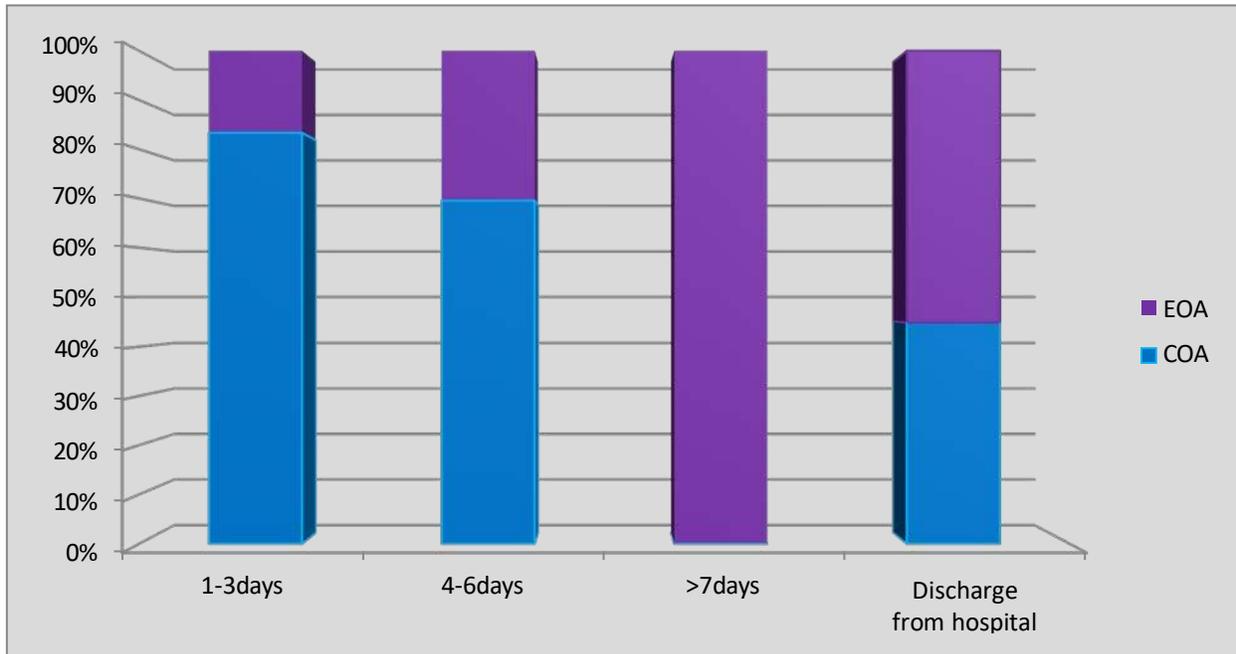
**p value > 0.05 ( Square Chi test )**

## RESULTS and DISCUSSION

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The analysis of the hospital stay found a statistically significant difference in the two groups /Chart No. 7/

**Chart no. 7: Postoperative stay**



In the comparison of patients with inguinal hernias operated on by the open method, the amount of early postoperative complications was found to be less, which leads to a reduction in the length of hospital treatment. In the EOH group, patients have more negative clinical consequences, with greater complaints and discomfort in the early postoperative period, due to the general anesthesia as well as due to the operative method itself, which is new to us. In the initial stages of mastering the method, we had some difficulties due to insufficient experience and a small “learning curve,” which required atraumatic dissection and meticulous fixation of the synthetic mesh. This method requires good anatomical and topographic knowledge, and the methodology is mastered after a sufficient learning curve. With EOA, there is a more pronounced pain syndrome, requiring a longer application time of analgesics and a longer period of hospitalization.

## RESULTS and DISCUSSION

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The conventional method has a number of advantages, such as simplicity in implementation, use of local or spinal anesthesia, lack of contraindications for application, as well as many significant advantages in relation to the quality of life in the early postoperative period and faster recovery of the health condition.

