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Research Article/Özgün Araştırma

The effect of subcutaneous drain use on the healing process and development of recurrences in open repair of incisional hernias

İnsizyonel herninin açık yöntemle tamirinde cilt altı dren kullanımının iyileşme sürecine ve nüks gelişimine etkisi

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Abstract

Aim: Incisional hernias are a common complication following abdominal surgical procedures. This retrospective study aimed to evaluate the role of perioperative drains in the healing process following incisional hernia repair using mesh.

Materials and Methods: A total of 117 patients who underwent elective hernia repair surgery were analyzed. Patients were divided into two groups based on whether a subcutaneous drain was inserted perioperatively. Various clinical outcomes were assessed.

Results: Drains were used in 64.1%, with seroma and surgical site infections observed in 6% each and a recurrence rate of 11.9%. Defect size significantly increased drain use, while BMI prolonged hospital stay by 7% per unit. Recurrence, seroma, and surgical site infections were not significantly affected by other factors.

Conclusion: The results of the study suggest that routine use of drains in incisional hernia repair may not be necessary and that their benefits remain uncertain.

Keywords: Incisional hernia; Subcutaneous drain; Recurrence; Seroma.

Öz

Amaç: İnsizyonel fıtıklar, karın cerrahisi işlemlerini takiben sık görülen bir komplikasyondur. Bu retrospektif çalışma, mesh kullanılarak insizyonel fıtık onarımı sonrası iyileşme sürecinde perioperatif drenlerin rolünü değerlendirmeyi amaçlamaktadır.

Gereç ve Yöntem: Elektif insizyonel herni onarımı uygulanan toplam 117 hasta analiz edildi. Hastalar perioperatif olarak subkutan dren koyulup koyulmadığına göre iki gruba ayrıldı. Çeşitli klinik sonuçlar değerlendirildi.

Bulgular: Drenler %64,1 hastada kullanılmış, seroma ve yara enfeksiyonu oranları her biri için %6 olarak saptanmış ve nüks oranı %11,9 olarak belirlenmiştir. Defekt boyutu dren kullanımını anlamlı şekilde artırırken, BMI hastanede kalış süresini birim başına %7 oranında uzatmıştır. Nüks, seroma ve yara enfeksiyonları diğer faktörlerden anlamlı şekilde etkilenmemiştir.

Sonuç: Çalışmanın sonuçları, insizyonel fıtık onarımında drenlerin rutin kullanımının gerekli olmayabileceğini ve faydalarının belirsiz kaldığını öne sürmektedir.

Anahtar Kelimeler: İnsizyonel herni; Cilt altı dreni; Nüks, Seroma.

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Introduction

Incisional hernias, which occur due to inappropriate closure of the fascia following abdominal surgical interventions for various reasons, lead to significant labour loss and morbidity and negatively affect the quality of life.[1,2] An incisional hernia may develop after all abdominal incisions, such as midline, Pfannenstiel, McBurney, and paramedian incisions. Between 4% and 12% of all closed abdominal incisions result in incisional hernias.[2–4] Risk factors include comorbidities such as obesity, diabetes mellitus, chronic obstructive pulmonary disease, and patient-related factors such as advanced age, male gender, steroid use, emergency surgical operations, surgical site infection, the type of abdominal surgery (open/laparoscopic surgery, bariatric surgery, malignancy surgery), and technical factors such as the closure of the fascial defect with continuous/intermittent sutures.[5,6]

This fascial defect may cause incarceration and strangulation in a significant proportion of patients, necessitating emergency abdominal surgery. Additionally, large hernias may require surgery in many patients for cosmetic reasons.[7]

Repair of incisional hernias can be performed using open, laparoscopic, or robotic surgical methods; anatomical repair or the use of prosthetic materials.[8] Many synthetic or biologic prosthetic materials have been frequently used in incisional hernia surgery in recent years.[9] The type of surgery and whether or not prosthetic materials will be used varies from patient to patient. Complications such as hematoma, seroma, surgical site infection, nosocomial infections, intestinal obstruction, chronic fistula, chronic pain, and recurrence may develop after the repair of the incisional hernia.[10,11] Recurrence rates have been reported to range between 8% and 27% in the literature.[4,12,13] Despite a lack of sufficient scientific evidence or expert consensus, the use of drains is a traditional method to prevent the perioperative or postoperative development of seroma or hematoma.[1] However, whether the use of drains contributes to wound healing and prevents the development of recurrences has not been fully clarified. Some authors have suggested that drains increase the risk of infection, cause pain, and may have undesirable consequences, such as prolonged postoperative hospital stays. Additionally, studies suggesting that the use of drains does not prevent the development of postoperative seroma have made the use of drains in incisional hernia surgery a controversial issue.[14]

We retrospectively evaluated the surgically repaired cases of incisional hernia in our clinic to determine whether drains placed after incisional hernia repair operations aid in the healing process.

