Republic of Yemen
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الجمهورية اليمنية
جامعة العلوم والتكنولوجيا – صنعاء
كلية الطب والعلوم الصحية
قسم طب المجتمع

Prevalence rate and associated factors of Incisional Hernia among patients at University of Science and Technology Hospital from 2020 to 2023 in Sana'a, Yemen.

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List of Abbreviations

BMI	Body Mass Index
COPD	Chronic Obstructive Pulmonary Disease
DM	Diabetes Mellitus
HTN	Hypertension
IH	Incisional Hernia
IPHge	Intra-Peritoneal Hemorrhage
I-SSI	Incisional Surgical-Site Infection
OR	Odds Ratio
SPSS	Statistical Package for the Social Sciences
SSI	Surgical-Site Infection
UST	University of Science and Technology
USTH	University of Science and Technology Hospital
VIH	Ventral Incisional Hernia

Chapter 1: Introduction

1.1 Background

Abdominal Hernia:

A hernia is the bulging of part of the contents of the abdominal cavity through a weakness in the abdominal wall (1). Its protrusion of a viscous or part of viscous within a peritoneal sac through a defect in the abdominal wall (2).

Incisional Hernia:

A hernia that develops at the site of a previous abdominal incision(2). These arise through a defect in the musculofascial layers of the abdominal wall in the region of a postoperative scar. Thus they may appear anywhere on the abdominal surface(1).

Incidence and Etiology of Incisional Hernia:

Incisional hernias have been reported in 10–50% of laparotomy incisions and 1–5% of laparoscopic port-site incisions. Factors predisposing to their development are patient factors (obesity, general poor healing due to malnutrition, immunosuppression or steroid therapy, chronic cough, cancer), wound factors (poor quality tissues, wound infection) and surgical factors (inappropriate suture material, incorrect suture placement). An incisional hernia usually starts as disruption of the musculofascial layers of a wound in the early postoperative period. Often the event passes unnoticed if the overlying skin wound has healed securely. Many incisional hernias may be preventable with the use of good surgical technique. The classic sign of wound disruption is a serosanguineous discharge (1).

Clinical features: These hernias commonly appear as a localized swelling involving a small portion of the scar but may present as a diffuse bulging of the whole length of the incision There may be several discrete hernias along the length of the incision and unsuspected defects are often found at surgery. Incisional hernias tend to increase steadily in size with time. The skin overlying large hernias may become thin and atrophic so that peristalsis may be seen in the underlying intestine. Vascular damage to skin may lead to dermatitis. Attacks of partial intestinal obstruction are common because there are usually coexisting internal adhesions. Strangulation is less frequent and most likely to occur when the fibrous defect is small and the sac is large. Most incisional hernias are broad-necked and carry a low risk of strangulation (1).

Treatment :

Asymptomatic incisional hernias may not require treatment at all. The wearing of an abdominal binder or belt may prevent the hernia from increasing in size. For most incisional hernias, surgery is relatively straightforward and both open and laparoscopic options are available. A number of principles apply, irrespective of the technique used. The repair should cover the whole length of the previous incision. Approximation of the musculofascial layers should be done with minimal tension and prosthetic mesh should be used to reduce the risk of recurrence. Mesh may be contraindicated in a contaminated field, e.g. bowel injury during the dissection but, in a clean-contaminated field, such as after an elective bowel resection, mesh may be used if placed in a different anatomical plane to the contamination, such as in the extraperitoneal/retromuscular space (1).

Reducing the risk of Incisional Hernia:

The incidence of incisional hernia may be reduced by improving the patient's general condition preoperatively where possible, e.g. weight loss for obesity or improving nutritional state for malnutrition. Closing the fascial layers with non-absorbable, or very slowly absorbable, sutures of adequate gauge is important. Traditional teaching was that sutures should be 1 cm deep and 1 cm apart. Recent work has shown that lower incisional hernia rates and reduced infection rates are gained when smaller and closer bites are used with a 2/0 suture rather than traditional heavier materials (1).