In the analysis made, the average hospital stay in the case of COA is minimally shorter compared to that of EOA.

**Табела бр. 14: Рано закрепнување по операцијата (враќање на работа)**

	<b>Hospital stay (days)</b>	<b>Sick leave (days)</b>
<b>COA</b>	3,1 (3–7)	17 [12–28]
<b>EOA</b>	3,8 (3–8)	38 [30–45]

**(Mann-Whitney U-test)**

The differences between the average length of sick leave until returning to work between the two groups are without statistical significance /Table No. 14/.

Authors such as El-Dhuwaib Y 2013, F. Ciftci 2015, F.V. Yen 2017, H. Pokorny 2008, M. Chauhan 2014, M. A. Khalil 2013, M. Hasbahceci 2014, Papachristou EA 2002, reported no significant difference in hospital stay between the two groups, while K. X. Cheong 2014, Memon MA 2003, R. Černevičiūtė 2018, J. Wellwood 1998, F. Wittenbecher 2013, and reported a shorter period of hospitalization in favor of EOP. In his study F. Wittenbecher 2013 also reported a shorter length of hospital stay, on average 2 vs. 3 days, in patients with EOA compared with COA, the difference being statistically insignificant.

## RESULTS and DISCUSSION

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In our study, statistically insignificant differences were found between the studied groups of patients regarding the length of hospital stay and treatment. Hospitalization days in the COA group were  $3.4 \pm 0.1$  days, for EOA  $4.0 \pm 0.1$  days. Similar to our study are the results of studies by Fatih Ciftci et al. 2015 COA (N=75) 0.6; EOA (N=33) 0.7; P Value NS. and Fong Voon Yen et al. 2017.

### **3.5 Results regarding the influence of BMI on the early recovery of patients**

In the conducted study, the patients were analyzed regarding the presence or absence of obesity. There was no statistically significant difference between operative time in lean and obese patients with BMI  $> 30$  kg/m<sup>2</sup> in both COA and EOA groups. Operating time in the COA group in obese patients was about 10 minutes longer compared to the time it took to perform conventional hernioplasty in patients with BMI  $> 30$  kg/m<sup>2</sup>.

### **3.6 Results and discussion regarding quality of life**

From the database of the obtained results in both groups of operated patients, the general state of health and the quality of life are better compared to the period before the surgical intervention. Regarding the functional state of the patients, the patients from the COP group have statistically significant ( $p < 0.5$ ) better indicators than those in EOP.

Statistically, we have established that the most important indicators, such as general health and functional status, have a statistically significant ( $p < 0.5$ ) difference compared to EOP.

## RESULTS and DISCUSSION

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After conducting telephone interviews, we examined the postoperative quality of life of the patients on the 3rd; 6th and 12th postoperative month. In this study, we used the 5-point Likert test. In this study, 90% (110/122) of the patients in the COA group felt that their quality of life had improved.

In the laparoscopic EOP group, 95% (61/64) of patients confirmed that they had a "better" quality of life after surgery. One patient from the EOA laparoscopic group considered his quality of life postoperatively to be "bad". In patients with BMI >30 kg/m<sup>2</sup>, statistical analysis showed better postoperative physical-functional outcomes compared to patients with BMI < 30 kg/m<sup>2</sup>. According to the RAND-36 scale studies, obesity had no significant effect on the quality of life of patients in either group.

According to literature data and analyzes of the postoperative quality of life after open and laparoscopic hernioplasty, Velanovich V et al. 2000 reported that quality of life was better after CH, but after several months there were no differences between the two groups.

A better quality of life in the laparoscopic group in the early postoperative period was reported by Gholghesaei M et al. 2005, Abbas AE et al. 2012, as well as Kushwaha JK et al. 2017.

Similar results appear in the studies of Pokorny H. et al. 2006, Bignell M. et al. 2012, Asti E. et al. 2016, who using the SF-36 and GIQLI questionnaires found no significant difference in quality of life between open and laparoscopic hernioplasty.

