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Assessment of Complications of Inguinal Hernia Surgery

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Abstract

Hernia repair is a frequent elective surgical operation. Unsatisfactory results in some cases have led to the persistence of a variety of different operative methods. Our study aimed to determine the frequency of postoperative complications with different surgery methods and evaluate the correlation of complications with patient characteristics and health. **Materials and methods:** We examined 403 patients with an inguinal hernia who underwent hernioplasty, including 98 by the method of Liechtenstein, 74 by the method of Gvenetadze, 231 by the laparoscopic method. Patients were aged 18-80 years with a mean age of 56.914.6 years. Statistical analysis was performed using SPSS 22. **Results:** The frequency of total perioperative complications of surgery was 52 (53.06 %), according to the method of Lichtenstein, 13 (17.57%) according to the method of Gvenetadze, and 23 (9.96 %) according to laparoscopic surgery. The following postoperative complications were observed: damage to the colon, bleeding from the lower epigastric vessels, urinary retention, neuralgia, hematomas, and delayed postoperative wound healing, higher in patients undergoing Lichtenstein

surgery (p <0.05). The Liechtenstein method significantly increases the likelihood of complications; odds ratio OR=8.23 (95% CI: 4.87-13.94), with the Gvenetadze method, the relative chance decreases insignificantly OR=0.722 (95% CI: 0.30-1.39), with the laparoscopic method, the relative chance of complications are significantly reduced OR=0.20 (95% CI: 0.12-0.34). **Conclusions:** The odds ratio of postoperative complications of hernioplasty increases with the Liechtenstein method and decreases with laparoscopy. A comparison of the open methods of hernioplasty shows an advantage of the Gvenetadze method over the Liechtenstein method.

Keywords: Inguinal hernia repair, complications

Introduction

The inguinal hernia is a protrusion of abdominal contents into the inguinal canal through an abdominal wall defect [Wei K., 2018]. The risk of inguinal hernia increases with age from 0.25% at 18 years of age to 4.2 % at 75 to 80 years of age [*Burcharth J, 2013*].

The choice of method of repair of inguinal hernias remains open to debate. Hernia repair is a frequent planned operation. Worldwide over 20 million inguinal hernia repairs are performed annually [*Kingsnorth A.2004*]. The surgical treatment of inguinal hernia can be achieved via an open or a minimally invasive laparoscopic approach [*Awad S.S., Fagan SP. 2004*]. The National Institute for Health and Clinical Excellence (NICE) recently recommended laparoscopic surgery as a treatment option for inguinal hernia. It said that patients should be fully informed of the risks and benefits of open and laparoscopic surgery to enable them to choose between procedures [*NICE guidance 2004*.]

The variety of existing methods of hernioplasty is explained by the frequency of unsatisfactory results. Despite numerous scientific studies and practical experience in treatment, many clinical issues have not been fully resolved [*Vizgaov CA, Smotrin S.M. 2010*].

The concept of a tension-free hernia repair is widely accepted in inguinal hernia surgery, and the use of mesh is considered standard of care. Shouldice herniorrhaphy is the best non-mesh technique in terms of recurrence, though it is more time consuming and needs a slightly longer postoperative hospital stay. The use of mesh is associated with a lower rate of recurrence. Many studies have documented a 50 % to 75 % reduction in recurrence rates with the addition of mesh to an inguinal hernia repair [*Amato B et al., 2012*].

Although the introduction of non-tensioned methods in hernioplasty has contributed to reducing relapses and complications, this issue is still the subject of research. The problem is associated with using the mesh in the

Lichtenstein method, which helps to reduce relapses. Yet, studies have shown that the mesh has contact with the spermatic cord, which leads to a fibrous reaction with subsequent secondary azoospermia [*Fitzgibbons RJ et al., 2005, Maciel LC et al.,2007, Peiper C et al.,2006, Shin D et al., 2005, Protasov et al.,2010*]. T. Gvenetadze developed a method that allows using the mesh to isolate it from the spermatic cord, which contributes to the prevention of male infertility [*Kiladze et al., 2009]*.

According to the literature, with hernioplasty for bilateral hernias by the Liechtenstein method, there are fewer relapses with the laparoscopic method. In other cases, the laparoscopic method shows better results [Wara P *et al.,* 2005]. In other studies, with laparoscopic and open methods, there was no significant difference in the incidence of complications and recurrences [Neumayer L *et al.,* 2004, Pokorny, H., *et al.,* 2009].

Laparoscopic operations were associated with a short period of hospitalization, early activation, and fewer complications after surgery. However, the operation time was significantly longer, and repeated cases were increased [*Memon MA et al., 2003*]. The laparoscopic approach has shown clear advantages regarding less chronic postoperative pain and numbness, fast return to normal activities, and a decrease in the incidence of wound infection and hematoma [*Cavazzola LT, Rosen MJ. 2013*]

Hernia surgery has hitherto been focused on reducing the risk of recurrences. Still, prevention of long-term pain may require other approaches [*Köninger J, 2004 et al., Poobalan AS et al., 2001, Courtney CA et al., 2002*]. Chronic pain after hernia repair is common, and it is unclear to what extent the different operation techniques influence its incidence [*Köninger J,2004 et al.*].

