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IMPACT OF COVID-19 ON SPINE SURGERIES IN A HIGH COMPLEXITY EMERGENCY HOSPITAL

IMPACTO DO COVID-19 NAS CIRURGIAS DE COLUNA EM UM HOSPITAL DE URGÊNCIAS DE ALTA COMPLEXIDADE

IMPACTO DEL COVID-19 EN LAS CIRUGÍAS DE COLUMNA EN UN HOSPITAL DE URGENCIAS DE ALTA COMPLEJIDAD

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ABSTRACT

Objective: To study the impact of the COVID-19 pandemic on spine surgeries at a Reference Center for High Complexity Urgencies in Goiás. Methods: A retrospective, observational study was carried out based on data from medical records of patients undergoing spine surgery between September 2017 and September 2021. Volunteers were divided into two groups: before and during the pandemic, considering April 2020 as a starting point. The following was extracted from the medical records: age, gender, education, etiology, neurological deficit, region of the spine addressed, mechanism of trauma, fractured vertebrae, type of fracture, length of stay in the ICU, COVID test (PCR), and deaths. Student t, chi-square, and Fisher's exact statistical tests were used to compare the pre- and post-pandemic profiles. In addition, Spearman's correlation test was applied to verify the correlation between variables, considering $p<0.05$. Results: 388 medical records were analyzed, showing a 15% increase in spine surgeries during the pandemic. There was a significant difference in the etiology of surgeries ($p=0.05$), with lumbar trauma being more prevalent in men and also more cases of neurological deficits ($p=0.001$). There was also a reduction in the length of stay in the ICU ($p=0.0001$), which was lower during the pandemic. Conclusion: The COVID-19 pandemic did not directly impact the number of surgeries performed at a Reference Hospital in High Complexity Urgencies in Goiás, but there was a prioritization of emergency surgeries. ***Level of Evidence II; Retrospective Study.***

Keywords: Spinal Injuries; Orthopedic Surgery; COVID-19.

RESUMO

Objetivo: Estudar o impacto da pandemia de COVID-19 nas cirurgias de coluna em um Centro de Referência em Urgências de Alta Complexidade em Goiás. Métodos: Foi realizado um estudo retrospectivo, observacional a partir de dados de prontuários médicos de pacientes submetidos à cirurgia de coluna entre setembro de 2017 a setembro de 2021. Os voluntários foram divididos em dois grupos: antes da pandemia e durante a pandemia, considerando abril de 2020 como marco de início. Foram extraídos dos prontuários: idade, gênero, escolaridade, etiologia, déficit neurológico, região da coluna abordada, mecanismo de trauma, vértebras fraturadas, tipo de fratura, tempo de internação em UTI, teste de COVID (PCR) e óbitos. Utilizou-se os testes estatísticos T de Student, Qui quadrado e exato de Fisher para realizar a comparação entre o perfil pré e pós-pandemia. Além disso, foi aplicado o teste de correlação de Spearman para verificar a correlação entre as variáveis, considerando $p<0,05$. Resultados: Foram analisados 388 prontuários, constatando um aumento de 15% nas cirurgias de coluna durante a pandemia. Houve diferença significativa na etiologia das cirurgias ($p=0,05$), sendo mais prevalentes traumas lombares em homens e também mais casos de déficits neurológicos ($p=0,001$). Notou-se também uma redução no tempo de internação na UTI ($p=0,0001$), que foi menor durante a pandemia. Conclusão: A pandemia de COVID-19 não impactou diretamente na quantidade de cirurgias realizadas em um Hospital de Referência em Urgências de Alta Complexidade em Goiás, mas verificou-se uma priorização das cirurgias emergenciais. ***Nível de Evidência II; Estudo Retrospectivo.***

