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IMPACT OF ASSISTED DEAMBULATION ON PULMONARY FUNCTION IN PATIENTS SUBMITTED TO ABDOMINAL SURGERY

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ABSTRACT

The number of elective surgeries in Brazil grew 39.1% this year 2017, are medium and high complexity surgical procedures. In the postoperative period of abdominal surgery can generate some not only pulmonary, but also circulatory impairment due to immobility in the bed. Therefore, the present study aims to verify the impact of assisted ambulation in the postoperative period of abdominal surgery. The study is a subproject with longitudinal design. The patients were approached 12 hours after the surgery, where the patient was evaluated for peripheral muscle strength, lung volumes and capacities, and maximal inspiratory and maximal expiratory force, after being ambulated, and after 30 minutes the patient was reevaluated. Peripheral muscle strength had a significant result, and the result of maximal inspiratory pressure and maximal expiratory pressure showed an increase in the results compared before and after the intervention, where only the maximal inspiratory pressure showed a satisfactory but not significant response. Early mobilization is a low-cost and widely used technique. In the present study, it proved that its application in the postoperative period of elective abdominal surgery can provide a significant increase in peripheral muscle strength, as well as promote inspiratory muscle strength.

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INTRODUCTION

The number of elective surgeries in Brazil grows 39.1% per year. These are medium and high complexity surgical procedures of all medical specialties. The three most demanded surgeries are those of the digestive tract, appendages and abdominal wall (MINISTRY OF HEALTH, 2017). Elective surgery in the abdominal region usually impacts the respiratory biomechanics, and this happens due to trauma in the diaphragm region, this trauma ends up causing compromises in the ventilatory component, impacting the cough reflex and reducing respiratory muscle strength, and this decrease in strength. predisposes the patient to pulmonary infections, atelectasis, hypoventilation, hypoxemia and thus increases the length of stay and hospital costs (BOONE *et al*; 2018). This surgical procedure ends up inhibiting the phrenic nerve, and this inhibition besides causing pain in the surgical incision, alveolar collapse, occurs a reduction of 50% to 60% of vital capacity (CV) and 30% of functional residual capacity (CRF), and the decrease in CRF consequently generates hypoxemia. In addition to these complications, elective abdominal surgery causes changes in lung volumes, total lung capacity (TLC) and tidal volume (VC) (SILVA *et al*; 2018). Early postoperative mobilization allows the respiratory system and the cardiac system a better functional condition. Preventing alveolar collapse, optimizing tachycardia, tachypnea, blood pressure and thus reducing risks of complications, promoting a shorter hospital stay and thus reducing hospital costs. Among other positive aspects of early mobilization in pulmonary function we can state that it improves expandability, thus promoting increased lung volumes and capacities and optimizing physical and hemodynamic conditioning (CORDEIRO *et al*., 2015). For any physiotherapeutic conduct a protocol of action is required aiming at a differentiated treatment with positive aspects. The aim of this study was to prove the efficacy of assisted ambulation in pulmonary function in patients undergoing abdominal surgery through a physical therapy protocol.

MATERIAL AND METHODS

This is a subproject of a major project " Physical Therapy in the Pre and Postoperative Elective Abdominal Surgery: A Randomized Clinical Trial ", submitted and approved by the

Research Ethics Committee (CEP) under protocol number CAEE: 14419319.0 .0000.5578. Opinion Number: 3,368,508. Patients were informed about the ethical principles of the research where the objectives, risks and benefits were presented and signed the Informed Consent Form. It was a quantitative, exploratory cross-sectional analytical study that sought to obtain data, increasing credibility. of the technique used, when it is still little explored in the scientific environment.And because it has an accessibility and convenience, this study was carried out in a hospital unit in the city of Vitória da Conquista - BA. elective abdominal surgery, where individuals were of both sexes, aged over eighteen, regardless of race or social class, performed the surgery by the lucid and oriented Unified Health System (SUS), which comprised the guidelines patients who did not fit the sample profile were excluded. , and that presented pathology such as heart disease or chronic obstructive pulmonary diseases that compromised the study result. For the collection, a questionnaire was applied, containing specific information about the patient, about their characteristics, clinical and laboratory aspects, information about the surgery. The Mini Mental State Examination (MMSE), the Visual Analog Scale (VAS) was also applied. The dynamometer (INSTRUTHERM DIGITAL MODEL) was used to evaluate the peripheral force, and for the pulmonary evaluation the digital manovacuometer (MVD300-U-HOMED) and the peak flow (PHILIPS-RESPIRONICS) were used.

