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RESEARCH ARTICLE

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ROLE OF THE PHYSICAL THERAPIST IN THE IMMEDIATE POSTOPERATIVE PERIOD OF LIVER TRANSPLANTATION

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ABSTRACT

Liver transplantation has been the most suitable choice for the treatment of end-stage liver disease. And it is in the postoperative period of liver tx that the monitoring of respiratory complications guarantees survival after this procedure. The objective of this study is to evaluate the role of physical therapy in the immediate postoperative period of liver transplantation. Methodology: This is a literature review with publications from 2012 to 2022, including original scientific and opinion articles referring to liver transplantation, upper abdominal surgery, laparotomy, and physical therapy. The reviews on the topic and the reference list of all articles considered important were consulted with the aim of new articles for inclusion. Studies in children and literature reviews were excluded. Result: after analyzing 20 articles, it was observed the importance of a preoperative physiotherapeutic evaluation for a better performance in the possible pulmonary complications in the postoperative period of liver transplantation. Conclusion: Physiotherapy is effective in the treatment of respiratory complications in the immediate postoperative period of liver transplantation.

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INTRODUCTION

Liver transplantation has emerged as a solution for advanced liver diseases, which are responsible for respiratory changes. However, even after liver transplant surgery, there may be respiratory complications due to abdominal surgery or pre-liver transplant risk factors that can develop postoperative respiratory problems (SILVA et al., 2016; HUANG et al., 2011). After surgery, new functional and respiratory complications appear because the liver transplant is a high abdominal surgery, where there are abdominal muscle injuries (rectum and oblique) that are often associated with lung movements (respiratory mechanics) (SILVA et al., 2016). Upper abdominal incisions are associated with respiratory problems, which is very common in liver transplantation. Infections, prolonged time on mechanical ventilation, need for reintubation, atelectasis, pleural effusion are examples of respiratory dysfunctions and problems associated with morbidity and mortality in liver transplantation

(FONSECA-NETO et al., 2018; KIA et al., 2015). Mortality caused by complications of respiratory functions in the postoperative period of upper laparotomy increases the length of stay and increases the expected costs. Respiratory physiotherapy, in this context, becomes effective acting to reduce the incidence of respiratory changes (CHINALI et al., 2009). Other factors that affect pulmonary function are general anesthesia, prolonged time of liver transplant surgery (6-8h.), analgesic administration, presence of abdominal drains, type of surgical incision, postoperative pain, and pleural effusion, which compromise the ventilation-perfusion ratio and chest wall compliance in liver transplantation. Functional Respiratory Reeducation, a therapy that fundamentally uses movement in its intervention, appears with the aim of reestablishing the function of breathing (SOUSA et al., 2009). There is currently a paucity of long-term studies related to lung function after liver transplantation. It is important to create a respiratory profile for a long period so that interventions can be developed in the main pulmonary alterations (SILVA et al., 2016). This study is justified due to the relevance of the physical therapy

approach in postoperative respiratory complications. In this way, the theme becomes relevant so that we can, through studies and use of new techniques, be minimizing and/or healing the process suffered by patients in the postoperative period of liver transplantation, seeking a satisfactory approach to the patient and a lower cost to hospitals. In the context of all the aforementioned problems, we aim to evaluate the role of physical therapy in the immediate postoperative period of liver transplantation.

METHODOLOGY

This is a literature review study, in which a search was carried out in reference articles on electronic sites such as: Google academic, LILACS (Latin American and Caribbean Literature in Health Sciences) and SCIELO (Scientific Library Online). The descriptors used were: "liver transplant", "physiotherapy", "surgery", "abdomen", "lung", "surgical incision". In which scientific articles published in the last 10 years, from 2012 to 2022, in Portuguese and English were evaluated. In the scientific research, the reference lists of some articles, considered relevant, were consulted in search of new articles to be used. Articles carried out in adults were included. As an exclusion criterion, articles involving children, Literature Review articles, thesis, TCC and monographs were not studied.