The aim of our study is to determine the frequency of postoperative complications when used different methods of surgery and evaluate the correlation between the main characteristics of the patient's health condition.

Materials and methods:

We examined 403 patients with an inguinal hernia who underwent hernioplasty including: 98 by the Liechtenstein method, 74 by the Gvenetadze method, and 234 by the laparoscopic method. Patients were 18-80 years of age, mean 56.914.6 years.

Preoperatively, the groups were evaluated regarding age, gender, body mass index (BMI), the presence of comorbidity, American Society of Anesthesiology (ASA) score, hernia type defined according to the Nyhus classification as determined by both superficial ultrasonography and site of the hernia. *Clinical Laboratory. The study was conducted* between 2016 and 2018 years *in* the National Medical Center of Gudushauri (Tbilisi) and Helios Clinic (Rotvail, Germany).

Description of the Gvenetadze Surgical technique
(copyright certificate N 4054 "Sakpatent," 2004)**:**

a) Narrowing the inner ring of the inguinal canal with a purse-string suture with an obligatory gripping of the transverse fascia and tying the necktie so as not to squeeze the spermatic cord (Fig. 1); b) grid modeling – a window with a diameter of 0.3-0.5 cm larger than the diameter of the spermatic cord should be cut in the grid; c) fixing of the simulated grid is made in the usual way; d) fixing the edge of the window at the inner ring of the inguinal canal so that there is no flotation (Fig. 2); e) flashing the aponeurosis of the muscles behind the spermatic cord; e) removal of the spermatic cord over the aponeurosis, thus achieving its complete isolation from the grid (Fig. 3). At the final stage, the Thompson fascia is stitched above the spermatic cord, which, together with the subcutaneous fatty tissue, protects the spermatic cord from external influences.

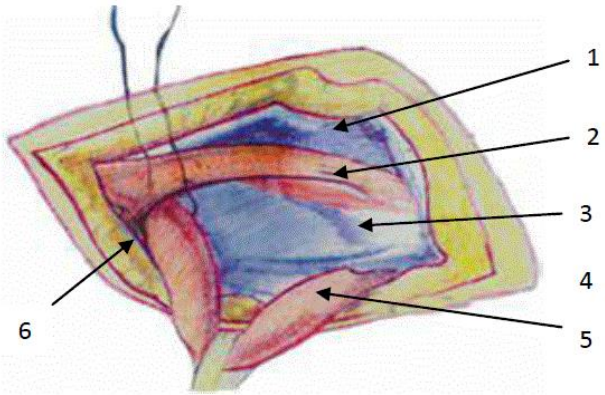

Fig. 1. The scheme of narrowing the internal ring of the inguinal canal with a purse-string suture: 1 – aponeurosis m. obliquus externs abdominis; 2 – m. obliquus internus abdominis; 3 – m. transversus abdominis; 4 – fascia transversalis; 5– funiculus spermaticus; 6 – annulus inguinalis profundus;

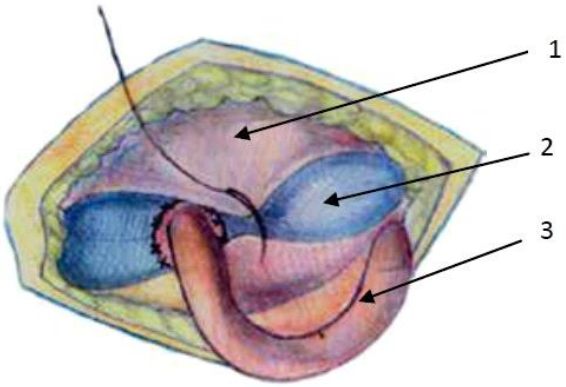

Fig. 2. Prevention of flotation mesh: 11 – aponeurosis m. obliquus externus abdominis; 2 – polypropylene mesh; 3 – funiculus spermaticus.

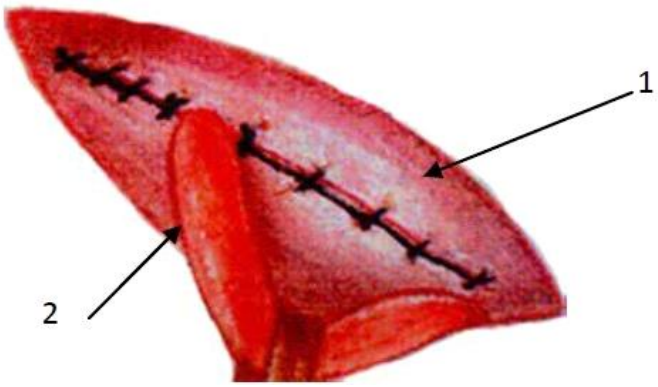

Fig. 3. The method of isolation of the spermatic cord from the mesh: 1 – aponeurosis m. obliquus externus abdominis; 2 – funiculus spermaticus.

