



Research Article

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Incisional hernia at “Guglielmo da Saliceto” hospital of Piacenza in Italy: Epidemiological, anatomical and therapeutic aspects

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Abstract

Introduction: Incisional hernia is a common complication after abdominal surgery, occurring in 10 to 20% of cases after laparotomy, but may also occur after laparoscopy. The aim of this study is to determine the epidemiological, anatomical and therapeutic aspects of incisional hernia. **Patients and methods:** It is a descriptive retrospective study, from January 1, 2013 to December 31, 2016 in department of general, vascular and senologic surgery of "Guglielmo da Saliceto" hospital of Piacenza in Italy. Statistical analyzes were performed with SPSS statistic software, version 20.0. **Results:** We collected files of 239 incisional hernia cases, of which 48 cases occurred in 2013, 48 in 2014, 85 in 2015, and 58 in 2016. The annual incidence was respectively 2.88%, 1.85%, 3.23% and 2.56%. The majority of patients ranged between 61 and 81 years old, accounting for 131 patients out of 239 (54.81%). Extremes were 20 years old and 95 years old. On average 66 ± 14.24 years. The sex ratio was 0.66. Median orifice took 87.03% of cases. In 63.18% of patients the incisional hernia was small, in 23.01% of cases were large. In 191 patients (79.92%) the orifice was single and double in 18 cases (7.53%). Most patients, 167/239 cases (69.87%) underwent elective surgery. Durations ranging from 8 to 986 minutes. 50% of patients the procedure lasted less than 90 minutes. Contaminated represent 20.92%, compared to 74.90% of cases strictly clean and 4.18% of infected cases. Hospital stay lasted for 7 to 9 days on average. The prosthesis was used in 179 patients (74.90%) and 54 cases (22.59%) received a parietorrhaphy. Polypropylene prostheses are by far the most used 132/179 (73.74%), Followed by those in polyester 25/179 (13.97%). In 197 out of 239 patients (82.43%), there were no complications. There were 6 deaths, mortality rate of 2.51%, and 10 cases (4.18%) of infection. **Conclusion:** The average age is 66 years and the female sex is the most touched. The median location is by far the most common. The diameter is often less than 5 cm. Despite being a rather clean procedure, incisional hernia repair is not free of infection risks. It is generally an elective scheduled procedure. Prosthesis use is the most common technique and polypropylene prostheses are most frequently used.

Keywords: anatomy, epidemiology, incisional hernia, Piacenza, therapeutic.

INTRODUCTION

Incisional hernia is a common complication following abdominal surgery, occurring in 10 to 20% of cases after laparotomy, but may also occur following laparoscopy [1]. The potential gravity of their typical complications such as strangulation, and atypical ones, such as evisceration, gravid visceral incarceration [2] justifies elective surgical management.

Since the early days and the first parietal prostheses, polypropylene in the USA and polyester in France, the use of prostheses has become essential in parietal surgery for groin hernias as well as for incisional hernia [3]. Laparoscopic repair of incisional hernia with an intraperitoneal prosthesis to cover the gap was first described by LeBlanc and Booth in 1993 [4]. In Africa, Diabira [5] reports a serie of incisional hernia cases in BAMAKO hospital (MALI) in which open surgical parietorrhaphy is the only technique used to repair.

The aim of this study is to determine the epidemiological, anatomical and therapeutic aspects of incisional hernia in Italy, through a retrospective study carried out in the department of general, vascular and senologic surgery of "Guglielmo da Saliceto" hospital of Piacenza.

Patients and Methods

This is a descriptive retrospective study over a period of 4 years from January 1, 2013 to December 31,

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2016. The study involved all patients brought to the operating room with pre- or peroperative incisional hernia diagnosis during the study period. All cases recorded in the hospital database over the study period were included.

The following variables were studied: *epidemiology*: annual incidence, age, gender; *anatomy*: location, dimension, number of orifice, content; *therapeutic*: Character of procedure, Duration of surgery, Type of anesthesia, State of the operating site, Hospital stay, Associated procedures, Surgical approach, Surgical technique, Type of prosthesis and complications.