## RESULTS and DISCUSSION

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Our own data from the completed surveys on the 30th postoperative day (Final Score and RAND – 36) indicate an advantage of CH over LH in terms of quality of life and most significantly in physical fitness and functional capacity after CH.

In both groups, patients found their quality of life to be better after surgery than before surgery. The results of our experience presented in the present work are similar to the studies of Velanovich V et al. 2000 in which the open conventional type of hernioplasty has better patient health outcomes compared to the laparoscopic group.

### 3.7. Results and discussion on cost of operations

The cost analysis found that the value for EOM is a significantly more expensive operational method compared to COM. The difference mostly depends on the price of the operation itself and to a lesser extent on the hospital stay /Table No. 15/.

**Table no. 15: Price analysis**

VALUE (prices)	COA	EOA
To 300 lv	157 (86.26)	–
From 300 to 1400 lv	25 (13.74)	36 (80%)
Over 1400 lv	-	9 (20%)
Total	182 (100%)	45 (100%)

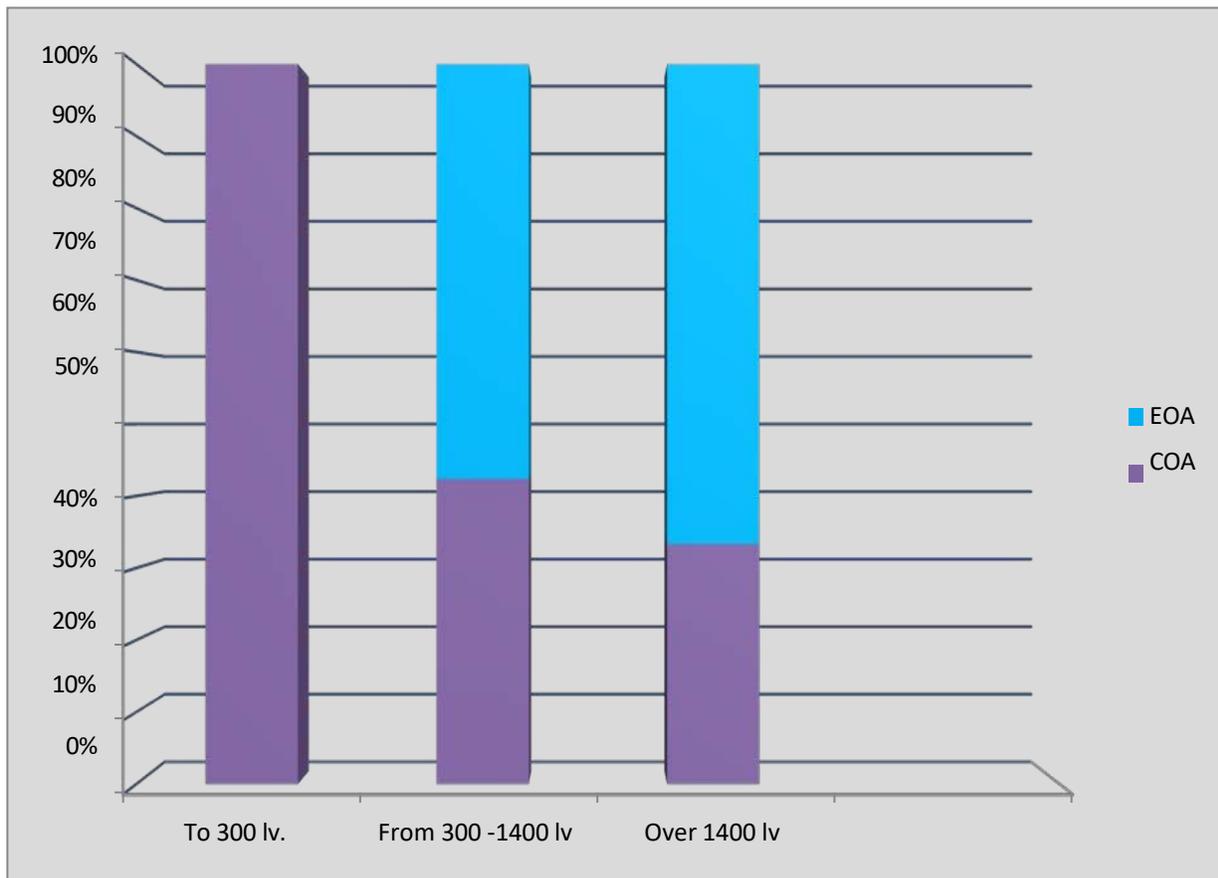
**p value < 0.05 ( Square Chi test )**

## RESULTS and DISCUSSION

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The price of drugs also gives small differences, most often at the expense of anesthetics.

**Chart no. 8: Value (prices) of operational methods**



The average price of EOA comes to BGN 1,200 lv, while that of COA comes out to BGN 450 lv./Chart No. 8/.

## RESULTS and DISCUSSION

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EOA according to Butler RE 2007, Gong K 2011, Hynes DM 2006, Jacobs VR 2008, Sgourakis G 2013. is significantly more expensive compared to COA.

Wang WJ. 2013 and Tadaki C. 2016. reported a significant difference between the costs of the two operative procedures, reporting that LH was a more expensive operative method by about \$700–800 than CH. The difference is mainly in the cost of surgical tools and equipment. Costs depend on the use of disposable instruments, such as trocars, which increase the cost of LH.

In our study, we found a statistically significant difference in the values in the patients of the two groups. The treatment carried out with the EOA method turned out to be a significantly more expensive method - with an average value of about BGN 1,200 lv, compared to the patients operated on with COA, where the average value is about BGN 500 lv. The obtained results are based on a toolkit used for repeated use, not including high fees for laparo-endoscopic surgery. Our recorded costs correspond approximately to those in the studies of Papachristou EA et al. 2014 (483.90 euros for COA and 763 euros for EOA) and Vale L. et al. 2003 who reported a shorter duration of COA compared to EOA.

