

Short Term Complication of Abdominal Overlay Hernioplasty in Patients with Abdominal Hernia, Aden Hospitals, January - December-2022

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Abstract

Introduction: The term ventral hernia refers to the hernia of anterior abdominal wall. Treatment of hernia has different types of surgical repair procedures, that are laparoscopic or open; by suturing anatomical or mesh repair. Use of mesh in hernia repair had improved the outcome, mostly the recurrence. Mesh can be placed in different planes in abdominal wall; Overlay, retromuscular, preperitoneal or intraperitoneal. Accordingly, these different planes had different outcomes. This study aimed to determine the postoperative complications of overlay hernioplasty.

Methods: This is a descriptive and prospective hospital-based study performed in two hospitals (AL Noor private hospital and 22 May public hospital), during January through December 2022 at Aden city. It included 150 patients diagnosed as ventral abdomen hernia (both types; 77 spontaneous ventral hernias and 73 incisional hernias) who were treated by open overlay technique using polypropylene mesh. Sociodemographic characteristics, associated factors; (hard labor occupations, chronic cough, diabetes mellitus, smoking, body mass index, hernia characteristics, intraoperative and post-operative data were collected. Patients were followed for one year postoperatively to assess the post-operative complication.

Results: There were 150 patients; of them, spontaneous hernia formed (51.4%) and (48.6%) incisional hernia. The mean age was 56.2 ± 13.60 years for patients with spontaneous hernia, and 38.4 ± 12.70 years for incisional hernia distributed as 27.3% males and 72.7% females, with 2.7:1 female to male ratio in spontaneous hernia. For incisional hernia; there were 75.3% males and 24.7% females with 3.1:1 male to female ratio. Distribution of major associated clinical factors were; 21.3% for hard labor, 15.3% for diabetes mellitus, and 12% for constipation. Obesity was noted in 16.7% of patients. The operation time was almost similar in both types of hernia; 50.6 ± 28.40 minutes vs. 53.2 ± 28.10 minutes in spontaneous and incisional hernia respectively. The main duration of post-operative drain placement was 5.6 ± 1.10 days in incisional hernia and 4.1 ± 1.00 days for spontaneous hernia whereas post-operative hospital stay was 3.0 ± 1.70 days for spontaneous hernia, and 5.4 ± 1.90 days for incisional hernia. The overall post-operative morbidity developed in 40 patients; 23.4% in spontaneous hernia and 30% in incisional hernia, with no deaths. The post-operative complications in spontaneous hernia were; hematoma (6.5%), skin necrosis and chronic pain 5.2% for each, and 3.9% for seroma. In incisional hernia, the complications were; seroma 12.3%, chronic pain 8.2%. While, hematoma, and skin necrosis 2.7%.

Conclusion: The study identified several associated factors that had significant association to hernia in these patients. These mostly were smoking, and hard lobar occupation. However, prevalence of obesity was lower than global reports. Overlay hernioplasty repair was found to be safe, technically simple and effective approach, associated with low incidence and mild postoperative complications and without deaths.

Keywords: Ventral hernia, Abdominal hernia, Hernia repair, Hernioplasty, Mesh repair, Overlay, Onlay.

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المضاعفات قصيرة الأمد لعملية رأب الفتق البطني بالتراكب المفتوح في المرضى الذين يعانون من الفتق البطني الأمامي في مستشفيات عدن، يناير -ديسمبر 2022م

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الملخص

المقدمة: إنَّ مصطلح الفتق البطني، يمثل الفتق الذي يحدث في جدار البطن الأمامي، الذي يمكن رأبه باستخدام إجراءات طبية جراحية متعددة، متمثلة في الجراحات المفتوحة أو باستخدام المنظار الجراحي، سواء باستخدام الشبكة الطبية الجراحية أو عدمها. إنَّ استخدام الشبكة الطبية الجراحية في رأب الفتق البطني أدى إلى انخفاض كبير في نتائج مضاعفات ما بعد العملية، وخصوصاً تلك المتعلقة بالفتق المتكرر. هذه الشبكة الطبية الجراحية يمكن وضعها في محاور عديدة في النسيج التشريحي لطبقات البطن الأمامية، مثل: التراكب أو ما تعرف بالشبكة الطبية ما فوق سطح العضلات، وشبكة طبية خلف العضلات، وشبكة طبية ما قبل الصفاق، وشبكة طبية داخل الصفاق، وكل مستوى مختلف، له نتائج مختلفة خاصة به. هدفت هذه الدراسة إلى تحديد المضاعفات ما بعد الجراحة لعملية رأب الفتق البطني باستخدام الشبكة الطبية الجراحية بالتراكب المفتوح.

