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Trabalho de Conclusão de Residência

Comparação das Técnicas Onlay e Sublay para correção de hérnia incisional: desfechos nos primeiros 30 dias pós-operatórios

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Resumo

Objetivo: O desenvolvimento de hérnia incisional é uma complicação comum após laparotomias. Também tem um impacto econômico importante nos sistemas de saúde e no orçamento da previdência social. O reforço com tela da parede abdominal foi um avanço importante para aumentar o sucesso dos reparos e ajudou a reduzir sua recorrência em longo prazo. Os dois locais mais comuns para colocação de tela em reparos de hérnia incisional incluem os planos pré-muscular (técnica onlay) e retromuscular (técnica sublay). Porém, até o momento, não há consenso na literatura sobre a localização ideal da tela. **Método**: Neste estudo, acompanhamos 115 pacientes submetidos a reparos de hérnia incisional onlay ou sublay e avaliamos, como desfecho, as ocorrências de sítio cirúrgico no pós-operatório de trinta dias e a recorrência precoce para cada técnica. **Resultados**: Não encontramos diferença nos resultados entre os grupos, exceto na formação de seroma, que foi maior nos pacientes submetidos à técnica de sublay, provavelmente pela menor taxa de colocação de dreno neste grupo. **Conclusão**: Assim, ambas as técnicas de colocação de tela parecem ser adequadas no reparo de hérnias incisionais, sem grande diferença na ocorrência de sítio cirúrgico ou recorrência de hérnia no seguimento em curto prazo.

DESCRITORES: Hérnia. Parede Abdominal. Hérnia Ventral

Abstract

Purpose: Development of incisional hernia is a common complication following laparotomy. It also has an important economic impact on healthcare systems and social security budget. The mesh reinforcement of the abdominal wall was an important advancement to increase the success of the repairs and reduce its long-term recurrence. The two most common locations for mesh placement in ventral hernia repairs include the pre-muscular (onlay technique) and retromuscular planes (sublay technique). However, until now, there is no consensus on the literature about the ideal location of the mesh. **Method:** In this study, we followed 115 patients who underwent either to onlay or sublay incisional hernia repairs, and evaluated the thirty-day postoperative surgical site occurrences and hernia recurrence for each technique. **Results:** We found no difference in the results between the groups, except in seroma formation, which was higher in patients submitted to the sublay technique, probably because of the lower rate of drain placement in this group. **Conclusion:** Thus, both techniques of mesh placement seem to be adequate in the repair of incisional hernias, with no major difference of surgical site occurrences or hernia recurrence in short-term follow up.

Introduction

Incisional hernia (IH) is a common complication after an open abdominal surgery, with a reported incidence of 10-20% [1-3]. Around 20,000 incisional hernioplasty procedures are performed annually in Brazil's public health system (SUS). In the US this number reaches 200,000 procedures annually, costing from 3,900 to 16,000 dollars per surgery, depending on whether it requires hospitalization or not [5].

Aside from the functional, aesthetic and psychological impairment, incisional hernias have also a large economic impact. In Brazil, they are one of the main causes of absence from work. In 2018, approximately 1% of the 2,271,033 benefits granted by the Brazilian social security program were related to incisional ventral hernia (about 19,000 benefits), which represented an impact of almost 5 million dollars on the social security budget that year [6]. For comparison, it is estimated that the total cost of IH repairs in the US is around $ 3.2 billion annually [7].

Basta et al conducted a scientific analysis of approximately 30,000 abdominal surgeries performed between 2005 and 2016 including intra-abdominal, urological and gynecological procedures. It was identified an IH incidence of about 3.8% at an average follow-up of 57.9 months. The procedures most involved in the development of IH were colorectal (7.7%), vascular (5.2%), bariatric (4.8%) and organ transplant surgery (4.5%) [8].

Many risk factors for IH have been identified, such as obesity, smoking, COPD, previous abdominal surgery, surgical site infection (SSI) and diabetes [8,9]. Some authors have dedicated themselves to create risk stratification models to identify these high-risk patients and propose strategies to decrease its incidence. It is well stablished the use of mesh drastically increases the success rate of IH repairs and decreases its occurrence when used prophylactically in laparotomies [10, 11].

There are several approaches for mesh placement, but the most used are the onlay and the sublay (retromuscular) repairs. Over the years, several studies have compared the two techniques in order to identify which has the best outcomes related to surgical site complications and recurrence. Although some have demonstrated that the sublay technique may have lower surgical site occurrences [4, 12], there is no consensus on which one is best to perform.