Statistical analysis:

Differences in continuous parameters will be analyzed by means of an independent sample *t*-test. The homogeneity of variances will be checked utilizing Levene's analysis. Dichotomous data are presented as numbers and percentages. Fisher exact test was used to analyses categorical variables. Statistical significance was set at $p < 0.05$; the odds ratio of complications were determined by binary logistic regression analysis. Statistical analysis was performed using SPSS 22.

Results:

Age distribution patient is given in Table 1.

Table 1: Age distribution by method

	N	Mean±Std. Dev	Minimum	Maximum
Liechtenstein method	98	57.42±14.44	21.00	80.00
Gvenetadze method	74	56.15±14.861	18.00	79.00
Laparoscopic surgery	231	55.82±14.27	20.00	80.00

Mean age by method did not differ, $p>0.05$

The results of the operation showed that complications occurred in all three methods (Table 2).

Table 2: Distribution of perioperative complications by method

	Laparoscopic surgery n(%)	Gvenetadze method n(%)	Liechtenstein method n(%)	p
Damage to the colon	1(0.43)	0(0.00)	1(1.02)	0.6290
Bleeding	3(1.30)	0(0.00)	0(0.00)	0.3263
Urinary retention	1(0.43)	0(0.00)	0(0.00)	0.6902
Neuralgia	0(0.00)	0(0.00)	4(4.08)	0.0018
Hematoma	2(0.87)	5(6.76)	24(24.49)	<0.0001
Lymphorrhea	0(0.00)	2(2.70)	6(6.12)	0.0011
Delayed wound healing	0(0.00)	0(0.00)	7(7.14)	<0.0001
Pain	2(0.87)	2(2.70)	10(10.20)	0.0001
Feeling of heaviness	17(7.36)	4(5.41)	23(23.47)	<0.0001
Implant migration	1(0.43)	0(0.00)	1(1.02)	0.6290

The following postoperative complications were observed: damage to the colon, bleeding from the lower epigastric vessels, urinary retention, neuralgia, hematomas, and delayed postoperative wound healing, higher in patients undergoing Lichtenstein surgery ($p <0.05$).

Bleeding from the lower epigastric blood vessels and urinary retention was observed only after laparoscopic surgery. More frequently, the pain was observed after the Liechtenstein method, and neuralgia was observed only in the case of the Liechtenstein method.

After surgery Gvenetadze method had no intraoperative complications and no implant migration.

The frequency of total perioperative complications by operation techniques is shown in Table 3.

The incidence of complications was higher in patients undergoing Lichtenstein surgery ($p < 0.05$).

We examined the odds ratio of perioperative complications risk, depending on the surgery method.

Table 3: The frequency of complications with herniolplasty.

	Liechtenstein method a (1) N=98		Gvenetadze method (2) N=74		Laparoscopic surgery (3) N=231		(1)-(3)		(1)-(2)		(2)-(3)	
	abs	%	abs	%	abs	%	F	p	F	p	F	p
Total complication	52	53.06	13	17.57	23	9.96	46.39	<0.0001	25.71	<0.0001	3.13	0.0779

As shown in Table 4, the odds ratio of complications is increased with the Liechtenstein method and reduced with the laparoscopic method.

Table 4: Evaluation of the odds ratio of complications by different hernioplasty methods

	OR	95 % confidence interval	
Gvenetadze method	0.722	0.376	1.385
Liechtenstein method	8.236	4.868	13.937
Laparoscopic surgery	0.198	0.118	0.335

Discussion

Inguinal hernia repair (IHR) is among the most common general surgery procedures. Multiple studies have demonstrated the benefits of the laparoscopic approach versus open repair [*Pavlosky KK et al., 2019*].

Chronic pain or discomfort in the period after hernioplasty was registered in 30% of patients, and significantly more in open surgery than in the case of laparoscopy and reduces physical activity in 18% of patients [*Kumar S et al., 2002*, Gorgodze, T (2019)]. Patients of the laparoscopic group showed postoperatively significantly less chronic inguinal pain [*Hamza Y et al., 2010*]. Our research has shown - the pain was fixed in all cases, but it was significant in the case of the Lichtenstein method and less on the laparoscopic surgery. Laparoscopic hernioplasty takes longer and is characterized by a higher frequency of visceral complications (especially blood vessels and bladder). Still, rehabilitation is faster [*McCormack K et al., 2003*]. In our research, the laparoscopic method resulted in 1 case of damage to the colon and 1 case of urinary retention.

Our research has shown that the highest incidence of complications was found during Liechtenstein operations. The Liechtenstein method significantly increases the likelihood of complications; the relative chance OR=8.23(95%CI: 4.87-13.94), with the Gvenetadze method the relative chance decreases insignificantly OR=0.722 (95%CI: 0.30-1.39), laparoscopic

method, the relative chance of complications is significantly reduced OR=0.20 (95% CI: 0.12-0.34).

Conclusion

The relative chance (odds ratio) of perioperative complications with hernioplasty increases with the Liechtenstein method and decreases with the laparoscopic method. Of the open methods of hernioplasty, compared with the method of Liechtenstein, complications are fewer with the Gvenetadze method.

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