المنهجية: تمت هذه الدراسة بصورة وصفية مستقبلية، شملت 150 مريضاً يعانون من الفتق البطني على نوعيه 77 مريضاً بفتق تلتقائي، و 73 بفتق ندبي، تمَّ رأبها بالتراكب المفتوح باستخدام شبكة طبية مصنوعة من مادة البولي بروبيلين، في المدة من الأول من يناير وحتى أواخر ديسمبر من عام 2022م، وقد أخذت عينة المرضى من مركزين جراحيين: مستشفى النور الجراحي التخصصي، ومركز 22 مايو الجراحي في محافظة عدن. جُمعت البيانات الديموغرافية والاجتماعية والعوامل والأمراض المصاحبة: الأعمال الشاقة، والسعال المزمن، ومرض السكري، والتدخين، ومؤشر السمنة، وكتلة الجسم، والعوامل التي ترفع مستوى مقاييس الضغط الداخلي للتجويف البطني. إضافة إلى أنه قد جُمعت البيانات المتعلقة بخصائص وصفات الفتق، وبيانات العملية الجراحية لرأب الفتق البطني بالتراكب المفتوح، ورصد مضاعفات ما بعد العملية في مدة عام واحد من تاريخ خروج المريض من المركز.

النتائج: من بين 150 مريضاً يعانون من الفتق البطني الأمامي، كانت حسيبة الفتق التلقائي هي 51.4%، مقابل الفتق الندبي 48.6%. في مرضى الفتق التلقائي، وُجد أن متوسط العمر هو $56,2 \pm 13,60$ سنة، 72,7% منهم إناث متناسب 1:2,7 أنثى إلى ذكر. وفي مرضى الفتق الندبي، وجد أن متوسط العمر هو $36,4 \pm 12,70$ سنة، منهم 75,3% ذكوراً، متناسب 3,1 : 1 ذكر إلى أنثى. وكان توزيع العوامل السريرية المصاحبة لهم كالتالي: ما نسبته 21,3% من ذوي الأعمال الشاقة، و 15,3% يعانون من مرض السكري، و 12% يعانون من الإمساك. منهم 16,7% كانوا من ذوي السمنة. وقد أجريت عملية رأب الفتق بالتراكب المفتوح في متوسط مدة زمنية متقاربة لدى المجموعتين $28,40 \pm 50,6$ دقيقة و $28,10 \pm 53,2$ دقيقة للفتق التلقائي والفتق الندبي علي التوالي، ومتوسط مدة بقاء مصروف التصريف الجراحي للسوائل هو $4,8 \pm 1,30$ يوم في الفتق التلقائي و $5,6 \pm 1,10$ يوم في الفتق الندبي. ومتوسط بقاء المريض في المستشفى هو $3,0 \pm 1,70$ يوم لمرضى الفتق التلقائي و $5,4 \pm 1,90$ يوم لمرضى الفتق الندبي. وقد لوحظ أن مضاعفات ما بعد العملية لمرضى رأب الفتق التلقائي كانت على النحو الآتي: النزف الدموي 6,5%، وتخر الجلد 5,2%، والألم المزمن 5%، والمصلية 3%، أما مرضى الفتق الندبي فقد لوحظ أن مضاعفات ما بعد العملية كانت على النحو الآتي: المصلية 12,3%، والألم المزمن 8,2%، والنزف الدموي وتخر الجلد 2,7% لكل منهم.

الاستنتاج: أوضحت الدراسة مجموعة من العوامل السريرية المصاحبة ذات الدلالة الإحصائية المعنوية المؤثرة في تكوين الفتق أهمها التدخين والعمل الشاق. بينما كان معدل عامل السمنة الأدنى مقارنة بالمعدلات العالمية. لوحظ في هذه الدراسة أن عملية إصلاح الفتق بالتراكب المفتوح من العمليات الآمنة والسهلة في كلا نوعي الفتق البطني الأساسي والثانوي، ومصحوباً بمعدلات منخفضة من المضاعفات دون تسجيل حالة وفاة.

