ORIGINAL ARTICLE
TRAUMA
http://dx.doi.org/10.1590/S1808-185120222204276182

RETROSPECTIVE ANALYSIS OF SPINAL FRACTURE CASES IN A TERTIARY HOSPITAL

ANÁLISE RETROSPECTIVA DOS CASOS DE FRATURA DE COLUNA EM UM HOSPITAL TERCIÁRIO

ANÁLISIS RETROSPECTIVO DE CASOS DE FRACTURA DE COLUMNA EN UN HOSPITAL TERCIARIO

LUCAS HENRIQUE ROSSATO[1], FRANCIEL WAWRZYNIAK[1], LEANDRO MEDEIROS DA COSTA[1], KARIN DE ALMEIDA[2], LUCAS RODRIGUES BORGES[1], VICTOR CÉSAR GAVA VICENTI[1]

1. Hospital Regional de São José Dr. Homero de Miranda Gomes, Department of Orthopedics and Traumatology, São José, SC, Brazil.
2. Universidade do Sul de Santa Catarina (UNISUL), Tubarão, SC, Brazil.

ABSTRACT

Objective: To evaluate the clinical and epidemiological profile of patients diagnosed with spinal fractures treated at Hospital Regional de São José Dr. Homero de Miranda Gomes (HRSJ), from the municipality of São José/SC, from March 2020 to March 2021. Methods: An observational study was carried out with a cross-sectional design and analysis of secondary data obtained by reviewing electronic medical records of patients diagnosed with spinal fractures treated during the study period. Associations of categorical variables were tested using Pearson's chi-square test. The statistical significance level adopted was 5% ($p<0.05$). Results: 173 individuals participated in the study. There was a predominance of males, with 120 (70.5%) cases. The most frequent trauma was falling from a height (43.4%), followed by trauma from traffic accidents (37.6%). In the AO Classification, A1 was attributed in 35.8% of the cases, and the Frankel Scale had mostly E (90.8%). The approach to fractures was predominantly conservative (70.5%). The most injuries were in the lumbar spine (93). Conclusion: The risk group for spine fractures consists of young men, with a predominance of falls as a mechanism of trauma and lumbar involvement. It is necessary to establish preventive measures aimed at the public at risk. Since spine fractures are important determinants of morbidity and mortality in the population. ***Level of Evidence II; Type of study: Prognostic study.***

Keywords: Spine; Spinal Injuries; Spinal Fractures.

RESUMO

Objetivo: Avaliar o perfil clínico e epidemiológico dos pacientes com diagnóstico de fratura de coluna atendidos no Hospital Regional de São José Dr. Homero de Miranda Gomes (HRSJ), do município de São José/SC, no período de março de 2020 a março de 2021. Métodos: Foi realizado um estudo observacional com delineamento transversal e análise de dados secundários obtidos por meio da revisão de prontuários eletrônicos, dos pacientes com diagnóstico de fratura de coluna atendidos no período de estudo. As associações das variáveis categóricas foram testadas pelo teste de Qui-quadrado de Pearson. O nível de significância estatística adotado foi de 5% (valor de $p<0,05$). Resultados: Participaram do estudo 173 indivíduos. Obteve-se predomínio do sexo masculino com 120 (70,5%) dos casos. O trauma mais frequente foi o de queda de altura (43,4%), seguido por traumas provenientes de acidentes de trânsito (37,6%). Na Classificação AO, a A1 foi atribuída em 35,8% dos casos e a Escala de Frankel teve em sua maioria E (90,8%). A abordagem das fraturas teve predomínio por conduta conservadora (70,5%). Os maiores acometimentos de lesão foram em coluna lombar (93). Conclusão: O grupo de risco para fraturas de coluna constitui-se por homens jovens, com predomínio de quedas como mecanismo de traumas e acometimento lombar. É necessário que se estabeleçam medidas de prevenção voltadas para o público de risco. ***Nível de Evidência II; Tipo de estudo: Estudo prognóstico.***