For the choice of one or another operative surgical method, the factors operative time, possible intraoperative complications, the level of postoperative pain and the potential postoperative intake of analgesics, possible complications, the recovery of patients, the length of hospital stay, costs, quality of life and the long-term results of the treatment.

For the choice of one or another operative surgical method, the factors operative time, possible intraoperative complications, the level of postoperative pain and the potential postoperative intake of analgesics, possible complications, the recovery of patients, the length of hospital stay, costs, quality of life and the long-term results of the treatment.

### **3.8 Future perspectives in inguinal hernia surgery**

Laparoscopic surgery applied in specialized centers by experienced surgeons leads to excellent results, currently it is showing serious progress and global popularity.

A large number of laparoscopic hernioplasty procedures are performed as a day surgery with good postoperative recovery and an excellent cosmetic result.

Classical (conventional) surgery of inguinal hernias also has significant achievements and results, especially in specialized centers and clinics with great experience, practiced by surgeons who appreciate, master, and improve surgical techniques and tools.

It must be seriously emphasized that hernia surgery should not be desecrated as "minor", "everyday" and "easy" surgery.

Continuous qualification and training of surgeons in the direction of knowledge and rethinking of the anatomical-physiological features and pathological changes of the inguinofemoral area, knowledge and mastery of the specific reconstructive and hernioplasty operative techniques and their precise implementation is necessary.

## RESULTS and DISCUSSION

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Classic hernioplasty offers better options than laparoscopic hernioplasty. The conventional method is cheaper, requires standard surgical instruments and does not need very expensive disposable surgical instruments.

Robotic surgery has so far not proven a significant benefit compared to laparoscopic hernioplasty, although it is more popular in other surgical fields.

The global change in lifestyle, the challenges of technological progress and the modern requirements for surgical practice will lead to new, better opportunities for success in the treatment of inguinal hernias.

### CHAPTER 4. CONCLUSION

A basic principle in the treatment of inguinal hernias should be the differentiated, individual approach to the choice of operative method.