كلمات مفتاحية: فتق الجدار البطني، الفتق البطني، إصلاح الفتق، رأب الفتق، إصلاح الفتق.

Introduction

Abdominal Hernia is (an organ or a part, pushed out into the abdominal site tissue because of weakness) [1]. According to European hernia society (EHS), "hernia is any abdominal wall gap with or without a bulge in the area of postoperative scar perceptible or palpable by clinical examination or imaging [2]. Abdominal wall hernias classified as ventral hernias (umbilical, epigastric, spigelian, lumbar, and incisional hernia) and groin hernias (femoral or inguinal) [3]. The symptoms and signs in hernia can be changed. Hernia is a progressive condition, it may be present without symptoms, mostly starts with pain, could progressively up to intestinal obstruction. The symptoms can produce mild, moderate to severe condition with time [2,3]. In the American community, the major risk factors that predisposes to formation of hernia after the laparotomy for any reason are Perioperative wound issues, obesity, active smoking, uncontrolled diabetes, and malnutrition. while, factors that increase the intra-abdominal pressure are the main risk factors for primary ventral hernia [4] [5]. Incidence of incisional hernia remains high up to 20 % after laparotomy [6]. The reported incidence of other abdomen hernias are 10% for umbilical hernia, 3%- 5% epigastric hernia and there are number of hernias that occur infrequently with low prevalence, as (Spigelian hernia, superior lumbar triangle (Grynfeltt triangle), and inferior lumbar triangle (Petit triangle) [7]. Concerning hernia treatment (surgical repair), the main challenges lie in deciding about the surgical approach and types of repair procedure to perform; that are,

laparoscopic or open surgery, anatomical or mesh repair and type of mesh to use [7]. Surgeon have various options for placing the mesh in different planes in abdominal wall; (overlay, retromuscular, preperitoneal, and intraperitoneal) [8,9]. The overlay technique, includes primary closure of the fascia defect and placement of the mesh over the anterior fascia with adequate overlap for the edges, the major advantage; Mesh is placed outside the abdominal cavity, avoiding direct interaction with the abdominal viscera. However, disadvantages include; the large subcutaneous dissection with the increased likelihood of seroma, hematoma, and skin necrosis [9]. The main goal of the current study was to evaluate the short term complications in patients underwent the new operative technique (overlay polypropylene mesh) in Aden hospitals for one-year follow-up, as first research attempt conducted in Aden on this topic.

Methods

Study design and setting

This is a prospective hospital-based study conducted on 150 patients with primary and secondary (incisional) ventral abdomen hernia, in two surgical hospitals (AL-Noor private hospital and 22 May public hospital) , at Aden city, in January through Dec-2022.

Inclusion criteria

Adult male and female patients at/above 16 years old with ventral abdomen hernia (epigastric, umbilical, and incisional hernia).

Exclusion criteria

Patients who did not use mesh, used another plane, another type of mesh, or did not complete their treatment, or went to discharge against medical advice (DAMA), and who could not be followed up during one year due to any reason.

Procedures

The operative and post-operative care conducted by one expert team and under the same management protocols. All patients with ventral hernia were treated by overlay repair technique by using polypropylene mesh. Clinical assessment and documentation by age sex, occupation, weight, height, type of hernia, history of smoking, diabetes mellitus (DM), constipation, chronic cough) were recorded for all patients.

All patients were clinically investigated for medical fitness for surgery.

Overlay hernioplasty technique

Preoperative prophylactic antibiotics was given for all patients, (parenteral combicid 1500mg) within 30 minutes before induction of anesthesia. Operation was performed under general anesthesia with ETT. Skin incision was 5–10 cm, but it might be extended up to 20 cm in large hernia. Undermining of subcutaneous tissue by sharp dissection, isolation of the hernia sac, then exploration of the hernia contents, and its reduction to the intra-abdominal cavity, sac was completely removed until the edges of the defect of anterior rectus fascia appeared.