Descritores: *Coluna Vertebral; Traumatismos da Coluna Vertebral; Fraturas da Coluna Vertebral.*

RESUMEN

Objetivo: Evaluar el perfil clínico y epidemiológico de los pacientes con diagnóstico de fractura de columna atendidos en el Hospital Regional de São José Dr. Homero de Miranda Gomes (HRSJ), del municipio de São José/SC, de marzo de 2020 a marzo de 2021. Métodos: Se realizó un estudio observacional con diseño transversal y análisis de datos secundarios obtenidos a través de la revisión de historias clínicas electrónicas de pacientes con diagnóstico de fractura de columna atendidos durante el periodo de estudio. Las asociaciones de variables categóricas se probaron mediante la prueba de chi-cuadrado de Pearson. El nivel de significancia estadística adoptado fue del 5% ($p<0,05$). Resultados: 173 personas participaron en el estudio. Hubo predominio del sexo masculino con 120 (70,5%) de los casos. El traumatismo más frecuente fue la caída de altura (43,4%), seguido del traumatismo por accidente de tráfico (37,6%). En la Clasificación AO se atribuyó A1 en el 35,8% de los casos y la Escala de Frankel tuvo mayoritariamente E (90,8%). El abordaje de las fracturas fue predominantemente conservador (70,5%). La mayoría de las lesiones fueron en la columna lumbar (93). Conclusión:

Study conducted by the Hospital Regional de São José Dr. Homero de Miranda Gomes, Department of Orthopedics and Traumatology, n/n, Rua Adolfo Donato da Silva, São José, SC, Brazil. 88103901.
Correspondence: Lucas Henrique Rossato. n/n, Rua Adolfo Donato da Silva, São José, SC, Brazil. 88103901. lucas.rossato@gmail.com

Received on 07/04/2023 accepted on 10/19/2023
Reviewed by: Murilo Daher

El grupo de riesgo para las fracturas de columna está formado por hombres jóvenes, con predominio de caídas como mecanismo de traumatismo y afectación lumbar. Es necesario establecer medidas preventivas dirigidas al público en riesgo. ***Nivel de Evidencia II; Tipo de estudio: Estudio pronóstico.***

Descriptores: *Columna Vertebral; Traumatismos Vertebrales; Fracturas de la Columna Vertebral.*

INTRODUCTION

Spinal trauma accounts for approximately 4% to 23% of all traumas.[1] Spinal fractures are important determinants of population morbidity and mortality and have a direct economic impact, either through the population affected or public treatment costs. In addition, spinal injuries have the worst functional outcomes and the lowest return to work rates after injury.[2,3]

Fracture mechanisms vary and are mostly preventable, mainly falls from heights, traffic accidents, and firearm injuries.[2,4]

The correct diagnosis and management of these cases are fundamental to the patient's prognosis. Thus, fracture and neurological involvement classifications, such as the Frankel Scale and AO, are used. The Frankel Scale is used for neurological deficits. It is classified from A to E, with A being the absence of motor or sensory function below the lesion and E being normal motor and sensory function. The AO Scale was created to allow good inter-observer communication, presenting a progression of severity and being applied to the thoracolumbar segments.[5,6]

The ideal classification should be simple, universal, intelligible, and replicable for everyone. In addition, it should enable or assist in treatment decision-making.[5,6]

In this sense, it is of fundamental importance to trace these patients' epidemiological profiles to better manage and prevent these fractures.

METHODS

This is a retrospective, cross-sectional study. The study population consisted of patients treated at the Hospital Regional de São José Dr. Homero de Miranda Gomes (HRSJ), in the municipality of São José/SC, who were diagnosed with a spinal fracture between March 2020 and March 2021.

The HRSJ is a public hospital in the Greater Florianópolis region and is considered the largest in the region, being a reference in the traumatology service.

The study was carried out by reviewing medical records and collecting data. The aim was to assess the clinical and epidemiological profile of patients diagnosed with spinal fractures. Patients diagnosed with a spinal fracture during the analysis period were included. Patients with incomplete medical records were excluded from the study.

