Outcome Analysis in Metastatic Spinal Tumor Surgery through MCID:Delineating Improvement Versus Non-Improvement Profiles and Risk Factors

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INTRODUCTION: Advances in systemic treatment have improved outcomes for spinal metastases patients, highlighting the need to consider quality of life (QoL) alongside clinical outcomes. Surgical interventions are essential for alleviating pain and neurological deficits, but benchmarks for decision-making and assessing postoperative outcomes are lacking. Health-related QoL (HRQoL) and patient-reported outcomes (PROs) are crucial metrics for evaluating treatment effectiveness and guiding personalized care. We aimed to establish meaningful benchmarks for surgical outcomes in metastatic spinal tumor patients.

METHODS: This multicenter, prospective registry study aimed to establish benchmarks for surgical outcomes in metastatic spinal tumor patients by analyzing health-related quality of life (HRQoL) and patient-reported outcomes (PROs). A total of 413 patients from 35 centers across Japan were enrolled from 2018 to 2021. Eligible patients completed EQ-5D-5L, visual analog scale (VAS), and Face Scale assessments. Surgical indications included progressive neurological impairment and mechanical instability. Data on demographics, surgical details, and disease state were collected. Patients were categorized into aware and unaware groups based on postoperative EQ-5D-5L changes. Logistic regression analysis identified risk factors for non-perception of improvement.

RESULTS:

Patient Characteristics: Of the 413 patients initially enrolled, 171 were included in the final analysis. The mean age was 66.4 years, with a majority being male (60%). Thoracic level surgeries were the most frequently performed (46.5%). Preoperative assessments revealed significant impairments, with mean scores of 0.40 ± 0.29 for EQ-5D-5L and 59.6 ± 30.0 for VAS. Comparison between patients followed up and those lost to follow-up showed no significant differences in neurological function or life expectancy scores. However, patients lost to follow-up had shorter operative times, less intraoperative blood loss, and lower preoperative scores in the Daily Activities subdomain of EQ-5D-5L.

Postoperative Improvements: Patients in the aware group (n=85) exhibited greater improvements in EQ-5D-5L and PROs compared to the unaware group (n=86). Notably, the aware group demonstrated significant enhancements in all endpoints at 1 month postoperatively, with these improvements sustained through 6 months postoperatively. Conversely, the unaware group showed limited improvements at 1 month postoperatively, particularly in VAS and Face Scale scores, with no significant changes observed in other domains. Logistic regression analysis identified preoperative dressing difficulties and lower scores for mobility, pain, and anxiety as risk factors for non-perception of improvement.

DISCUSSION AND CONCLUSION:

Discussion:

Significance of PROs: This study underscores the significance of PROs in evaluating surgical outcomes for metastatic spinal tumor patients. While traditional clinical measures provide valuable insights, HRQoL assessments offer a comprehensive understanding of treatment impact from the patient's perspective. The substantial improvements observed in PROs highlight the efficacy of surgical intervention in enhancing patient well-being beyond physiological parameters.

Personalized Treatment Approach: The findings suggest the importance of a personalized treatment approach tailored to individual patient needs. Patients with poorer preoperative conditions, as indicated by dressing difficulties and lower functional scores, tend to derive greater benefits from surgical intervention. This underscores the necessity of considering not only clinical factors but also patient-specific characteristics in treatment decision-making.

Implications for Clinical Practice: Understanding the factors influencing patient perception of treatment effects is crucial for optimizing treatment strategies and enhancing patient satisfaction. Clinicians should prioritize comprehensive preoperative assessments to identify patients who may benefit most from surgical intervention. Additionally, ongoing monitoring of PROs postoperatively enables clinicians to track treatment efficacy and adjust management strategies accordingly.

Limitations and Future Directions: While this study provides valuable insights, several limitations must be acknowledged. The relatively low follow-up rate and survival bias may affect the generalizability of the findings. Future research should address these limitations by implementing strategies to improve follow-up rates and conducting longitudinal studies to assess long-term treatment outcomes. Furthermore, exploring prognostic factors across different cancer types and pathological conditions will enhance our understanding of optimal treatment approaches for metastatic spinal tumors.

Conclusion:

In conclusion, this study highlights the significant improvements in HRQoL and PROs following surgical intervention for metastatic spinal tumors. Patients with poorer preoperative conditions tend to derive greater benefits from treatment, emphasizing the importance of personalized care approaches. By incorporating PRO assessments into clinical practice, clinicians can optimize treatment strategies and improve patient outcomes. Further research is warranted to refine prognostic factors and enhance treatment efficacy for metastatic spinal tumors.