Materials and Methods

This is a retrospective study in which a total of 117 patients who underwent incisional hernia repair using mesh between June 2019 and December 2022 in the General Surgery Clinic of Balıkesir University Hospital were analyzed. The study was approved by Balıkesir University Clinical Research Ethics Committee. Informed consent was obtained preoperatively from all patients. Patients older than 18 years of age with a diagnosis of incisional hernia who underwent elective open hernia repair surgery using mesh were included in the study. Patients who underwent laparoscopic surgery, emergency surgery due to incarceration or strangulation, or those in whom mesh was not used during repair were excluded from the study. The same type of mesh (polypropylene mesh) was placed in all patients using the same technique (onlay) by four senior surgeons in the general surgery department. Negative pressure drain systems (VAC) were used in the study. These drains were routinely placed to prevent postoperative fluid accumulation and were generally removed within 2–3 days in patients without complications. During the postoperative period, sterile dressings were applied to all patients. The first dressing was changed 24 hours after surgery, followed by daily dressing changes using an antiseptic solution (povidone-iodine). Abdominal support garments were recommended for all patients after surgery, and they were advised to use them regularly for a period of 4 weeks. In our study, dissection was performed to provide sufficient space for mesh placement, typically

aiming for at least a 5 cm area beyond the defect margins to allow for comfortable placement of the mesh. This approach aimed to balance expanding the surgical field with minimizing tissue trauma. Patients who underwent incisional hernia repair were divided into two groups based on whether or not a subcutaneous drain was inserted perioperatively. In the series of 117 patients, Group 1 consisted of 75 patients in whom the same type of subcutaneous drain was used during the operation, while Group 2 consisted of 42 patients in whom no drain was used. These groups were evaluated in terms of age, gender, hernia diameter, duration of hospitalization, surgical site infection, seroma formation, recurrent hernia development, and timing of drain removal. The complete healing was evaluated based on clinical parameters such as the absence of surgical site infection, seroma formation, recurrence, and postoperative complications. Recurrences were defined as the development of hernias at any time after complete healing. The mean follow-up period was 21 months (12-43 months).

Statistical analysis

In summarizing the data obtained from the study, descriptive statistics were tabulated as mean ± standard deviation or median, minimum and maximum depending on the distribution pattern of continuous (numerical) variables. Categorical variables were summarized as numbers and percentages. The fitness of the numerical variables to normal distribution pattern was checked by Shapiro-Wilk, Kolmogorov-Smirnov and Anderson-Darling tests.

In intergroup comparisons of differences in categorical variables, Pearson Chi-Square test was used in 2x2 contingency tables with expected cell counts of ≥5. However, Fisher's Exact Test was used in tables with expected cell counts below 5, and Fisher-Freeman-Halton test was used in RxC tables with expected cell counts below 5.

In comparisons between two independent groups, Independent Samples t-Test was used for normally, and Mann- Whitney U test for non-normally distributed numerical variables.

In comparisons among more than two independent groups, One-Way ANOVA test was preferred for normally, and Kruskall-Wallis H test for non-normally distributed numerical variables. For multiple comparisons Games-Howell or Tukey test was used in parametric, and Dwass-Steel-Critchlow-Fligner test in nonparametric tests.

Spearman's Rho correlation coefficient was used to evaluate the relationship between non-normally distributed variables.

In this study, five different regression analyses were applied to investigate the effects of drain use on the healing process in incisional hernia repair. Each analysis included univariate and multivariate regression models to predict specific clinical outcomes (drain requirement, length of hospitalization, recurrence, surgical site infection, and seroma).

In each analysis, the effect of variables on outcomes was assessed using Odds Ratios (ORs), 95% Confidence Intervals (CIs) and p values. Univariate regression models were used to assess the independent effect of each variable, and multivariate regression models were applied to assess the effect of each variable when all other variables were controlled.

