

## Comparison of pain score and patient satisfaction between laparoscopic and open abdominal incisional hernia repair

Açık ve laparoskopik insizyonel herni onarımının ağrı skorları ve hasta memnuniyeti açısından karşılaştırılması

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### Abstract

**Aim:** Incisional hernia is one of the most common postoperative complications of abdominal surgery. Recently laparoscopic repair was introduced. The aim of this study is to compare pain scores and satisfaction rates of patients performed open and laparoscopic incisional hernia repair.

**Materials and Methods:** A total of 164 patients were included. Group 1 (n=47) consists of patients performed laparoscopic repair and Group 2 (n=117) consists of open repair. Patients were analyzed according to demographic data, operative findings, postoperative complications and recurrence. 32 (68.08%) patients in Group 1 and 88 (75.21%) patients in Group 2 were applied to telephone survey. Pain scores and satisfaction rates of patients were compared.

**Results:** Fifty-one (31.1%) patients were male and 113 (68.9%) patients were female. Mean age of patients was 55.35±11.73 years. Postoperative complications were found in only 2.1% of patients in Group 1 and 23.9% of patients in Group 2 (p<0.05). Recurrence rates for Group 1 and 2 was 25.7% and 20%, respectively (p>0.05). No statistical difference was observed between groups regarding to pain scores and satisfaction rates (p>0.05).

**Conclusion:** Although laparoscopic repair seems to have advantages, it has no superiority to the open repair regarding pain and satisfaction.

**Keywords:** Incisional hernia, pain, satisfaction, laparoscopic hernia repair, hernia.

### Öz

**Amaç:** İnsizyonel herni karın cerrahisi sonrası görülen en sık komplikasyonlardandır. Son zamanlarda laparoskopik onarım gündeme gelmiştir. Bu çalışmanın amacı, açık ve laparoskopik insizyonel herni onarımı yapılan hastalarda ağrı skorları ve memnuniyet oranlarını karşılaştırmaktır.

**Gereç ve Yöntem:** Yüz altmış dört hasta çalışmaya dahil edildi. Grup 1 (n=47) laparoskopik onarım ve Grup 2 (n=117) açık onarım yapılan hastalardan oluşmaktaydı. Hastalar, demografik özellikler, ameliyat bulguları, ameliyat sonrası komplikasyon ve nüks açısından incelendi. Grup 1'deki 32 (%68,08) ve Grup 2'deki 88 (%75,21) hastaya telefon anketi uygulandı. Ağrı skorları ve memnuniyet oranları karşılaştırıldı.

**Bulgular:** Hastaların 51'i (%31,1) erkek, 113'ü (%68,9) kadındı. Ortalama yaş 55,35±11,73 idi. Ameliyat sonrası komplikasyon oranları Grup 1 için %2,1 ve Grup 2 için %23,9 olarak saptandı (p<0,05). Grup 1 ve 2 için nüks oranları sırasıyla %25,7 ve %20 olarak saptandı (p>0,05). Gruplar arasında ağrı skorları ve memnuniyet oranları açısından anlamlı fark saptanmadı (p>0,05).

**Sonuç:** Laparoskopik onarımın avantajları olmasına rağmen ağrı ve memnuniyet açısından açık onarıma üstünlüğü olmamaktadır.

**Anahtar Sözcükler:** İnsizyonel herni, ağrı, memnuniyet, laparoskopik fıtık onarımı, fıtık.

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## Introduction

Incisional hernia (IH) is one of the most undesirable postoperative complications after abdominal surgery. The incidence of IH was found to be 11-20% (1,2). But the incidence can rise up to 35-50% in some circumstances (3,4). Majority of the IH develop 1 year following the abdominal operations. Some factors for IH development such as diabetes, chronic use of corticosteroids, wound infection, obesity, and malnutrition (5).

