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NEUROLOGICAL RECOVERY AFTER SURGICAL TREATMENT IN PATIENTS WITH THORACOLUMBAR TRM

RECUPERAÇÃO NEUROLÓGICA APÓS TRATAMENTO CIRÚRGICO EM PACIENTES COM TRM TORACOLOMBAR

RECUPERACIÓN NEUROLÓGICA DESPUÉS DE DEL TRATAMIENTO QUIRÚRGICO EN PACIENTES CON LME TORACOLUMBAR

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ABSTRACT

Objective: Evaluate the neurological recovery with a follow-up of 06 (six) months in victims of thoracic and lumbar fractures who underwent spinal decompression in less than 24 hours, between 24 and 48 hours, and more than 48 hours after the trauma. Methods: Data were collected on patients seen at a large public hospital in Belo Horizonte, between 2014 and 2018, who were victims of SCI who presented with neurological deficits at initial care, and the neurological recovery presented. Results: 41 SCI patients were evaluated, whose mean age was 34 years. There was a predominance of thoracic spine fractures (65.9% of the cases) and classified as AO Spine type C (75%). Regarding the time variable, about 68% of the patients were submitted to surgical treatment more than 48 hours after the trauma. It was observed that both the patients submitted to surgical decompression within less than 24 hours, and those operated on more than 48 hours after the trauma showed a slight neurological improvement at the 6-month follow-up. However, no statistical significance was found. It is worth noting that even when analyzing the 41 patients of the study, regardless of the surgical interval, it was impossible to observe a statistically significant neurological improvement at the 6-month follow-up. Conclusion: Our study could not demonstrate significant differences between those patients who operated early in less than 24 hours and those who operated after more than 48 hours. ***Level of Evidence III; Comparative retrospective study.***

Keywords: Spinal Cord Injuries; Spinal Cord Compression; Arthrodesis; Decompression; Fractures, Bone; Wounds and Injuries.

RESUMO

Objetivo: Avaliar a recuperação neurológica com um acompanhamento de 06 (seis) meses em vítimas de fraturas torácicas e lombares submetidos a descompressão medular em menos de 24 horas, entre 24 e 48 horas e em mais de 48 horas do trauma. Métodos: Foram coletados dados relativos a pacientes atendidos em hospital público de grande porte de Belo Horizonte, no período de 2014 e 2018, vítimas de TRM que apresentavam déficits neurológicos no atendimento inicial, e a recuperação neurológica apresentada. Resultados: Foram avaliados 41 pacientes vítimas de TRM, cuja idade média foi de 34 anos. Observou-se predomínio de fraturas na coluna torácica (65.9% dos casos) e classificadas como AO Spine tipo C (75%). Em relação a variável tempo cerca de 68% dos pacientes foram submetidos a tratamento cirúrgico com mais de 48h decorridas do trauma. Observou-se que tanto nos pacientes submetidos a descompressão cirúrgica com menos de 24h quanto nos operados com mais de 48h após o trauma houve discreta melhora neurológica no follow-up de 6 meses. Não foi constatada, todavia, significância estatística. Cabe destacar ainda que mesmo analisando o conjunto dos 41 pacientes do estudo, independente do intervalo cirúrgico, não foi possível constatar melhora neurológica com significância estatística na reavaliação de 6 meses. Conclusão: Nosso trabalho não conseguiu demonstrar diferenças significativas entre aqueles pacientes operados precocemente em menos de 24 horas daqueles operados em mais de 48 horas. Nível de evidência III; Estudo retrospectivo comparativo.