Statistical analyses were performed with Jamovi (Version 2.3.28) and JASP (Version 0.17.3) statistical software programs and the level of statistical significance was set at p=0.05.

Ethics committee approval

This study was approved by the Clinical Studies Ethics Board of Balıkesir University (date: 20.12.2023, No. 2023/191). This study conformed to the principles of Helsinki Declaration.

Results

The study population, with a median age of 57 years, consisted of 72 (61.5%) female and 45 (38.5%) male patients. The mean follow-up period was 21 months (12-43 months). Postoperatively, drains were used in 75 (64.1%) patients, while they were not used in 42 (35.9%) patients. The mean body mass

index (BMI) was 29.7 kg/m². The defect size was < 4 cm in 29 (24.8%), 4-10 cm in 54 (46.2%), and > 10 cm in 34 (29.1%) patients. Seroma formation and surgical site infection were observed in 7 (6.0%) patients each. The median hospitalization time was 2 days, with a median drain removal time also of 2 days. Recurrence was seen in only 14 (11.9%) out of 127 patients (Table 1). A total of 20 cases operated on for incisional hernia were recurrent incisional hernias. Among these, postoperative drains were placed in 12 cases, while no drains were used in 8 cases.

Table 1. Demographic, and clinical characteristics of cases with incisional hernia.

		Total n=117
Age (year) median (range)		57.0 [32.0 – 89.0]
Gender. n (%)	Female	72 (61.5)
	Male	45 (38.5)
Presence of drains, n (%)	No	42 (35.9)
	Yes	75 (64.1)
[1]BMI kg/m² (mean)		29.7 ± 3.7
Defect size		
<4 cm, n (%)		29 (24.8)
4-10 cm, n (%)		54 (46.2)
> 10 cm, n (%)		34 (29.1)
Seroma formation, n (%)	No	110 (94.0)
	Yes	7 (6.0)
Surgical site infection, n (%)	No	110 (94.0)
	Yes	7 (6.0)
Length of hospital stay (day): median (range)		2.0 [1.0 – 4.0]
Drain removal time (day): median (range)		2.0 [1.0 – 6.0]
Recurrence, n (%)	No	103 (88.1)
	Yes	14 (11.9)

[1]BMI: Body mass index

There were no significant differences between patients in whom drains were used and those in whom they were not used in terms of age, gender, seroma formation, surgical site infection, length of hospital stay, and recurrence rates (p>0.05 for each). BMI values were significantly higher in patients with drains (p=0.015). Drains were used significantly less frequently in patients with a defect size of less than 4 cm (p<0.001). Drain insertion rates were similar in patients with defect sizes between 4-10 cm and larger than 10 cm (Table 2). Hematoma development was observed in a total of 3 patients in the group where drains were used, while it was detected in 2 patients in the group without drains. When 72 patients with drains were classified according to the Clavien-Dindo classification: 3 patients (4.1%) were classified as grade 1, 3 patients (4.1%) as grade 2, 2 patients (2.7%) as grade 3a, 1 patient (2.7%) as grade 3b, and 1 patient (2.7%) as grade 4a. When 45 patients without drains were classified according to the Clavien-Dindo classification: 2 patients (4.4%) were classified as grade 1, 2 patients (4.4%) as grade 2, 1 patient (2.2%) as grade 3a, 2 patients (4.4%) as grade 3b, and 1 patient (2.2%) as grade 4a. For patients with seroma from both the drained and non-drained groups, bedside aspiration procedures were performed, while patients with surgical site infections were treated with antibiotic therapy. Patients with subcutaneous abscesses underwent percutaneous surgical drainage procedures and were treated with antibiotic therapy. One patient from each group requiring respiratory support was monitored in the intensive care unit, and no mortality was observed between the groups.

According to the results of the univariate logistic regression analyses, no significant effects of age and gender were observed on drain insertion rates (p>0.05), whereas BMI and defect size had a significant impact on this parameter. Accordingly, a 1-unit increase in BMI increased the probability of drain use by 14% (p=0.028), while the frequency of drain use increased 4.09 times (p=0.004) in patients with a defect size between 4-10 cm and 22.96 times (p<0.001) in patients with a defect size greater than 10 cm compared to patients with a defect size less than 4 cm (Table 3). In our

study, the relationship between seroma, surgical site infection, and recurrence development was evaluated. In univariate analysis, it was observed that seroma (OR: 3.12; 95% CI: 0.88–11.02; *p*=0.081) and surgical site infection (OR: 2.45; 95% CI: 0.74–8.18; *p*=0.135) might increase the risk of recurrence, but this relationship was not found to be statistically significant.

