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**DIGESTIVO**

Hérnia incisional pós-transplante hepático - fatores de risco e resultados do  
tratamento cirúrgico  
(Incisional hernia after liver transplantation - risk factors and hernia repair  
results)

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## Resumo

**Introdução:** pacientes submetidos ao transplante de fígado (TF) possuem alto risco de desenvolverem hérnia incisional (HI), variando na literatura de 4 a 20%.

**Métodos:** em 261 pacientes submetidos ao TF de janeiro de 2004 a novembro de 2020, foi realizada uma análise retrospectiva para a ocorrência de HI em até um ano do TF. Foram avaliados características demográficas, doenças de base, como carcinoma hepatocelular (CHC) e vírus da hepatite C (HCV), albumina e hematócrito antes do TF, índice de massa corporal (IMC), MELD-Na (Model for End-stage Liver Disease), perda sanguínea durante o TF, infecção pós-operatória, reoperação abdominal em 3 meses, tipo de sutura para fechamento musculoaponeurótico. O diagnóstico de hérnia ocorreu durante o exame físico de controle ambulatorial ou através de exames de imagem. Os desfechos de HI, correção da hérnia e recidiva herniária foram avaliados posteriormente.

**Resultados:** 71 (27,2%) pacientes desenvolveram HI, enquanto 190 (72,7%) cicatrizaram bem suas incisões. 52 de 165 (31,5%) pacientes do sexo masculino desenvolveram HI, havendo uma associação significativa como fator de risco ( $p=0,044$ ). As demais características não mostraram correlação estatisticamente significativa para a formação de HI. 28 de 71 pacientes foram submetidos ao reparo da hérnia com colocação de tela, com uma taxa de recidiva de 17,8%.

**Conclusão:** a HI após o TF é um problema relativamente comum, mais associado ao sexo masculino.

## **Introduction**

Liver transplant (LT) is acknowledged to be the only definitive treatment option for patients with end-stage liver disease (1), and some cases of unresectable hepatic neoplasms (2). With advances in the results of this therapy, greater safety and prolonged patient survival, the focus is increasingly on the quality of life of recipients.

Because these individuals sometimes have numerous pre-conditions for general postoperative complications, such as diabetes mellitus, advanced age, obesity and malnutrition (3,4), in addition to the specific debilitating characteristics of patients with liver disease, these outcomes may impair LT results.

Among these outcomes, there is incisional hernia (IH), with an incidence around 4 to 20% (5,6) in the LT population, in some cases disabling and reducing the quality of life of patients, and also related to greater rate of hospitalization and emergency surgeries, especially in cases of incarceration and strangulation, putting at risk a therapy as complex and valuable as LT.

The main objective of the present study is to define the rate of IH in patients who underwent LT in a population in southern Brazil, to assess the related risk factors, in order to establish in the future measures for prior optimization and specific prophylactic care. Secondly, cases that underwent incisional hernia repair with mesh will be described, as well as cases of hernia recurrence after the correction procedure.

## **Patients and Methods**

All patients undergoing adult LT from January 2004 to November 2020 were retrospectively analyzed. The observation period was twelve months. Patients in a second transplant or more, or who did not have the abdominal wall completely closed in LT for a variety of reasons (e.g. critical patients) or who died within the first year or lost outpatient follow-up of at least one year, were excluded, remaining 261 patients in the study.

The minimum age was 18 years. The main incision used was the bilateral subcostal transverse with superior median extension (Mercedes incision). The musculature was closed in at least two muscle layers with either polyglycolic acid, polyglycolic acid+polypropylene, polypropylene or polydioxanone, sizes 0 or 1. The skin was closed most commonly with nylon 3-0 and the stitches removed in postoperative day 30.

Antibiotic prophylaxis were cefuroxime plus vancomycin for 72 hours. The initial immunosuppressive therapy consisted of tacrolimus, mycophenolate and corticosteroid, the last for only six months.