Figure (1): Fifty-Six years old female with large irreducible incarcerated primary epigastric hernia (size of hernia defect > 4cm, (AL Noor Hospital).



Figure (2): Omentum with part of transvers colon as the incarcerated part of hernia in same patients, (AL-Noor Hospital)

Closure of the defect by simple non tensioned continued non-absorbable suture (nylon 2). Supported by another suture (0,1 or 2). More subcutaneous

tissue dissection up to 5 -7 cm all around the edges of defect. A polypropylene mesh was placed on the rectal sheath with overlapping of 5 -7 cm away around the edges of

defect. It fixed in the middle by non-absorbable continued suture (nylon/ 0-round), and in peripheral (near of all edges of mesh by 0.5 - 1cm / at least 2-3 cm apart) by non-absorbable interrupted suture (nylon/ 2-0 -round).

Vacuum drain (size 18) was placed in all cases, the duration was dependent on the quantity of collection, drainage of less than 30 ml / 24 hours was the parameter of removal.

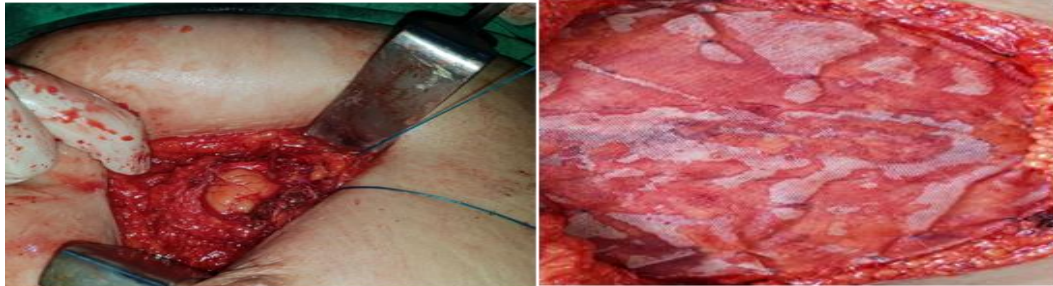


Figure (3):The defect of hernia after reduction of hernia content with complete remove of sac , mesh was implanted and fix by nylon suture at the center (around the defect) and near of all edge of mesh, (AL-Noor Hospital).

Patients were managed post operatively with antibiotics (combicid 1500 mg TDS added to cefepim 1000 mg BD if there was a contact with bowel) for 5 days. After discharge, all patients were followed up in the outpatient clinic for a period of 2 weeks, and then kept contact with them up to 12 months, reminded them about follow up on phone and visit out clinic for any complaint. Postoperative complications; (hematoma, seroma, chronic pain, and skin necrosis) were recorded during one-year follow up.

Statistical Analysis

Data were processed and analyzed by using SPSS. Frequencies and percentages were calculated. Mean and stander deviation were calculated for quantitate ones. The Chi-squared Goodness of fit test for one variable was used and $p < 0.05$ was considered statically significant, while Fisher exact test was used in case of small cell frequency.

Ethical Consideration

This study was approved by the committee of postgraduate studies of the Faculty of Medicine and Health

Sciences, Aden University. Informed consents were obtained from the patients and administrations of enrolled hospitals before including the data into the study, after providing them detailed explanation of the objectives, methods, and benefits of the study. The information obtained were confidentially handled and used only for this research purpose. They had the right to agree or refuse as well as to withdraw themselves at any time during the study.

Result

Table (1) describes the age group and occupation of operated patients by the type of hernia. The overall Mean age for patients was 48.1 ± 14.53 . Patients with spontaneous hernia had higher mean age 56.2 ± 13.60 years; of these, middle age group (40 to 60) was accounted for the highest percentage 41(53.2%). On the other hand, the mean age of patients with incisional hernia was 38.4 ± 12.70 years; of them, young age group (16-39) has the highest frequency (53.5%). In spontaneous hernia, the

female to male ratio was 2.7:1 while in incisional hernia, male to female ratio was 3.1:1. Thirteen patients (16.9%) with spontaneous hernia

were classified as hard laborers ($p < 0.001$). In incisional hernia, only 19 (26 %) were classified as hard laborers ($p 0.003$).