1.2 Justification

- Incisional hernia is one of the most common postoperative complications following abdominal surgery, but studies identifying the prevalence rate and associated factors of Incisional hernia are scarce regionally and locally in Yemen and no similar previous studies in UST.
- So we will do this study to estimate the prevalence rate and the associated factors of Incisional Hernia among patients of USTH from 2020 to 2023 in Sana'a, Yemen.
- For partial fulfillment of our graduation requirements.

1.3 Research questions:

-What are the prevalence rate and the associated factors of Incisional Hernia among patients of USTH from 2020 to 2023 in Sana'a, Yemen?

Chapter 2: Literature Review

2.1: Reviewed Literature:

First study:

Title: Incidence of and risk factors for incisional hernia after abdominal surgery.

Done by: K Itatsu, Y Yokoyama, G Sugawara, H Kubota, Y Tojima, Y Kurumiya, H Kono, H Yamamoto, M Ando, M Nagino.

Place: Japan; Divisions of Surgical Infection, Department of Surgery, Nagoya University.

Time: Published online (14 August 2014) in Wiley Online Library.

Aims: This prospective observational study aimed to evaluate the rate of IH after abdominal surgery and to assess the impact of perioperative factors on the risk of IH.

Results: A total of 4305 consecutive patients were registered. Of these, 378 were excluded because of failure to complete follow-up and 3927 patients were analysed. IH was diagnosed in 318 patients. The estimated incidence rates for IH were 5·2 % at 12 months and 10·3% at 24 months. In multivariable analysis, wound classification III and IV (hazard ratio (HR) 2·26, 95% confidence interval 1·52 to 3·35), body mass index of 25 kg/m^2 or higher (HR 1·76, 1·35 to 2·30), midline incision (HR 1·74, 1·28 to 2·38), incisional surgical-site infection (I-SSI) (HR 1·68, 1·24 to 2·28), preoperative chemotherapy (HR 1·61, 1·08 to 2·37), blood transfusion (HR 1·46, 1·04 to 2·05), increasing age by 10-year interval (HR 1·30, 1·16 to 1·45), female sex (HR 1·26, 1·01 to 1·59) and thickness of subcutaneous tissue for every 1-cm increase (HR 1·18, 1·03 to 1·35) were identified as independent risk factors. Compared with superficial I-SSI, deep I-SSI was more strongly associated with the development of IH.

Conclusion: Although there are several risk factors for IH, reducing I-SSI is an important step in the prevention of IH [(3)].

Second study:

Title: Rate of development of incisional hernia 1 year after urgent midline laparotomy.

Done by: Abd-El-Aal A. Saleem, Hassan A. Abdallah, Osama A. Abdul Raheem, Mohamed A. Yousef.

Place: Emergency Department of Aswan University Hospital, Egypt.

Time: Received 17 February 2016 , Accepted 2 May 2016.

Aims: The aim of the present study was to determine the rate of development of incisional hernia at 6 months and 1 year in patients suffering from peritonitis (potentially septic wounds) and other patients suffering from intraperitoneal hemorrhage (IPHge) (aseptic wounds) who had undergone urgent midline laparotomy. In addition, we aimed to evaluate different surgical techniques and suture materials used for abdominal closure and the prevalence of postoperative complications among the studied groups in the Emergency Department of Aswan University Hospital, Egypt.

Results: Analyses of 160 patients in the two groups indicated that the incisional hernia rate increased significantly from 7.5% at 6 months to 17.5% at 1 year after urgent midline laparotomy in all studied patients (P=0.007). There was a significant increase in incisional hernia rate in group A in comparison with group B at 6 months (12.5 vs. 2.5%; P=0.02) and at 1 year (25 vs. 10%; P=0.01) follow-up after urgent midline laparotomy. Regarding the techniques of closure of urgent midline laparotomy and the used suture materials (Vicryl and Prolene), there was an insignificant deference as regards the development of incisional hernia between subgroups A1 and A2 at 6 months (P=0.50) and at 1 year (P=0.30), and also between subgroups B1 and B2 at 6 months (P=0.49) and at 1 year (P=1.0) follow-up after urgent midline laparotomy.