The data needed for the study was collected from the electronic medical record (MICROMED®), the standard tool used to record medical appointments at the HRSJ. Data was obtained on age, gender, trauma mechanism, type of treatment, fracture level, fracture classification, and the Frankel Scale. All patients seen at this nosocomial suspected of having a spinal fracture are carefully examined using plain radiography and computed tomography to assess the lesions, classify them, and deal with them.

The database was structured in a Microsoft Excel spreadsheet. The data was analyzed using SPSS software version 20.0. Percentages, absolute numbers, and numerical variables by central tendency and dispersion measures described categorical variables. Associations between categorical variables were tested using Pearson's chi-squared test. The level of statistical significance adopted was 5% (p-value <0.05).

The use of data for this study was approved by the Research Ethics Committee (CEP) of the HRSJ under opinion no. 5.668.389.

RESULTS

A total of 173 individuals seen by the HRSJ Spine Service between March/20 and March/21 took part in the study. The mean ($\pm$SD) age was 44.7 ($\pm$17.4) years, and males predominated with 120 (70.5%) of the cases. The most common trauma was falls from a height (43.4%), followed by traffic accidents (37.6%). As for the classifications, A1 was assigned in 35.8% of cases when the AO was used, and the Frankel Scale was mostly E (90.8%). The approach to fractures was predominantly conservative (70.5%). (Table 1)

In absolute frequency, there were more cases of injury to the lumbar spine (93), as shown in Figure 1, and in most cases, only one segment was involved. (Figure 2)

In the population under 40, traffic accidents predominately (67.7%) were the trauma mechanism. On the other hand, in the population over 60, trauma from falling from their height was higher than in the others (81.8%). (Table 2)

Surgical treatment was more common in cases of traffic accidents (32.3%), and conservative treatment was more prevalent in falls from a height (81.8%). In addition, the type of fracture most often indicated for surgery was a sacral fracture (40%), followed by a cervical fracture (37.9%). In most cases of lumbar spine fractures, conservative treatment was chosen (72%).

Table 1. Epidemiological data of patients admitted with a diagnosis of spinal fracture between March 2020 and March 2021. (n=173).

	n	%
Age		
<40 years	76	43.9
40 to 59 years	60	34.7
≥60 years	37	21.4
Sex		
Male	122	70.5
Female	51	29.5
Trauma mechanism		
Fall from a height	75	43.4
Traffic accident	65	37.6
Fall from own height	22	12.7
Direct trauma	7	4.0
Firearm injury	2	1.2
Falling off a bike	2	1.2
Fracture classification		
A0	35	20.2
A1	62	35.8
A2	5	2.9
A3	21	12.1
A4	17	9.8
B1	3	1.7
B2	14	8.1
B3	1	0.6
C	7	4.0
Other	8	4.6
Frankel scale		
A	5	2.9
B	1	0.6
C	3	1.7
D	2	1.2
E	157	90.8
Sedated	5	2.9
Conduct		
Surgical	51	29.5
Conservative	122	70.5

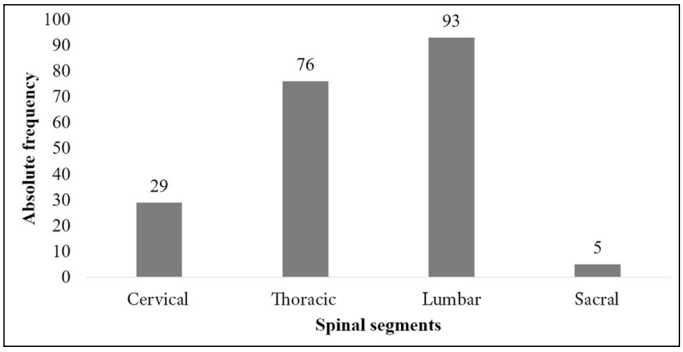

Figure 1. Absolute frequency of the types of spinal fractures involved in the injuries.

