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Incidence and risk factors of post-incisional abdominal eventration in postoperative exploratory laparotomy patients

Incidencia y factores de riesgo de eventración abdominal postincisional en postoperados de laparotomía exploradora

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Palabras clave: *hernias ventrales postincisionales, hernias ventrales, laparotomía, incidencia, eventración, abdominal.*

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ABSTRACT

Introduction: post-incisional ventral hernias are one of the most frequent postoperative complications. There are different repair techniques for post-incisional ventral hernias; in most cases, synthetic meshes are used, obtaining better results in terms of recurrence. **Objective:** to report the number and incidence of post-incisional ventral hernias in postoperative exploratory laparotomy patients at the Central State Hospital. **Material and methods:** a retrospective cross-sectional observational study in which operating room databases were analyzed to find postoperative patients with post-incisional ventral hernias at the Central Hospital from 2017 to 2018. Selected patients were contacted one year later to corroborate whether they developed post-incisional ventral hernias. **Results:** 74 patients who met the inclusion criteria were analyzed. We found a prevalence of 17.1% of patients who developed post-incisional ventral hernia in 2019 at the Central Hospital of the State of Chihuahua. The average age was 42 years. **Conclusions:** we found no relationship between the factors studied and the development of post-incisional hernias.

RESUMEN

Introducción: *las hernias ventrales postincisionales son una de las complicaciones postoperatorias más frecuentes. Existen diferentes técnicas de reparación para las hernias ventrales postincisionales; en la mayoría de los casos se utilizan mallas sintéticas, obteniendo mejores resultados en cuanto a recidiva.* ***Objetivo:*** *reportar el número e incidencia de hernias ventrales postincisionales en pacientes postoperados de laparotomía exploradora en el Hospital Central del Estado.* ***Material y métodos:*** *estudio observacional retrospectivo de corte transversal, en el cual se analizaron bases de datos de quirófano para encontrar pacientes postoperados de hernia ventral postincisional en el Hospital Central de 2017 a 2018 y se contactó a los pacientes seleccionados un año después para corroborar si éstos desarrollaron o no hernias ventrales postincisionales.* ***Resultados:*** *se analizaron 74 pacientes que cumplieron con los criterios de inclusión. Se encontró una prevalencia de 17.1% de pacientes que desarrollaron hernia ventral postincisional durante el año 2019 en el Hospital Central del Estado de Chihuahua. La edad promedio fue 42 años.* ***Conclusiones:*** *no encontramos relación entre los factores estudiados y el desarrollo de las hernias postincisionales.*

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INTRODUCTION

Total post-incisional ventral hernias are one of the most frequent postoperative complications; the risk of developing a hernia after elective surgery is between 5 and 20%.[1,2] A post-incisional ventral hernia is defined as a palpable and visible mass no more than 3 cm from the surgical scar.[3,4] The increasing incidence of post-incisional ventral hernias is due to a growing, aging population with obesity, among several other risk factors, undergoing abdominal surgeries.[5-7] Some risk factors mainly associated with the appearance of hernias are infection, obesity, tobacco use, malnutrition, immunosuppressive therapy, chronic pulmonary disease, ascites, emergency surgeries, age over 70 years, hypertension, malignancy, and connective tissue defects; they produce failure in the repair of the injured tissue at the time of the surgical procedure so that its anatomical structure is compromised and is reflected as a defect of the abdominal wall.[5] Obesity is one of the most frequent risk factors in the development of post-incisional ventral hernias;[8] about 2/3 of patients with ventral hernias suffer from obesity, having a body mass index greater than 30, in addition to reporting a recurrence of between 30 and 40%.[2,9] The increasing incidence of post-incisional ventral hernias is due to a growing population, aging with both obesity and major abdominal surgeries, which predisposes to a lower quality of repair and collagen created.

Wall closure could also be considered a predisposing factor for the appearance of ventral hernias; the type of suture material used to perform it has been questioned. Histologically, two subtypes of macrophages are known: subtype 1 has proinflammatory properties, and subtype 2 contains regulators of extracellular matrix remodeling. An increased expression of type 2 macrophages was found with polydioxanone (PDS) in the early days. Type 2 macrophages favor fibroblast activity, which is why they are considered a good prognostic factor and could positively affect abdominal wall repair. This activity provides arguments for closing the abdominal wall with polydioxanone sutures compared to vicryl or prolene.[10]

Using meshes for repair is a common practice, either open or laparoscopic, and their use produces a lower percentage of recurrence. However, they have an essential disadvantage since they increase the risk of infection, erosion, and fistula formation, and even mesh migration can occur.[11] The causes of this migration can be classified into two: those produced mechanically due to the patient's movement and those that occur secondary to erosion of the surrounding tissues.[12,13]

For hernia repair, mesh placement can be performed laparoscopically.[14,15] It is a procedure that consists of patching the abdominal wall defect with a non-absorbable mesh attached to the wall.[16-19] Post-incisional hernias recur up to 44% after the first repair. Recurrence with the laparoscopic technique is comparable to that of the open technique.[20,21] The laparoscopic technique is only sometimes possible due to the hernia size (greater than 7 cm).[22-25]

This study aims to define the incidence of post-incisional ventral hernias in postoperative exploratory laparotomy patients at the Central State Hospital and find a relationship between risk factors and suture material used for closure.