This study aims to compare the two most common incisional hernia repair techniques (onlay and sublay) with regard to the complication rate within the first 30

days of postoperative care. Likewise, we also aim to assess the epidemiological profile of the patients undergoing incisional hernioplasty in our institution.

Materials and Methods

In this retrospective cohort analysis, we studied patients who were submitted to IH repairs between January 2019 and November 2020, in the Hospital de Clínicas de Porto Alegre (HCPA), Brazil, funded by the National Public Health System (SUS). The procedures were performed in a teaching hospital by surgeons of different levels of expertise. The institutional review board approved the study and waived written informed consent.

We analyzed all the incisional hernioplasty with mesh placement performed at the institution in the informed period. Data were extracted from medical records, using an electronic standard form. We collected data about the preoperative conditions (comorbidities, imaging exams, previous surgery, BMI, hernia parameters and surgery indication), intraoperative period (surgical technique, suture thread type, mesh parameters) and 30 days postoperative complications.

Patients were excluded from the study if one of the following conditions were presented: age less than 14 years old; repair with no mesh placement; health insurance financing; combined surgical technique (onlay and sublay mesh replacement). Of the 151 initially identified patients, 36 were excluded of the analysis (25 patients were funded by health insurances, with no post-operative adequate follow up data; 3 patients were not submitted to a mesh repair hernioplasty; and 8 patients were submitted to a combined repair), as shown in Figure 2.

We used the European Hernia Society (EHS) classification to locate the hernial defect in the abdominal wall. Midline incisional hernias were classified in 5 zones (Figure 1): M1 subxiphoidal, M2 epigastric, M3 umbilical, M4 infraumbilical and M5 suprapubic. Lateral incisional hernias were classified in 4 zones (Figure 1): L1 subcostal, L2 flank, L3 iliac and L4 lumbar. Midline hernial defects that affected the entire incision, extending over two or more zones, were classified in a separate category.

Statistical Analysis

Data were presented as mean and standard deviation or median and interquartile range (IQR) (continuous data) or as count and proportion (categorical and ordinal data). Continuous variables with normal distribution were

analyzed with the Student's t test and asymmetric variables with the Mann-Whitney test. Categorical variables were compared using the chi-square test. After univariate screening, we used multivariable linear regression to adjust for clinically and statistically significant covariates. All statistical analyses were performed with IBM® SPSS® *Statistics 23.0* (SPSS Inc, Chicago). All tests were two-sided and p-values of < 0.05 were considered statistically significant.

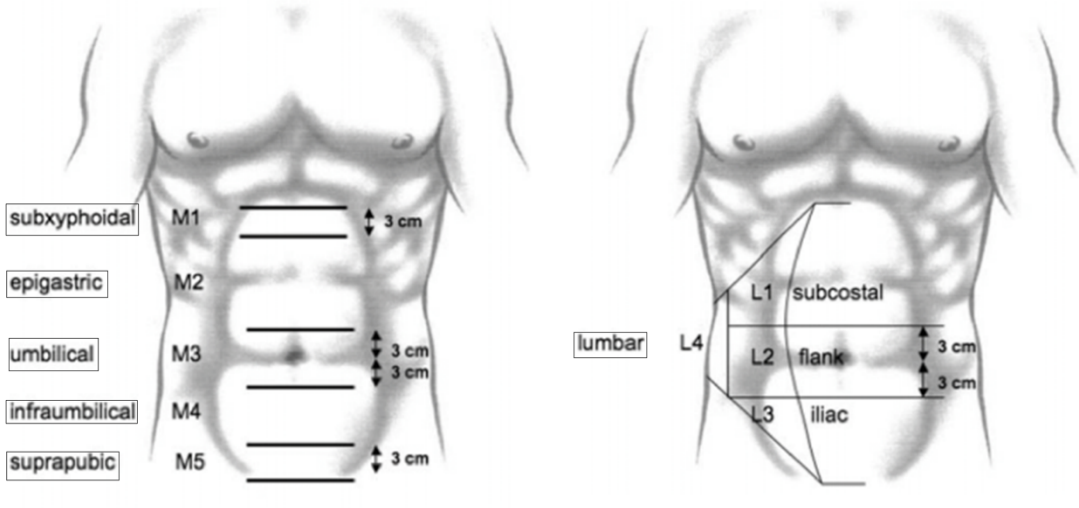

Figure 1 – European Hernia Society (EHS) Classification for incisional hernia. Extracted and adapted from Muysoms FE, Miserez M, et al. Classification of primary and incisional abdominal wall hernias. Hernia, 13:407-14; 2009. [25]

