



## Surgical treatment of inguinal hernia: Our experience

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### ABSTRACT

**Aim:** In present retrospective analysis, we aimed to evaluate the treatment results of subjects with inguinal hernia whom underwent surgical repair.

**Methods:** Surgical treatment of inguinal hernia for last 7 years have been retrospectively analyzed. Surgical procedures include anterior mesh, posterior mesh, Mc Vay, non-mesh repair, plug mesh.

**Results:** A total of 2320 patients underwent hernia surgery were included to the study. While, 2224 of the cases were elective procedures while 96 were operated in emergency conditions. Incarceration 78 of emergent cases were incarcerated and 18 were strangulated. Patients requiring emergency surgery were significantly older than the patients underwent elective hernia repair. Duration of hospital stay was significantly longer in emergent cases compared to elective cases. Need for intestinal resection was more common in emergent cases compared to elective surgery cases. Mc Vay and plug mesh procedures were more commonly used in emergent cases compared to elective surgery cases. Intestinal laceration and development of recurrences were more common in emergent surgery cases compared to elective surgery.

**Conclusion:** Inguinal hernia patients should be scheduled for elective surgery without delay since need for emergent surgery may increase by time and emergent cases are associated with more complications and surgical morbidity.

**Keywords:** Hernia; anterior mesh; posterior mesh; Mc vay; elective surgery; emergent surgery.

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### Introduction

Inguinal hernia repair is one of the most common procedures in general surgery. The word *hernia* is derived from the word *hernios* which means *bud* in the Greek language, and refers that an organ goes out of its surrounding structure. Hernia is used to mean herniation of the abdominal organs through the peritoneum in the pressure gradient direction through a

defect in the muscle aponeurosis layers forming the abdominal wall [1]. Approximately 75% of the herniated abdominal wall is pubic area [2]. Although the abdominal wall hernias are easy to see at first glance and the treatment does not seem to be like a simple disease group, the fact that there is no single method that everyone understands is an indication that the best method for hernia repair has not yet been described [3,4]. The approach to inguinal hernia repair varies from traditional tissue approach techniques to the current mesh-based repairs that are applied as open or laparoscopic procedures [5]. Additionally, choosing one of the most appropriate surgical techniques for inguinal hernia repair allows for safe performance, a rapid recovery period, and can be a significant contributor to reducing national health care costs [6]. In our study, we evaluated the results of emergency and elective repair techniques in patients with inguinal hernia, together with recurrence rates, operative complications and some other parameters.

### Methods

Hernia operations performed in general surgery clinics of Haseki Training and Research Hospital in Istanbul and Abant İzzet Baysal University Hospital in Bolu were retrospectively analyzed between 2008 and 2015. A total of 2420 patients were underwent hernia surgery between these dates, however, 100 of them were excluded since their medical records were not completely reachable. Remaining 2320 patients evaluated.

Study population was grouped into two either elective inguinal hernia repair or emergency inguinal hernia repair groups according to the surgery indication. Informed consent and ethical approval were obtained. Age, gender, localization of the hernia (right, left bilateral or

femoral), primary or recurrence hernia, surgical technique (anterior mesh, posterior mesh, Mc Vay, non-mesh repair, or plug mesh), hospitalization duration, anesthesia type (general or spinal), need for intestinal resection, postoperative complications (hematoma, seroma, intestinal laceration, wound infection, recurrence, mesh reaction, testicular ischemia, inguinal pain, headache after spinal anesthesia, bladder laceration, need for intensive care and death) were recorded.

The mesh reaction decision was made by histopathological examination of the mesh by the reoperation indicated by discharge from the incision line at least postoperatively 6 months. The method used in the treatment of the disease was according to the choice of the surgeon performed the surgery.

SPSS 15.0 for Windows program was used for statistical analysis. Descriptive statistics; number and percentage for categorical variables, mean, standard deviation, minimum, maximum for numerical variables. Mann Whitney U test was used because independent numerical comparisons between two groups did not provide normal distribution. Comparisons of ratios in independent groups were tested by Chi Square Analysis. Monte Carlo Simulation was applied when conditions were not met. Statistical significance level of alpha was accepted as  $p < 0.05$ .

