



Significant Factors Influencing Wound Infection After Inguinal Hernia Surgery

Dr: Kareem A. Ahmed Alobaidy(FICMS) *

Dr: Mohamad Theyab Hamad Hussein (D.G.S, M.R.C.S) *
Department of Surgery, Baquba Teaching Hospital, Diyala Health Directorate. Iraq.

Abstract

Background: Wound infection after surgery is a considerable clinical problem ,it increases morbidity and may be mortality, hospital admission, antibiotics and even resurgical intervention. However vast majority of these infections are preventable and treatable. Several risk factors of infection such as smoking , obesity , diabetes mellitus , type of hernia ,type of surgery and the age of patient, these risk factors and many other added factors may affect the incidence of wound infection after inguinal hernia surgery. Antibiotics were given for all patients, type, duration, single or multiple according to the situations and circumstances of surgery.

Objectives: The aim of our study is to assess significant risk factors affecting wound infection after inguinal hernia surgery.

Patients and methods: 284 patients with inguinal hernia admitted during the period study from 5 February 2013 to 25 December 2015 to the surgical unit of Baqubah teaching hospital were included. Factors predisposing to wound infection were evaluated involved smoking, obesity, diabetes mellitus, type of surgery, type of inguinal hernia and age. All patients undergoing surgical interference. The data were taken from patient records. Patient charts were evaluated for history, physical examination, all investigations needed and operative report for operation. Patients followed for more than one month for recording any wound infection happened.

Results: 284 patients were involved in this retrospective study. Wound infection occurred in 34 (12%). Over weight patients were 33 (11.6 %). All obese patients decreased body weight to overweight before surgery .Wound infection occurred in 9 (27.3 %), diabetic patients 46 (16.2 %), wound infection occurred in 8 (17.4 %) and smoker patients were 85 (29.9 %) wound infection occurred in 9 (10.6 %). Patients with direct inguinal hernia were 75(26.4%), wound infection occurred in 17 (22.7 %)and patients with indirect inguinal hernia 209(73.6%),wound infection occurred in 17 (8.1%) . Inguinal hernia surgery by repair was done for 186 patients (65.5%), wound infection occurred in 23 (12.4%) while by mesh for 98 (34.5%) and wound infection occurred in 11 patients (11.2%).

Keywords: Risk factor, Inguinal hernia surgery, Wound infection.

Introduction

Surgery that involves a cut (incision) in the skin can lead to a wound infection after surgery. Surgical wound infections may have pus draining from them and can be red, painful or hot to touch. You might have a fever and feel sick. Surgical wounds can become infected by: Germs that are already on your skin that spread to the surgical wound .Germs that are

inside your body or from the organ on which the surgery was performed. Germs that are in the air. Infected hands of a caregiver or health care provider. Infected surgical instruments .You are more at risk for a surgical wound infection if you: Have poorly controlled diabetes .Have problems with your immune system, are overweight or obese., are a smokers.