Results

Patients

Of the 115 selected patients, 57 underwent onlay and 58 sublay mesh placement. The patients were initially compared based on sociodemographic and comorbidities profile, as shown in Table 1. The following comorbidities were evaluated: obesity (BMI > 30), hypertension, diabetes, current neoplasia, HIV infection, immunosuppression (use of corticosteroids, immunobiologicals), coagulopathy or use of anticoagulants, chronic kidney disease, inflammatory bowel disease and COPD. There was no statistically significant difference between the groups with regard to comorbidities. The average age between the groups was also similar, with the majority of patients being female in both groups. As part of our preoperative routine, we usually adopt a BMI < 33 as a cut-off point for surgical indication, regardless of the type of technique employed. In the onlay group (OG), 47 patients had a BMI <33 (82.5%), while in sublay group (SG), 44 patients (77.2%) with this characteristic were found; there was no statistically significant difference between the groups (p-value = 0,484).

Hernia Characteristics

The hernia defects of the OG had a larger total area compared to the SG (table 2). Length and width of the defects were measured during the surgery. In case of missing measurement records in the surgical description, we used imaging tests to assess the size of the defects (mostly CT-scan). Likewise, it was observed that recurrent hernias were also more frequent in the OG (14% vs 5%, p = 0.009). When analyzing these recurrent cases, we observed that 36% of the patients had been previously submitted to surgery with no mesh placement, 50% underwent onlay technique and 14% sublay technique. On the other hand, all patients of the SG with recurrent incisional hernias had been previously submitted to the onlay repair technique.

The types of procedures most involved in the development of incisional hernia in the SG were: exploratory laparotomy (24.1%), colectomy (19%) and bariatric surgery (8.6%). In OG, we obtained a slightly different profile, and the most common surgeries related to incisional hernias were: colectomy (19.3%), exploratory laparotomy (17.5%) and open cholecystectomy (9%).

When analyzing the position of the abdominal wall defects according to the classification of the European Hernia Society (EHS), we observed that in the OG, epigastric hernias predominated (26%), followed by umbilical hernias (21%) and subcostal hernias (14%). In the sublay group, epigastric defects also predominated (47%) but it was followed by flanks (12%) and infraumbilical (10%) defects. Despite this difference was not statically significant, we believe it was due to the different types of surgeries that originated the incisional hernias in both groups.

Surgery

All surgeries, regardless of the technique, were performed using a polypropylene mesh. We also observed that in the OG all surgeries involved mesh fixation, while in the SG 16% of the cases were performed without any type of mesh fixation ($p = 0.002$). Polypropylene (58%) was the most used type of suture thread to fixate the mesh, followed by polydioxanone (23%) and polyglactin (19%). Most surgeries were performed using the open technique (95%).

There was a higher rate of drain placement in the OG, probably because of the need for greater dissection of the subcutaneous tissue, which also could lead to others postoperative complications, such as seroma formation. In all cases where drainage was performed, it was used a suction drain (eg, Portovac).

Although the abdominal wall defects in the patients of the OG were larger (Table 2), the average size of the mesh used was not. In fact, the mesh length was greater in the SG (table 3). Eight patients of the OG group and three of the SG underwent to emergency surgery, all due to incarcerated hernia, with no statistically difference ($p = 0.106$).

Postoperative

The postoperative data are shown in Table 4. All postoperative outcomes were evaluated within the first 30 days after surgery, either during hospitalization or outpatient visits. We assessed surgical site occurrences (SSI, seroma, fistula and dehiscence), as well as recurrence of the hernia or death. Likewise, each of these complications was individually identified and compared between the groups.

Fifty-two (45%) patients had some type of postoperative complication. The most common complication was seroma formation (30%), followed by skin dehiscence (17%) and SSI (15%). Complication rates, analyzed individually or together (SSO), were similar between groups, with the exception of seroma formation. We observed a higher incidence of seroma in the SG compared with the OG (40% vs 21%, p = 0.030). Considering the higher rate of drain placement in the OG, we performed a linear regression to control this variable, and found that the placement of drains was related to a lower incidence of seroma formation. Postoperative complications were also evaluated using the Clavien-Dindo scale and no statistically significant differences were found between the groups (table 4).