RESULTS

Liver transplantation has evolved thanks to knowledge in multiple areas such as anesthesia, intensive care, immunology, and surgical techniques. And based on this evolution, there are many surgical incision techniques for liver transplantation, however, even with techniques that respect the innervation, reducing postoperative pain and decreasing hypoesthesia in the surgical wound, respiratory complications are very frequent (PACHECO, 2011). Currently, with the improvement of surgical techniques and more selective immunosuppression, liver transplantation has been the treatment of choice for various liver diseases. These techniques reduce the incidence of respiratory diseases in the postoperative period of liver transplantation. (WANG *et al.*, 2012). However, anesthesia, surgical trauma, and postoperative conditions (incision, drainage, catheter) interfere with respiratory mechanics and patient mobilization, leading to pulmonary complications (SILVA *et al.*, 2016). Studies reveal that there are preoperative risk factors that lead to acute respiratory failure in the postoperative period of liver transplantation, causing prolonged hospital stays, morbidity and mortality. However, as some risk factors related to the patient and surgical procedures cannot be changed, it is important to identify them so that physiotherapy can direct its treatment, preventing complications and death (NASCIMENTO *et al.*, 2017; FERNANDES *et al.*, 2019). The role of physiotherapy is not only limited to physiotherapeutic techniques, but also the initial assessment in the preoperative period to identify musculoskeletal changes and especially respiratory changes in the postoperative period. Since lung abnormalities are found in chronic liver diseases such as hypoxemia, ventilatory restrictions due to ascites, pleural effusion, respiratory muscle weakness, among others (AUGUSTO *et al.*, 2012). Tests measuring maximal inspiratory and expiratory pressure can determine lung function and predict lung risk before liver transplantation. Early detection of changes in respiratory function can minimize possible complications in the postoperative period (AUGUSTO *et al.*, 2012). Some authors argue that repeat pulmonary function testing before and after liver transplant surgery is useful to identify significant changes and prevent morbidities. In this way, there is the possibility of studying functional improvement interventions such as physical and pulmonary rehabilitation (KIA *et al.*, 2016).

DISCUSSION

According to Fernandes *et al.* (2019), laparotomy according to doctors means "surgical opening of the abdominal cavity" and this surgery is responsible for respiratory complications. Silva *et al.*

(2016), on the other hand, defines liver transplantation as upper abdominal surgery whose procedure can cause respiratory complications. Finally, Santos *et al.* (2018), includes respiratory and motor physical therapy as benefits to prevent respiratory and musculoskeletal complications in the postoperative period of elective abdominal surgery. Contextualizing this theme, Silva *et al.* (2016), researched the respiratory profile after liver transplantation through the assessment of respiratory muscle strength and pulmonary function test, among other assessments, and found that after periods of 1, 3, 6, 9 and at 12 months the mean of maximal inspiratory and expiratory pressure and respiratory function are in accordance with the expected normality. However, volumes and vital capacities are reduced due to the surgical incision and diaphragmatic dysfunction returning to normal values within 7 to 10 days. In view of all this problem, studies reveal that there is a decrease in maximal inspiratory pressure (MIP) between the preoperative period and the first and fourth postoperative periods (PO), however, between the preoperative period and the seventh there were no significant differences in the PO of upper abdominal surgery. Ergo, this finding may be related to diaphragmatic dysfunction by reflex inhibition of the phrenic nerve due to anesthesia or it may be related to pain. However, expiratory muscle strength on the seventh PO did not return to baseline values, which may be a susceptibility to respiratory complications. As a limitation of the study, the author suggests that there should be a control group in which the patient would receive respiratory muscle training for comparison, showing the effectiveness of physical therapy in the recovery of respiratory muscle strength (GALANT *et al.*, 2012).