Table 2. Comparison of demographic and clinical characteristics in incisional hernia patients according to drain use

	Drain use		***p***
	No (n=42)	**Yes** (n=75)	
Age (year) median (range)	58.0 [32.0 – 78.0]	57.0 [34.0 – 89.0]	0.089**
Gender. n (%)			
Female	29 (69.0)	43 (57.3)	0.293*
Male	13 (31.0)	32 (42.7)	
[1]BMI kg/m^2 (mean)	28.6 ± 2.9	30.2 ± 4.0	**0.015*** **
Defect size [‡]			
<4 cm, n (%)	20 (47.6)[a]	9 (12.0)[b]	**<0.001***
4-10 cm, n (%)	19 (45.2)[a]	35 (46.7)[a]	
> 10 cm, n (%)	3 (7.1)[a]	31 (41.3)[a]	
Seroma formation, n (%)	3 (7.1)	4 (5.3)	0.700*
Surgical site infection, n (%)	4 (9.5)	3 (4.0)	0.248*
Length of hospital stay (day): median (range [§]	2.0 [1.0 – 3.0]	2.0 [1.0 – 4.0]	0.256**
Drain removal time (day): median (range)[§]	--	2.0 [1.0 – 6.0]	--
Recurrence, n (%)	6 (14.2)	8 (10.6)	0.700*

a, b: Letters signifying the presence of intergroup differences.
*. Pearson Chi-Square or Fisher's Exact test.
**. Mann-Whitney U test.
***. Independent Samples t-Test.

According to the results of the multivariate logistic regression analyses, age, gender and BMI had no significant effect ($p<0.05$), whereas defect size had a significant effect on drain insertion rates. Accordingly, drain insertion rates increased 4.06 times ($p=0.007$) in patients with a defect size between 4-10 cm and 19.37 times ($p<0.001$) in patients with a defect size larger than 10 cm compared to patients with a defect size smaller than 4 cm (Table 3).

Table 3. Factors associated with the use of drains in cases with incisional hernia.

"Logistic regression analysis predicting use of drains"	**Univariate Logistic Regresssion**		**Multivariate Logistic Regresssion**	
	OR. [95%CI]	***p* value**	**OR. [95%CI]**	**P value**
Age	0.97 [0.94 – 1.01]	0.103	0.98 [0.94 – 1.01]	0.191
Gender: *Male vs. Female*	1.66 [0.75 – 3.69]	0.213	1.46 [0.59 – 3.61]	0.407
BMI	1.14 [1.01 – 1.27]	**0.028**	1.02 [0.89 – 1.17]	0.750
Defect size: *ref.= <4 cm*				
4-10 cm	4.09 [1.56 – 10.74]	**0.004**	4.06 [1.47 – 11.22]	**0.007**
>10 cm	22.96 [5.54 – 95.21]	**<0.001**	19.37 [4.24 – 88.52]	**<0.001**

BMI: Body mass index; OR: Odds ratio, CI:: Confidence interval

According to the results of the univariate logistic regression analyses, age, gender, defect size, surgical site infection, seroma formation, and drain use had no significant effect on the length of hospital stay ($p>0.05$ for each). However, a 1-unit increase in BMI caused an 8% increase in the length of hospital stay ($p<0.001$) (Table 4).

According to the results of the multivariate regression analyses, no significant effect of age, defect size, and drain use was observed on the length of hospital stay, while hospitalization time decreased by 31% in males compared to females, and a 1-unit increase in BMI caused a 7% increase in length of hospital stay ($p=0.001$) (Table 4).

In cases with incisional hernia, the results of both univariate and multivariate logistic regression analyses revealed that age, gender, BMI, defect size, presence of drains, and length of hospital stay did not have significant effects on recurrence rates ($p>0.05$ for each) (Table 5).

Tablo 4. Factors effecting the length of hospital stay in cases with incisional hernia.