Descritores: *Lesões da Coluna Vertebral; Cirurgia Ortopédica; COVID-19.*

RESUMEN

Objetivo: Estudiar el impacto de la pandemia de COVID-19 en las cirugías de columna en un Centro de Referencia para Urgencias de Alta Complejidad en Goiás. Métodos: Se realizó un estudio observacional retrospectivo a partir de datos de historias clínicas de pacientes operados de la columna entre septiembre de 2017 y septiembre de 2021. Los voluntarios se dividieron en dos grupos: antes de la pandemia y durante la pandemia, considerando abril de 2020 como punto de partida. De las historias clínicas se extrajo: edad, sexo, escolaridad, etiología, déficit neurológico, región de la columna abordada, mecanismo del trauma, vértebras fracturadas, tipo de fractura, tiempo de estancia en la UCI, test COVID (PCR) y fallecidos. Se utilizaron las pruebas estadísticas t de Student, chi-cuadrado y exacta de Fisher para

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comparar el perfil pre y postpandemia. Además, se aplicó la prueba de correlación de Spearman para verificar la correlación entre las variables, considerando p<0,05. Resultados: se analizaron 388 historias clínicas, mostrando un aumento del 15% en las cirugías de columna durante la pandemia. Hubo una diferencia significativa en la etiología de las cirugías (p=0,05), siendo más frecuente el traumatismo lumbar en los hombres y también más casos de déficit neurológico (p=0,001). También hubo una reducción en la estancia en la UTI (p=0,0001), que fue menor durante la pandemia. Conclusión: La pandemia de COVID-19 no impactó directamente en el número de cirugías realizadas en un Hospital de Referencia en Urgencias de Alta Complejidad en Goiás, pero hubo una priorización de las cirugías de emergencia. ***Nivel de Evidencia II; Estudio Retrospectivo.***

Descriptores: *Lesiones Vertebrales; Cirugía Ortopédica; COVID-19.*

INTRODUCTION

Coronavirus disease 2019 (COVID-19) is a pandemic disease that has already registered more than half a billion cases and six million deaths, significantly impacting health systems around the world. The World Health Organization (WHO) officially recognized COVID-19 as an international emergency on March 11, 2020;[1] since then, the redirection of medical attention and priority to the care of patients suspected and confirmed for the disease has imposed increasing challenges for health services around the world, including surgical services.[2]

The impact of the COVID-19 pandemic in Brazil has been one of the most significant in the world, with the country recording more than 30 million cases and more than 600,000 deaths by May 11, 2022.[3] This impact has also been felt by Brazilian public and private health services and all medical care specialties.

In Spinal Surgery, the impacts reported by many international services have included postponing all elective interventional spinal procedures to reduce patient exposure to COVID-19. This measure also sought to allow surgeons to concentrate their efforts on treating patients who needed urgent care, with hospitals developing criteria to assess which operations were urgent and which could be postponed.[4]

The main recommendation came from a joint document signed by the Brazilian Spine Society (SBC), the Brazilian Neurosurgery Society (SBN), and the Brazilian Orthopedics and Traumatology Society (SBOT).[5] The joint document, drawn up at a time when healthcare resources were being concentrated on combating and treating the global COVID-19 pandemic, recognized the dilemma of various medical specialties in defining their priorities and aimed to help surgeons and managers define these priorities in spine surgery. Thus, the document classifies each clinical presentation indicating spinal surgery into "urgent surgery", which should be managed within 24 to 48 hours; "delayed urgent surgery / potential urgency", which should be managed over 4 to 7 days; and "non-urgent surgery", which should be postponed until the normalization of care for COVID-19 cases.[5]

It is well known, however, that the postponement of elective surgeries considered "non-urgent" can have serious consequences for the health of patients with the clinical conditions classified as such. For example, patients with degenerative, traumatic, and oncological spinal diseases represent a rapidly growing population, with rates of lumbar spinal fusions almost quadrupling over three decades. With strategies to restrict the number of surgical procedures performed, many patients have to deal with untreated diseases and their own, which directly affects their quality of life and long-term morbidity and mortality rates.[6]

Thus, for spinal surgery, the difficulties encountered led to a significant change in operating dynamics. The number and priority of surgeries have changed, affecting patients with their health needs and spine surgeons in the hospital field. An SBC survey identified that the number of spinal surgeries in Brazil increased by 20% in the first nine months of 2021, compared to the same period in 2019, before the COVID-19 pandemic.[7] This is in line with a reasonable expectation of reducing the number of operations performed, given the greater rigor in classifying clinical conditions urgently needing intervention. However, it has not yet been quantified how much services were affected in Goiás.