The text was entered using the Word 2010 software. Statistical analyzes were performed with the SPSS statistic software (IBM SPSS Statistics for Windows, version 20.0, Armonk, NY: IBM Corp).

Medical ethics and ethical considerations: All data collected during our work were used only for this study and remained confidential.

RESULTS

Epidemiology: Annual incidence, Age, Gender.

We collected files of 239 incisional hernia cases, of which 48 cases

occurred in 2013, 48 in 2014, 85 in 2015, and 58 in 2016. The annual incidence was 2.88% (48/1668) in 2013, 1.85% (48/2580) in 2014, 3.23% (85/2627) in 2015 and 2.56% (58/2267) in 2016. (figure1) The majority of patients ranged between 61 and 81 years old, accounting for 131 patients out of 239 (54.81%). Extremes were 20 years old and 95 years old. On average 66 ± 14.24 years. Females were the dominant sex with 146 women (61.09%) compared to 93 men (38.91%). The sex ratio was 0.64. (Table I)

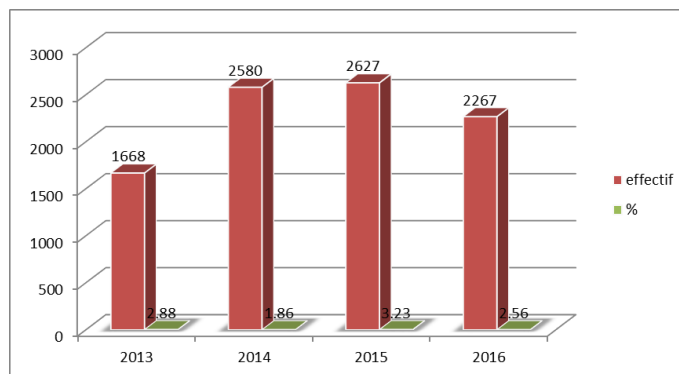


Figure 1: distribution of incisional hernia cases per year

Table I: Case Distribution by Epidemiological and Anatomic Variables

	number of cases	Percentages
Age		
[20-41]	12	5,02
[41-61]	55	23,01
[61-81]	131	54,81
≥81	41	17,16
Total	239	100
Gender		
Female	146	61.09
Male	93	38.91
Total	239	100
Location		
Medial	208	87.03
Lateral	31	12.97
Total	239	100
Size		
Small	151	63.18
Medium	33	13.81
Large	55	23.01
Total	239	100
Number of orifices		
Unique	191	79.92
Double	18	7.53
Plus de 2	30	12.55
Total	239	100
contents		
fatty tissue	6	2,51
Intestine	61	25,52
Omentum	49	20,50
empty	23	9,62
others	4	1,67
Not specified	96	40,17
Total	239	100

Anatomy: Location, Size, Number of orifices, Contents

208 patients (87.03%) had a median orifice and 31 patients (12.97%) lateral orifice site. In 63.18% of patients the incisional hernia was small (<5 cm in diameter), 23.01% of cases were large (> 9 cm in diameter) and 13.81% of average size (between 5 and 9 cm in diameter). In 191 patients (79.92%) the orifice was single, double in 18 cases (7.53%) and more than 2 in 30 patients (12.55%). Of the 239 cases, 61 (25.52%) had the intestine as their contents. In 96 patients (40.17%) the content was not specified, intestine in 61 patients (25.25%), omentum in 49 patients (20.50%) and for 23 patients (9.62%) the hernia sac was empty. (Table I)

Table IIa: Case Distribution by Therapeutic Variables: Character of procedure, Duration of surgery, Type of anesthesia, State of the operating site, Hospital stays, and associated procedures.