Conclusion: The incisional hernia remains the most common complication after midline laparotomy, representing 7.5% at 6 months and 17.5% at 1 year follow-up in the present study. Incisional hernia was significantly increased in patients suffering from peritonitis than in those patients suffering from IPHge at 6 months and at 1 year after urgent midline laparotomy. Regarding the surgical techniques and suture materials used for closure of urgent midline laparotomy, there was an insignificant difference as regards the development of incisional hernia between closure of urgent midline incision by continuous suture plus some interrupted sutures in between using slowly absorbable multifilamentous suture material [Vicryl (polyglactin)] and continuous suture only using nonabsorbable monofilamentous suture material [Prolene (polypropylene)] at 6 months and 1 year between subgroups A1 and A2, and between B1 and B2 [(4)].

Third study:

Title: Development and Validation of a Risk Stratification Score for Ventral Incisional Hernia after Abdominal Surgery: Hernia Expectation Rates iN Intra-Abdominal Surgery (The HERNIA Project).

Done by: Goodenough, Christopher J. MD[a]; Ko, Tien C. MD, FACS[a]; Kao, Lillian S. MD, MS, FACS[a]; Nguyen, Mylan T. MPH[a]; Holihan, Julie L. MD[a]; Alawadi, Zeinab MD[a]; Nguyen, Duyen H. MPH[a]; Flores, Juan R. MD[a]; Arita, Nestor T. MD[b]; Roth, Scott J. MD, FACS[c]; Liang, Mike K. MD, FACS[a,].

Place: USA.

Time: available in PMC (2016 April 01).

Aims: Aimed to develop and validate a risk-assessment tool to predict Ventral Incisional Hernia (VIH) after abdominal surgery.

Result: Of 625 patients followed for a median of 41 months (range 0.3 to 64 months), 93 (13.9%) developed a VIH. The training cohort (n = 428, VIH = 70, 16.4%) identified 4 independent predictors: laparotomy (HR 4.77, 95% CI 2.61 to 8.70) or hand-assisted laparoscopy (HAL, HR 4.00, 95% CI 2.08 to 7.70), COPD (HR 2.35; 95% CI 1.44 to 3.83), and BMI $\geq$ 25 kg/m^2 (HR1.74; 95% CI 1.04 to 2.91). Factors that were not predictive included age, sex, American Society of Anesthesioloigsts (ASA) score, albumin, immunosuppression, prior surgery, and suture material or technique. The predictive score had an AUC = 0.77 (95% CI 0.68 to 0.86) using the validation cohort (n = 197, VIH = 23, 11.6%). Using the HERNIAscore: HERNIAscore = 4*Laparotomy+3*HAL+1*COPD+1* BMI $\geq$ 25, 3 classes stratified the risk of VIH: class I (0 to 3 points),5.2%; class II (4 to 5 points),19.6%; and class III (6 points), 55.0%.

Conclusion: The HERNIAscore accurately identifies patients at increased risk for VIH. Although external validation is needed, this provides a starting point to counsel patients and guide clinical decisions. Increasing the use of laparoscopy, weight-loss programs, community smoking prevention programs, and incisional reinforcement may help reduce rates of VIH [(5)].

Fourth study:

Title: Prevalence and risk factors of incisional hernia: an observational study.

Done by: Madhuri Barade, Vasat Laakar, Takshak Deshukh.

Place: Dr. Pajarao Deshukh Meorial Medial College, Aravai, Maharashtra, India.

Time: 2018.

Aims: To find out risk factors associated with incisional hernia ad its prevalence.

Results: During the study period total operated cases were 921. From that 50 cases of incisional were reported during the follow-up. Out of fifty cases, 12 (24 %) were male, and 38 (76%) were female. Ratio of male to female is (1:3.2). The difference was found

to be significant ($p<0.05$). Maximum cases were distributed between the age group of 41-50 (32%). Overall highest prevalence of incisional hernia was noted with perforation peritonitis operation, and female it was noted with LSCS operation. Commonest incision was midline (76 %) which lead to incisional hernia.