Table 1: Overlay Hernioplasty According to Age and Occupation by Hernia Type and Gender

Variable		Spontaneous Hernia (n=77)			Incisional Hernia (n=73)		
Age (years)		No.	%	<i>p</i>	No.	%	<i>p</i>
Young age	Male	7	9.1	< 0.001	34	46.6	< 0.001
	Female	17	22.1		5	6.9	
Middle age	Male	8	10.4		15	20.5	
	Female	33	42.8		10	13.7	
Old age	Male	6	7.8	6	8.2		
	Female	6	7.8	3	4.1		
Mean ±SD		56.2±13.60			38.4 ±12.70		
Occupation							
H. laborer	Male	7	9,1	< 0.001	19	26	(0.003)
	Female	6	7.8		0	0	
Not .H. laborer	Male	14	18.1		36	49.3	
	Female	50	65		18	24.7	

Note: Percent by column, * $P < 0.05$ is considered statistically significant. SD; Standard Deviation

Table 2 describes the distribution of clinical factors in the operated patients by the type of repaired hernia. The highest preoperative prevalent factor was Diabetic Mellitus (19.5%) in spontaneous hernia and smoking (13.7%) in incisional hernia. Followed by both Benign Prostate Hypertrophy and constipation

(14.3%) in spontaneous hernia, and Diabetic Mellitus (11%) in incisional hernia. For incisional hernia, (9.6%) had constipation, (3.9%) Benign Prostate Hypertrophy and 1.4% chronic cough. Only smoking in incisional hernia was statistically significant.

Table 2: Patients with Overlay Hernioplasty by Associated Clinical Variables and Hernia Type

		Spontaneous Hernia (n=77)			Incisional Hernia (n=73)		
		No.	%	<i>p</i>	No.	%	<i>p</i>
Chronic cough	Yes	2	2.6	0.462	1	1.4	0.559
	No	75	97.4		72	98.6	
DM	Yes	15	19.5	0.946	8	11	0.372
	No	62	80.5		65	89	
Smoking	Yes	1	1.3	0.100	10	13.7	0.048*
	No	76	98.7		63	86.3	
BPH	Yes	3	14.3	1.000	2	3.6	1.000
	No	18	85.7		53	96.4	
Constipation	Yes	11	14.3	1.000	7	9.6	0.800
	No	66	85.7		66	90.4	
Pregnancy	Yes	1	1.8	1.000	0	0	_____
	No	55	98.2		0	0	

Note: Percent by column, * $P < 0.05$ is considered statistically significant, DM; Diabetes Mellitus, BPH; Benign Prostate Hypertrophy. prevalence of pregnancy from the total of female, and prevalence of BPH from the total of male.

In Table 3, the mean Body Mass Index (BMI) in spontaneous hernia was $25.9 \pm 4.75 \text{ kg/m}^2$ while it was $24.8 \pm 4.35 \text{ kg/m}^2$ in incisional hernia patients.

The obese categories were distributed as 23.4% in spontaneous hernia compared to 9.6% in incisional hernia respectively. Total obesity was noted in 16.7%.

Table 3: Patients with overlay hernioplasty in both types of hernia according Body Mass Index

	Spontaneous Hernia (n=77)			Incisional Hernia (n=73)		
Body Mass Index	No.	%	p	No.	%	p
Underweight	4	5.2	< 0.001*	7	9.6	0.001*
Normal weight	32	41.5		37	50.7	
Overweight	23	29.9		22	30.1	
Obese	18	23.4		7	9.6	
Mean $\pm$ SD	$25.9 \pm 4.75 \text{ kg/m}^2$			$24.8 \pm 4.35 \text{ kg/m}^2$		

Note: Percent by Column. * $p < 0.05$ = statistically significant

Classification of hernia types are shown in Table 4 according to European hernia society classification of ventral abdominal hernias. It reveals a slightly higher prevalence of spontaneous hernias; (51.4%) compared to incisional hernias (48.6%). Subtypes of spontaneous hernia were umbilical hernias as the

highest percentage (55.8%), and epigastric hernia (44.2%). Regarding incisional hernias, subtype M2 was the most encountered (28.8%), followed closely by M3 (27.4%). In contrast, percentages of other subtypes were notably low, L3 (4.1%), M5 (2.7%), without L1 subtype.