Several methods were described for IH repair. Primary suture was the first technique described. The recurrence rate was found to be 31-49 % (6) therefore primary repair technique was recommended for hernias less than 3 cm (7). The recurrence rate was decreased after the introduction of mesh repair unfortunately seroma formation was increased and wound infection was complicated. The mesh can be placed onlay, inlay and sublay. Thus another issue was evaluated by literature which was positioning of the mesh (8,9). Recurrence rate for retromuscular hernia repair was reported to be 6.7% (10). Since various mesh types were introduced such as dual mesh, laparoscopic approach for IH was started to be performed. Laparoscopic approach was first described by Le Blanc and Booth in 1993 by using intraperitoneal polytetrafluoroethylene (PTFE) mesh (11). This technique has advantages like less pain, scar and seroma formation (12,13) and disadvantages like longer operation time and higher risk of bowel injury (14,15).

Comparison of open and laparoscopic techniques is still being investigated in the literature. Recently meta-analysis was performed on this topic but no obvious results was found yet (16). The aim of this study is to compare pain score and satisfaction rate of laparoscopic and open abdominal incisional hernia repair.

## Materials and Methods

Between January 2014 and November 2015, a total of 224 consecutive patients with abdominal incisional hernia, were operated at our institution. Sixty patients with primary incisional hernia repair were excluded. Incarcerated and strangulated incisional hernias, patients younger than 18 years old, immunocompromised patients and patients with intestinal perforation were not included in this study. One hundred and sixty four patients with laparoscopic and open incisional hernia repair were included in our study. Data were collected retrospectively. The size of each hernia was measured in two directions (hernia area=length x width) intraoperatively. All operations were performed by experienced general surgeons. A total of 117 patients were treated by open surgery using sublay polypropylene or composite mesh. The laparoscopic approach was performed in 47 patients and composite mesh was used in all patients. Table-1 shows the characteristics of patients.

All operations consist of elective cases. Antithrombotic prophylaxis was administered and first generation cephalosporin was given 30 minutes before surgery in both groups. General anesthesia was done in all cases. Flexible composite mesh (Ethicon Physiomes®<sup>®</sup>, Ethicon Surgery, Somerville, NJ, USA) was the standard mesh used in the laparoscopic group. The mesh was implanted with an overlap of at least 3 cm above the edges of the defect and anchored with four transfascial full-thickness sutures to the anterior abdominal wall with the support of non-absorbable spiral tacks. In the open group, a polypropylene mesh (Svpro propylene mesh®<sup>®</sup>, Klas Medikal, İstanbul, Turkey) was placed under the rectus abdominis muscle and retromuscular hernia repair was performed. In some cases closure of the fascia was not done in order to prevent tension. Composite mesh was used in 13 patients of open group with a very large defect or when there was a lack of the posterior rectus sheath or the peritoneal layer.

Patients were divided into two groups; laparoscopic repair (Group 1) and open repair (Group 2). Both groups were compared according to age, sex, comorbidity, prior operation, American Society of Anesthesiologists (ASA) score, hernia site, hernia area, mesh area, mesh type, operation time, length of hospital stay, recurrence, follow-up and complications. A telephone survey was applied to all patients. In case of uncertainties, the patients were invited for a visit. At follow-up, the recurrence rate, pain score, patient satisfaction with the surgical result were determined. Verbal pain intensity scale (VPIS) was applied to patients reached via telephone survey. This survey was applied between 3rd and 12th months postoperatively. The patient was asked to give a point for his/her intensity of pain after surgery. Minimum 0 point means "no pain" and maximum 10 points means "highest pain ever experienced". Physical satisfaction was questioned as; very pleased, pleased and unhappy. Recurrence was defined as any palpable protrusion at the site of the operation or findings of the surgeon on medical records of the patient or signs of the hernia on patient visit.

Statistical analysis was performed using the statistical package SPSS software (Version 17.0, SPSS Inc., Chicago, IL, USA). If continuous variables were normal, they were describe as the mean±standard deviation [ $p > 0.05$  in Kolmogorov-Smirnov test or Shapiro-Wilk ( $n < 30$ )], and if the continuous variables were not normal, they were described as the median. Comparisons between groups were applied using Student t test for normally distributed data and Mann Whitney U test were used for the data not normally distributed. Values of  $p < 0.05$  were considered statistically.

Informed consent was taken from all patients.