"Linear regression analysis predicting the length of hospital stay"	**Univariate Linear Regresssion**		**Multivariate Linear Regresssion**	
	OR. [95%CI]	***p* value**	**OR. [95%CI]**	***p* value**
Age	-0.01 [-0.02 – 0.01]	0.162	-0.01 [-0.02 – 0.01]	0.286
Gender: *Male vs. Female*	-0.29 [-0.61 – 0.02]	0.067	-0.31 [-0.61 – 0.01]	**0.049**
BMI	0.08 [0.04 – 0.12]	**<0.001**	0.07 [0.03 – 0.12]	**0.001**
Defect size: *ref.= <4 cm*				
4-10 cm	0.21 [-0.17 – 0.59]	0.283	0.10 [-0.29 – 0.49]	0.609
>10 cm	0.35 [-0.07 – 0.77]	0.104	-0.02 [-0.49 – 0.46]	0.948
Surgical site infection: *Yes vs. No*	0.12 [-0.52 – 0.77]	0.707		
Seroma formation: *Yes vs. No*	-0.18 [-0.83 – 0.47]	0.589		
Drain use : *Yes vs. No*	0.23 [-0.09 – 0.54]	0.167	0.12 [-0.22 – 0.46]	0.484

BMI: Body mass index; OR: Odds ratio, CI: Confidence interval

Table 5. Factors effective on recurrence rates in cases with incisional hernia.

"Logistic regression analyses predicting development of recurrences"	**Univariate Logistic Regression**		**Multivariate Logistic Regression**	
	OR. [95%CI]	***p* value**	**OR. [95%CI]**	***p* value**
Age	1.01 [0.95 – 1.07]	0.876		
Gender: *Male vs. Female*	1.21 [0.26 – 5.7]	0.806		
BMI	0.86 [0.68 – 1.09]	0.221	0.81 [0.61 – 1.08]	0.154
Defect size: *ref.= <4 cm*				
4-10 cm	0.25 [0.02 – 2.94]	0.273	0.39 [0.03 – 4.78]	0.460
>10 cm	1.80 [0.30 – 10.62]	0.516	4.21 [0.54 – 32.74]	0.169
Drain use: *Yes vs. No*	0.73 [0.16 – 3.44]	0.693		
Length of hospital stay	0.59 [0.21 – 1.65]	0.319	0.76 [0.25 – 2.32]	0.633

BMI: Body mass index; OR: Odds ratio, CI: Confidence interval

According to the results of univariate logistic regression analyses in cases with incisional hernia, age, gender, presence of seroma, drain use, and length of hospital stay had no significant effect on the development of surgical site infection (p>0.05 for each), whereas defect size had a significant effect on this parameter. Accordingly, the risk of surgical site infection increased by 9% in cases with a defect size of 4-10 cm compared to cases with a defect size of less than 4 cm (p=0.032), while these parameters had no significant effect on the risk of surgical site infection in cases with a defect size greater than 10 cm (p=0.087) (Table 6).

Table 6. Factors effective on the development of surgical site infections in cases with incisional hernia

"Logistic regression analyses predicting development of surgical site infection"	**Univariate Logistic Regression**		**Multivariate Logistic Regression**	
	OR. [95%CI]	***p* value**	**OR. [95%CI]**	***p* value**
Age	0.95 [0.9 – 1.02]	0.146	0.95 [0.88 – 1.02]	0.128
Gender: *Male vs. Female*	0.62 [0.12 – 3.36]	0.582		
BMI	0.86 [0.68 – 1.09]	0.221	0.98 [0.76 – 1.26]	0.858
Defect size: *ref.= <4 cm*				
4-10 cm	0.09 [0.01 – 0.82]	**0.032**	0.11 [0.01 – 1.14]	0.064
>10 cm	0.15 [0.02 – 1.33]	0.087	0.15 [0.01 – 2.44]	0.181
Seroma formation: *Yes vs. No*	2.89 [0.3 – 28]	0.360		
Drain use: *Yes vs. No*	0.4 [0.08 – 1.86]	0.241	0.71 [0.1 – 4.83]	0.726
Length of hospital stay	1.19 [0.49 – 2.87]	0.704		

BMI: Body mass index; OR: Odds ratio, CI: Confidence interval

In cases with an incisional hernia, the results of both univariate and multivariate logistic regression analyses revealed that age, gender, BMI, defect size, surgical site infection, and the presence of drains did not have significant effects on seroma formation (p>0.05 for each) (Table 7).