Table 4: Overlay Hernioplasty by Hernia Types and Subtypes (EHS Classification).

Spontaneous Hernia (n=77)				Incisional Hernia (n=73)			
Sub type	No.	%	p	Sub type	No.	%	p
Epigastric	34	44.2	<0.001*	M1	5	6.9	<0.001*
Umbilical	43	55.8		M2	21	28.8	
Lumbar	NA	NA		M3	20	27.4	
Spigelian	NA	NA		M4	10	13.7	
				M5	2	2.7	
				L1	0	0	
				L2	5	6.8	
				L3	3	4.1	
				L4	7	9.6	

Note: according to EHS European Hernia Society Classification.

NA: not applicable. Percent by column. * $p < 0.05$ = statistically significant

Table 5 shows the distribution of patients according the time of operation. It was almost similar in both types of hernia; 50.6 ± 28.40 minutes vs. 53.2 ± 28.10 minutes in spontaneous and incisional hernia, respectively. The mean postoperative hospital stay for patients was

3.0 ± 1.70 days for patients with spontaneous hernia, while it was little higher for incisional hernias at 5.4 ± 1.90 days. The duration of drain placement was higher in patients with incisional hernia (5.6 ± 1.10 days) than that found in spontaneous hernia (4.1 ± 1.00 days).

Table 5: Overlay Hernioplasty by Hernia Type and Duration of Operation.

	Spontaneous Hernia n=77			Incisional Hernia n=73		
Duration of operation (minutes)	No.	%	<i>P</i>	No.	%	<i>p</i>
< 45 minutes	53	68.8	0.111	36	49.3	0.047*
45- 91 minutes	12	15.6		25	34.3	
> 91 minutes	12	15.6		12	16.4	
Mean±SD	50.6±28.40			53.2±28.10		

Table 6 shows one-year follow up postoperative evaluated morbidity after the surgery. The overall morbidity was 26.6% while there was no reported death. In spontaneous hernia, complications developed in 23.4%. However, the complicated cases were little higher in incisional hernia (30%). The complications in spontaneous hernia, listed in order of frequency were hematoma (6.5%), skin necrosis and chronic pain (5.2

each %), seroma 3(3.9%). In incisional hernia; the complications listed in order of frequency were seroma (12.3%), and chronic pain (8.2%). While, hematoma, and skin fat necrosis had a percentage of 2.7% for each of them. The distribution of postoperative morbidity in both types of hernia did not show any significant statistical difference between the two types of hernioplasty.

Table 6: Postoperative Morbidity in patients treated by Overlay Hernioplasty for both Types of Abdominal Ventral Hernia.

	Spontaneous Hernia n=77			Incisional Hernia n= 73		
	No.	%	p	No.	%	p
No complication	59	76.6	0.232	51	70	0.064
Seroma	3	3.9	0.134	9	12.3	0.219
Hematoma	5	6.5	0.823	2	2.7	0.477
Skin necrosis	4	5.2	0.586	2	2.7	0.477
Chronic pain	4	5.2	0.586	6	8.2	0.651

Note: Percent by column, * $p < 0.05$ is considered statistically significant.

Discussion

In this study, there was big difference between gender prevalence in both types of hernia; the male gender was higher in incisional hernia patients while in spontaneous ventral hernia, female gender was higher. However, there is a worldwide high ratio of female to male, which is similar to our patients with spontaneous hernia. Alobaidi *et al* [10] from Iraq and Kumari *et al* [11] from India. Male

to female ratio 3.1:1 in incisional hernia was not in parallel with most of the researches for patients with incisional hernia. Worldwide, a high female to male ratios was reported as: Saber *et al* from Egypt as 1.1:1 [12], Hassan *et al* from Pakistan [13] as 1.7:1. For the mean age of patients, it was in the fifth decade (56.2 ± 13.60 years) in spontaneous hernia, and in the third decade in incisional hernia (38.4 ± 12.70 years). Authors reported mean age similar to the age reported in spontaneous hernia in Newzlanda [14], and Pakistan [15]. Lower mean

age and high male to female ratio in the studied patients of incisional hernia, possibly because the patient's sample mostly constituted of patients who were military with ventral incisional hernias. Actually, our country has been in an armed conflict since 2011 with war injuries targeting young male gender.