Shortly after applying the above questionnaires and scales, vital signs were measured: blood pressure (BP), heart rate (HR), respiratory rate (RR), temperature (T) and oxygen saturation (SPO2) (BP, HR, RR). , T and SPO2), measured the peripheral muscle strength, where the patient in sedation was oriented on the technique, where with the dominant limb made a maximum pressure in the designated part of the device for measurement, soon after the volumes and capacities were measured with the peak flow device, the patient was sedated, the airway was occluded with a nasal clip, attached to a mouthpiece, was instructed to take a maximum inspiration after a deep exhalation and then breathed, and was given a one-minute break. At each measurement, still using the nasal clip for airway occlusion and the mouth nozzle, the maximum inspiratory muscle strength (MIP) was measured, where the The patient underwent a maximal inspiration after a deep exhalation, and the maximal expiratory muscle strength (MEP) where the patient underwent a maximum exhalation after a deep inspiration with the manovacuometer. In all the methods mentioned, three values were collected and the largest value was used for the sample. Then the patient performed a 5-minute ambulation and then 1-minute ambulation where the limit of each patient was respected, then the patient was referred to bed. Respecting an interval of thirty minutes after the pre evaluation, the postoperative evaluation was performed where the patient was again evaluated with the same methodological standards. Data were tabulated and processed by Statistical Package for Social Sciences-SPSS 22.0 for windowns. The treatment was descriptive (mean, standard deviation and measure of dispersion) and analytical (Paired Student t test) with reliability set at 95%. Graphs and tables were plotted using Microsoft Excel 2013 software.

RESULTS

The ten individuals analyzed for this research had mean ages of 39.0 ± 13.06 years, height of 1.59 ± 0.09 meters, weight of 71.62 ± 10.14 kg and length of stay of 24, 8 ± 9.57 days. The sample consisted entirely of women, with no previous lung disease, diabetes, heart disease or smoking. Two (20.0%) cases of systemic arterial hypertension were observed, as shown in table 1.

Table 1. Sociodemographic, anthropometric and clinical characteristics of the sample. Vitória da Conquista BA, 2019

Variables	Average ± dp[1]	n	%
Age years	39,0 ± 13,06	10	—
Height, m	1,59 ± 0,09	5	—
Weight, kg	71,62 ± 10,14	8	—
Length of stay, days	24,8 ± 9,57	10	—
Sex			
Feminine		10	100,0
Prior lung disease			
Not		10	100,0
Arterial Hypertension			
Yea		2	20,0
Not		8	80,0
Diabetes Mellitus			
Not		10	100,0
Heart disease			
Not		10	100,0
Smoker			
Not		10	100,0

[1]Sample standard deviation; Source: Data.

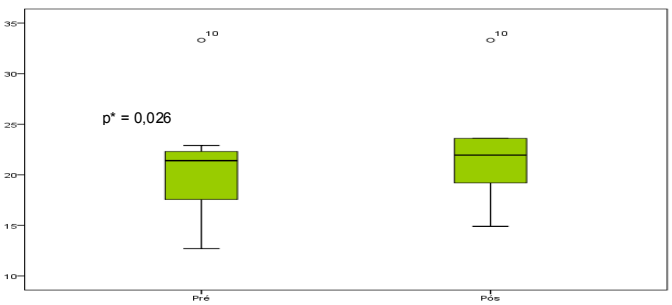
Comparison between the obtained data and the predicted variables of the study variables revealed that all values obtained are below the predicted values, except for the nearest approaching dynamometry. Given this behavior, only the dynamometry showed no statistically significant difference (p = 0.234), as shown in table 2.

Table 2. Comparison between obtained and predicted values. Vitória da Conquista - BA, 2019

Variables	Average ± dp[1]		*p**
	Average obtained	Predicted average	
Preak flow	235,62 ± 77,25	429,1 ± 23,70	≤ 0,001
Dynamometry	20,66 ± 5,54	23,20 ± 3,25	0,234
Pi máx	32,68 ± 12,41	56,31 ± 6,01	≤ 0,001
Pe máx	28,7 ± 11,16	92,83 ± 8,88	≤ 0,001

[1]Sample standard deviation; * Paired student t-test; Source: Research Data.

