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IMPACT OF SURGERY ON AMBULATORY STATUS IN PATIENTS WITH SYMPTOMATIC NEOPLASTIC SPINAL CORD COMPRESSION IN SOUTHERN BRAZIL

IMPACTO DA CIRURGIA SOBRE A CAPACIDADE DE AMBULATÓRIA EM PACIENTES COM COMPRESSÃO NEOPLÁSICA SINTOMÁTICA DA MEDULA ESPINALNO SUL DO BRASIL

IMPACTO DE LA CIRUGÍA EN LA CAPACIDAD DE AMBULACIÓN EN PACIENTES CON COMPRESIÓN MEDULAR NEOPLÁSICA SINTOMÁTICA EN EL SUR DE BRASIL

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ABSTRACT

Background: Spinal cord compression is a common complication of spine metastasis and multiple myeloma. About 30% of patients with cancer develop symptomatic spinal metastases during their illness. Prompt diagnosis and surgical treatment of these lesions, although palliative, are likely to reduce the morbidity and improve quality of life by improving ambulatory function. Study Design: Retrospective review of medical records.Objective: To evaluate postoperative functional recovery and the epidemiological profile of neoplastic spinal cord compression in two neurosurgical centers in southern Brazil. Methods: We retrospectively analyzed the data of all patients who underwent palliative surgery for symptomatic neoplastic spine lesion from metastatic cancer, in two neurosurgical centers, between January 2003 and July 2021. The variables age, sex, neurological status, histological type, affected segment, complications and length of hospitalization were analyzed. Results: A total of 82 patients were included. The lesions occurred in the thoracic spine in 60 cases. At admission, 95% of the patients had neurological deficits, most of which were Frankel C (37%). At histopathological analysis, breast cancer was the most common primary site. After surgery, the neurological status of 46 patients (56%) was reclassified according to the Frankel scale. Of these, 22 (47%) regained ambulatory capacity. Conclusion: Surgical treatment of metastatic spinal cord compression improved neurological status and ambulatory ability in our sample. ***Level of evidence II; Retrospective study.***

Keywords: Spine; Decompression; Neoplasm metastasis; Spinal neoplasms.

RESUMO

*Introdução: A compressão medular é uma complicação comum de metástases da coluna vertebral e de mieloma múltiplo. Cerca de 30% dos pacientes com câncer desenvolvem metástases sintomáticas na coluna no decorrer da doença. O diagnóstico imediato e o tratamento cirúrgico dessas lesões, embora paliativos, em geral reduzema morbidade e melhoram a qualidade de vidaao ampliar a capacidade de deambular. Desenho do estudo: Revisão retrospectiva de prontuários médicos. Objetivo: Avaliar a recuperação funcional pós-operatória e o perfil epidemiológico da compressão medular neoplásica em dois centros de neurocirurgia do sul do Brasil. Métodos: Analisamos retrospectivamente os dados de todos os pacientes submetidos à cirurgia paliativa de lesão neoplásica sintomática da coluna decorrente decâncer metastático, em dois centros neurocirúrgicos entre janeiro de 2003 e julho de 2021. Foram analisadas as variáveis idade, sexo, estado neurológico, tipo histológico, segmento acometido, complicações e tempo de internação. Resultados: Foram incluídos 82 pacientes no estudo. As lesões ocorreram na coluna torácica em 60 casos. À internação, 95% dos pacientes apresentavam déficits neurológicos, sendoa maioria classificada como Frankel C (37%). Na análise histopatológica, o câncer de mama foi o sítio primário mais comum. Depois da cirurgia, 46 pacientes (56%) tiveram o estado neurológico reclassificado pela escala de Frankel. Entre eles, 22 (47%) recuperaram a capacidade de deambular. Conclusões: O tratamento cirúrgico da compressão medular metastática melhorou o estado neurológico e a capacidade de deambulação em nossa amostra. **Nível de evidência II; Estudo retrospectivo.***

Descritores: *Coluna vertebral; Descompressão; Metástase neoplásica; Neoplasias da coluna vertebral.*

RESUMEN

Introducción: La compresión de la médula espinal es una complicación común de la metástasis de la columna vertebral y el mieloma múltiple. Aproximadamente el 30% de los pacientes con cáncer desarrollan metástasis espinales sintomáticas en el curso de la enfermedad. El diagnóstico precoz y el tratamiento quirúrgico de estas lesiones, aunque son paliativos, suelen reducir la morbilidad y mejor en lacalidad