	Number of cases	Percentage
Character of procedure		
Urgent	72	30.13
elective	167	69.87
Total	239	100
Duration of surgery(min)		
<45	32	13.39
[45-90]	91	38.07
[90-180]	70	29.29
≥180	46	19.25
Total	239	100
Type of anesthesia		
General anaesthesia	220	92.05
locoregional anesthesia	12	5.02
local anesthesia	7	2.93
Total	239	100
State of the operating site		
clean	179	74.90
infected	10	4.18
contaminated	50	20.92
Total	239	100
Hospital stays(days)		
<5	131	54.81
6-16	90	37.66
16-30	15	6.28
>30	3	1.26
Total	239	100
Associated procedures		
ablation of the infected prosthesis	8	3.35
Inguinal hernia treatment	6	2.51
Extra abdominal surgery	2	0.84
Intra-abdominal surgery	5	2.09
Bowel resection	36	15.06
Any	182	76.15
Total	239	100

Therapeutic aspects: Character of procedure, Duration of surgery, Type of anesthesia, State of the operating site, Hospital stay, associated procedures, surgical approach, surgical technique, type of prosthesis and complications.

Most patients, 167/239 cases (69.87%) underwent elective surgery (scheduled) and 72/239 cases (30.13%) were operated urgently. Surgery took about 3 hours on average, with durations ranging from 8 minutes to 986 minutes (16h43). 50% of patients the procedure lasted less than 90 minutes. General anesthesia dominated with 92.05% of cases, compared with 5.02% for locoregional anesthesia and 2.93% for local anesthesia. Contaminated (= patients in whom a septic or potentially septic gesture was performed in the same operating time) represent 20.92%, compared to 74.90% of cases strictly clean and 4.18% of infected cases. Hospital stay lasted for 7 to 9 days on average, the shortest stay being one day long and the longest, 112 days. In 182 patients (76.15% of cases) no other procedure was performed during the same operating time. Intestinal resections accounted for 15.06% of the interventions associated with incisional hernia repair. (Table IIa)

For 6 patients (2.51%) no surgical procedure was performed to repair the incisional hernia. The prosthesis was used in 179 patients (74.90%) and 54 cases (22.59%) received a parietorrhaphy. Among 179 patients of prosthesis procedure, 59 cases (32.96%) underwent laparoscopic surgery and 120 cases (67.04%) open surgery. Polypropylene prostheses are by far the most used 132/179 (73.74%), followed by those in polyester 25/179 (13.97%). The e-PTFE prostheses and biological prostheses were used respectively at 5.59% and 3.91% rates. In 197 out of 239 patients (82.43%), there were no complications. There were 6 deaths, mortality rate of 2.51%, 10 cases (4.18%) of infection, 8 cases (3.35%) of transit disorder and 5 cases (2.09%) of respiratory distress. (Table IIb)

Table IIb: Case Distribution by Therapeutic Variables: Surgical technique, Surgical approach, Type of prosthesis and complications.

	Number of cases	Percentage
Surgical technique		
Prosthesis	179	74.90
parietorrhaphy	54	22.59
Abstention	6	2.51
Total	239	100
Surgical approach		
Open surgery	120	67.04
laparoscopy	59	32.96
Total	179	100
Type of prosthesis		
Absorbable	5	2.79
ePTFE	10	5.59
Polypropylene	132	73.74
Polyester	25	13.97
Biological prosthesis	7	3.91
Total	179	100
Complications		
deceased	6	2.51
Respiratory distress	5	2.09
Infection	10	4.18
Hematome	4	1.67
Transit trouble	8	3.35
Other	9	3.77
Any	197	82.43
Total	239	100

DISCUSSION

Epidemiology: Annual incidence, Age and gender.

The frequency of incisional hernia ranges from 2 to 20% following laparotomy [6]. In an African study in Nigeria, authors report that surgical repair of the anterior abdominal wall accounts for 15 to 18% of surgical interventions in general surgery. In this Nigerian study, the male / female ratio is 4:1. The age range is 16 to 95 years of age with an average of 48 years [7]. In a Western study, out of 224 patients, the authors note an average age of 67.5 years, with a standard deviation of 16.35 years, divided as 113 males (50.4%) and 111 females (49.6%) [8].