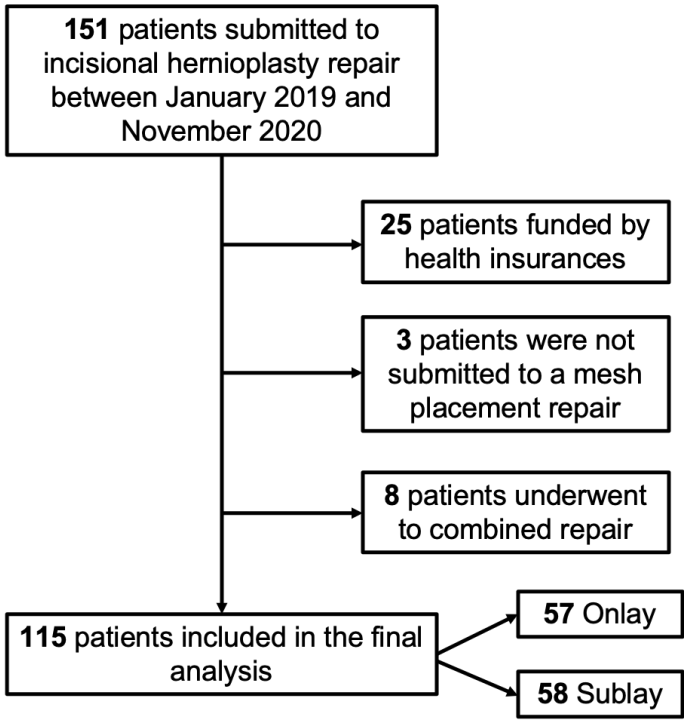

Figure 2 – Flowchart of the article selection process

	Onlay Group (57)	Sublay Group (58)	p value
Age, *years*	61,0 ± 12,0	58,7 ± 12,8	0,328
Male	16 (28)	22 (38)	0,261
BMI, kg/m^2	29,7 ± 5,8	30,3 ± 4,4	0,608
Obesity (BMI ≥ 30)	24 (42)	31 (54)	0,190
Smoking	9 (16)	21 (36)	0,013
Diabetes	15 (26)	14 (24)	0,788
Cancer	9 (16)	7 (12)	0,564
Immunosuppression	11 (19)	5 (9)	0,106
Chronic Renal Disease	1 (2)	3 (5)	0,317
Any other comorbidity	41 (72)	43 (74)	0,790

Table 1. Preoperative characteristics.
BMI: Body Mass Index.
Data are presented as mean ± SD or n (percentage).

	Onlay Group (57)	Sublay Group (58)	p value
Hernia length, *cm*	9,6 ± 11,9	9,4 ± 6,2	0,889
Hernia width, *cm*	6,8 ± 6,8	6,1 ± 3,4	0,465
Hernia area, cm^2	79,8 ± 11,8	65,4 ± 61,1	0,013
Previous hernioplasty	14 (25)	4 (7)	0,009
Location (EHS)			
M1 (subxiphoidal)	0	1 (2)	0,119
M2 (epigastric)	15 (26)	27 (47)	
M3 (umbilical)	12 (21)	5 (9)	
M4 (infraumbilical)	6 (11)	6 (10)	
M5 (suprapubic)	1 (2)	2 (3)	
L1 (subcostal)	8 (14)	1 (2)	
L2 (flank)	7 (12)	7 (12)	
L3 (iliac)	2 (4)	2 (3)	
L4 (lumbar)	0	1 (2)	
Entire incision	6 (11)	6 (10)	

Table 2. Hernia characteristics
EHS: European Hernia Society
Data are presented as mean ± SD or n (percentage).

	Onlay Group (57)	Sublay Group (58)	p value
Absence of Mesh Fixing	0	9 (16)	0,002
Type of Suture Thread			
Polypropylene	34 (60)	28 (57)	0,318
Polyglactin	8 (14)	12 (25)	
Polydioxanone	15 (26)	9 (18)	
Drain	41 (72)	17 (30)	<0,001
Type of repair			
Open	57 (100)	52 (90)	0,013
Videolaparoscopic	0	6 (10)	
Mesh length, *cm*	16,2 ± 8,2	19,8 ± 6,8	0,021
Mesh width, *cm*	14,3 ± 7,8	16,4 ± 6,1	0,156
Mesh area, *cm^2*	287,9 ± 290,1	350,8 ± 210,5	0,066
ASA Classification			
1	7 (12)	2 (3)	0,208
2	36 (63)	43 (74)	
3	14 (25)	12 (21)	
4	0	1 (2)	

Table 3. Surgical parameters
ASA: American Society of Anesthesiology
Data are presented as mean ± SD or n (percentage).