Taking corticosteroids (for example, prednisone). Have surgery that lasts longer than 2 hours [1] Inguinal hernia surgery is generally not regarded as heroic or lifesaving. It is a small field for devoted and diligent surgeons, seeking for profound knowledge of the inguinal anatomy, with admiration for small details. Inguinal hernia repair is one of the most common operations done by a general surgeon, inguinal hernia surgery suddenly becomes significantly more relevant and puts small changes within this field into a whole other perspective. The principles of hernia surgery have changed throughout history, but one change is to be regarded as revolutionary, when in the 1950s the prosthetic mesh was introduced. HISTORY The basic principles of modern inguinal hernia surgery derive from 1884 when the Italian surgeon Edoardo Bassini (1844 - 1924) introduced a new surgical technique [2,3,4]. Bassini discovered that the inguinal floor played an important role in the etiology of inguinal hernias. He approached the hernia at the anterior side, resected the hernialsac, incised the fascia transversalis and reconstructed the posterior wall of the inguinal canal by a triple layer method. The three layers consisted of the fascia transversalis, the aponeurosis of the musculus transversus abdominis and the aponeurosis of the musculus obliquus internus abdominis, which he all sutured to the inguinal ligament [5]. Bassini published his results showing wound infection rates of 8 %. His technique was adopted and modified by many others, but eventually failed in about 30% of the patients. However, the Bassini repair was the leading procedure for inguinal hernias until 1945 when the Canadian surgeon Earle Shouldice (1890 -1965) opened a small hospital treating only inguinal hernias [6]. His surgical technique resembled the Bassini technique, but did have some alterations and reconstructed the posterior wall of the inguinal canal by a four layer method. Shouldice revisited the ideas of peri-operative care of inguinal hernia patients as well, including early mobilization, short hospital admittance and resuming normal activities as soon as the patient felt comfortable [5]. In 1962 he introduced the polypropylene mesh, which is still the mesh of choice nowadays [7]. and excellent long-term results were obtained. Postoperative wound infections, also known as surgical site infections (SSIs), complicate the recovery course of many patients. As defined by the Centers for Disease Control and Prevention (CDC), these infections typically occur within 30 days of an operation at the site or part of the body where the surgery took place, or within a year if an implant is left in place and the infection is thought to be secondary to surgery.[8,9,10] Bacterial colonization

on the patient's skin and alimentary and genital tract are the principal contributing sources that lead to SSIs. [11] The organism most often isolated is *Staphylococcus aureus*. [12] Exogenous sources, such as breaches in sterile technique and operating room equipment may contribute, albeit much less frequently than endogenous flora. [13] Bacteria within the tissue or organ space hinder the postoperative healing processes, and can lead to anastomotic leaks, wound dehiscence, and superficial incisional infections. SSIs may be classified as superficial/incisional if limited to the skin and subcutaneous tissue, deep incisional when involving the fascia and muscle, or organ space when involving a body cavity (eg, abdominal cavity following gastrointestinal surgery). [9,10] Deep tissue and organ space SSIs are less frequently encountered than superficial SSIs, but are associated with greater morbidity/mortality, readmission rates, longer hospital stay, and increased overall hospital-associated costs when compared with superficial SSIs. [14, 15, 16] Although the majority of SSIs are uncomplicated, others may be severe and more challenging to manage, such as necrotizing deep soft tissue infections. [9-15] The latter often require extensive surgical debridement, multiple reoperations, and may even be life-threatening. [17,18] The location and extent of the infection, as well as the patient's clinical condition, guide the management approach. [9-17] For instance, in the setting of an implant, as in the case for a synthetic mesh in an infected wound, oftentimes explantation of the implant is required, which may add to the postoperative morbidity. Furthermore, appropriate antibiotic therapy is often necessary to achieve source control in such patients. Today inguinal hernias account for 75% of abdominal wall hernias and are 25 times more common in men; [19] becoming one of the leading causes of workloss and disability. As the procedure can be performed within one hour, daycare hernia repair surgery has begun to gain a lot of attention.

Mesh repair has rapidly become one of the most popular techniques of hernia repair. Of the open mesh repair techniques, the Lichtenstein hernia repair is most frequently used [20] which is a tension-free repair of the weakened inguinal floor using a polypropylene mesh. One of the most important objectives of any surgical procedure remains to be the prevention of surgical site infections (SSIs). Literature reports overall 0-9% SSI after inguinal hernia repair and 1-3% with antibiotic cover. [21, 22] Since to date there are only a few publications analysing mesh infections, there continue to be difficulties in selecting optimal

treatment of SSIs following mesh repair of hernias. This difficulty is even more in low-income countries, where use of mesh for the treatment of hernias is a recent development.