### Results

Of 2320 patients who underwent hernia surgery, 2190 were male and 130 were female. While 95.9% ( $n = 2224$ ) of the cases were operated under elective conditions and the remaining 4.1% ( $n = 96$ ) were operated under emergent conditions. The incidence of incarceration and strangulation cases were 3.4% ( $n = 78$ ), and 0.8% ( $n = 18$ ) respectively. Surgical techniques applied to the patients

**Table 1.** Surgical techniques in study groups.

Surgical techniques	Total (n, %)		Emergency inguinal hernia repair (n, %)		Elective inguinal hernia repair (n, %)	
	<b>Anterior mesh</b>	2016	86,9	85	88,8	1931
<b>Posterior mesh</b>	74	3,2	1	1,0	73	3,3
<b>Mc Vay repair</b>	6	0,3	3	3,1	3	0,1
<b>Non-mesh repair</b>	221	9,5	5	5,2	216	9,7
<b>Plug mesh</b>	3	0,1	2	2,1	1	0,0

were as follows; 2016 patients had anterior mesh, 221 non-mesh repair, 74 posterior mesh, 6 Mc Vay, 3 plug mesh (Table 1). The mean age of cases with emergency surgery was statistically significantly higher than that of elective ones ( $p < 0.001$ ). There was no statistically significant difference in the sex ratios of the groups ( $p = 0.1$ ).

There was no bilateral hernia in patients underwent emergency surgery. The mean duration of hospitalization for emergency cases was statistically higher than the elective surgery cases ( $p = 0.001$ ).

There was a statistically significant difference in intestinal resection rates between emergency and elective operations ( $p < 0.001$ ). Resection rates were high in cases of emergency surgery. Resections made include; small intestine, colon, omentum, testis, and hydrocelectomy (Table 2).

The rate of hospitalization and mortality in the intensive care unit was statistically significantly higher in elective cases ( $p < 0.001$ ,  $p = 0.002$ , respectively). The rates of intestinal injury and recurrence complications were statistically higher in emergent cases than those of elective surgery cases ( $p = 0.037$ ,  $p < 0.001$ , respectively) (Table 3).

### Discussion

The aims of inguinal hernia surgery are complete and permanent repair of the posterior wall, minimizing recurrence, maximizing the quality of life of the patient, reducing loss of workload and reducing the length of hospitalization. Therefore, many methods are described and applied in the surgical treatment of inguinal hernia. Life-long inguinal hernia risk is 27% in males and 3% in females [7]. 90% of inguinal hernia repair surgeries are performed in males and 10% in females [2]. In our study, 94.4% of the patients who had hernia repair were male and 5.6% were female patients. Today, it is still a matter of debate as to which method is best since a large number of repair methods available for surgical treatment of inguinal hernias [8,9]. In our study, 86.9% of the cases were repaired with anterior mesh, 3.2% with posterior mesh, 0.3% with Mc Vay, 9.5% with non-mesh repair, and 0.1% with plug mesh.

Lichtenstein method is recommended as an open technique preferred by adults in the treatment of unilateral or bilateral inguinal hernia in guidelines published by the European Hernia Society [10]. The mean recurrence rate of Lichtenstein repair in 3019 inguinal hernia

**Table 2.** Need of resection in study population.

Resection	Total (n, %)		Emergency inguinal hernia repair (n, %)		Elective inguinal hernia repair (n, %)	
	None	2269	97,8	77	80,2	2192
Small intestine	7	0,3	6	6,3	1	0,0
Colon	2	0,1	2	2,1	0	0,0
Omentum	15	0,6	8	8,3	7	0,3
Hydrocelectomy	18	0,8	1	1,0	17	0,8
Orchiectomy	8	0,3	1	1,0	7	0,3
Omentum + Hydrocelectomy	1	0,0	1	1,0	0	0,0

**Table 3.** Postoperative complications in study population.

Complications	Total (n, %)		Emergency inguinal hernia repair (n, %)		Elective inguinal hernia repair (n, %)	
	Hematoma	12	0,5	0	0,0	12
Seroma	5	0,2	1	1,0	4	0,2
Intestinal laceration	1	0,0	0	0,0	1	0,0
Wound infection	38	1,6	1	1,0	37	1,7
Recurrence	47	2,0	1	1,0	46	2,1
Headache after spinal anesthesia	10	0,4	2	2,1	8	0,4
Intensive care	29	1,3	7	7,2	22	1,0
Mesh reaction	18	0,8	1	1,0	17	0,8
Testicular ischemia	4	0,2	1	1,0	3	0,1
Inguinal pain	14	0,6	0	0,0	14	0,6
Exitus	2	0,1	2	2,1	0	0,0
Bladder laceration	1	0,0	0	0,0	1	0,0

cases was 0.2% [11]. In our study, 86.9% of the preferred methods were Lichtenstein technique and the recurrence rate of the patients who underwent repair surgery with Lichtenstein method was 0.7%.