Conclusion: The prevalence rate of incisional hernia was 5.42%. Overall highest prevalence of incisional hernia was noted with perforation peritonitis operation, and female it was noted with LSCS operation. 76% cases of incisional hernia associated with midline incision [(6)].

Fifth study:

Title: Incidence of abdominal incisional hernia in developing country: a retrospective cohort study.

Done by: Litian Zhang

Place: The Second Affiliated Hospital with Dalian Medical University, Dalian, Liaoning Province, P. R. China.

Time: Published online 2015 Aug 15.

Aims: To estimate the incidence of abdominal incisional hernia in developing countries.

Result: identified 2096 patients who had abdominal surgery during the inclusion period and 51 cases were excluded. During follow-up, 80 of these patients who had a hernia requiring repair were analyzed. Of these 20 had infected incision and 80 had non-infected incision. The incidence is significantly higher in infected incision (20/202) than that in non-infected incision (60/1843). There were no any differences in the incidence between Aden and Dalian.

Conclusion: The overall incidence of abdominal incisional hernia requiring surgical repair within 1 year after abdominal surgery was 80/2045 in a population from Aden and Dalian. Infected incision is prone to occur incisional hernia during the follow-up period [(7)].

Sixth study:

Title: Incidence, risk factors, and burden of incisional hernia repair after abdominal surgery in France: a nationwide study.

Done by: P. Ortega‐Deballon, Y. Renard, J. de Launay, T. Lafon, Q. Roset, G. Passot.

Place: France.

Time: Published online: 27 June 2023.

Aims: The aims of this study were to assess the rate of incisional hernia repair after abdominal surgery, recurrence rate, hospital costs, and risk factors, in France.

Result: In 2013–2014, 710074 patients underwent abdominal surgery, of which 32633 (4.6%) and 5117 (0.7%) had ≥ 1 and ≥ 2 incisional hernia repair(s) within five years, respectively. Mean hospital costs amounted to €4153/hernia repair, representing nearly €67.7 million/year. Some surgical sites exposed patients at high risk of incisional hernia repair: colon and rectum (hazard ratio [HR] 1.2), and other sites on the small bowel and the peritoneum (HR 1.4). Laparotomy procedure and being ≥ 40 years old put patients at high risk of incisional hernia repair even when operated on low-risk sites such as stomach, duodenum, and hepatobiliary.

Conclusion: The burden of incisional hernia repair is high and most patients are at risk either due to age ≥ 40 or the surgery site. New approaches to prevent the onset of incisional hernia are warranted [(8)].

Seventh study:

Title: A study on clinical profile and risk factors in incisional hernia patients.

Done by: Ambuj Kumar Soni1, Sharad Kumar Sahu2, Vineeth Kumar RKPlace.

Place: In India.

Date: Available online 28th of November, 2022.

Aims: To study the clinical profile of incisional hernia patients with respect to various etiological factors, distribution of cases in relation to age and sex, details of previous surgical procedures undergone.

Result: A total of 52 cases were included in this study. There were 32 females (61.54%) and 20 males (38.46%) with female to male ratio was found to be 1.6:1. Majority of the patients presented with abdominal swelling (n=30, 58%) followed by both abdominal swelling and pain (n=20, 38%). Among the females now presented with incisional hernias the mean parity was 2.69. Majority of the cases developed hernias within 1 year (n=29, 55.77%) and about 26.93% of the patients developed hernia in 1 to 3 years. Most of cases of incisional hernia in our study occurred over midline (n=22, 42.3%) at the site of incisions made for midline laparotomy (n=20.38.5%). Risk factors favoring incisional hernia formation were post-operative wound infection (n=45, 84.9%) and obesity (n=21, 40.38%).

Conclusion: Incisional hernia is more common in females who undergo emergency midline laparotomy and emergency caesarean section. Majority of the cases presented

within 1 year of surgery. Post-operative wound infection, obesity and anemia were the crucial factors for the development of incisional hernias [9].

