

LEVEL OF PAIN AND FUNCTIONAL INDEPENDENCE OF PATIENTS SUBMITTED TO CARDIAC SURGERY

NÍVEL DE DOR E GRAU DE INDEPENDÊNCIA FUNCIONAL DE PACIENTES SUBMETIDOS À CIRURGIA CARDÍACA

NIVEL DE DOLOR Y GRAU DE INDEPENDENCIA FUNCIONAL DE PACIENTES SOMETIDOS A LA CIRUGÍA CARDÍACA

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Objective: to evaluate the correlation of pain and functional independence in the pre and postoperative period of patients submitted to cardiac surgery. **Methods:** A prospective, noninterventive study of 24 patients submitted to elective cardiac surgery. Clinical data was collected in patients' charts and a direct interview was done both in the preoperative and in the postoperative period. The pain intensity was rated according to the Numerical Visual Scale. Functionality was measured with the Functional Independence Measure. **Results:** in the first evaluation, the patients did not report pain. In the postoperative evaluation, patients presented an average of 4.75 ± 1.91 points on the pain scale. The functionality increased from 124.29 ± 6.38 in the preoperative period to 97.42 ± 12.73 in the postoperative. There was a significant correlation between pain and functionality. **Conclusion:** there was an increase in pain and reduced functionality in the postoperative period of cardiac surgery, in addition to a correlation between the variables, demonstrating that the higher the intensity of the pain, the lower the functional independence of the patient.

Descriptors: Thoracic surgery. Pain measurement. Physical therapy. Rehabilitation.

Objetivo: avaliar a correlação da dor e independência funcional no período pré e pós-operatório dos pacientes submetidos à cirurgia cardíaca. Métodos: estudo prospectivo e não intervencionista composto por 24 pacientes que realizaram cirurgia cardíaca eletiva. Foram coletados os dados clínicos nos prontuários dos pacientes e realizada entrevista direta no pré-operatório e no pós-operatório. A intensidade de dor foi avaliada pela Escala Visual Numérica e a funcionalidade pela Medida de Independência Funcional. Resultados: na primeira avaliação, os pacientes não relataram dor. Na avaliação pós-operatória, os pacientes apresentaram uma média de $4,75 \pm 1,91$ pontos na escala de dor. A funcionalidade passou de $124,29 \pm 6,38$ no pré-operatório para $97,42 \pm 12,73$ no pós-operatório. Verificou-se correlação significativa entre dor e funcionalidade. Conclusão: ocorreu aumento da dor e redução da

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funcionalidade no pós-operatório de cirurgia cardíaca, além de correlação entre as variáveis, demonstrando que quanto maior a intensidade da dor, menor é a independência funcional do paciente.

Descritores: Cirurgia torácica. Medição da dor. Fisioterapia. Reabilitação.

Objetivo: evaluar la correlación del dolor e independencia funcional en el período pre y postoperatorio de los pacientes sometidos a la cirugía cardíaca. Métodos: estudio prospectivo y no intervencionista compuesto por 24 pacientes que realizaron cirugía cardíaca electiva. Se recogieron los datos clínicos en los prontuarios de los pacientes y se realizó una entrevista directa en el preoperatorio y en el postoperatorio. La intensidad de dolor fue evaluada por la Escala Visual Numérica y la funcionalidad por la Medida de Independencia Funcional. Resultados: en la primera evaluación, los pacientes no reportaron dolor. En la evaluación postoperatoria, los pacientes presentaron una media de $4,75 \pm 1,91$ puntos en la escala de dolor. La funcionalidad pasó de $124,29 \pm 6,38$ en el preoperatorio a $97,42 \pm 12,73$ en el postoperatorio. Se verificó una correlación significativa entre el dolor y la funcionalidad. Conclusión: ocurrió aumento del dolor y reducción de la funcionalidad en el postoperatorio de cirugía cardíaca, además de correlación entre las variables, demostrando que cuanto mayor es la intensidad del dolor, menor es la independencia funcional del paciente.

Descriptorios: Cirugía torácica. Medición del dolor. Fisioterapia. Rehabilitación.