Comparisons of these techniques in various studies do not yield a healthy result because of the different types of hernia, follow-up times, different surgeons and selected patient groups. According to Sweden data, 107838 inguinal hernias mortality due to all cause was 7 times more common in emergency cases compared to elective cases who underwent hernia repair [12]. Williams and Hale reported 2% mortality in elective hernia surgeries and 16% in urgent hernia surgeries [13]. In our study, mortality due to all causes in emergency cases was 2.1% while this rate was 0% in elective cases. Mortality and morbidity of emergent procedures were higher in comparison to elective cases.

One of the undesirable outcomes in hernia surgery is the resection of organ and tissues in the herniated sac. Kurt et al and Alvarez et al have shown in their reports that intestinal resection did not affect mortality but increased complication rates such as wound infection and prolongs hospital stay [14,15]. In our study, resection rate was 19.8% in emergency cases and 1.4% in elective surgery.

In conclusion, despite elective surgery is indicated in inguinal hernia patients without urgent conditions, we recommend scheduling of surgery in such patients without much delay in order to reduce morbidity and mortality related to emergent hernia surgery.

### **Compliance with ethical statements**

*Conflicts of Interest: None.*

### **References**

- [1]Prieto-Diaz-Chavez E, Medina-Chavez JL, Ramirez-Barba EJ et al. Reduction of peritoneal adhesion to polypropylene mesh with the application of fibrin glue. *Acta Chir Belg.* 2008; 108(4): 433-37.
- [2]Brunnicardi FC. *Schwartz's Principles of Surgery.* 10th ed; 2010
- [3]Kekeç Y, Alparslan A, Demirtaş S, Ezici H, Altınay R. The Effects of Strangulation on Morbidity and Mortality in Irreducible Hernias. *Turk J Surg.* 1993; 9(2): 128-31.
- [4]Payne JH Jr, Grininger LM, Izawa MT, Podoll EF, Lindahl PJ, Balfour J. Laparoscopic or open inguinal herniorrhaphy? A randomized prospective trial. *Arch Surg.* 1994;129(9):973-9; discussion 979-81.
- [5]Ismaila BO, Misauno MA, Ojo EO. Inguinal hernia: the quest for the best repair. *Niger J Med.* 2010;19(4):369-73.
- [6]Bittner R, Schwarz J. Inguinal hernia repair: current surgical techniques. *Langenbecks Arch Surg.* 2012;397(2):271-82.
- [7]Gould J. Laparoscopic versus open inguinal hernia repair. *Surg Clin.* 2008; 88(5): 1073-81.
- [8]Douglas DM. Tensile strength of sutures; the B.P.C. method of test. *Lancet.* 1949;2(6577):497-99.
- [9]Liffshutz H, Juler G. The Inguinal Hernia. *Arch Surg.* 1987; 121: 418-22.
- [10]Simons M, Aufenacker T, Bay-Nielsen M et al. European Hernia Society guidelines on the treatment of inguinal hernia in adult patients. *Hernia.* 2009; 13(4):343-403
- [11]Shulman A, Amid P, Lichtenstein I. The safety of mesh repair for primary inguinal hernias: results of 3,019 operations from five diverse surgical sources. *Am Surg.* 1992; 58(4): 255-57.

- [12] Nilsson H, Stylianidis G, Haapamäki M et al. Mortality after groin hernia surgery. *Ann Surg.* 2007; 245(4): 656-60.
- [13] Williams J, Hale H. The advisability of inguinal herniorrhaphy in the elderly. *Surg Gynecol Obstet.* 1966; 122(1): 100-104.
- [14] Alvarez JA, Baldonado RF, Bear IG, Solís JA, Alvarez P, Jorge JI. Incarcerated groin hernias in adults: presentation and outcome. *Hernia.* 2004;8(2):121-26.
- [15] Kurt N, Oncel M, Ozkan Z, Bingol S. Risk and outcome of bowel resection in patients with incarcerated groin hernias: retrospective study. *World J Surg.* 2003; 27(6): 741-43.