In our research center, the average number of surgical procedures per year is 2285.5 cases and the annual incidence for incisional hernia ranges from 1.86% to 3.23%, similarly to the literature's data. The average age in our study is 66 years with a standard deviation of 14.24; more than 70% of cases are older than 61 years of age, as in other Western studies, but high compared to African studies because of the generally old population in Europe. We noted a net female predominance of 61.09% compared to 38.91% of men, the sex ratio being 0.64.

Anatomy: location, Dimension, Number of orifices, Content

The vast majority of incisional hernia occurs on the midline and on the cranial extension of the subcostal incision, according to the evidence that midline incisions are more prone to disengagement than transverse incisions [9].

Tamer A. *et al.* [10] found an orifice diameter of less than 5 cm in 32 patients (64%), 5 to 10 cm in 14 patients (28%) and 10 to 15 cm in 4 patients (8%). Incisional hernia was, in our study, more frequent in the median region (87.03%) than in the lateral region, 12.97%, which corroborates other studies. The majority of our patients (63.18%) had a small defect (<5cm), 13.81% of patients had an average size one (5-9cm) and 23.01% had a 10cm or larger defect. A defect larger than 10 cm has been reported as a significant risk factor for recurrence regardless of whether it resulted from an open or laparoscopic technique [11]. To reduce the incidence of incisional hernia a rational deduction from these findings would be to minimize the use of midline incision and / or to abandon the cranial extension of the subcostal incision if possible. Some authors recommend the establishment of a prophylactic prosthesis on any median incision in people of high risk of incisional hernia [12, 13]. The transverse diameter of the incisional hernia is a better predictive factor of postoperative complications than its length. The size of the incisional hernia can also influence the time required for the surgical procedure and determines the complexity of the surgery [14].

We noted in more than 79% of cases a unique orifice, double in 7.53% and triple in 12.55% of our cases. We did not find in the literature other studies which analyze the number of hernia defects. But, the number of defects on the median line is decisive for the length of the prosthesis. Ignoring an orifice, however small, can be a factor of recurrence. Apart from cases where the contents were not specified, the intestine (25.25%) and omentum (20.50%) were more contained in the hernia sac. This is explained by the mobility of these two organs.

Therapeutic aspects

In the study of Ayandipo *et al.* [7] the majority of patients had elective surgery 80.7% while 19.3% had emergency surgery. In the European literature, surgery is performed for 5 to 15% of incisional hernia cases because of an acute complication (obstruction / strangulation). These emergency repairs are associated with high morbidity [14].

In our study, the majority was also operated under elective mode (69.87%), and 30.13% in emergency. The rate of emergency surgery

cases is rather high compared to other studies. Long waiting lists at the operating program in our study center could explain this rate. The overall average duration of the procedure was 3 hours. However, in more than 50% of patients the procedure lasted less than 90 minutes. The average stay was 7 to 9 days. The shortest stay lasted one day and the longest lasted 112 days. Others surgical procedures associated with the incisional hernia repair, which were found in 23.85% of patients, were very decisive in the duration of the intervention as well as in the hospital stay. The associated interventions in our series were dominated by intestinal resections (15.06%) followed by removal of the old infected prosthesis (3.35%), inguinal hernia repair (2.51%), other intra-abdominal interventions (2.09%) and extra-abdominal (0.85%) interventions.

Muysoms *et al.* [15] report an operating time of 74 minutes. They had an average hospital stay of 3.9 days. On the other hand, Colon *et al.* [16] reported an operative time of 106 minutes with no operative complications nor conversions. It should be noted that these authors' findings concern well selected cases, with no associated interventions.

Out of 239 incisional hernia cases during our study period, 179 cases (74.90%) benefited from parietal repair by prosthesis, 54 cases (22.59%) received a parietorrhaphy and surgical abstention in 6 patients (2.51%). Abstention was decided because of the degree of infection and the general poor condition of the patients.