Descritores: *Traumatismos da Medula Espinal; Compressão da Medula Espinal; Artrodese; Descompressão; Fraturas Ósseas; Ferimentos e Lesões.*

RESUMEN

Objetivo: Evaluar la recuperación neurológica con un acompañamiento de 06 meses en víctimas de fracturas torácicas y lumbares sometidos a la descompresión medular en menos de 24 horas, entre 24 y 48 horas y en más de 48 horas del trauma. Métodos: Se recogieron datos de pacientes atendidos en un gran hospital público de Belo Horizonte, en el período de 2014 y 2018, víctimas de TRM que presentaban déficits neurológicos en el atendimiento inicial y la recuperación neurológica presentada. Resultados: Fueron evaluados 41 pacientes víctimas de TRM, cuya edad media fue de 34 años. Se ha observado una preponderancia de fracturas en la columna torácica (65.9% de los casos) y clasificadas como AO Spine tipo C (75%). En relación a la variable tiempo, un 68% de los pacientes fueron sometidos al tratamiento quirúrgico con más de 48h transcurridas del trauma. Se ha observado que tanto en los pacientes sometidos a la

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descompresión quirúrgica con menos de 24 horas cuanto en los operados con más de 48h tras el trauma hubo discreta mejora neurológica en "follow-up" de 6 meses. No fue averiguada, sin embargo, significancia estadística. Conviene resaltar todavía que, aunque analizando el conjunto de los 41 pacientes de estudio, independiente del intervalo quirúrgico, no fue posible observar mejora neurológica con significancia estadística en la revaluación de 6 meses. Conclusión: Nuestro trabajo no consiguió demostrar diferencias significativas entre aquellos pacientes operados tempranamente en menos de 24 horas de aquellos operados en más de 48 horas. ***Nivel de Evidencia III; Estudio retrospectivo comparativo.***

Descriptores: *Traumatismos de la Médula Espinal; Compresión de la Médula Espinal; Artrodesis; Descompresión; Fracturas Óseas; Heridas y Lesiones.*

INTRODUCTION

Thoracic and lumbar fractures account for 30 - 50 % of all spinal injuries in trauma victims.[1] Patients with thoracic and lumbar spine fractures are mostly adults (mean age 39 years), economically active, and male.[2] Traumatic spinal fractures occur in about 6% of polytrauma patients, and about half (2.6%) have associated nerve injuries.[1]

To standardize and facilitate communication between doctors, the Frankel scale[3] describes neurological lesions. This is an alphabetical classification in which each letter represents a neurological loss. (Table 1)

When it comes to treatment, there are two approaches: conservative and surgical. The decision for which course of action to take should aim to restore spinal alignment, maintain stability and function, recover from neurological deficit and avoid its installation and progression, and resolve pain.[4]

An early approach (<48 hours) has shown the best results in the neurological recovery of patients with spinal cord injuries associated with neuromuscular deficits. Because spinal cord injury mainly affects the economically active population, it has a high individual social cost.[3]

This study aims to evaluate the neurological recovery at a 6-month follow-up in patients with thoracic and lumbar spine fractures who have undergone spinal decompression in less than 24 hours, between 24 and 48 hours, and more than 48 hours after the trauma.

METHODOLOGY

A retrospective evaluation of neurological recovery was performed by reviewing the medical records of patients with thoracic and lumbar fractures with neurological damage seen at an emergency hospital in Belo Horizonte, Minas Gerais, Brazil. It is a highly complex center financed by the Brazilian Unified Health System (SUS). (CAAE 01929818.0.0000.5119)

Data were collected between 2014 and 2018, and a database was built in Excel with the following variables: gender, age, fracture level, AO Spine classification, assessment of neurological status according to the Frankel scale (Initial and six months), and time to post-trauma surgery (< 24 hours, 24 - 48 hours or > 48 hours).

Following the hospital's flowchart, after clinical stability, the patients were evaluated by a spine surgeon and submitted to a CT scan. The patients were then classified neurologically by the Frankel scale, and the vertebral fractures were classified according to AO Spine.

The Frankel scale was introduced in 1969, allowing for a better understanding among hospital staff of the patient's neurological status. It is divided from A to E, "A" being the patient with a complete lesion, "B" with preserved sensitivity and absent motor, "C" preserved sensitivity and non-functional motor, "D" preserved sensitivity and functional motor, "E" the patient with no deficits. (Table 1)

After the surgical treatment, the patients were re-evaluated and reclassified for neurological recovery at return visits at 2, 6, 12, and 24 weeks according to the hospital's protocol.