Introduction

There are several treatment alternatives for coronary artery diseases. Cardiac surgery is often the most indicated option because it offers greater benefits in the medium and long term, as it pursues the return of the functional capacity of the heart based on the restoration and restitution of its vital functions⁽¹⁾. Cardiac surgeries, the most common of which are reconstructive surgeries, myocardial revascularization and valve drainage are highly complex procedures that have important repercussions on the body and may cause clinical instability. It is a time full of particularities, mainly because of the critical care period that requires adequate treatment of the patient⁽²⁾.

Pain is a symptom reported by most patients after thoracic surgeries⁽³⁾ and is among the main factors that limit the maintenance of their daily activities, negatively impacting their quality of life⁽⁴⁾. Pain measurement aims to identify its occurrence and allow multidisciplinary teams to create strategies that improve the condition of the individual⁽⁵⁻⁶⁾, since it negatively affects the evolution of the patient, inflicting functional and organic damage. Thus, the approach to pain in the studies has great relevance because it involves the overall condition and includes the functional capacity of the patient⁽⁷⁾. Considering that functional decline is a key factor for the

decrease in the quality of life after hospital discharge, it is imperative to know the causes and quantify the losses, in order to prescribe the best treatment and to maintain or improve these patients' quality of life after hospital discharge⁽⁸⁻⁹⁾. In this sense, functional independence is inversely proportional to the painful condition ie, higher greater pain intensity leads to a reduction in functionality⁽⁷⁾.

Although pain and functional independence are important in the postoperative assessment of cardiac surgery, the correlation between them is still poorly described in the literature. Therefore, we sought to evaluate the correlation of pain and functional independence in the pre and postoperative period of patients submitted to cardiac surgery.

Methods

It is a prospective and non-interventional study of patients in the pre and postoperative period of elective cardiac surgery. Developed according to the Directives and Norms Regulating Research Involving Human Beings according to the Resolution of the National Health Council (CNS) n. 466/2012 and approved by the Ethics and Research Committee under opinion n. 1.471.319/2016 and CAAE 52079515.4.0000.5350. Data was collected at Grande Porte Hospital in the state of Rio Grande do Sul - RS/Brazil.

Patients were selected continuously and the sample were collected for convenience. The study included 24 patients submitted to elective cardiac surgery by sternotomy, between April and October 2016, of both genders, between 18 and 80 years old, who agreed to participate by signing the free and informed consent form. The exclusion criteria of the sample were patients unable to understand the research procedures, correctly answer the questionnaires, who remained for more than 12 days hospitalized, who died during the hospital stay or who did not perform the second evaluation. Thus, five patients were excluded.

Data was collected from medical records. We looked for information about factors prior to the cardiac surgery: the risk factors of cardiovascular diseases, individual characteristics of the patient, ejection fraction; intraoperative data: type and time of surgical procedure, time of extracorporeal circulation and aortic clamping, time of surgery; and postoperative data: time under mechanical ventilation, length of stay in the Intensive Care Unit and discharge/death.

The first evaluation with the patient was performed one day before the surgery (day of hospitalization). The second evaluation took place on the day of hospital discharge (on the 5th day of hospitalization, on average).

The assessment included the taking of anthropometric measures and the rating of the level of pain and of functional independence. The pain was measured by means of the Visual Numerical Pain Scale, in which the patient should report the degree of pain he/she was feeling. This scale quantifies the painful feeling in a scale from zero to ten, where zero means no pain and ten, the worst pain imaginable⁽¹⁰⁾.

To measure functional independence, the Functional Independence Measure (FIM) tool was used. This tool quantitatively assesses the burden of care required by a person to perform various motor and cognitive tasks in his/her everyday life. Among the activities evaluated are self-care, transfers, locomotion, sphincter

control, communication and social cognition, including memory, social interaction and problem solving. Each of these activities is evaluated and scored 1 (total dependence) to 7 (complete independence), with the total score varying from 18 to 126 points⁽¹¹⁾.

For the statistical analysis of the data, the Statistical Package for Social Sciences (version 23.0, SPSS, Chicago, Illinois) software was used. Data was presented in absolute and relative values, mean \pm standard deviation. The Kolmogorov-Smirnov test was used to evaluate the normality of the variables. The correlation between the variables was tested by the Pearson correlation test for parametric variables and Spearman for non-parametric variables. For the comparison between the parametric variables, we used t test of Student and for the non-parametric variables we used the Wilcoxon test.

