



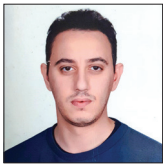
Original Article

Outcomes and efficiency of managing patients admitted for surgery for spinal metastases

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ABSTRACT

Background: This study evaluated the current pathways for dealing with patients admitted for surgery to address spinal metastases.

Methods: In this retrospective analysis (2016–2021), the following variables were studied admission, demographics, length of stay, critical care admission, hospital costs, primary cancer, and average survival.

Results: There were 306 patients admitted from 2016 to 2021; 66 were planned admissions, 203 were emergency admissions, and 37 were day case admission. Patients averaged 65.4 years old. About 75% (203) were emergently admitted, while 25% (66) had planned elective admissions. Their respective lengths of stay were 16.5 versus 5.74 days. Interestingly, nearly half of the emergency admissions (46.3%) did not have surgery during that admission. The most common level for metastatic disease was the thoracic spine in both groups (53% in the elective vs. 62% emergency groups). The most common primary lesions included lung, breast, and prostate in both groups. The average survival in the emergency admission group was 9.1 months and the planned admission group was 13.07 months. Notably, the costs of emergent care were much higher than planned admissions.

Conclusion: The pathway for spinal metastases is unique in that though there is a pathway for late-stage disease, there is not one for early disease. As a result, the majority of patients admitted for surgery for spinal metastases come in as an emergency rather than as a planned admission. Yet, close to half do not end up having surgery during that emergency admission to the spinal center. The cost of emergency care is significantly higher versus planned elective care for spinal metastatic disease. A service transformation is suggested to combat these problems with a pathway for managing all spinal metastases, rather than just metastatic spinal cord compression.

Keywords: Metastatic spinal cord compression, Spinal metastasis, Surgical decompression

INTRODUCTION

Metastatic spinal cord compression (MSCC) is an oncological emergency and debilitating complication of cancer that occurs in 5–14% of patients.^[5] As treatment of primary cancers has become more effective, there is an increasing number of patients with longer life expectancy, leading to more surgical intervention.^[1,2]

Patients with a life expectancy of more than 3–6 months may require surgical decompression ± stabilization of the spine. Most primary tumors (60–70%) arise from the lung, breast, or prostate. Interestingly, in 20–35% of cases, MSCC is the first presentation of systematic cancer.^[3,4]

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Although there is a unified pathway for managing end-stage disease (MSCC) disease, no such pathways exist for treating early-stage disease. Therefore, most patients with spinal metastases requiring surgery present as an emergency. Here, we evaluated whether outcomes, length of stay (LOS), costs, etc., would be improved/better if patients with spinal metastases requiring surgery could be identified earlier and undergo elective admissions/treatment.

MATERIALS AND METHODS

Data were retrospectively collected for metastatic spinal disease from 2016 to 2021 using CODE for bony metastases ICD10 C795. Patients were admitted to Spinal Surgery/Neurosurgery Care.

The day case admissions were discarded as they were mainly for diagnosis.

RESULTS

Patient population

Patients were divided into two groups according to admission types: there were 66 (25%) elective admissions, while 203 (75%) were emergently admitted for considering surgery for spinal metastases. The mean age was similar in both groups; 63.74 years for elective versus 66 years for the emergency group [Table 1]. Twenty-one (32%) patients with elective admission were admitted to CCU with an average stay of 26.7 h and 53 (26%) patients with emergency admission with an average stay of 28.7 h in CCU. The emergency group (including those who did not have surgery) showed a longer hospital stay with a mean of 16.5 days while the elective group had a mean stay of 5.74 days. When looking at those only who had surgery, the elective group had a stay of 5.2 days versus 14.8 days for the emergency group.

Source of elective versus emergent hospital admissions

Most of the elective admissions came through the city's cancer center or the spinal surgery center's outpatient clinic.

Characteristics	Emergency	Elective
Age, mean (years)	66	63.7
Number (%)	203 (75%)	66 (25%)
Gender		
Male	143	31
Female	60	35
Length of stay (days), Mean	16.5	5.74
Cost of bed (£), Mean	£6270	£2181
Critical care stay (hours), Mean	28.7	26.7
Cost of theater (£)	£6066	£6783
Average survival (month), Mean	9.1	13.07

However, the emergency admissions were from several different routes but mostly from other hospitals. Average survival for patients in the elective group was 13.07 months while for the emergency group was 9.1 months.

Relative costs of elective versus emergent hospitalization

The average cost of a bed in our neurosurgery/spinal department is approximately 380 pounds/day. The emergency group had a mean LOS of 16.5 days. Therefore, the emergency group had a mean bed cost of 6270 pounds while the elective group had 5.74 days mean stay and had a mean bed cost of 2181 pounds. The average duration of surgery was 364 min in the emergency group and 407 min in the elective group. The operative cost for 1-h in our operating room was £1000; therefore, the average cost for the emergency group for theater time was £6066 and for the elective group was £6783.

Statistical analysis

Data analysis was done using SPSS software 28 using descriptive statistics.

DISCUSSION

In this system review, we are evaluating the outcome and efficiency of the current pathway for managing spinal metastases which require surgery. The most common primary tumor sites were lung, breast, and prostate comprising about 54.2% and the thoracic spine was a common site for metastasis comprising about 60%. About 75% of our patients were admitted as an emergency and only a quarter had a planned elective admission [Figure 1]. About half of the patients admitted as an emergency (46.3%) ended up not having surgery and ended up having radiotherapy or were treated conservatively.