Exclusion criteria were patients with cervical fractures, patients without neurological deficits, patients undergoing conservative treatment, patients who could not be properly evaluated in their initial care because they were unconscious, in spinal shock, with peripheral lesions, among others, and those patients who did not return for follow-up. In addition, patients with only thoracolumbar fractures, patients with neurological deficits, and those who attended return visits were included.

Table 1. Frankel Scale.

Frankel Scale		
Classification	**Motricity**	**Sensitivity**
A	Absent	Absent
B	Absent	Present
C	Present not useful	Present
D	Present useful	Present
E	Normal	Present

The study was approved by the ethics committee of João XXIII Hospital - FHEMIG -MG - Brazil.

Statistical analysis

The profile of the patients was characterized by absolute frequency (n), relative frequency (%) for categorical variables, and mean and standard deviation for continuous variables. The normality of the data was checked using the Shapiro-Wilk test. The comparison of neurological recovery, assessed according to Frankel's classification at baseline, six months, and one year after surgery as a function of the time of surgery, was performed using *Pearson*'s Chi-square test and the Kruskal-Wallis test. The Frankel scale was worked out statistically as an ordinal scale, ranging from 1 to 5, considering that the higher the grade, the better the patient's neurological status. The data were analyzed with the help of the *Statistical Package for Social Science*, version 26.0 (IBM Corporation, Armonk, USA). The significance level adopted was 5% ($p < 0.05$).

DISCUSSION

Spinal paralysis is responsible for considerable human suffering and an extraordinarily high hospital time and resource expenditure.[5]

SCI due to spinal fractures predominated in patients with a mean age of 34.20 ± 10.61 years, which coincides with the peak of the economically active population in Brazil, that is, 25 to 49 years-old,[6] which is why spinal fractures have a great economic impact. As for gender, a higher incidence was observed in male patients, which is in agreement with what was published by Lomaz and collaborators in 2017.[7]

The incidence of neurological involvement in patients with thoracic and lumbar spine injuries is variable.[8] Magerl et al.[9] found an overall incidence of 22%, while Frank et al.,[4] in a study of thoracic injuries only, found an 81.3% incidence of deficits. There is a great deal of variation among different studies on the neurological evolution of patients operated on for thoracic and lumbar spine injuries. Rath et al.,[8] reported a 71% rate of neurological improvement (at least 1st of Frankel). Our study obtained the highest improvement rate (36%) in patients operated on > 48 hours.

Rath et al.[8] in 2005 showed that even in cases of complete neurological injury (Frankel A), some patients could improve after surgery, contrary to Whitesides[10] assertion that a complete spinal cord injury will never recover. Our study also showed

that some Frankel A patients in both groups operated on less than 24 hours and greater than 48 hours achieved some neurological recovery.

Several factors are responsible for the neurological improvement in patients with SCI. The time between the injury and the surgical procedure should be highlighted among them. The concept of early surgery still needs to be divergent in the literature. Better neurological recovery has been demonstrated[6,11] in those patients operated on early in less than 24 hours. In contrast, McEvoy and Bradford[12] defined early surgical treatment as performed within two weeks of injury. Experimental studies have shown a 6- to an 8-hour window of opportunity to significantly reduce secondary injury by relieving spinal cord pressure.[13,14]

To perform spine surgery in less than 24 hours, we encounter some difficulties, such as those patients who have accidents in neighboring cities and take time to be regulated and transferred to our hospital, as well as those who present with clinical instability that prevents them from having surgery immediately after arriving at our hospital.

As a limitation of the study, we emphasize that it is a retrospective study with a high number of patients with incomplete medical records or who did not return to our team and who were excluded from the study, thus determining a small sample for the study.

CONCLUSION

The debate about the ideal time to approach spinal cord trauma victims is still wide, but recent research has shown that early decompression seems to be the way to go.[15] However, our study could not demonstrate a significant difference in neurological recovery between patients who operated on early in less than 24 hours and those who operated on after more than 48 hours. The fact that the group of patients operated on $>$ 48 hours is numerically larger may be an important confounding bias.

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