In recent years, a new trend has been noticed for the mass and universal use of Lichtenstein's operation, accepted as the "gold standard", due to its easy and assimilation and simplified technique applicable to any type of inguinal hernia, even recurrent ones, as a result of which the general frequency of recurrences decrease many times, and other methods are used only in strict indications.

The only difference historically is the search for an operative procedure with minimal pain and consequences for the patient, quick recovery and optimal cosmetic result.

In our study, we presented reasonably all the advantages and disadvantages of open and laparoscopic methods of hernioplasty.

Open conventional hernioplasty had a shorter operative time, reduced discomfort and postoperative pain compared to laparoscopic hernioplasty, analgesic therapy lasted only 1 day, and hospital stay was shorter. The statistical analysis performed shows that all differences are considered minimally significant. Postoperative complications were more in the laparoscopic group.

## CONCLUSION

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The cost of laparoscopic hernioplasty is higher than that of the open conventional procedure.

The open method of hernioplasty with a prosthesis is technically not complicated, it is easy to learn and perform, at the same time it is highly reliable, less traumatic and cost-effective. It does not require additional equipment, special preparation, the learning curve is not so steep and long compared to laparoscopic techniques and results in good outcomes with a low recurrence rate.

Postoperative quality of life in open conventional hernioplasty is better than quality of life in endo-laparoscopic hernioplasty. At the 3rd month, there was no statistical significance in the postoperative quality of life between the two operative methods.

Open conventional hernioplasty with prosthetics is a fast and reliable method with a low rate of intra- and postoperative complications, reduced pain syndrome, reduced use of analgesics, better long-term results and quality of life for patients.

### **Advantages of the open conventional method of hernioplasty:**

- Low cost.
- No special and expensive equipment is needed.
- Indicated for large inguinoscrotal, irreponible, recurrent, sliding hernias;

## CONCLUSION

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- Indicated for high-risk general intubation anesthesia in impaired patients with ASA III and ASA IV functional class.
- Possibility of applying local anesthesia or local with venous potentiation.
- Shorter operating time compared to laparoscopic operations.
- Minor pain syndrome, reduced intake of analgesics, early discharge from hospital, absence of serious postoperative complications and recurrences.
- Easily accessible and applicable with basic general surgical technical skills and does not require complex and lengthy surgical training.
- Widely applicable due to the lack of requirements for specific and expensive tools, equipment and consumables.

Shortened hospital stay, lack of severe complications and faster recovery after conventional hernioplasty in our results provide improved patient quality of life and satisfaction due to rapid resocialization.

### **DISADVANTAGES:**

- Impossibility of inspection and exploration of the entire abdomen.
- Larger operative incision.
- Difficult dissection in recurrent hernias.
- Post-traumatic in patients with high BMI.

## CONCLUSION

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### **Advantages of laparoscopic techniques compared to the open technique are:**

- Smaller incisions with a better cosmetic result.
- Preferred for recurrences after anterior inguinal approach.
- Deep dissection of the inguinal hernia with repair at the site of "origin".
- Reduces all potential sites at risk of additional herniation.
- Decreased frequency of seroma occurrence, possibility of performing additional intra-abdominal procedures at the same time.
- Ability to diagnose and repair additional asymptomatic defects of the inguinal hernia.
- Option of one-stage treatment for bilateral hernias

### **DISADVANTAGES:**

- Inability to choose anesthesia (obligatory general anesthesia).
- Not suitable for patients with ASA III and IV f.cl.
- A steeper learning curve
- Longer operating time
- Difficult to perform if the preperitoneal space is dissected by previous operations.
- Higher rates of recurrence and complications early in the surgeon's experience.

## CONCLUSION

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- Not suitable for urgent surgical interventions (incarcerated hernias).
- Complex forms of inguinal hernias – combined, combined, sliding, inguinoscrotal, giant, irreponible.
- Many times more expensive method with high costs for surgical instruments and equipment.