Demographic characteristics, including underlying disease, such as hepatitis C virus (HCV), hepatocellular carcinoma (HCC), albumin and hematocrit before LT, body mass index (BMI), MELD-Na (Model for End-stage Liver Disease) score, blood loss during LT, postoperative infection, abdominal reoperation within 3 months of LT, type of suture for musculoaponeurotic closure, were collected. Hernia was diagnosed either during physical exam of outpatient control or radiology (e.g. computed tomography, control ultrasound). The outcomes of incisional hernia, hernia repair, and hernia recurrence were further evaluated.

Statistical analyses were performed using SPSS (PASW Statistics for Windows, Version 18.0. Chicago: SPSS Inc.). Categorical variables, presented as N (%), were compared using Chi Square test. Continuous variables were analyzed using Mann-Whitney test, presented as median (interquartile range) and Student's T test, presented as mean (standard deviation). Differences with a p value < 0.05 were considered statistically significant for all comparisons.

## **Results**

From a total of 381 patients submitted to LT during the study period, 120 met exclusion criteria, remaining 261 patients for analysis. 16 individuals (4,1%) were excluded due to a second LT and a previous main incision. Age ranged from 18 to 71 years old, with a median of 57,5 (14,55) years. The main causes for LT were cirrhosis due to HCV, and HCC.

71 out of 261 (27,2%) patients developed IH during one year of follow-up, while 190 (72,7%) healed their incisions well, composing two groups of comparison. Both showed no significant differences concerning age, underlying disease (i.e. HCV, HCC), MELD-Na score, pre-transplant albumin and hematocrit, obesity, blood loss during LT, postoperative infection, abdominal reoperation in three months after LT nor suture material for closure (Table 1).

In the IH group, 52 out of 165 (31,5%) male patients developed IH, while 19 out of 96 (19,8%) females patients did. A significant association was confirmed for male gender ( $p=0.044$ ).

Comparing the IH group versus control group, the albumin level was lower (3,17 vs 3,26), hematocrit was lower (32,93 vs 33,87) and they bled more during the LT (2.667 mL vs 2.406 mL), but not significant statistically. There were no significant differences in relation to the suture material among the groups.

Of the 71 patients who developed IH, 28 (39,4%) were submitted to hernia repair. In all cases a prosthetic mesh was placed, most commonly in an onlay position (71,4%). Five patients (17,8%) developed hernia recurrence in some point of their follow-up. All of them had HCV as cause of LT, and four (80%) were men.

**Table 1.** Demographic and surgical characteristics of the study population.

Parameter	No incisional hernia	Incisional hernia	P Value
N (%)	190 (72,7%)	71 (27,2%)	
Male (%)	113 (68,5%)	52 (31,5%)	.044
Age, median (IR)	57,4 (15,3)	57,4 (12,1)	.996
HCV ()	119 (69,6%)	52 (30,4%)	.143
HCC (%)	101 (74,8%)	34 (25,2%)	.488
MELD-Na, median (IR)	15,0 (10)	15,0 (11)	.585
Hematocrit, mean (SD)	33,87 (6,56)	32,93 (6,57)	.303
Albumin, mean (SD)	3,26 (0,65)	3,17 (0,55)	.251
Obesity	39 (68,4%)	18 (31,6%)	.396

**Table 1.** Demographic and surgical characteristics of the study population.

Parameter	No incisional hernia	Incisional hernia	P Value
Blood loss, median (IR)	2406,5 (2450)	2667,0 (2109)	.189
Postoperative infection	73 (70,9%)	30 (29,1%)	.670
Abdominal reoperation in 3 months	30 (62,5%)	18 (37,5%)	.105
Suture material			.821
Polyglycolic acid	130 (73,4%)	47 (26,6%)	
Polyglycolid acid plus polypropylene	17 (73,9%)	6 (26,1%)	
Polypropylene	17 (65,4%)	9 (34,6%)	
Polydioxanone	25 (75,8%)	8 (24,2%)	

HCC = hepatocellular carcinoma, HCV = hepatitis C virus, MELD = model for end-stage liver disease.