Study conducted by the Hospital São José, Santa Casa de Misericórdia de Porto Alegre e Hospital Cristo Redentor, Grupo Hospitalar Conceição, Porto Alegre, RS, Brazil.
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de vida al aumentar la de ambulación. Diseño del estudio: Revisión retrospectiva de registros médicos. Objetivo: Evaluarla recuperación funcional postoperatoria y el perfil epidemiológico de la compresión medular neoplásica en dos centros neuroquirúrgicos del sur de Brasil. Métodos: Analizamos retrospectivamente los datos de todos los pacientes sometidos a cirugía paliativa por lesión vertebral neoplásica sintomática por cáncer metastásico, en dos centros neuroquirúrgicos entre enero de 2003 y julio de 2021. Se analizaron las variables edad, sexo, estado neurológico, tipo histológico, segmento afectado, complicaciones y duración de la hospitalización. Resultados: Se incluyeron 82 pacientes en el estudio. Las lesiones se produjeron en la columna torácica en 60 casos. Al ingreso, el 95% de los pacientes presentaban déficits neurológicos y la mayoría de ellos eran clasificados como Frankel C (37%). En el análisis histopatológico, elcáncer de mama fue el sitio primario más común. Después de la cirugía, se reclasificó el estado neurológico de 46 pacientes (56%) por la escala de Frankel. Entre ellos, 22 (47%) recuperaron la capacidadde deambulación. Conclusiones: El tratamiento quirúrgico de la compresión medular metastásica mejoró el estado neurológico y la capacidad de deambulación en nuestra muestra. ***Nivel de evidencia II; Estudio retrospectivo.***

Descriptores: *Columna vertebral; Descompresión; Metástasis de la neoplasia; Neoplasias de la columna vertebral.*

INTRODUCTION

The spine is the most common bone site for secondary implantation of malignant neoplasms and can be affected by primary tumors, such as multiple myeloma.[1]Improvements in surgical, chemotherapy and radiotherapy treatments has increased the survival time rates of cancer patients, causing metastatic disease to become increasingly prevalent. Spinal cord compression is one of the complications of spine metastases, occurring in up to 30% of patients with spine metastasis.[2,3]It can manifest clinically in several ways, such as back pain, radiculopathy, loss of sensation in the limbs, bladder dysfunction or loss of ability to walk due to motor deficit in the lower limbs.[2]

Ambulatory status and pain control are important for maintaining the quality of life of cancer patients. The loss of the ability to walk causes patients to become bedridden and dependent on caregivers, as well as increasing the clinical complications, such as respiratory and urinary infections, venous thrombosis and pressure ulcers.[4,5]

Treatment for metastatic spinal cord compression (MSCC) has historically consisted of corticosteroids and radiotherapy. However, decompressive surgery has become the standard treatment for metastatic lesions caused bysolid primary tumors, being superior to radiotherapy in preserving neurological function, especially for radioresistant tumors.[2,5] This surgery also allows the reduction of opioid use.

Postoperative ambulation is an important functional parameter, contributing to quality of life and a decline in spinal cord injury-related complications. In this study, the authors aim to retrospectively analyze the epidemiological profile of neoplastic spinal cord compression in two centers in southern Brazil, and the impact of surgery on ambulatory status in these patients.

METHODS

We retrospectively analyzed the data of all patients who underwent palliative surgery for the treatment of a symptomatic neoplastic spine lesion from metastatic cancer in two neurosurgical centers in Southern Brazil between January 2003 and July 2021. The article was not submitted for review by an ethics committee. Patients aged 18 years or older who underwent surgical treatment for neoplastic spinal cord compression evaluated pre- and postoperatively by the Frankel scale were included in the study. Patients with spinal cord compression due to non-neoplastic injury were excluded from the study. The variables age, sex, histological type, affected segment, complications and length of hospitalization were analyzed. The neurological status was assessed using the Frank scale, which divides patients into categories A, B, C, D and E, where A represents complete neurological deficit and E,normal neurological status. Categories B, C and D representincomplete spinal cord injuries with different levels of motor and sensory deficit. Patients classified as Frankel A, B and C are considered non-ambulatory, while those classified as D and E are able to walk.[6,7]

RESULTS

A total of 82 patients were included. There were 46 women and 36 men, and the mean age of patients was 56 years (25-79). The thoracic spine was the most commonly affected site, with a total of 60 cases (73.1%), and the lumbar spine was the second most affected, with 17 cases (20.7%). The demographic characteristics of the patients are shown in Table 1.

At admission, 95% of patients had neurological deficits, with 64% of them being unable to walk. Most of the patients who were unable to walkwere classified as Frankel C (37%), and the remainder as Frankel B (20%) or A (6%). Histopathological analysis showed breast cancer to be the most common primary site (24% of cases), followed by prostate, lung, lymphoma and kidney. After the surgery, the neurological status of 46 patients (56%) was reclassified, according to the Frankel scale. Of these, 22 (47%) regained ambulatory capacity (Table 2). The rate of complications was 24%, and surgical site infection was the most common complication. The average hospital stay was 15.2 days.[6-45]

DISCUSSION

Neoplasms affecting the spine can be caused either by primary tumors, such as multiple myeloma, or by secondary implantation of other neoplasms. MSCC is a commoncomplication of cancer, being the most common extra dural tumor of the spine. In the presence of neurological deficits, MSCCis considereda neurosurgical emergency. In these cases, spinal cord injury is caused by direct compression, causing edema, venous congestion, demyelination and secondary vascular injury.[1,3]

The main purpose of this retrospective analysis was to examine

Table 1. Demographic Characteristics of Patients (n = 82).