Results

Twenty-nine patients were initially evaluated, five of whom were excluded due to the length of their hospital stay ($n = 1$), discharge prior to evaluation ($n = 3$), and death during hospitalization ($n = 1$). A total of 24 patients were included in the study.

In the analysis of the clinical characteristics of the sample, there was a predominance of male patients (17-70.8%), mean age of 60.54 ± 10.34 , characterizing the sample as belonging to the age group of the elderly. The body mass index (27.76 ± 10.2) was overweight. The mean ejection fraction was $61.74 \pm 14.63\%$.

The risk factors for cardiovascular disease of higher incidence were: systemic arterial hypertension (70.8%), followed by stress (62.5%), family history (62.5%), smoking (58.3%) and sedentary lifestyle (50.0%). All patients who participated in the study underwent median sternotomy surgery and left the OR using a chest drain. The number of myocardial revascularization and valve replacement surgeries was similar, and the combination of both surgeries occurred in a lower percentage (8.3%) (Table 1).

Table 1 – Clinical characteristics of patients in the preoperative period of elective cardiac surgery. Ijuí, RS, Brazil, 2016 (n = 24)

Variable	
Age, years (mean ± SD)	60.54 ± 10.34
Gender (male/fem), n (%)	17 (70.8)/7 (29.2)
Body mass index, kg.m ⁻² (mean ± SD)	27.76 ± 10.2
Ejection fraction (%) (mean ± SD)	61.74 ± 14.63
Risk factors for CVD n (%)	
SAH	17 (70.8)
Stress	15 (62.5)
Sedentary lifestyle	12 (50.0)
History AMI	5 (20.8)
Diabetes mellitus	11 (45.9)
Smoking	14 (58.3)
Alcoholism	9 (37.5)
Dyslipidemia	13 (35.1)
Family history	15 (62.5)
Type of surgical procedure n (%)	
MRS	11 (45.8)
Valve change	11 (45.9)
Valve change + MRS	2 (8.3)

Values are presented as mean ± standard deviation.

CVD: Cardiovascular diseases; SAH: Systemic Arterial Hypertension; AMI: acute myocardial infarction; RMS: myocardial revascularization surgery.

Intra and postoperative data was presented in mean ± standard deviation (Table 2). The duration of the surgical procedure was 187.92 ± 35.78 minutes and during that period the patients remained with the aorta clamped for 62.67 ± 13.69 minutes and under

extracorporeal circulation for 77.48 ± 16, 64 minutes. The mechanical ventilation time was 611.64 ± 196.98 minutes. The period of hospitalization at the Intensive Care Unit was 58 ± 17.21 hours and the total hospital stay was 135.27 ± 41.59 hours.

Table 2 – Intra and postoperative data of patients submitted to elective cardiac surgery. Ijuí, RS, Brazil, 2016 (n = 24)

Variable	Mean ± SD	Minimum/maximum
Surgery time (min)	187.92 ± 35.78	145/300
Aortic clamping time (min)	62.67 ± 13.69	35/89
Time of ECC (min)	77.48 ± 16.64	45/113
Time of MV (min)	611.64 ± 196.98	410/1320
Length of stay in ICU (hours)	58 ± 17.21	48/96
Length of hospital stay (hours)	135.27 ± 41.59	72/264

SD: standard deviation; ECC: Extracorporeal circulation; MV: Mechanical ventilation; ICU: Intensive Care Unit.

In the analysis of pain through the Numerical Visual Scale, presented in Table 3, patients did not report pain on the pre-surgery day, but presented moderate postoperative pain on hospital discharge day ($p \leq 0.01^*$). In the preoperative period, the patients showed

total independence and in the postoperative period the level of functional independence decreased ($p \leq 0.01^*$).

When comparing pre and postoperative values, we can see an increase in pain and a reduction in the level of functionality of the patients.