Discussion

Despite the lack of sufficient scientific evidence or expert consensus, perioperative drain placement is a common practice among surgeons in order to remove perioperative and postoperative fluid.[1] Although there is no consensus on whether these drains improve wound healing or prevent recurrences, some authors have stated that they may lead to

undesirable outcomes such as an increased risk of infection, pain, and prolonged postoperative hospitalization.[14,15] In this study, we aimed to investigate whether drains help healing and prevent the development of recurrences in open repair of incisional hernia using mesh. In our study, in line with the recommendations in the literature, mesh was placed in all patients undergoing surgery for incisional hernia, regardless of defect size. Numerous randomized controlled trials in the literature emphasize that the use of mesh significantly reduces recurrence rates and improves long-term surgical outcomes, even in defects smaller than 2 cm[8,12].

Table 7. Factors effective on the seroma formation in cases with incisional hernia

"Logistic regression analyses predicting seroma formation"	**Univariate Logistic Regression**		**Multivariate Logistic Regression**	
	OR. [95%CI]	***p* value**	**OR. [95%CI]**	***p* value**
Age	1.04 [0.97 – 1.11]	0.244	1.04 [0.98 – 1.12]	0.200
Gender: *Male vs. female*	1.21 [0.26 – 5.7]	0.806		
BMI	0.95 [0.76 – 1.18]	0.623		
Defect size: *ref.= <4 cm*				
4-10 cm	1.08 [0.19 – 6.28]	0.932		
>10 cm	0.41 [0.04 – 4.76]	0.475		
Surgical site infection: *Yes vs.No*	2.89 [0.30 – 28]	0.360	3.86 [0.37 – 40.77]	0.261
Drain use: *Yes vs.No*	0.73 [0.16 – 3.44]	0.693		

BMI: Body mass index; OR: Odds ratio, CI: Confidence interval

Although male gender is among the risk factors for incisional hernia, 72 (61.5%) of the 117 patients included in our study were female, and 45 (38.5%) were male. Consistent with the literature data, the median age of the patients was 57 years. We observed that, consistent with the relevant literature data, female gender and obesity prolonged the postoperative hospital stay.[6,16] The longer hospital stay of obese patients may be explained by the presence of a greater number of comorbidities or their increased susceptibility to complications.

In our study, we focused on the effects of drain use in incisional hernia repair. The findings revealed that the use of drains had no significant effect on factors such as seroma formation, surgical site infection, length of hospital stay, and recurrence rates. Some authors have not routinely recommended the use of drains, indicating that their presence does not reduce postoperative fluid collection.[1,17] For example, one study showed that drain use did not objectively reduce the rate of postoperative fluid collection and that routine drain use in incisional hernia repair was unnecessary.[17] On the other hand, a study by Miller et al. showed a significantly lower rate of seroma formation in the group where drains were used.[18] Mohamedahmed et al. found that drainage was associated with higher rates of surgical site infections; however, they couldn't find a significant correlation between drainage and seroma, hematoma formation or recurrence.[19]

In our study, it was observed that the risk of infection increased by 9% (p= 0.032) in hernia defects measuring 4–10 cm, but this increase was not statistically significant in defects larger than 10 cm (p= 0.087). This may be attributed to the small number of cases in the large defect group and the limited statistical power, resulting in a random variation. Additionally, in incisional hernia surgeries, defects larger than 10 cm are often considered more complex cases, and surgeons tend to exercise greater caution during such procedures. We believe this heightened caution may have acted as a factor reducing the risk of infection, thereby influencing our results. It is evident that these findings need to be supported by further studies with larger patient groups.

In our study, the recurrence rate was found to be 11.9%, which is consistent with the reported range of 8–27% in the literature. Possible causes of recurrence reported in the literature include large defect sizes, obesity, inadequate surgical techniques, and postoperative complications[8,11,12]. In our study, variables that might influence recurrence, such as age, sex, BMI, hernia defect size, postoperative seroma, and surgical site infection, were evaluated. Statistical analyses

did not find any significant effect of these parameters on recurrence. However, higher recurrence rates were observed in patients with large hernia defects (>10 cm) and high BMI. Additionally, although not statistically significant, recurrence rates were higher in cases with postoperative seroma and surgical site infection. We attribute the lack of statistical significance to the limited sample size and the heterogeneity of the patient group. We believe that larger-scale studies could provide better insights into this issue.