2.2 Conceptual Framework:

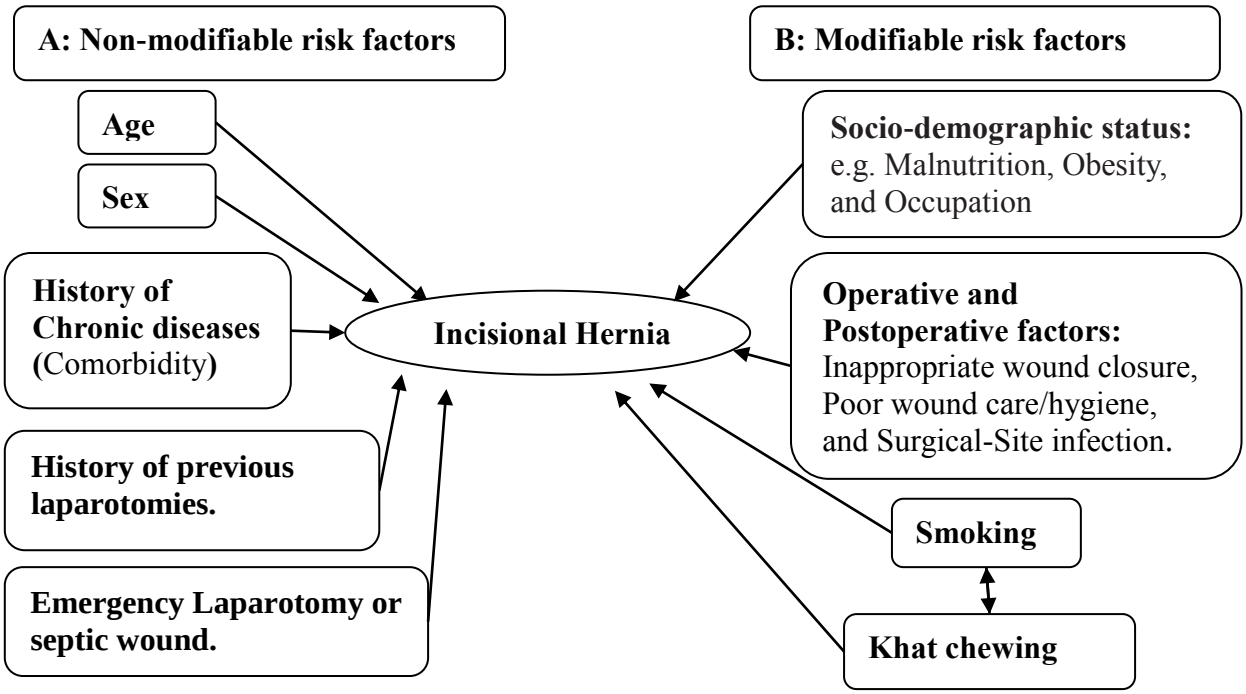

Figure (1): Conceptual Framework of Incisional Hernia.

Chapter 3
RESEARCH OBJECTIVES

Chapter 3: Research Objectives

General research Objectives:

- To determine the prevalence rate of incisional hernia among patients of USTH from 2020 to 2023 in Sana'a, Yemen.
- To identify the associated factors of incisional hernia among patients of USTH from 2020 to 2023 in Sana'a, Yemen.

Chapter 4
METHODOLOGY

CHAPTER 4: METHODOLOGY

4.1 Study area:

University of Science and Technology Hospital (USTH).

4.2 Study design:

Retrospective Descriptive Cross-sectional study, with Retrospective Observational Case-Control study.

4.3 Study population:

Patients at University of Science and Technology Hospital Surgical ward.

4.4 Sample size and method:

Confidence level=95%, P=10.3% (as estimated by the first study which was in Japan), confidence interval=0.05, so sample size is at least 142 IH cases.

Regarding the Case-Control study, cases will be patients with a history of previous laparotomy and diagnosed with Incisional Hernia, and meeting the study criteria.

For each case, two controls meeting the same criteria of sampled cases, will be selected from the medical records through a non-probability convenient sampling method. Cases and controls were matched for time, place, and age.

4.5 Study Tools:

A checklist composed of 3 parts;

First part: Preoperative factors & Socio-demographic characteristics: age, gender, marital status, occupation, comorbidities, smoking, khat chewing, number of previous laparotomies. Second part: Operative factors: elective or emergency surgery, Third part: Postoperative factors: Surgical-site infection (SSI).