Table 3 – Measurement of functional independence and referred pain in the pre and postoperative period of patients submitted to elective cardiac surgery. Ijuí, RS, Brazil, 2016 (n = 24)

Variable	Preoperative	Postoperative	P
Pain	0.00	4.75 ± 1.91	≤ 0.01*
Functional independence (total FIM)	124.29 ± 6.38	97.42 ± 12.73	≤ 0.01*
Motor Domain	90 ± 3.43	63.29 ± 11.92	≤ 0.01*
Cognitive Domain	34.17 ± 3.66	34.13 ± 3.66	0.317

Wilcoxon test.

FIM: Functional Independence Measure.

* statistically significant.

The motor domain showed a greater reduction than the cognitive domain. The correlation of the pain and functional variables in the postoperative period was negative, showing that the higher the pain, the lower the degree of functional independence. When we correlated postoperative pain with extracorporeal circulation time, there was no significant correlation.

Functional independence was also not influenced by time of extracorporeal circulation. There was also no statistical significance in the correlations between time of mechanical ventilation and the functionality. The same was verified between functionality and total hospitalization time, with no significant correlation between the variables (Table 4).

Table 4 – Correlation between variables of patients submitted to elective cardiac surgery. Ijuí, RS, Brazil, 2016 (n = 24)

Variable	Correlation coefficient	P
Pain x Total FIM	- 0.511	0.01*
ECC x pain	0.256	0.23
ECC x FIM total	0.215	0.32
MV x FIM total time	-0.278	0.211
Length of hospitalization x total FIM	-0.315	0.221

FIM: Functional Independence Measure; ECC: extracorporeal circulation; MV: mechanical ventilation.

Spearman correlation test.

* statistically significant.

Discussion

This study sought to evaluate the correlation of pain and functional independence in the pre and postoperative period of patients submitted to elective cardiac surgery. It was observed through the Visual Numerical Scale, for pain analysis, that the patients had no pain complaints before the surgical procedure, but they presented moderate postoperative pain. Regarding the functional capacity, in the preoperative period the patients showed total independence. In the postoperative period, the functional independence level

decreased and this difference was statistically significant. The correlation of these variables demonstrated that the greater the pain, the lower the level of functionality.

It is known that acute postoperative pain of cardiac surgery can occur due to several causes, among them invasive procedures, chest drains and sternum retraction. Pain is most often reported in the sternum area, with stiffening of the musculature, difficulty in coughing, breathing and moving⁽¹²⁾. The data from this study demonstrates that all patients presented pain at the surgical incision site, albeit at different levels. These

findings are similar to those of a study carried out by other authors⁽¹³⁾, who, in addition to the presence of pain in most patients, found a positive correlation with physiological changes.

Pain measurement is extremely important in the postoperative period of cardiac surgery, since it should be controlled and preferably should not exist in a way that impairs the clinical improvement of the patient. The presence of pain may vary in intensity, especially during situations that the patient experiences during the recovery period, for example, rest, deep breathing, episodes of coughing and vomiting⁽¹²⁾.

The data from our research also matches another study⁽⁵⁾, in which the authors evaluated the postoperative pain of thoracic and abdominal surgeries, and most of the patients reported some degree of pain after the surgical procedure. In addition, these authors emphasize that during physical therapy using respiratory exercise techniques and health education, it was possible to perceive that pain limits the performance of the activities.

In a study⁽¹⁴⁾ on perceived stressors in post-cardiac surgery patients, the variable "feeling pain" was the sixth stressor in the general ranking of the scale, considered moderately stressful by 18 (17.1%), very stressful by 23 (21.9%) and extremely stressful by 17 (16.2%) of the 105 patients evaluated. In addition, it was observed that patients who presented pain in the immediate postoperative presented higher scores of the stressors than the patients who didn't. This item was evaluated as one of the most stressful in another study with patients of cardiac surgery⁽¹⁵⁾.

In the present study, functional independence reduction was observed between the pre and postoperative period. It was found that this decrease occurs in a differentiated way among the activities evaluated by the FIM, since the motor domain presented a greater reduction than the cognitive domain. For some researchers⁽³⁾, this difference in domains may be justified by the physical changes and limitations caused by the surgical procedure. These changes usually do not affect communication, memory, social interaction, and problem solving skills.