Based on this context, another study reveals the decrease in spirometric values (Forced Vital Capacity and Forced Expiratory Volume in the first minute) and MIP when comparing the preoperative period with the first PO of upper abdominal surgery without showing statistically significant differences. However, on the fourth PO, an increase in these results was observed without returning to preoperative values. Elucidating in this way, the importance of the incentive spirometer and the ventilation patterns, which can contribute to the improvement of spirometric values and MIP without significant differences between the methods mentioned. Regarding pain, there was a decrease in intensity comparing the first PO with the fourth PO (IVO FILHO *et al.*, 2017). Corroborating the study on physical therapy in the postoperative period of abdominal surgery, two respiratory incentive techniques (volume incentive spirometry and three-stage inspiratory patterns) were compared in thoracoabdominal mobility after upper abdominal surgery (CAA). Concluding that the cytometry in the group treated with Voldyne (volume respiratory booster) recovery was greater and faster than in the group that performed ventilatory patterns. In conclusion, the physical therapy intervention in patients undergoing CAA provides gradual recovery from thoracoabdominal mobilizations, thus reducing postoperative complications (TREVISAN *et al.*, 2010). According to Silva *et al.* (2010), respiratory physiotherapy (diaphragmatic proprioception exercises, breathing exercises associated with active upper limb kinesiotherapy, sustained maximal inspiration exercises, exercises with inspiration from the residual volume, exercises with respiratory incentive) in the first post-operative period. laparotomy operation (surgical opening of the abdominal cavity) is effective in the respiratory condition, improving the minute volume, tidal volume, maximal inspiratory pressure, and maximal expiratory pressure. However, the study revealed an increase in pain after physical therapy.

According to Senduran *et al.* (2010), no significant differences were observed between hemodynamic parameters (heart rate, systolic and diastolic blood pressure) and respiratory parameters (peripheral oxygen saturation and respiratory rate) in the pre-physiotherapy treatment (basal respiratory exercises). and diaphragmatic, coughing maneuvers and active movements in bed) and measurements in the recovery after physical therapy treatment. However, the authors state that early postoperative physical therapy is feasible, in intensive care, for liver transplantation. And they advise new controlled and randomized studies with a greater number of cases to improve

physiotherapeutic care after liver transplantation. Another article to enrich the role of physiotherapy in the immediate postoperative period of abdominal surgery reveals that physiotherapeutic care through diaphragmatic proprioception, ventilatory patterns, forced expiration techniques, expiratory delay and assisted cough, prove to be a possibility of early treatment providing maintenance pulmonary function (forced vital capacity, forced expiratory volume in the first minute, Tiffeneau index, PEF.) and expiratory muscle strength. However, the author reveals that the non-standardization of the physiotherapeutic techniques addressed in the research may have interfered with the aforementioned results (JUNIOR *et al.*, 2009). Here is another work that concludes the effectiveness of respiratory muscle training (RMT) through Threshold using 40% of MIP in the postoperative period of cholecystectomy, which is part of an upper abdominal surgery. Where it was concluded that there is a decrease in diaphragmatic strength after surgery (CAVENHAGI *et al.*, 2015). According to Fernandes *et al.* (2016), in their study, the role of respiratory physiotherapy with intermittent positive pressure techniques with two pressure levels in the airways and inspiratory volume booster was also evidenced, providing an increase in vital capacity, in this context demonstrating the benefits of physiotherapy in the postoperative period of abdominal surgery. The author also reveals that in this study there was a gain in strength and functionality separately, suggesting motor physiotherapy to gain functional independence. Corroborating with the studies, it is observed that the delay in early mobilization in the postoperative period of upper abdominal surgery is a predisposing factor for respiratory complications. It was then suggested in this study, randomized clinical trials to investigate early mobilization compared to targeted physical therapy interventions (such as the use of non-invasive ventilation) (HAINES *et al.*, 2013). Finally, different respiratory techniques show equivalent effects when it comes to preventing respiratory complications in the postoperative period of upper abdominal surgeries. However, the study concluded that the performance of physiotherapy does not affect the length of hospital stay (JUZO *et al.*, 2020).

CONCLUSION

It is concluded that physiotherapy, which has evaluation techniques, lung expansion, diaphragmatic awareness, respiratory muscle strengthening and early mobilization, together with the multidisciplinary team, adds benefits for an effective approach to respiratory complications in the immediate postoperative period of liver transplantation, which is included in abdominal surgeries. However, there are still few studies correlating physical therapy and liver transplantation and studies that identify long-term lung changes after liver transplantation, for a better physical therapy approach. Physiotherapy acting from a preoperative assessment to an intervention in the immediate postoperative period of liver tx is essential for the recovery of transplanted patients. However, many studies correlating physical therapy and postoperative liver tx are suggested in order to study a specific population within the abdominal surgery group.

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