## Results

A total of 164 patients were eligible for this study. 51 (31.1%) patients were male and 113 (68.9%) patients were

female. There was a statistical difference with regard to sex for both groups ( $p<0.05$ ). Mean age of patients for laparoscopic and open group was  $54.68\pm 9.56$  and  $55.62\pm 12.5$  years, respectively. Only 24 (51.1%) patients in Group 1 and 60 (51.3%) patients in Group 2 have no comorbidity. The most common comorbidity was hypertension (20.7%) followed by hypertension and diabetes (7.9%), diabetes only (6.1%), coronary artery disease (5.5%), chronic renal disease (3%) and others (5.6%). Most of the patients (59.1%) had ASA-2 score, followed by ASA-3 (32.3%) and ASA-1 (8.5%). Table-2 shows the operative findings of the patients. Average hernia area of the patients in Group 1 and 2 was  $131.4$  (range 10-600) and  $187.37$  (range 4-916)  $\text{cm}^2$ , respectively, which is statistically different ( $p<0.05$ ). Composite mesh was used in all patients Group 1 whereas only in 13 patients (11.1%) in Group 2. 10.6% of Group 1 and 10.3% of Group 2 was recurrent IH. 4 (2.4%) patients have 1, 5 (3%) patients have 2 and 4 (2.4%) patients have 3 recurrent disease (range 1-11 recurrence). The most common prior operation causing incisional hernia was gynecological (24.4%) followed by umbilical hernia (13.4%), colorectal (12.2%), appendectomy (8.5%), cholecystectomy (7.3%), small bowel (6.7%) and other (19.6%) operations. 90.9% patients received only incisional hernia operations however others had additional operations such as; cholecystectomy (5.5%), colectomy (1.2%), gynecological operation (1.2%), gastrectomy (0.6%) and small bowel resection (0.6%). IH was located on midline (77.4%), paramedian (5.5%), subcostal (4.9%), pfannenstiel (4.3%), Mc Burney's point (4.3%) and flank (3.7%) incisions.

Average mesh size for Group 1 and 2 was  $530.89$  (range 150-884) and  $581.5$  (range 40-900)  $\text{cm}^2$ , respectively which

is statistically significant ( $p<0.05$ ). Mean operation time for Group 1 and Group 2 was  $103.89\pm 40.57$  and  $109.34\pm 44$  minutes, respectively. Mean length of hospital stay was  $1.98\pm 1.22$  days for Group 1 and  $3.39\pm 1.81$  days for Group 2 and statistically significant difference was observed between groups ( $p<0.05$ ). Postoperative complications were found in only 2.1% of patients in Group 1 and 23.9% of patients in Group 2 which is also found to be statistically significant ( $p<0.05$ ). Subcutaneous hematoma formation was the complication found in only 1 patient in Group 1. The most commonly encountered complication was seroma formation (10.3%) found in Group 2. Early postoperative complications were given on Table-3. The overall recurrence was observed in 28 (21.5%) patients. Recurrence rates for Group 1 and 2 was 25.7% and 20%, respectively but no statistically significant difference was observed ( $p>0.05$ ). Most of the recurrence (77.7%) was observed in the first 6 months namely the beginning of our learning curve for laparoscopic repair. Mean follow-up of the patients in Group 1 was 6.51 (range 0-22) and 5.22 (range 0-27) months in Group 2 ( $p>0.05$ ).

Thirty-two (68.08%) patients in Group 1 and 88 (75.21%) patients in Group 2 responded to telephone survey. Average verbal pain intensity scale (VPIS) (min:0, max:10 points) of patients for Group 1 was  $3.34\pm 3.01$  and  $2.66\pm 2.11$  points for Group 2 which is not statistically different ( $p>0.05$ ). 18.8% and 71.8% of patients in Group 1 and 84.4% and 10% of patients in Group 2 felt "very pleased" and "pleased", respectively after the operation whereas 9.4% of patients in Group 1 and 5.6% of patients in Group 2 felt "unsatisfactory" after the operation ( $p>0.05$ ). VPIS and patient satisfaction rates are listed on Table-4.