	Onlay Group (57)	Sublay Group (58)	p value
Surgical Site Infection (SSI)	9 (16)	8 (14)	0,762
Seroma	12 (21)	23 (40)	0,030
Fistula	0	1 (2)	0,319
Wound dehiscence	9 (16)	10 (18)	0,834
Hernia reccurrence	2 (4)	2 (4)	0,986
Death	2 (4)	1 (2)	0,548
Surgical Site Occurrence (SSO)	24 (42)	28 (48)	0,506
Clavien Dindo			
Grade 1	14 (58)	17 (61)	0,661
Grade 2	6 (25)	7 (25)	
Grade 3	2 (8)	2 (7)	
Grade 4	0	1 (4)	
Grade 5	2 (8)	1 (4)	

Table 4. 30-day Postoperative Data
Data are presented as mean ± SD or n (percentage).

Discussion

The groups in our study had no statistically significant difference in terms of preoperative characteristics, showing that the comparison between the two is feasible. Most of the patients were female, with an average age of 60 years and BMI of 30kg/m2. There are some well-known risk factors associated with incisional hernias and recurrence. Some of them include obesity, smoking, malnutrition, old age, immunosuppression and connective tissue disorders [15, 16]. So, it is also important to note that the groups in our studies were similar in regard to these risk factors. We found a recurrence rate of 4% in both groups, with no statistically difference between them. Similar results were found by Demetrashvili et al, who compared the onlay and retromuscular techniques in 180 hernia cases and showed that there was no difference in recurrence.

Wound complications are a common problem in incisional hernia repair, regardless of the technique. Some studies have shown that the development of these complications occurs more frequently after onlay repair compared to the retromuscular method [17], although others do not [18,19]. Seroma formation is one of this common complications, with an incidence of 30 to 50% after open mesh repair. The exact pathophysiology of seroma formation is unknown [20]. Some authors justify that both seroma and infection are more frequent after the onlay technique due to greater dissection of the subcutaneous tissue and its contact with the mesh [21].

Recent meta-analyses comparing retromuscular and onlay repair techniques did not show difference in seroma development, but fewer cases of wound infection were found in the retromuscular group. The higher incidence of wound infection after onlay hernia repair might be explained by the superficial location of the mesh and the facilitation of bacterial colonization in the area [12,21].

In the other hand, Demetrashvili et al. shown a lower rate of wound complications when comparing retromuscular hernia repair (22.1%) with onlay repair (50.0%) ($P < 0.001$). The incidence of postoperative seroma was also higher in the onlay group ($P<0.0013$). There was no difference in the frequency of wound infection and hematoma between the groups.

Ibrahim et al. conducted a systematic review to answer the following question: among the onlay and sublay techniques, which one offers the lowest seroma rate? Of the 64 articles evaluated, after the exclusion criteria, a total of 6 articles (2 randomized controlled trials, 1 prospective study and 3 retrospective studies) were chosen to provide the best evidence to answer the question. Two studies in this review did not suggest any difference in the seroma rate between onlay and sublay hernia repair. In contrast, the rest of the four studies showed a lower rate of seroma in the sublay group of patients compared to the onlay group.

Our results suggest a different trend. The number of surgical site complications (SSO) did not show a difference between the onlay and sublay groups. However, when individual analysis was conducted, we observed that the retromuscular group had a higher incidence of seroma compared to the onlay group (40% vs. 21%, $P < 0.030$). There were no difference regarding other surgical site complications. In an attempt to explain the difference in seroma formation, we could observe that the onlay group had a higher rate of drain placement compared to the retromuscular group (72% vs. 30% $P< 0.001$). The result did not change even after controlling this variable with covariance analysis.

In contrast to our study, Westphalen et al. allocated 42 individuals with large incisional hernias who underwent onlay mesh repair in two groups. In group 1, suction drains were placed in the subcutaneous tissue, while in group 2 there was only subcutaneous suture without drainage. Participants underwent clinical and ultrasound evaluation to detect seroma and surgical wound infection three times after surgery. They concluded that there was no statistical difference in seroma formation or wound infection frequency between groups, and that drain placement does not minimize the rate of surgical site complications [23]. Another retrospective study performed by Hodgson et al, evaluated the incidence of postoperative complications after drain placement in various types of hernia repairs. They also found that drainage did not decrease the incidence of seroma formation, but only increased time of hospitalization [24].

Conclusion

The increased incidence of incisional hernias has become a global burden. Despite the advance of surgical techniques in the recent years, some aspects are still on debate [12]. The aim of our study was to clarify which technique for

incisional hernia repair has the best outcomes, either onlay or sublay. We concluded that both have similar results, but routine drainage can decrease the rate of seroma formation.

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