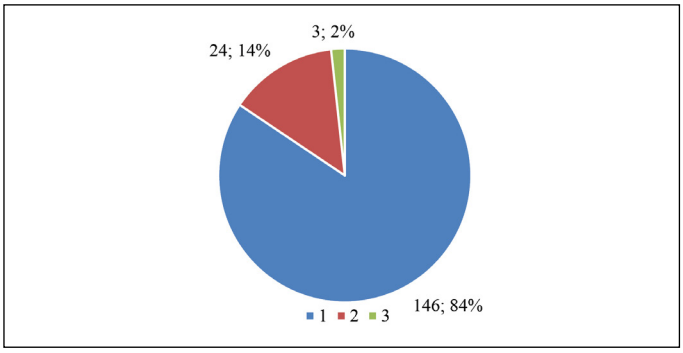

Figure 2. Number of total segments affected by the lesions.

Table 2. Characteristics were inherent to trauma concerning the age of patients admitted with a diagnosis of spinal fracture.

		<40 years	40-60 years	≥60 years	p
Cervical fracture	Yes	19	7	3	0.033
		25.0%	11.7%	8.1%	
	No	57	53	34	
		75.0%	88.3%	91.9%	
Thoracic fracture	Yes	35	25	16	0.873
		46.1%	41.7%	43.2%	
	No	41	35	21	
		53.9%	58.3%	56.8%	
Lumbar fracture	Yes	31	42	20	0.003
		40.8%	70.0%	54.1%	
	No	45	18	17	
		59.2%	30.0%	45.9%	
Sacral fracture	Yes	4	0	1	0.191
		5.3%	0.0%	2.7%	
	No	72	60	36	
		94.7%	100%	97.3%	
Trauma mechanism	Fall from a height	25	35	15	<0.001
		36.2%	61.4%	41.7%	
	Traffic accident	44	18	3	
		63.8%	31.6%	8.3%	
	Fall from own height	0	4	18	
		0.0%	7.0%	50.0%	
Number of segments affected	1	64	48	34	0.292
		84.2%	80.0%	91.9%	
	≥2	12	12	3	
		15.8%	20.0%	8.1%	

Lumbar fractures were the most prevalent in both sexes. About the mechanism of trauma, the most common among women is traffic accidents. (Table 3)

DISCUSSION

Spinal fractures showed a profile of occurrence in young men (<40 years) associated with falling from a height as the predominant trauma mechanism, followed by traffic accidents, data consistent with other studies.[2,7-10]

The prevalence of this risk profile can be explained by the fact that it corresponds to the economically active age group in Brazil, sometimes attributing a greater occupational risk exposure to males.[2,7,8,10] The socio-economic impact spinal fractures can have on society can be explained by this predominant profile, resulting in people taking time off work and the state spending money on them.

A statistically significant difference was found in gender and trauma mechanisms. Women suffer more traumas due to traffic accidents, while men suffer more traumas due to falls from a height. Lomaz et al. also found that the main trauma mechanism in women was automobile accidents.[2,7] There is no evidence in the literature that trauma due to traffic accidents is higher in women. According to Vasconcelos et al., in an analysis carried out in Ribeirão Preto (SP), there was a prevalence of automobile accidents, most of which were caused by the use of motorcycles, associated with disrespect for traffic laws and not wearing a helmet.[11]

In this respect, the prevalent groups for falls from their height were those aged over 60 and women. In the post-menopausal female population, bone density is significantly reduced. These characteristics may explain the greater damage caused by power outages in this population, which can lead to long hospital stays and even deaths, resulting in another major socio-economic problem.[9,12,13]

Most of the lesions affected only one segment. In their cohort study, Roche et al. found that multiple spinal injuries were common.[13] Among the segments, the lumbar spine was the most affected,

Table 3. Characteristics were inherent to trauma with the sex of patients admitted with a diagnosis of spinal fracture. São José-SC.