**Table-1.** Characteristics of Patients.

	Laparoscopic repair (n=47)	Open repair (n=117)	p value
Age* (Years)	54.68±9.56	55.62±12.52	0.447
Sex (Male/Female)	9/38	42/75	<b>0.041</b>
Comorbidity (%)			0.583
None	51.1	51.3	
HT	21.3	20.5	
DM+HT	8.5	7.7	
DM	4.3	6.8	
CAD	4.3	6	
CRD	6.4	1.7	
Other	4.1	6	
ASA (%)			0.693
1	6.4	9.4	
2	63.8	57.3	
3	29.8	33.3	
Hernia location (%)			0.801
Midline	35 (74.5)	92 (78.6)	
Paramedian	4 (8.5)	5 (4.3)	
Subcostal	2 (4.3)	6 (5.1)	
Pfannenstiel	2 (4.3)	5 (4.3)	
McBurney	3 (6.4)	4 (3.4)	
Flank	1 (2)	5 (4.3)	

CAD: Coronary artery disease; CRD: Chronic renal disease; DM: Diabetes mellitus; HT: Hypertension.

\* Values are mean±standard deviation.

**Table-2.** Operative and Postoperative Findings.

	Laparoscopic repair (n=47)	Open repair (n=117)	p value
Hernia area* (cm <sup>2</sup> )	131.4±131.46	187.37±167.14	<b>0.025</b>
Mesh size* (cm <sup>2</sup> )	530.89±274.15	581.5±299.14	0.068
Operation time* (minutes)	103.89±40.57	109.34±44	0.510
Length of hospital stay* (day)	1.98±1.22	3.39±1.81	<b>0.0001</b>
Follow-up* (months)	6.51±5.7	5.22±6.2	0.146
Complication (%)	1 (2.1)	28 (23.9)	<b>0.000</b>
Recurrence (%)	9 (25.7)	19 (20)	0.480

\* Values are mean±standard deviation.

**Table-3.** Early Postoperative Complications.

	Laparoscopic repair (n=47)	Open repair (n=117)
Seroma (%)	0	12 (7.3)
Wound dehiscence (%)	0	7 (4.3)
Wound infection (%)	0	3 (1.8)
Hematoma (%)	1 (2.1)	2 (1.7)
Mesh infection (%)	0	1 (0.6)
Skin necrosis (%)	0	1 (0.6)
Enterocutaneous fistula (%)	0	1 (0.6)
Eversion (%)	0	1 (0.6)

**Table-4.** Pain Scale and Patient Satisfaction of the Patients.

	Laparoscopic repair (n=32)	Open repair (n=88)
VPIS (min-max)	3.34 (0-10)	2.66 (0-8)
Patient satisfaction		
Very pleased	6 (18.8%)	9 (10%)
Pleased	23 (71.8%)	76 (84.4%)
Unhappy	3 (9.4%)	5 (5.6%)

## Discussion

Incisional hernia is a common complication after abdominal surgery. Optimal repair technique for incisional hernia is still conflicting. After the introduction of laparoscopic repair, comparison of laparoscopic and open repair has been questioned by the literature. Although laparoscopic repair promises less pain and faster return to daily activities, these advantages are blamed to be impaired by longer operation time and higher complications such as bowel injury (15). One disadvantage of laparoscopic repair is the higher costs. However Earle et al. found that laparoscopic repair does not increase cost to the health care system in overall looking (17). Recently, laparoscopic and open hernia repair was compared by meta-analysis (16-19). Al Chalabi et al. in 2015 published a meta-analysis of 5 randomized controlled trials with a total of 611 patients and found laparoscopic repair to be associated with less wound infection (only wound infection rate ( $p<0.001$ ) was statistically different), shorter hospital stay but longer operation time (16). In a recent meta-analysis

consisted of 751 patients, laparoscopic and open repair was found to have comparable results (19).

In our study, mean operation time for laparoscopic repair was shorter than open repair group (103.89±40.57 versus 109.34±44 minutes). Some authors found operation time for laparoscopic repair to be longer (20) than open repair whereas others found it shorter (21). Our findings were longer than the literature average which may be due to the learning curve of our surgeons for laparoscopic repair and large hernias were found in the open group with an average hernia size of 187.37 cm<sup>2</sup>. But Tsuruta et al. (22) found longer operation time than our findings around 143.1 minutes in laparoscopic group and 152.7 minutes in open group.