**Table 2.** Hernia repair results.

Technique	Submitted to hernia repair	Recurrence by technique
N	28	5
Onlay	20	3
Sublay	4	1
Inlay	1	1
Intraperitoneal	1	0

## Discussion

Incisional hernia (IH) is a common complication after liver transplantation (LT) (7). The above results showed an incidence of 27.2%, above the average of other studies (8), around 15.1%.

This is a complication that should be valued, as hospitalizations independently lead to reduced graft and patient survival (8). This way, it is increasingly sought to identify the factors associated with postoperative complications in patients undergoing LT.

There are well-established risk factors for IH in the general surgical population, such as age over 45 years, obesity, surgical wound infection, previous abdominal surgery, diabetes mellitus, chronic lung disease, nutritional deficiencies (6). As these characteristics are often present in transplant patients, adding the entire burden of ongoing liver disease, these individuals are strong candidates for HI.

For example, the use of steroids and immunosuppressive agents, ascites, even lack of surgeon experience, have been described as risk factors (9). End-stage liver disease is usually complicated with cachexia and muscle wasting (10,11). Patients with chronic liver disease who require LT exhibit protein-energy malnutrition due to hypermetabolism and malabsorption. Furthermore, ascites, often present as a consequence of portal hypertension, increases intra-abdominal pressure and contributes to abdominal muscle weakness (12).

There are risk factors found in the literature, such as use of sirolimus and mycophenolate for immunosuppression, end-stage liver disease (Child C), male gender, acute cellular rejection, surgical wound infection, severe ascites, BMI over 25, age over 55 years, low platelet count, cirrhosis caused by viruses (7,12-16).

The use of steroids and immunosuppressants are already well established after LT. However, steroids negatively influence healing, and the use of mycophenolate and sirolimus are also related to poorer healing quality, unlike tacrolimus (17,18). Thus, these may be some of the most potent and modifiable factors for preventing IH (8).

According to the type of incision used, Gastaca et al. (19) found in their work that the right subcostal incision with extension to the xiphoid process (J-shaped) was



related to a lower rate of IH than the Mercedes incision. In the latter, the incision area is larger and there is a central area susceptible to a greater risk of ischemia, and consequently worse healing.

Hernia patients can suffer chronically and/or acutely. In the first, reducing the quality of life in the long term, whether due to chronic pain or making it difficult to practice physical activities, such as weight training, with consequent worse maintenance of health and functionality (sedentary lifestyle, cardiovascular disease). In the second, through emergency care due to incarcerated and sometimes strangulated hernias, putting at risk the results of the LT and the patient's own life, as the risk of emergency surgeries is greater in this population. Furthermore, intestinal obstruction can rapidly affect the levels of immunosuppressive agents, leading to toxicity and renal failure (8).

Treatment involves surgical correction of hernias with the use of meshes to reinforce the musculoaponeurotic system and reduce recurrence rates. Thus, the aim is to reestablish the functionality of the abdominal wall of these patients and increase their quality of life.

It is important to remember that these procedures, in this population, can occur in a context of previous/chronic active infections, loss of domain, intestinal involvement, and other significant comorbidities (20), such as immunosuppression, in addition to treating hernias in wide bidirectional incisions (e.g. Mercedes incision), hence the importance of better studying this population subgroup within the hernia universe.

Regarding hernia recurrence, we had a rate of 17.8%, above the rate reported in the literature of 12.4% (8). The size of the hernia and the use of steroids are related to a higher risk of hernia recurrence (21), characteristics that are often present in the transplant patient. The use of meshes is recommended, as they reduce the risk of recurrence, and are not necessarily related to increased rates of infection and other operative wound problems (6).

## **Conclusions**

IH after LT is a relatively common problem, more associated with males. These patients have several general risk factors for the formation of HI, such as malnutrition, as well as specific factors, such as the use of steroids, immunosuppressants, and ascites. This is a problem that should not be trivialized in view of the complexity of previous liver transplantation, as it can lead to a reduction in quality of life as well as jeopardize LT results with emergency surgeries.

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