4.6 Variables:

Independent variables: age, gender, marital status, occupation, comorbidities(Diabetes Mellitus, Hypertension, Chronic Obstructive Pulmonary disease, Cardiovascular disease, Liver disease), smoking, khat chewing, number of previous laparotomies, emergency surgery, surgical-site infection (SSI).

Dependent variable: Incisional Hernia.

4.7 Inclusion criteria:

Patients aged over 20 years, both genders, with intra-abdominal surgery.

4.8 Exclusion criteria:

Patients who underwent surgery for malignant disease will be excluded from the study. Also duplicated case files and files that lack essential information will be excluded.

4.9 Data analysis:

Data will be analyzed by SPSS version 23 and Microsoft Excel 2010, and will be presented by Microsoft PowerPoint.

4.10 Ethical consideration:

Data will be collected after permission taken from the UST as written consent to USTH managers. All information that will be taken will be kept confidential.

4.11 Time table (action plan):

Table(1) : Action plan for our research**:** prevalence rate and associated factors of Incisional hernia among patients of University of Science and Technology Hospital from 2020 to 2023 in Sana'a, Yemen.

Activities	**Time**											
	December 2023				January 2024				February 2024			
	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4
Proposal writing			**X**	**X**								
Data Collection					**X**	**X**	**X**					
Data analysis								**X**	**X**			
Final report writing										**X**	**X**	
Presentation Writing and Discussion												**X**

4.12 Budget:

Table(2) : Budget of our research**:** prevalence rate and associated factors of Incisional hernia among patients of University of Science and Technology Hospital from 2020 to 2023 in Sana'a, Yemen.

Items	**Number**	**Cost per Unit**	**Total**
Checklist papers	500	15	7500
Pens	10	100	1000
Transportation & communication			15000
Total Cost			23500

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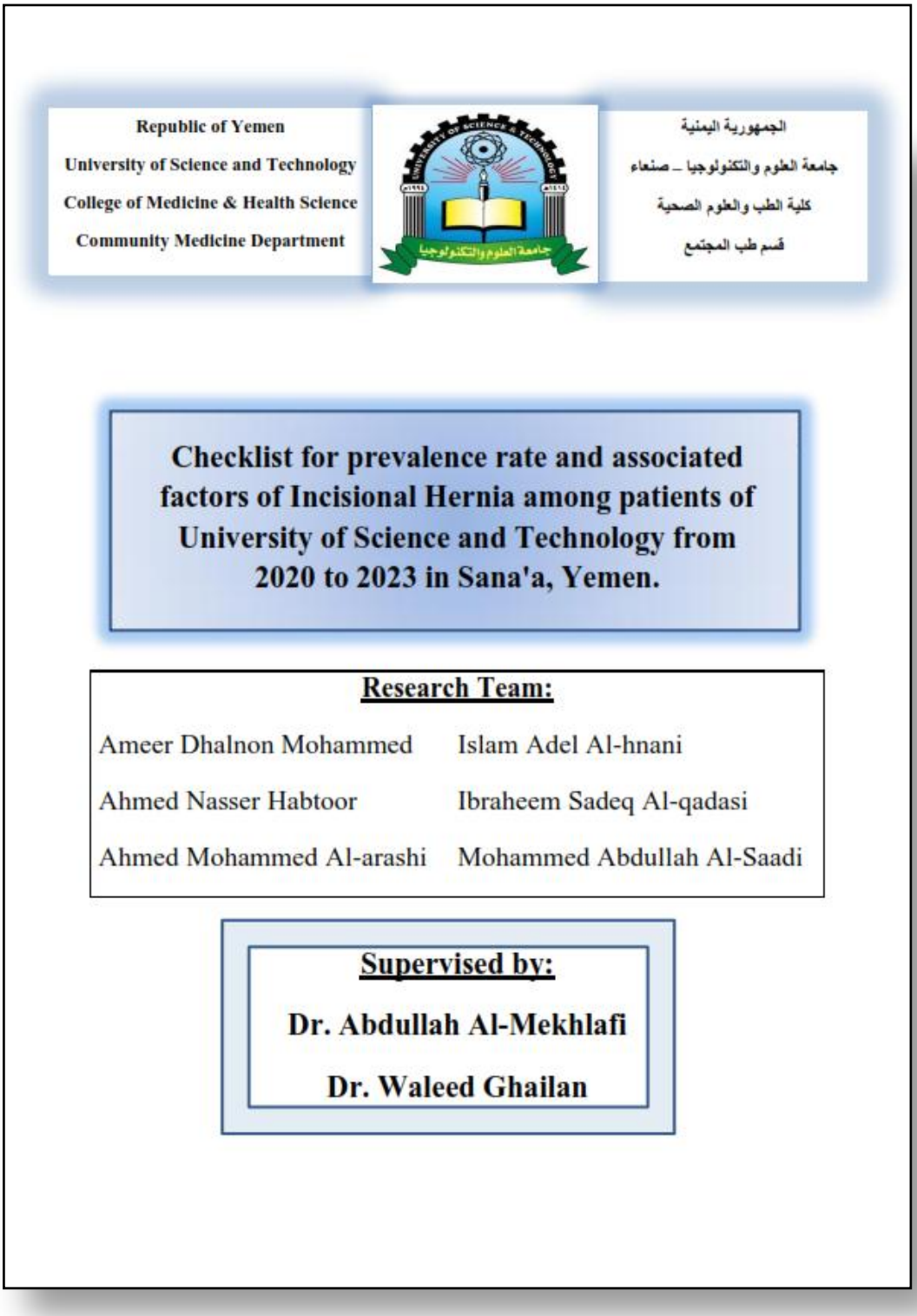
ANNEXES:

- Checklist for prevalence rate and associated factors of Incisional hernia among patients in University of Science and Technology Hospital from 2020 to 2023 in Sana'a, Yemen.



First part:

Preoperative factors and Socio-demographic characteristics:

- Age: _____ years old.
- Sex: ☐male ☐female.
- Marital status: ☐single, ☐married, ☐others.
- Occupation: _____.
- Comorbidity: ☐DM, ☐HTN, ☐COPD, ☐Cardiovascular disease, ☐Liver disease, ☐ No comorbidity.
- Smoking: ☐Yes ☐No ☐Ex-smoker.
- Khat chewing: ☐Yes ☐No ☐Ex-chewer.
- Number of previous laparotomies: _____.

Second part:

Operative factors:

- Operation status: ☐Elective, ☐Emergency.

Third part:

Postoperative factors:

- Surgical-Site Infection (SSI) : ☐Yes, ☐No

❖ Paper of permission taken from the UST as written consent to the USTH managers.

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جامعة العلوم والتكنولوجيا
كلية الطب والعلوم الصحية

التاريخ: 1445/6/15هـ

الاخ الفاضل/ د. معتصم العماد - المدير الطبي بالمستشفى الجامعي **الأكرم**

السلام عليكم ورحمة الله وبركاته،،، وبعد

الموضوع : مجموعة بحثية - مستوى سادس طب وجراحة

في البداية نهديكم أطيب التحايا .. ونتمنى لكم التوفيق والنجاح في جميع أعمالكم .

إشارة إلى الموضوع أعلاه، ، نفيدكم بأن طلاب مستوى سادس طب وجراحة بكلية الطب والعلوم الصحية المذكورين أدناه يقومون ببحث حول:

"Prevalance and Associated Factor of Incisional Hernia among Patients of University of Science and Technology Hospital in Sana'a, Yemen "

وعليه يرجى تسهيل مهمتهم فيما يخص موضوع البحث والتوجيه لكل من له علاقة للتعاون معهم وتسهيل الحصول على البيانات المطلوبة.

أسماء الطلاب :

1- أمير ذالنون محمد
2- إسلام عادل محمد
3- إبراهيم صادق القدسي
4- أحمد ناصر حبتور
5- محمد عبدالله السعادي
6- أحمد محمد العراشي

شاكرين لكم دوام التعاون وتشجيع البحوث

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