Patients and Methods

Aretrospective study of 284 patients underwent surgery for inguinal hernia between 5 February 2013 and 25 December 2015 was carried out in baqubah teaching hospital. All patients undergoing surgical interference either by repair or mesh. Patient charts were evaluated for history, physical examination and all investigations needed. Risk factors involved smoking, overweight, diabetes mellitus, age of patients, type of hernia and type of surgery were evaluated for affecting wound infection after inguinal hernia surgery. All diabetic patients were controlled before, during and after surgery by consultation and correlation with the physician. All obese patients changed to overweight by decreasing the weight before surgery. Most of patients stopped smoking at least 10 days before surgery (3 patients refused stop smoking and were given spinal anesthesia). All patients were taken either general or spinal or local

anesthesia .All patients were taken antibiotics and followed for more than one month to detect any wound infection.

Results

284 patients were operated in the surgical department of Baqubah teaching hospital between 5 February 2013 to 25 December 2015 by using either repairor mesh65.5%(186/284 patients)were operated on by repair while34.5%(98/284 patients) by mesh. Age of patients and percentage of wound infection are shown in Table 1.The mean age of patients was 44.3.Body mass index was recorded for all patients to determined the overweight, no underweight patients was noted. The distribution according to sex was known, all are men. Type of inguinal hernia whether indirect or direct and wound infections were registered. Patients with indirect inguinal hernia were 209 (73.6%) and patients with direct inguinal hernia were 75(26.4%) Table 4.All patients underwent elective surgeries. Risk factors and wound infection are shown in Table 2 while type of surgery and wound infection was shown in Table 3.

Table- 1 Age of patients and wound infection

Age (years)	Patients		Wound infection		No wound infection		Total
	No.	%	No.	%	No.	%	
< 30	100	35.2	3	3	97	97	100
30 – 40	70	24.7	6	8.6	64	91.4	100
41 – 50	62	21.8	11	17.7	51	82.3	100
> 50	52	18.3	14	26.9	38	73.1	100
Total	284	100	34	12	250	88	100

Table- 2 Risk factors and wound infection

Risk factor	Patients		Wound infection		No wound infection		Total
	No.	%	No.	%	No.	%	
Smoking	85	29.9	9	10.6	76	89.4	100
Over weight	33	11.6	9	27.3	24	72.7	100
Diabetes mellitus	46	16.2	8	17.4	38	82.6	100
Total	164	57.7	26	15.8	138	84.2	100

Table- 3 Type of surgery and wound infection

Type of surgery	Patients		Wound infection		No wound infection		Total
	No.	%	No.	%	No.	%	
Repair	186	65.5	23	12.4	163	87.6	100
Mesh	98	34.5	11	11.2	87	88.8	100
Total	284	100	34	12	250	88	100

Table-4 : Type of inguinal hernia and wound infection

Type of Hernia	Patients		Wound infection		No wound infection		Total
	No.	%	No.	%	No.	%	
Indirect	209	73.6	17	8.1	192	91.9	100
Direct	75	26.4	17	22.7	58	77.3	100
Total	284	100	34	12	250	88	100

Discussion

Both in the United States and Europe, more than 1 million inguinal hernia repairs are performed annually. [27]The majority of these repairs are nowadays performed using a variety of mesh techniques of which the Lichtenstein “open flat mesh repair” is the most popular. [23,24,25,27] In our study from 284 patients 98 patients(34.5%) underwent mesh repair while 186 patients(65.5%) underwent herniorrhaphy repair . Inguinal hernia repair is an elective clean operation, and the postoperative wound infection rate should be very low. Prophylaxis in clean operations has been shown of value in other areas of surgery such as trauma [30]and vascular surgery, [31,32]but in inguinal hernia repair its benefit remains uncertain. In this study all our patients were given antibiotics but the difference was in type and duration. Overall infection rate was low (1.7%) compared with a similar trial of Yerdel et al[26] (4.8%). The relatively low incidence of wound infection (1.8%) in placebo group compared with the 15% in other study be explained by patient and operation characteristics. [24]In our study wound infection after inguinal hernia surgery was 12% in spite of difficult circumstances in our country around the hospital economically and security stabilization. A potential drawback of many studies is the timing of administration of the antibiotic prophylaxis: 30 minutes before incision is difficult to organize in most hospitals. In theory, the optimal timing of the administration should be so that the bactericidal concentration is maximal in serum and tissues by the time the skin is incised.[29,33] .in the study antibiotics are given for all patients postoperatively