Sex (male/female)	**36/46**
Age, yrs (mean [range])	56 (25-79)
Primary origin	
Breast	20
Prostate	12
Lung	12
Lymphoma	8
Kidney	5
Others	24
Preoperative Frankel scale	
A	5
B	17
C	31
D	25
E	4
Surgical level	
Cervical	5
Thoracic	60
Lumbar	17

Table 2. Comparison of pre- and postoperative ambulatory status.

	Preoperative	**Postoperative**
Ambulatory patients (Frankel D or E)	29	48
Non-ambulatory patients (Frankel A, B or C)	53	34

the improvement in ambulatory status after surgery in patients with symptomatic MSCC. In this study of 82 patients with MSCC, 64% were able to walk after the surgery, compared with the 35% able to walk before the surgery.

There has always been a concern to assess the relationship between tumor histology and the patient's prognosis, but recently, there has been increased focus on factors related to the quality of life of these patients, which includes the ability to walk.[8]

Walking is a very important function in the quality of life of cancer patients, as it allows them to live more independently, improves self-esteem to face the oncological disease, and prevents clinical complications related to prolonged immobility.[4,9] The main complications related to spinal cord injuries are linked to immobility, such as decubitus ulcers, difficulty of hygiene care, deep venous thrombosis and pulmonary thromboembolism, and respiratory and urinary infections. These complications substantially increase the morbidity and mortality of these patients, often being the cause of death.[10-12] Furthermore, the quality of life of patients with metastatic cancer is an important aspect, asmetastatic disease is generally incurable.[13]

The goals of surgical intervention are to prolong patient survival and improve quality of life. In addition to motor improvement, the benefits of the operation also include reduction of pain, and the ability to walk, a prerequisite for rehabilitation.[4] Direct decompressive surgery, followed by radiotherapy, has become the standard treatment for MSCC caused by solid primary tumors, due to its increased efficacy over conventional radiotherapy alone in preserving neurological function and because it allows segment stabilization.[2,13,14] As in our case series, other studies have also shown improvements in functional outcomes after surgical decompression.[14-17]

Early surgical intervention seems to be one of the main factors related to the recovery of ambulatory function.[13,18] Symptoms lasting for less than 48 hours are also associated with more favorable outcomes, reinforcing the concept of "time is spine", much discussed in traumatic spinal cord compressions.[19] The optimal time for surgical decompression in MSCC is reported to be within 48-72 hours after the development of neurologic symptoms.[8,20,21] Postoperative radiation also seems to have a positive influence on ambulatory status, while preoperative radiotherapy seems to reduce the rates of functional recovery. The number of affected segments is also an important factor;patients with <3 levels of metastasis have a greater chance of recovering functional capacity as compared to patients with ≥ 3 levels.[6,18,22]

On the other hand, high glucose levels and prolonged time of neurological deficit are associated with lower chances of recovering ambulatory function.[14,21,23,24] Furthermore, the histological type of the primary tumor does not appear to be associated with outpatient outcome.[25]

In our study, patients who recovered the ability to walk had shorter hospital stays, which is a potential benefit of the return of ambulatory function, as the patient becomes less susceptible to complications related to being bedridden.

In addition, recent findings from the literature indicate atendency towards longer postoperative survival of patients, with better functional outcome, probably due to greater local control of the disease and lower rates of clinical complications linked to being bedridden.[26,27] Another factor that may be associated with increased survival in these patients is the fact that the ability to walkimproves the patient's chance of receiving postoperative adjuvant therapy, which has been shown to be associated with greater disease control.[9,18]

As in other studies, the majority of cases in our series occurred in the thoracic spine, probably because it is the spine segment with the largest number of vertebrae. It is also the segment of the spinal canal with the smallest diameter, resulting in more symptomatic injuries.[21,28-30]

CONCLUSION

Surgical treatment of neoplastic spinal cord compression significantly improved neurological status and ability to walkin our sample. The epidemiological data presented in our surgical series were consistent with those of the national and international literature. This study reported a significant casuistic, which contributes to producing an epidemiological profile of metastatic spinal cord compression in Brazil, especially in the southern region.

A limitation of thisstudy is that it does not evaluate the time from the diagnosis of spinal cord compression to surgical treatment, which influences the neurological prognosis.

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