It is the right of each patient to choose the type of surgical treatment after being familiar with the advantages and disadvantages of the two methods of inguinal hernioplasty.

### CHAPTER 5. INFERENCE

1. The open method of inguinal hernioplasty is indicated for all types of hernias and there are practically no contraindications for it.
2. The endoscopic method has limited indications and application for bilateral and some recurrent hernias, as well as unsuitable for emergency surgical interventions (incarcerated hernias).
3. In the case of open conventional operations with anterior access, it is possible to apply local anesthesia or local with venous potentiation as well as spinal anesthesia compared to the laparoscopic method which is performed only with general anesthesia.
4. The open method of hernioplasty is easily accessible and applicable when basic general surgical technical skills are mastered and does not require complex and lengthy surgical training, while the laparoscopic method has a steeper learning curve and a higher rate of recurrences and complications at the beginning of the experience to the surgeon.
5. Conventional hernioplasty has a low cost and is widely applicable due to the lack of requirements for specific and expensive instrumentation, technique and consumables and is economically more profitable than laparoscopic hernioplasty, which is a many times more expensive method with high costs for surgical instrumentation and equipment.

## INFERENCE

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6. Operative time in open operations with anterior access is shorter compared to laparoscopic operations.
7. Laparoscopic hernioplasty is a minimally traumatic and highly aesthetic surgical method with smaller incisions and a better cosmetic result compared to the conventional method, which is performed with a larger surgical incision.
8. Laparoscopic hernioplasty is preferred for bilateral inguinal hernias, in obese patients with BMI > 30 kg/m<sup>2</sup> and in recurrences after anterior inguinal access, as the preperitoneal space is untouched and dissection is easier.

## CHAPTER 6. SCIENTIFIC CONTRIBUTIONS

### **6.1 Original scientific contributions:**

6.1.1. For the first time, a comprehensive systematic literature review of all types of complications of inguinal hernias was performed on a national scale.

6.1.2. For the first time, on a national scale, a comparative analysis has been carried out between Lichtenstein's CH and LH - TAP and TEPP, in which statistically significant advantages and disadvantages of the individual operative techniques are highlighted.

6.1.3. Questionnaires were made for the postoperative quality of life of patients operated on by both methods.

### **6.2 Scientific contributions of a practical-applied character:**

6.2.1. The role of open conventional Lichtenstein hernioplasty as a basic and universal method in the treatment of inguinal hernias is confirmed.

6.2.2. The role of laparoscopic methods in certain indications is confirmed.

### RESEARCH WORKS RELATED TO THE DISSERTATION

#### PUBLICATIONS:

- 1. Postoperative complications in endoscopically operated patients with inguinal hernias. N. Trokovski; A. Mitevski; B. Zafirova Ivanovska; Medicus; 2019.24(3):354-358; ISSN 1409-6366 UDC 61 Vol.24(3).2019.**
- 2. Complications in conventionally operated patients with inguinal hernias. N. Trokovski; N. Ali; P. Uchikov; Contemporary Medical Problems.ISSN-2367-4776 Issue 4/2020 p.11-14.**
- 3. Postoperative results in conventional and laparoscopic inguinal hernioplasty. N. Trokovski; N. Ali; P. Uchikov; Contemporary Medical Problems.ISSN-2367-4776 Issue 4/2020 p.15-18.**
- 4. Advantages and disadvantages of laparoscopic inguinal hernia repair (hernioplasty). N. Trokovski; P. Uchikov; E. Yordanov; K. Atliev; Folia Medica 2021; vol. 64: 61-66 issue 1; ISSN-0204-8043 eISSN-1314-2143.**

#### SCIENTIFIC FORUMS:

- 1. Transversus abdominis release: A case report. A. Mitevski; I. Milev; T. Shenol; N. Trokovski; P. Markov; K. Nikolovska. Medicus.ISSN1409-6366 UDS 61 Vol.25(2):268-271.2020.**