This study aims to analyze the impact of the pandemic on spinal surgeries in a referral hospital for high-complexity emergencies in the Midwest region of Brazil by describing the profile of patients operated on by the hospital's spinal surgery team.

METHODS

Study design

This is a retrospective, observational, comparative study of patients who underwent spinal surgery between September 2017 and September 2021 at a high-complexity emergency reference center in Goiás, Brazil. This study was approved by the Research Ethics Committee (CAE 55640022.8.0000.5082), and the informed consent form was waived.

Inclusion criteria

Patients who underwent spinal surgery for trauma, degeneration, tumor, infection, or revision between September 2017 and September 2021 at a high-complexity emergency referral center were selected.

Exclusion criteria

Patients with incomplete medical records and those outside the study period were excluded.

Data collection

Data on age, gender, education, etiology (degenerative, traumatic, tumor, infection, revision, or other), neurological deficit, region of the spine affected, mechanism of trauma, length of hospital stay, length of admission, number of patients referred to the ICU, length of ICU stay and number of deaths were collected from the patient's records.

Data analysis

The analysis was carried out by dividing the study population into two groups: before April 2020 (pre) and after April 2020 (pandemic). The two groups were created according to when the COVID-19 pandemic began. IBM SPSS 23.0 software was used to carry out the statistical analysis. Student's t-test was used to compare parametric variables and the Chi-square test for non-parametric variables. Spearman's correlation coefficient was employed to establish the association between variables and trauma mechanism, which revealed a statistically significant difference at a p-value of less than 0.05.

RESULTS

A total of 388 patients were analyzed, 180 belonging to the pre-pandemic group and 208 to the pandemic group, which means a 15% increase in surgeries during the pandemic. The characterization of the groups is described in Table 1, and it was found that the patient profile was similar.

When comparing the medical records of the groups, there was a significant difference in the length of stay in the ICU (p=0.0001), the etiology (p=0.05), the presence of neurological deficits (p=0.001), the affected regions of the spine (p=0.05), the type of fracture (p=0.0001) and the positive test for COVID 19 (p=0.0001). (Table 2)

DISCUSSION

Analysis of the database showed that despite the pandemic, there was a 15% increase in spinal surgeries compared to previous years. Oliveira et al. reported that the Midwest region

Table 1. Characterization of the profile of patients before and during the pandemic.

Characterization		Pre-pandemic	Pandemic	p
Age (years)		44.91 ± 17.32	42.97 ± 16.45	0.26
Gender (%)	Female	41 (22.8%)	139 (77.2%)	0.25
	Male	58 (27.9%)	150 (72.1%)	
Schooling (%)	Not informed	83 (46.1%)	85% (40.9%)	0.10
	No education	3 (1.7%)	11 (5.3%)	
	Elementary school incomplete	31 (17.2%)	38 (18.3%)	
	Complete primary education	8 (4.4%)	15 (7.2%)	
	High school incomplete	6 (3.3%)	17 (8.2%)	
	Complete high school	38 (21.1%)	31 (14.9%)	
	Higher education incomplete	0 (0%)	2 (1.0%)	
	Complete university degree	11 (6.1%)	9 (4.3%)	

Table 2. Comparison of length of stay, time from admission to surgery, time in ICU, etiology, neurological deficit, regions of the spine affected, mechanism of trauma, type of fracture, positive CRP for COVID, and number of deaths between patients before and during the COVID-19 pandemic.