but duration ,number and type differ from patient to another. Since there is no benefit in the use of antibiotic prophylaxis for inguinal hernia repair in low-risk patients, its use is not cost-effective. Because of an unknown impact on bacterial resistance, [28] the use of routine antibiotic prophylaxis in primary inguinal hernia repair should be discouraged. A major problem occurs when the mesh is infected. Several studies reported late-onset of mesh infection or chronic groin sepsis [34,35]eventually leading to complete mesh removal. In our study, wound infection after mesh surgery occurred in 11 patients(11.2%) while by repair surgery occurs in 23 patients (12.4) % Table 3 . In 3 patients only we obligated to remove the mesh completely.DM is a known risk factor for developing SSI in postoperative patients. In one retrospective study of 267 patients, those with DM had higher rates of postoperative infection and prolonged hospitalization. Wound infection was 15.2%.[23] In a more recent retrospective case-controlled study of 273 surgery patients with and without infection, among other risk factors, DM was the highest of a number of independent risks for surgical site infection [15]. In our study from 284 patients involved ,46 patients (16.2%)were diabetic, wound infection occurred in 8 patients (17.4%) which is between overweight patients (wound infection 27.3%) and smoking patients (wound infection 10.6%)Table 2. In a study performed on 125 patients older than 19 years reported by Reid et al. [4], concerning complications, in normal weight patients, hematoma was 2 (6%) and wound infection was 1 (3%), and in overweight and obese patients, hematoma was 1 (1%) and wound infection was 2 (2%), and no significant difference between the two groups was seen.

In our study over weight patients record high percentage of wound infection (27.3%) Table 2 .Other studies have reported that among patients underwent inguinal hernia repair, in cases with high BMI, the risk of the development of complications was increased, and the higher was BMI, the longer was the average postoperative hospital stay. The mean postoperative hospital staddition, in inguinal hernia repair without using a mesh, obesity is associated with wound infection [14].)Other studies conducted retrospective review and reported a wound infection rate of 18% in overweight elderly patients undergoing hernia repair at Liaquat University of Medical and Health sciences which is correlated relatively with our study ,wound infection between ages 41-50 years was (17.7%) and over 50 years was(26.9%).This is because overweight ,diabetes mellitus and other factors recorded more in these age groups. Jawaid et al[26] conducted a study at Civil Hospital Karachi reported a wound infection rate of 11.4% in patients undergoing elective surgery including inguinal hernia repair. Two other local studies from Pakistan reported 0% infection rate in patients undergoing hernia repair, [36,37] however, they did not report how they diagnosed wound infection. In our study the wound infection rate was 12%, Table 1,2,3,4 . The possible reasons behind this wide range of reported incidence of SSI are the criteria, set up, patients' selection (elective/emergency/day care) and type of study. The criteria for declaring wound infection in our study was opening of the wound in clinic or if the consultant considered SSI and started patients on antibiotics. There were many statistically significant factors responsible for surgical site infections in the current study according to the sequence effect ,overweight (w.infection 27.3%) age more than 50 years (26.9%),type of hernia ,direct inguinal hernia (22.7%),diabetes mellitus (wound infection (17.4%), then smoking (10.6%). The other fault for wound infection could be anywhere from scrubbing techniques, to preparing and draping the patients or operative techniques to errors in aseptic techniques on part of the doctors, nurses and operating room staff, instruments and other substances .All these become other added factors affect wound infection rates.

Conclusion

Our study showed that overweight, age more than 50 years ,direct inguinal hernia, diabetes mellitus, and less than that smoking affect significantly wound infection rates after inguinal hernia surgery but type of surgery does not.

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