		Male	Female	p
Cervical fracture	Yes	23	6	
		18.9%	11.8%	0.255
	No	99	45	
		81.1%	88.2%	
Thoracic fracture	Yes	53	23	
		43.4%	45.1%	0.841
	No	69	28	
		56.6%	54.9%	
Lumbar fracture	Yes	64	29	
		52.5%	56.9%	0.596
	No	58	22	
		47.5%	43.1%	
Sacral fracture	Yes	3	2	
		2.5%	3.9%	0.601
	No	119	49	
		97.5%	96.1%	
Trauma mechanism	Fall from a height	62	13	
		53.9%	27.7%	<0.001
	Traffic accident	46	19	
		40.0%	40.4%	
	Fall from own height	7	15	
		6.1%	31.9%	
Number of segments affected	1	102	44	
		83.6%	86.3%	0.659
	≥2	20	7	
		16.4%	13.7%	

followed by the thoracic spine, with no significant differences between the sexes. This contrasts with the findings of Brito et al., who found a predominance of thoracic injuries.[14] In general, spinal fractures occur in the thoracolumbar segment, making up around 90% of cases and predominantly affecting the T12 and L2 segments. The change from thoracic kyphosis to lumbar lordosis leaves the thoracolumbar transition susceptible to axial loads and prone to injury.[7,15]

It is important to approach these traumas systematically, always seeking to minimize damage to the patient. The patients were examined according to the Frankel Scale on admission, with a predominance of Frankel E, which corroborates other articles.[8] Most patients classified with more severe deficits are responsible for a longer period of hospitalization and postoperative complications than the others.[5] In addition, the A1 classification was used in most cases.

These classifications are essential for establishing a therapeutic approach. Most of them used conservative treatment, also widely used in a study in Curitiba, Paraná.[16] Most fractures that don't present instability or neurological impairment are treated with conservative methods.[3,14] In many cases, this strategy can be used with good results. Wood et al. showed in their cohort study with a 22-year segment that patients without neurological involvement and who were treated conservatively had better outcomes in terms of functionality and pain.[17] A cohort study carried out in Paraná showed that among the cases of spinal fractures treated surgically, 50% of the patients had functional limitations closely linked to the patient's age.[18]

Concerning the mechanism of trauma, surgical treatment was adopted more frequently in cases of traffic accidents. For Melo-Neto et al., motorcycle accidents were a determining factor in the need for surgery since these patients are more susceptible to polytrauma.[19] In Bahia, there was a fivefold increase in spinal trauma resulting from motorcycle accidents over ten years.[15]

CONCLUSION

The risk group for spinal fractures consists of young men, with a predominance of falls as a trauma mechanism. Among women, the main mechanism of trauma was traffic accidents. The main segment affected was the lumbar; the most common approach was conservative. It is necessary to establish preventive measures for the public at risk to improve workplace and traffic safety conditions. Since spinal fractures are important determinants of morbidity and mortality in the population.

All authors declare no potential conflict of interest related to this article.

CONTRIBUTIONS OF THE AUTHORS: Each author has made an individual and significant contribution to the development of this article. FW: writing, revision, statistical analysis, intellectual concept and preparation of the entire research project; LHR: writing, revision, statistical analysis, intellectual concept and preparation of the entire research project; LMC: writing, revision, statistical analysis and intellectual concept; KA: writing, revision, statistical analysis, intellectual concept and preparation of the entire research project; LRB: revision, statistical analysis and intellectual concept; VCGV: revision, statistical analysis and intellectual concept. All the authors have approved the final version of the manuscript to be published.