		Pre-pandemic	Pandemic	p
Length of stay (in days)		19.89 ± 24.03	16.79 ± 18.13	0.15
Time from admission to surgery (in days)		5 ± 8.93	5 ± 6.74	0.94
Time in the ICU		4 ± 14.28	1.59 ± 6.92	0.0001
Etiology	Trauma	124 (68.9%)	147 (70.7%)	0.05
	Degenerative	27 (15.0%)	36 (17.3%)	
	Tumor	2 (1.1%)	3 (1.4%)	
	Infection	15 (8.3%)	5 (2.4%)	
	Review	6 (3.3%)	14(6.7%)	
	Not informed	6 (3.3%)	3 (1.4%)	
Neurological deficit	Yes	57 (37.1%)	80 (38.5%)	0.001
	No	86 (47.8%)	62 (29.8%)	
	Not informed	37 (20.6%)	66 (31.7%)	
The region of the spine affected	Cervical	51 (28.3%)	69 (33.2%)	0.05
	Thoracic	60 (33.3%)	43 (20.7%)	
	Lombar	64 (35.6%)	87 (41.8%)	
	Sacral	5 (2.8%)	7 (3.4%)	
	Not informed	0 (0%)	2 (1.0%)	
Trauma mechanism	Motorcycling	31 (17.2%)	49 (23.6%)	0.07
	Motorsport	41 (22.8%)	33 (15.9%)	
	Falling to the ground	9 (5%)	13 (6.2%)	
	Fall from height	31 (17.2%)	40 (19.2%)	
	White Weapon	1 (0.6%)	0	
	Firearms	2 (1.1%)	2 (1%)	
	Shallow water diving	8 (4.4%)	6 (2.9%)	
	Direct trauma	1 (0.6%)	11 (5.3%)	
	Not informed/no trauma	56 (31.1%)	54 (26.0%)	
Type of fracture	Compressive	31 (17.2%)	51 (24.5%)	0.001
	Ligament	2 (1.1%)	6 (2.9%)	
	Dislocation	55 (30.6%)	107 (51.4%)	
	Not informed/no fracture	92 (51.1%)	44 (21.2%)	
PCR positive	Yes	0	5 (2.4%)	0.001
	No	2 (1.1%)	41 (19.7%)	
	Not informed	178 (98.9%)	162 (77.9%)	
Death	Yes	12 (6.7%)	7 (3.4%)	0.133
	No	168 (93.3%)	201 (96.6%)	

The time variables were calculated in days, while the others were calculated in frequencies (absolute numbers and percentages). There was also a weak and inversely significant relationship between age and trauma mechanism (p=0.001; R= -0.169).

showed a reduction of 26.88% in the number of spinal surgeries in 2020 and 33.08% in 2021.[8] It is believed that this divergence is related to the fact that the hospital is a reference to trauma, urgencies, and emergencies.

Comparing the patient profile, there was a 3:1 ratio between males and females, respectively. This predominance has been found in other studies[9-12] and may be related to the type of work or social factors. There was also a high percentage of traumas caused by traffic accidents (39.7%), both automobile and motorcycle accidents, which shows the great potential danger that traffic poses to the health and safety of the population.

There was a high rate of neurological deficit of 35.3% and an average of 18 days of hospitalization, as in other articles in the literature.[13-15] Both are high figures that can be explained by the high complexity nature of the hospital, whose patient filter selects more severe cases, requiring longer hospitalization and greater chances of spinal cord involvement.

The main change seen in the service was the post-operative stay in the ICU, which was reduced from four days to one day due to the need for health services to adapt to the high demand for patients with SARS-Cov-2[16] and the shortage of intensive care beds. Noronha et al. also showed a significant reduction in the length of ICU stay during the pandemic, from 4.01 to 1.59 days. However, this reduction was not accompanied by changes in mortality.[17]

This study has limitations because it is observational and only presents data from one hospital center. However, it is necessary to understand how the pandemic has impacted health services to develop future strategies.

CONCLUSION

Although the COVID-19 pandemic has overwhelmed most hospitals, the high-complexity emergency center in the Midwest of Brazil absorbed the impact of the pandemic without significantly affecting the flow of surgeries. The patient profile remained similar, with a higher prevalence of lumbar trauma with compression fractures. About the health service, the only factor that underwent significant changes was ICU time, which fell from four to one day.

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