With the help of graph 1, it is observed that the peripheral force suffers positive variation with significant statistical difference (p = 0.026).



*Paired Student's test; Source: Reseach Data.

Graph 1. Evaluation and reassessment of peripheral strength. Vitória da Conquista -BA, 2019

According to Table 3, the sample showed an increase of PeMáx and PiMax of 38.22% and 40.27%, respectively. However, this evolution was statistically verified only for Pimax (p = 0.001).

Table 3. Evolution of PiMax and PeMax. Vitória da Conquista - BA, 2019

Variables	Average ± dp¹		%²	*p**
	Pré	Pós		
Pi máx	32,68 ± 12,41	45,84 ± 13,12	40,27	0,001
Pe máx	28,7 ± 11,16	39,67 ± 16,15	38,22	0,088

DISCUSSION

The present study sought to verify the impact that early mobilization would provide to patients undergoing abdominal surgery. Some variables had positive responses, peripheral muscle strength had a significant result evaluated by the dynamometer after the patient's submission to early ambulation. The MIP result showed an increase in the results compared before and after the intervention. The study showed significantly that early mobilization directly impacts peripheral muscle strength, so this technique needs to be used early in the hospital to promote a better physical and mental condition for the patient. When the patient in the postoperative period of abdominal surgery can walk, positive feedback is generated regarding their prognosis, as walking is one of the basic functions that the body needs for independence. Almeida (2016) and Cabral (2016) say in their research that immobility in the bed predisposes the patient to several complications, such as the risk of DVT (deep vein thrombosis) that is a consequence of a prolonged blood stasis. Ambulation will decrease this risk as it promotes blood pumping, thereby improving venous return, blood flow, and gas exchange. The study by Carvalho *et al* (2018), states that patients undergoing postoperative abdominal surgery present pain, a sign that restricts the patient to bed. Twelve patients were evaluated before and after abdominal surgery, where the results presented indicate significant loss of muscle strength in the postoperative period when compared to the pre. , and reduced postoperative and pulmonary complications. They state that patients who do not undergo ambulation have reduced body mass, dysfunctions and pulmonary infections.

The respiratory mechanism depends on a synchronization of inspiratory and expiratory muscle strength to generate air volume in the lungs. Knowing the impact of abdominal surgery, we understand that pain causes the patient to adopt a flexor posture, thus preventing the expansion of the ribcage, causes a shallow breathing with a predominance of thoracic, generating hypoventilation in the pulmonary bases, and consequently causing alteration in the restrictive component. Thus, the study cited proves the results of the present study, thus indicating the early use of the technique to maintain physical fitness, as well as promoting increased peripheral muscle strength, decreased infections and reduced alveolar collapse. According to Bastos *et al* (2018), 10 patients were evaluated pre and postoperatively for upper abdominal surgery, where the values obtained after evaluation of inspiratory and expiratory muscle strength patients present a decrease in postoperative muscle strength, where this This decrease is more significant in maximal inspiratory pressure, and this result corroborates the present study. Another study by Boone *et al* (2018) confirms the previous study, where after evaluating maximal inspiratory pressure and maximal expiratory pressure before and after abdominal surgery, the values obtained indicate that there was a decrease in inspiratory and expiratory muscle strength. The most significant decrease is the MIP.

And with this the present study presents a low cost strategy that provides significant improvement in inspiratory muscle strength. The study by LoMauro (2019) completes the previous study, as it justifies the impacts that patients after abdominal surgery have, with a reduced maximal inspiratory and expiratory pressure. This is because in this procedure the phrenic nerve that innervates the diaphragm muscle responsible for breathing is directly inhibited, impacting the balance of inspiratory forces and the expandability of the rib cage, remembering that the technique used also interferes, therefore, the surgical instruments used generate tissue injury, thus volumes and pulmonary muscle strength are compromised, justifying the reduced values found in the present study.

Conclusion

Early ambulation is a low-cost and widely used technique. In this study, it was shown that its application in the postoperative period of elective abdominal surgery can provide a significant increase in peripheral muscle strength, as well as promote maximal inspiratory muscle strength. However, this intervention is still poorly evaluated as to its benefits in the hospital environment, so it is important to explore this method in studies and research.

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