Reduced functionality in patients after hospitalization is common and may occur due to various reasons. A published study⁽¹⁶⁾ showed a reduction in functionality after one year of hospital discharge in individuals over 70 years of age. These results emphasize the importance of physical therapy in the postoperative period, since the motor domain is the most affected in FIM. It is precisely this aspect that physical therapy seeks to improve in cardiac rehabilitation.

Physical therapy follow-up is relevant in the recovery of postoperative functionality, bringing improvement in aspects that constitute the motor domain⁽⁷⁾. In our study, a good cognitive situation was verified and this is an indication that these patients have potential to receive orientations and to execute the physical therapy techniques, helping in their postoperative improvement. Other studies⁽¹⁻¹⁷⁾ indicate that physical therapy integrates patient care with indication of cardiac surgery, both in the pre- and postoperative periods, using active and educative techniques in collaborative patients.

Similarly, the performance of a multidisciplinary team is extremely important to increase the quality of care, since the different professions that integrate the team can formulate actions that improve the comfort and well-being of the patients, preventing the pain sensations from hindering daily activities and providing improvement in the quality of life. However, oftentimes in the hospital routine, some professionals do not perform the correct evaluation of the pain, and can make the management of the pain not very effective⁽¹⁸⁾.

The relationship between cardiopulmonary bypass time and functional reduction was not statistically significant. An opposite result was found in a study⁽¹⁹⁾ with a sample of 22 patients submitted to cardiac surgery in which the time of extracorporeal circulation had a negative influence on postoperative functional independence of the patients. The correlation between the functionality and the length of hospital stay was not statistically significant in our study. In a study of 46 patients⁽³⁾, there was a significant correlation, but it is a study in the elderly population,

which have a high rate of functional loss after hospital admission⁽¹⁶⁾. The time of mechanical ventilation also did not influence the functionality. A similar result was found in a study⁽²⁰⁾ with a population of adult patients hospitalized in the Intensive Care Unit, who used mechanical ventilation, where there was no significant correlation between the variables.

In our study, the negative association between pain and functionality is in line with the results found in the literature⁽³⁻⁷⁾, which may indicate that patients avoid performing activities due to postoperative pain. This functional impairment may be relevant in the prognosis of discharge and satisfactory recovery of patients⁽⁷⁾.

It should be noted that some limitations can be pointed out in the present study. Data was collected in less than a year and in a single hospital, reducing the sample. This is why it is suggested that more studies be done to complement these findings. However, these limitations do not affect the results obtained in this research, since the statistical tests we adopted ensure the reliability of the data.

Conclusion

The results showed that the pain was not reported by the patients before the surgical procedure, but in the postoperative period it was reported by all patients, albeit at different levels. Functionality also changed after surgery, with reduced functional independence when compared to preoperative periods, mainly in regard to the motor domain. Also, there was a correlation between the pain variable and the total functional independence measure, showing that the higher the pain intensity, the lower the functional independence of the patient after cardiac surgery.

Thus, the findings of this study confirm the importance of knowledge, pain management and functionality, in an interdisciplinary fashion and in the perspective of integral care to hospitalized patients. The presence of pain and functional decline are factors that reduce the quality of life after hospital discharge. In this sense, it is

possible to develop team strategies for the adequate management of pain, since it directly implies better recovery.

Collaboration

1. conception, project, analysis and interpretation of data:
2. essay writing and critical review of intellectual content:
3. final approval of the version to be published:

References

1. Santos NP, Mitsunaga RM, Borges DL, Costa MA, Baldez TE, Lima IM et al. Factors associated to hypoxemia in patients undergoing coronary artery bypass grafting. *Rev Bras Cir Cardiovasc*. 2013;28(3):364-70.
2. Duarte SCM, Stipp MAC, Mesquita MGR, Silva MM. O cuidado de enfermagem no pós-operatório de cirurgia cardíaca: um estudo de caso. *Esc Anna Nery*. 2012; 6 (4):657-65.
3. Gnoatto K, Mattei JC, Piccoli A, Polese JC, Silva SLS, Schuster RC et al. Functional capacity and pain in the elderly prior to and after cardiac surgery. *ConScientiae Saúde*. 2012;11(2):305-11.
4. Martelli, A, Zavarize, SF. Vias nociceptivas da dor e seus impactos nas atividades da vida diária. *Unicências*. 2014;17(1) 47-51.
5. Santos FDRP, Nunes SFL, Silva JP, Silva RMO, Viana RP, Pereira VO et al. Dor em pacientes no pós-operatório de cirurgias torácicas e abdominais. *Rev Cienc Ext*. 2014;10(3):99-107.
6. Silva MADs, Pimenta CAM, Cruz DALM. Pain assessment and training: the impact on pain control after cardiac surgery. *Rev Esc Enferm USP*. 2013;47(1):84-92.
7. Borges JBC, Ferreira DLM P, Carvalho SMR, Martins AS, Andrade RR, Silva MAM. Pain intensity and postoperative functional assessment after heart surgery. *Rev Bras Cir Cardiovasc*. 2006;21(4):393-402.
8. Cordeiro ALL, Melo TA, Neves D, Luna J, Esquivel MS, Guimarães ARF et al. Inspiratory muscle training and functional capacity in patients undergoing cardiac surgery. *Braz J Cardiovasc. Surg*. 2016;31(2):140-4.

9. Martinez B, Bispo A, Duarte A, Neto M. Declínio funcional em uma Unidade de Terapia (UTI). *Rev Inspirar*. 2013;5(1):1-5. Disponível em: https://www.researchgate.net/profile/Mansueto_Neto/publication/257169739_Functional_decline_in_intensive_care_unit_ICU/links/0a85e53b2eee6ec14d000000/Functional-decline-in-intensive-care-unit-ICU.pdf
10. Pimenta CAM. Escalas de avaliação de dor. In: Teixeira MD, editor. *Dor: conceitos gerais*. São Paulo: Limay; 1994. p. 46-56.
11. Riberto M, Miyazaki MH, Jucá SSH, Sakamoto H, Potiguara P. Validation of the Brazilian version of Functional Independence Measure. *Acta Fisiatr*.2004;11(2):72-3.
12. Faria Filho GS, Caixeta LR, Stival MM, Lima LR. Dor aguda: julgamento clínico de enfermagem no pós-operatório de cirurgia cardíaca. *REME - Rev Min Enferm*. 2012;16(3):400-9.
13. Andrade EV, Barbosa MH, Barichello E. Pain assessment in postoperative cardiac surgery. *Acta Paul Enferm*.2010;23(2):224-9.
14. Dessotte CAM, Rodrigues HF, Furuya RK, Rossi LA, Dantas RAS. Estressores percebidos por pacientes no pós-operatório imediato de cirurgia cardíaca. *Rev Bras Enferm*. 2016;69(4):741-50.
15. Veiga EP, Vianna LG, Melo GF. Fatores estressores em Unidade de Terapia Intensiva: percepção de pacientes idosos e adultos no pós-operatório de cirurgia cardíaca. *Rev Kairós*. 2013;16(3):65-77.
16. Boyd CM, Landefeld CS, Counsell SR, Palmer RM, Fortinsky RH, Kresevic D, et al. Recovery of activities of daily living in older adults after hospitalization for acute medical illness. *J Am Geriatr Soc*. 2008;56(12):2171-9.
17. Arcênio L, Souza M, Bortolin B, Fernandes A, Rodrigues A, Evora P. Cuidados pré e pós-operatórios em cirurgia cardiotorácica: uma abordagem fisioterapêutica. *Rev Bras Cir Cardiovasc*. 2008; 23(3):400-10.
18. Menezes MG, Ribeiro CJ, Nascimento FDS, Alves JAB, Lima AGCF, Ribeiro MDCDO. Postoperative pain and analgesia in patients submitted to unruptured brain aneurysm clamping. *Rev Dor*.2017;18(1):27-31.
19. Moraes DB, Lopes ACR, Sá VM, Silva Júnior WM. Evaluation of functional performance in patients undergoing cardiac surgery. *Rev Bras Cardiol*. 2010;23(5):255-98.
20. Curzel J, Forgiarini-Júnior A, Rieder MM. Avaliação da independência funcional após alta da unidade de terapia intensiva. *Rev Bras Ter Intensiva*. 2013;25(2):93-8.

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