The prolongation of hospital stay due to higher BMI in incisional hernia surgeries can be associated with the common comorbidities observed in obese patients, the increased complexity of surgical procedures, and challenges related to wound healing and mobilization in the postoperative period.[5,6] These findings once again highlight the importance of obesity management in surgical planning for patients undergoing incisional hernia surgery.

A study has shown that the use of drains did not create a statistically significant difference in the formation of postoperative seroma and the development of surgical site infections.[20] In another study, Louis et al. reported that the use of drains had no significant effect on the occurrence of surgical site infection.[21] In a record-based analysis of 39,523 patients, similar to our study, Sahm et al. showed that the use of drains in incisional hernia surgery did not prevent recurrences.[14]

The literature emphasizes that differences in patient characteristics, surgical techniques, and types of drains may influence seroma formation. For example, in our study, active negative pressure drains were generally used subcutaneously, whereas some studies in the literature report the use of passive subcutaneous drains operating under the effect of gravity. Additionally, surgical practices such as closing dead spaces and using compression garments in the postoperative period in our study may have limited the impact of drains on seroma formation.[4,11,12]

In the light of all these results, we think that the use of drains in incisional hernia repair does not decrease complication rates nor prevent recurrences. However, in this study, according to the results of the univariate logistic regression analyses, we observed that BMI values were significantly higher in patients in whom drains were used. In multivariate analysis, we observed that this effect of BMI became insignificant due to its interaction with other variables. In our study, we also found that drains were used at a significantly lower rate in patients with a defect size of less than 4 cm, but the rates of drain use were similar in patients with a defect size of 4-10 cm and those larger than 10 cm. Some studies have shown that obesity and larger hernia defects may increase the complication and recurrence rates after hernia operations.[22–25] We speculate that the higher rate of drain use in obese patients or patients with larger defects in our study was due to surgeons believing that obesity and large hernias increased the risk of complications such as recurrence and surgical site infection, prompting them to use drains more cautiously in this group. Similarly, we observed that surgeons tended to use drains more frequently in obese patients or those with large defects. In the aforementioned record-based analysis by Sahm et al., more frequent use of drains in patients with higher BMI or large defects was reported, consistent with our study results.[14] Specifically, the increased risk of infection in defects measuring 4–10 cm is suggested to be due to the surgical dissection becoming more complex and the formation of larger dead spaces in defects of this size. Additionally, these defects are often observed in patients with higher BMI or comorbid conditions. However, the lack of a significant increase in infection risk for defects larger than 10 cm may be explained by surgeons applying stricter infection prevention protocols and employing more meticulous surgical techniques in these cases. Furthermore, the smaller number of patients in this group may have limited the ability to detect statistical significance.

The reasons for longer hospital stays in obese patients are not limited to observed complications. This situation can be associated with obesity-related comorbidities, subclinical problems, surgeons' preventive approaches, and individual differences in recovery

processes. The need for closer monitoring in obese patients is evident. In particular, for patients with high BMI, longer hospital stays were often preferred to observe early signs of complications. We believe that the low complication rates may be attributed to the careful and meticulous surgical approaches employed by our surgeons for obese patients.

The retrospective nature of our study and the relatively small number of cases in our series compared to the literature are the limitations of this study. We believe that studies with a larger number of patients should be performed to understand the benefits of drains in incisional hernia surgery and their roles (if any) in preventing recurrences.

Conclusion

This study has provided important information for treatment planning and management of incisional hernias by evaluating the effects of drain use and various influential factors. It was shown that surgeons were more inclined to use drains as body mass index and defect size increased and that there was no difference in wound healing, postoperative infection, length of hospital stay, and recurrence in patients with and without drains. To address the question about the benefits of drains placed during incisional hernia repair, we believe that studies involving a larger number of patients should be conducted.

Ethics Committee Approval

This study was approved by the Clinical Studies Ethics Board of Balıkesir University (date: 20.12.2023, No. 2023/191). This study conformed to the principles of Helsinki Declaration.

Informed Consent

Informed consent was obtained preoperatively from all patients.

Author Contributions

All of the authors contributed at every stage of the study.

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None

Conflicts of Interest

The authors declare that they have no conflict of interest.

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Statements

This study has not been presented or published anywhere previously.

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