Verhelst J *et al.* [17] Compared the "watchful waiting" technique to the operative treatment for asymptomatic incisional hernias. They found that watchful waiting technique, correlates with a very high rate of morbidity and mortality. Then, they recommend the operative treatment for any symptomatic or non-symptomatic incisional hernia.

To repair incisional hernia by using prosthesis is nowadays accepted as the golden standard for treatment of clean incisional hernia [1, 18]. In Africa, lack of means, parietorrhaphy remains the most used technique [5]. The Challenges faced by the practice of surgery in developing countries Includes late presentation of patients in health care facilities and inadequate health care funding. This requires finding a balance between the cost and innovation of surgical practice [7, 19, 20].

Brian M *et al.* [21] state that the use of a cheap and commercially available (untreated, 50% polypropylene and 50% polyethylene) mosquito net from India, sterilized at a minimum temperature of 121° Celsius for 3 minutes, instead of 134° Celsius as recommended by the Medical Devices Agency, MDA; for repair in the treatment of inguinal hernia is plausible, safe and low cost. It could be an alternative in developing countries. As the use of synthetic prostheses in abdominal wall surgery, started with inguinal hernia repair, we believe that it is possible in developing countries to use this mosquito net to repair incisional hernia.

The most common type of prosthesis used in our study was the polypropylene prosthesis (132/179 cases), 73.74%. The e-PTFE prostheses and biological prostheses were used respectively at 5.59% and 3.91% rates. Their high cost would justify this low rate of use. Conventional resorbable prostheses lead to prohibitive recurrence rates. Coated prostheses and biologic prostheses are currently being evaluated, with recurrence rates appearing to be high according to preliminary results [3]. "The Ventral Hernia Working Group" recommends synthetic prostheses for healthy individuals and biological prostheses for contaminated / infected parietal repair cases [22].

Of the 239 patients, we recorded 42 cases of complications (17.57%) and 197 cases or 82.43% without complications. Six patients died, making a mortality rate of 2.51%. In other studies, the postoperative mortality rate ranges from 0.1% to 1.1%, Morbidity ranges from 15.1% to 22.2%. Most complications are minor but the major complication rates are not insignificant: respectively 4.2% and 6.6% in the studies of

Heniford *et al.* [4] and Egea *et al.* [23] Our incidence of complications was similar to other series, but our mortality rate higher, probably due to our inclusion criterion. We reported any case of incisional hernia during the study period, whether or not operated, associated or not with other pathologies. Apart from death (2.51%), surgical site infection (4.18%), transit disorder (3.35%), Respiratory distress (2.09%) and hematoma (1.67%) were the main complications observed in our series. Other complications representing 3.77% of cases were: enterocutaneous fistula, hematuria, intraoperative bladder lesions, and generalized acute peritonitis.

CONCLUSION

In our series, incisional hernia cases represent 1.86 to 3.23% of annual surgical interventions, the average age is 66 years and the female sex is the most touched. The median location is by far the most common. The diameter is often less than 5 cm, but large incisional hernia, greater than 10 cm in diameter, are not rare either. The orifice is often single but can be doubled or tripled. Despite being a rather clean procedure, incisional hernia repair is not free of infection risks. It is generally an elective scheduled procedure. The average duration of the intervention and hospitalization is respectively 3 hours and 7 days. Prosthesis use is the most common technique and polypropylene prostheses are most frequently used. Complications are not uncommon, the most frequent being: surgical site infection, bowel movement disorder, respiratory distress, seroma (hematoma), enterocutaneous fistula, peroperative bladder injury, generalized acute peritonitis, and even death.

Conflicts of interests: All authors do not claim any conflict of interests.

Author's contribution

- Alexis MUPEPE K. and Filippo BANCHINI: acquisition of data, Drafting the article, Substantial contribution to conception and design,
- Setondji GR. ATTOLOU, Enrico BANCHINI, Josaphat PALUKU K.: Revising it critically for important intellectual content.
- Patrizio CAPELLI and Delphin K. MEHINTO: Final approval of the version to be published.

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