Major risk factor and comorbidity that predisposes to hernia after the laparotomy in American community was active smoking [4] which was statistically significant in the present study. Similar results in patients with incisional hernia were reported by others such as Radwa *et al* [16] from Egypt (15%), and Ferreira *et al* [17], from Brazil (16%). In this study, BMI was used as measure for obesity. The mean BMI of patients with incisional hernia was at the end of normal weight classification, with total obesity (16.7%). Some authors reported higher findings such as Deherkar *et al* [18] from India and Radwa *et al* from Egypt [16].

Operative time was calculated in the current study from starting the incision to the wound closure as 53.2 ± 28.10 in incisional hernia and 50.6 ± 28.40 minutes in spontaneous hernia. Although, many other factors are involved in determining the time of surgical procedure, this achievement was in agreement with many other authors such as Liaqat *et al* [19] from Pakistan (52.3 ± 6.65) and Radwa *et al* from Egypt (50.1 ± 12.00) minutes [16].

In this study, the criteria to remove the drain was until the drain output became less than 30 ml in 24 hours. The mean duration of drain placement was 5.9 ± 1.80 in incisional hernia and 4.1 ± 1.00 days for spontaneous hernia. The mean duration of drain placement was in agreement with many studies

such as Hassan *et al* [13] from Pakistan (5.1 ± 1.88) and Sevinç *et al* [20] from Turkey (5.4 ± 2.30) days. However, others kept the drain for longer time (7-10) days. This could be due to the protocol of drain removal or due to higher prevalence of seroma [11,12,18].

The current study reported a good postoperative hospital stay mean of 3.1 ± 1.70 days in spontaneous hernia and (5.4 ± 1.90) days in incisional hernia, which was shorter than what was found in India [21] of >7 day. This could indicate to absent free health insurance system to decrease the patient costs in our country.

In this study, seroma was the commonest complication especially in patients with incisional hernia (12.3%). This is in alignment with what was reported from Pakistan [15]. However, other authors reported low prevalence of seroma in patients with spontaneous hernia which is near to the reported values (3.9%) in the current series such as Shakeel *et al* in Pakistani [22] who reported low prevalence of seroma (2.9%).

Chronic pain defined as "pain persisting for more than 3 months can significantly impair quality of life and daily functioning, often leading to disability" [25]. In the current series, during one year follow-up, 5.2% of patients with spontaneous hernia and 8.2% incisional hernia reported complaints of stich or mesh edge prominence under the skin, that caused discomfort or pain. Most cases were managed conservatively with analgesics and reassurance; few patients required minor procedure to remove the prominent stich. These findings were lower than what were reported by other authors who reported a higher prevalence rate of pain [16,20]. The chronic pain was at rate of 16.67% in the study of Tapan

et al [21] from India. The low rate of chronic pain in this study compared to others is more likely to be due to the concept of pain definition, where mild or simple form of chronic pain were not included.

In the current series, wound hematoma was a common complication observed in patients with spontaneous hernia (6.5%). Ibrahim *et al* [23] who had a prevalence of (5.13%) supported our finding while it was lower (2.7%) in incisional hernia. It was in middle of high prevalence of wound hematoma for Sevinç *et al* [20] from Turkey (6%), and lower prevalence of Iljin *et al* [24] from Poland (0%) for incisional hernia.

In the present study, skin necrosis occurred in 2.7% of patients with incisional hernia and 5.2% of patients with spontaneous hernia, which is in consistence with the global rate for skin necrosis [11,16,19,21].

Conclusion

The demographic characteristics of patients were in consistent with regional and international reports. However, prevalence of obesity was lower than global reports.

The study identified several associated factors that had significant association to hernia in these patients. These mostly were smoking, and hard lobar occupation. The postoperative morbidity prevalence was good with mild and correctable complications. Seroma rates during one year were within the lower reported rates. Therefore, the followings need to be recommended:

1. Preoperative optimization of modifiable risk factors, including smoking quit.
2. Onlay mesh hernioplasty is effective and safe technique with low post-operative complications. This method is good to be used for repair of ventral hernias.
3. A public health system registration and documentation of the outcomes are needed with implementing more studies about other Yemeni patients including comparative studied between operative technique repairs and longtime follow-up periods.

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