REFERENCES

1. Oliver M, Inaba K, Tang A, Branco BC, Barmparas G, Schnüriger B, et al. The changing epidemiology of spinal trauma: a 13-year review from a Level I trauma centre. Injury. 2012;43(8):1296-300.
2. Lomaz MB, Netto LAFS, Garrote Filho MS, Alves AP, Canto FR de T. Epidemiological profile of patients with traumatic spinal fracture. Coluna/Columna. 2017;37(3):224-7.
3. Daly MC, Patel MS, Bhatia NN, Bederman SS. The Influence of Insurance Status on the Surgical Treatment of Acute Spinal Fractures. Spine (Phila Pa 1976). 2016;41(1):37-45.
4. Whang PG, Vaccaro AR. Thoracolumbar Fractures: Anterior Decompression and Interbody Fusion. J Am Acad Orthop Surg. 2008;16(7):424-31.
5. Negrelli MAC, Oliveira RG de, Rocha ID da, Cristante AF, Marcon RM, De Barros Filho TEP. Traumatic Injuries of the cervical spine: current epidemiological panorama. Acta Ortop Bras. 2018;26(2):123-6.
6. Iutaka SA. Classificação das lesões traumáticas vertebrais. AO Spine Latin America. p. 1-36. Disponível em: https://www.aolatam.org/ftp/edudatabase/open-files/aos_da_n1m3t3_sadao_prt.pdf.
7. Rodrigues LCL, Bortoletto A, Matsumoto MH. Epidemiologia das fraturas toracolombares cirúrgicas na zona leste de São Paulo. Coluna/Columna. 2010;9(2):132-7.
8. Fernandes RB, Gomes EGF, Gusmão MS, de Amorin Junior DC, Simões MTV, Gomes JF, et al. Estudo clínico epidemiológico das fraturas da coluna vertebral. Coluna/Columna. 2012;11(3):230-3.
9. Báča V, Klimeš J, Tolar V, Zimola P, Balliu I, Vítvarová I, et al. A 1-year prospective monocentric study of limb, spinal and pelvic fractures: Can monitoring fracture epidemiology impact injury prevention programmes?. Cent Eur J Public Health. 2018;26(4):298-304.
10. Koksal I, Alagoz F, Celik H, Yildirim AE, Akin T, Guvenc Y, et al. Timing of Surgery for Spinal Fractures Associated with Systemic Trauma: A Need for a Strategic and Systemic Approach. Turk Neurosurg. 2016;26(3):411-5.
11. Vasconcelos ECLM, Riberto M. Caracterização clínica e das situações de fratura da coluna vertebral no município de Ribeirão Preto, propostas para um programa de prevenção do trauma raquimedular. Coluna/Columna. 2011;10(1):40-3.
12. Meinberg EG, Clark D, Miclau KR, Marcucio R, Miclau T. Fracture repair in the elderly: Clinical and experimental considerations. Injury. 2019;50(1):S62-5.
13. Roche SJ, Sloane PA, McCabe JP. Epidemiology of spine trauma in an Irish regional trauma unit: a 4-year study. Injury. 2008;39(4):436-42.
14. Brito LMO, Chein MB da C, Marinho SC, Duarte TB. Avaliação epidemiológica dos pacientes vítimas de traumatismo raquimedular. Rev Col Bras Cir. 2011;38(5):304-9.
15. Oliveira TAB de, Andrade SM dos S, Prado GO, Fernandes RB, Gusmão MS, Gomes EGF, et al. Epidemiology of spine fractures in motorcycle accident victims. Coluna/Columna. 2016;15(1):65-7.
16. Araújo FAJ de, Matsybara A, Pereira LHC, Schmidt EHB, Kondlatshcj GL de S. Epidemiology of Spinal cord Injury in references trauma center in Curitiba (Paraná, Brazil). Coluna/Columna. 2021;20(2):123-6.
17. Wood K, Buttermann G, Mehbod A, Garvey T, Jhanjee R, Sechriest V. Operative compared with nonoperative treatment of a thoracolumbar burst fracture without neurological deficit. A prospective, randomized study. J Bone Joint Surg Am. 2003;85(5):773-81.
18. Morais GS, Benato ML, Kulcheski AL, Santoro PG del, Sebben AL, Graells XS i. Return to work after spinal fracture surfery: na analysis of predictive factors. Coluna/Columna. 2017;16(4):292-5.
19. Melo-Neto JS de,Vidotto LEL, Gomes F de C, Morais DF de, Tognola WA. Characteristics and clinical aspects of patients with spinal cord injury undergoing surgery. Rev Bras Ortop. 2017;52(4):479-90.