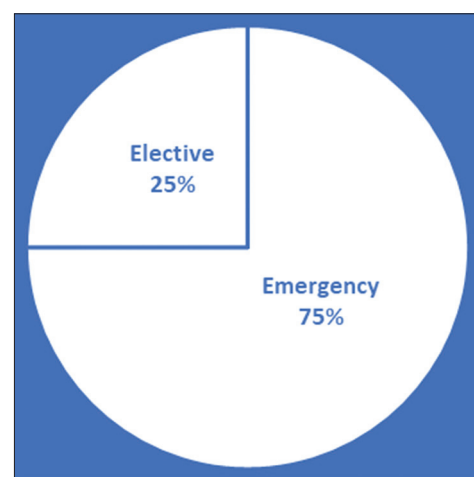


Figure 1: Pie Chart showing the percentage of admission in each group.

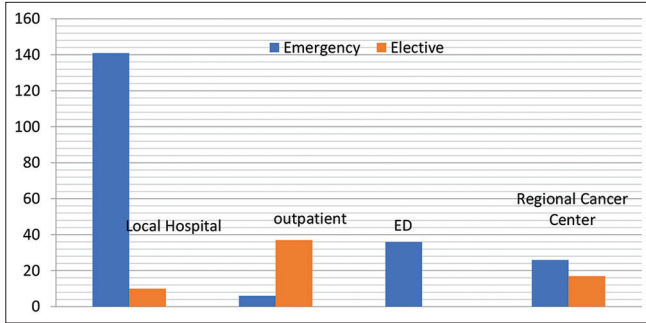


Figure 2: Route of admission in elective and emergency group.

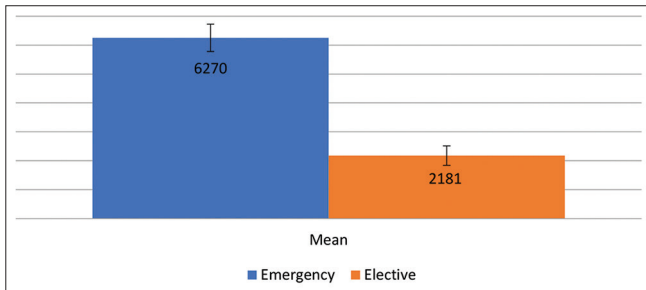


Figure 3: Mean cost of a bed in pounds in elective and emergency group.

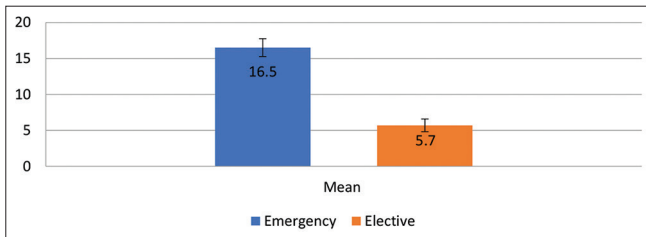


Figure 4: Mean length of stay in days in elective and emergency group.

This suggests poor utilization of beds in a tertiary center. Elective patients were mostly admitted through referral from the regional cancer center or the spine center’s outpatient clinic, while emergency patients were admitted through a wide variety of health-care settings, but mostly from other hospitals [Figure 2].

Greater utilization/costs/LOS for emergencies

Greater LOS increased the average cost of emergency admission in terms of bed utilization to £6270 versus the mean elective cost of £2181 [Figure 3]. The emergency group showed a mean stay in CCU of 28.7 h versus 26.7 h for the elective group and had a longer LOS of 16.5 days for emergent versus 5.74 days for elective surgery [Figure 4].

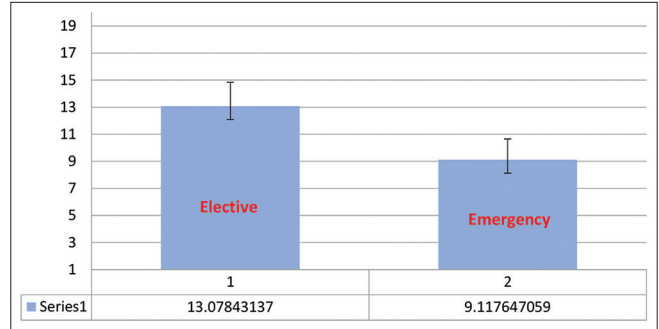


Figure 5: Mean average survival in elective and emergency group in months.

Similar time spent in theater and in ICU reflected similar complexity of cases in both the emergency and planned groups. The most common routes of admission in the elective group were from the outpatient clinic in the spine center and through the regional cancer center and for the emergency group, it was through the emergency departments in the local hospitals as well as the spine center. This suggests that earlier recognition of symptomatic spinal metastases can lead to a planned admission and late recognition leads to an emergency admission.

The data suggest that a planned admission for surgical management of spinal metastases is much better in resource utilization than an emergency admission despite the two groups undergoing a similar complexity of the surgery. Because of these findings, we propose a service transformation in which all spinal metastases, not just MSCC be referred through a unified portal, like what happens for brain metastases. This should enable earlier referrals for surgery in appropriate patients, enabling a planned admission.

The average survival in the planned elective group was 13.07 months and, in the emergency, group was 9.1 months [Figure 5]. Although the data suggest a better outcome for elective admissions, further study would be needed to remove confounding variables like bias in selecting cases for surgery.

CONCLUSION

The cost of caring for patients with spinal metastatic disease who come in as an emergency is much higher than for those who are admitted as an elective. Less than half of these patients have spinal surgery during that index emergency admission. Based on these findings, we propose a service transformation and a unified pathway for managing all spinal metastases rather than just one for managing MSCC.

Declaration of patient consent

Institutional Review Board (IRB) permission obtained for the study.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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