MATERIAL AND METHODS

This report refers to an observational, retrospective, cross-sectional, retrospective study developed at the Hospital Central del Estado, Chihuahua, Mexico. Operating room and records databases were analyzed to find cases that underwent emergency exploratory laparotomy surgery at the hospital from 2017 to 2018.

In the clinical records, the suture material used for abdominal wall closure was investigated. The selected patients were contacted one year later to corroborate whether or not they developed post-incisional ventral hernias. In addition, post-surgical notes from the clinical records were analyzed to define the type of closure and suture used in the exploratory laparotomy. The data obtained were analyzed with IBM SPSS Statistics 22 software.

Inclusion criteria: patients over 18 years of age, of either sex, undergoing exploratory laparotomy at the Chihuahua State Central

Hospital between 2017 and 2018 were included.

Exclusion criteria: subjects who had not undergone exploratory laparotomy or cases in which this was not performed at the State Central Hospital. Patients under 18 years of age or who did not have informed consent issued by the institution signed by the patient where he/she cedes the information of his/her file.

RESULTS

The subjects considered for the study were 126; 40 were excluded based on the exclusion criteria, and 12 were eliminated due to a lack of necessary data in the clinical record. For the study, 74 patients who met the inclusion criteria were selected. The sample size necessary to obtain a confidence level of 95% and power of 80% was calculated as 73 patients.

We found a 17.1% incidence of patients who developed post-incisional ventral hernia during 2019. The mean age was 42 years. A correlation was sought between the development of post-incisional ventral hernias and the factors: sex, age, surgical wound classification, and type of suture used for abdominal wall closure. No statistically significant relationship was found when comparing the incidence of post-incisional ventral hernia and the sex of the person (female, p=0.76, OR: 0.813, 95%CI: 0.216-3.065; male, p=0.76, OR: 1.230, 95%CI: 0.326-4.635). There was no significant difference by suture material used (polypropylene, p=0.484, OR: 2.292, 95%CI: 0.212-24.801; polydioxanone, p=1.204, OR: 0.405, 95%CI: 0.077-2.120; vicryl, p=0.458, OR: 1.742, 95%CI: 0.397-7.643). The rest of the results are shown in *Table 1*.

DISCUSSION

In this series, we found an incidence of 17.1% of patients who developed ventral hernia, consistent with that reported in the literature, ranging from 5 to 20%.[1,2]

Most patients were male (63.3%), but no statistically significant difference was found concerning females. Most of the subjects who developed post-incisional ventral hernia were in the 18-30 and 44-56 age ranges. It is important to note that, contrary to what is mentioned in the literature, being close to 70

Table 1: Comparison of factors associated with ventral hernia.

	Ventral hernia, n (%)			
	Present	Absent	p	OR (95% CI)
Sex				
Female	4 (36.4)	26 (41.3)	0.76	0.813 (0.216-3.065)
Male	7 (63.6)	37 (58.7)	0.76	1.230 (0.326-4.635)
Age (years)				
18-30	4 (36.4)	26 (41.3)	0.76	0.813 (0.216-3.065)
31-43	0 (0)	10 (15.9)	0.155	1.208 (1.080-1.350)
44-56	4 (36.4)	14 (22.2)	0.313	2.000 (0.511-7.828)
57-69	1 (9.1)	8 (12.7)	0.736	0.688 (0.077-6.114)
> 70	2 (18.2)	5 (7.9)	1.148	2.578 (0.433-15.345)
Suture				
Prolene	1 (11.1)	3 (5.2)	0.484	2.292 (0.212-24.801)
PDS	2 (22.2)	24 (41.4)	1.204	0.405 (0.077-2.120)
Vicryl	6 (66.7)	31 (53.4)	0.458	1.742 (0.397-7.643)

PDS = polydioxanone. OR = *odds ratio*. CI = confidence interval.

years of age or older than 70 did not increase the incidence of hernias.[1,2]

Regarding the material used for wall closure, the most used in our institution is vicryl used in 53.4% of cases, followed by polydioxanone (41.4%) and prolene (5.2%). Although the percentage of recurrence was lower in the case of polydioxanone, the probability value calculations did not show a significant value to be able to conclude that any material is more effective in this study, contrary to the literature that mentions greater efficacy of closure when using polydioxanone.[10]

No statistical significance was found when analyzing the rest of the risk factors.

Among the study's considerations, we must take into account the surgical technique used for closure, the surgeon who performed it, and his experience with the procedure; however, the study's objectives were met since the incidence of post-incisional ventral hernias or abdominal eventrations in our environment and their relationship with the risk factors and suture material used were defined.

CONCLUSIONS

The incidence in our setting is like that described in the literature.[1,2] No statistically significant relationship was found between the variables analyzed; a possible explanation for this is that the appearance or development of post-incisional hernias could be an outcome that depends on the surgeon's expertise and experience.[26]

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