Laparoscopic surgery has the advantage of shorter hospital stay and early return to work is the general acceptance. In our study, laparoscopic repair group had shorter length of hospital stay than open group which was statistically different ( $p<0.05$ ). Olmi et al. (21) also found laparoscopic repair with shorter hospital stay which is statistically different ( $p<0.005$ ). However

Asencio et al. (20) found laparoscopic group to have longer hospital stay which is similar with the open group. The overall complication rate in our study for laparoscopic and open repair groups were 2.1% and 23.9%, respectively. These findings are similar with the percentages reported in literature (23). The most common complication was seroma with a percentage of 10.3%. Stipa et al. (23) also found seroma to be the most common complication for both groups and explained that in laparoscopic approach the hernia sac is not dissected leading empty space between the mesh and abdominal wall further leading to seroma. For this reason, we applied compressive dressings to the area where the hernia sac exists. We believe that this compressive dressings cause hernia sac to adhere on the mesh and prevent seroma formation. Wide dissection in open repair also causes seroma but the use of drains prevent it to a point. When the drains occlude or a potential space exists, seroma formation and infection becomes inevitable.

In a recent meta-analysis involving 11 studies and 1003 patients, recurrence rate of laparoscopic and open incisional hernia repair were found to be 7% and 5.8%, respectively (24). Our recurrence rate was higher than literature findings. We believe that this is due to our patient population consisting of large incisional hernias and the study was conducted at the beginning of learning curve of our surgeons for laparoscopic repair. Thus most of recurrence (77.7%) in the laparoscopic group occurred in the first 6 months after we start performing laparoscopic repair in our clinic. Higher average hernia area may also increase the recurrence rate. Froylich et al. (25) evaluated long-term results of laparoscopic and open ventral hernia repair in obese patients and found similar results to our findings with recurrence rates of 20% and 27.1% in laparoscopic and open groups, respectively. The most unfortunate limitation of our study is the lack of body mass index data of our patients which may also affect the recurrence rate.

One of the advantages of laparoscopic incisional hernia repair is less pain which was investigated in the literature with several studies (20,23,26,27). Although Asencio et al. states laparoscopic approach to be safe, feasible, and effective, laparoscopic IH repair does not seem to be a better procedure than the open anterior technique in terms of pain or quality of life (20). Stipa et al. found no statistical difference between laparoscopic and open groups however difference in visual analogue scale (VAS) for postoperative pain results were more remarkable for patients with defects larger than 10 cm

(23). Wolter et al. (26) found pain score of the patients to be statistically significant ( $p=0.001$ ) in the follow-up period but no difference ( $p=0.82$ ) in the postoperative period. In a non-randomized prospective study including 100 patients, similar pain scores in both groups were found 24 h and 48 h postoperatively but significantly less pain at 72 h in the laparoscopic group (27). In our study, pain score of the patients, however not statistically different, were higher in laparoscopic than open repair which was the opposite of literature findings. Our findings of pain score in the follow-up period was similar to only one study (26). Although all our findings represent the follow-up period results between 3rd and 12<sup>th</sup> months, other studies investigated the early postoperative pain score of the patients. This makes some comparative conflict which is one of the limitations of our study. But this is a result of retrospective design of this study. Another limitation is that only 73.17 % of the patients were evaluated via telephone survey. Pain in laparoscopic repair can be as a result of intraperitoneal fixation of mesh with spiral tacks to the areas of course of the nerves. Mesh fixation techniques have been also investigated in a study including 199 patients but none of three techniques was found to have a pain-reduction advantage over the others (28).

Better satisfaction rates in laparoscopic group were found in a retrospective study including 123 patients (26). Although laparoscopic surgery is expected to have better satisfaction rates due to less scar formation, overall patient satisfaction was better in open group (90.6% vs. 94.4%) in our study. This similarity in both groups can be explained by the higher expectations of patients from laparoscopic surgery. Patients do not care about new or old skin incision while there is already scar in incisional hernia patients. Till there is no superiority of laparoscopic repair regarding pain scores, higher expectancy of laparoscopic repair gives no additional advantage for patient satisfaction rates.

## Conclusion

Although laparoscopic incisional hernia repair has the advantages such as less scar formation and length of hospital stay, it has no statistical difference with the open repair regarding pain and patient satisfaction in the follow-up period. Prospective randomized studies should be performed in order to better understand results of these techniques.

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