

统计分析计划

描述性统计:

使用均值 \pm 标准差 ($\pm s$) 描述连续变量

使用频数和百分比描述分类变量

推断性统计:

a. 单因素方差分析 (ANOVA)

比较不同肿瘤分类间的手术时间和出血量差异

如果发现显著差异,进行事后多重比较 (如 LSD 法)

b. 重复测量方差分析

评估术前、术后 1 周和 6 个月的 NDI 评分变化

c. 配对样本 t 检验

比较术前和术后的 McCormick 评分

d. 多变量 logistic 回归分析

评估评分因素 (肿瘤与硬脑膜关系、跨越椎间隙数目、与椎动脉关系、肿瘤最外侧端距椎管中心距离) 与手术难度和术后并发症的关系

计算优势比 (OR) 及其 95%置信区间

缺失数据处理:

对于少量随机缺失的数据 (<5%) ,采用多重插补法进行处理

对于非随机缺失或大量缺失的数据,将进行敏感性分析以评估缺失数据对结果的潜在影响
在结果报告中,将详细说明缺失数据的数量、类型及处理方法。

统计软件:

使用 SPSS 26.0 进行所有统计分析

显著性水平:

所有统计检验采用双侧检验,显著性水平设为 $\alpha=0.05$

样本量估算:

基于预期效应量、显著性水平和统计检验力,使用 G*Power 3.1 软件进行样本量估算

Statistical Analysis Plan

Descriptive Statistics

Continuous variables will be described using mean \pm standard deviation (\pm s)

Categorical variables will be described using frequencies and percentages

Inferential Statistics

a. One-way Analysis of Variance (ANOVA)

To compare differences in operation time and blood loss among different tumor classifications

If significant differences are found, post-hoc multiple comparisons will be conducted (e.g., LSD method)

b. Repeated Measures ANOVA

To assess changes in NDI scores preoperatively, 1 week postoperatively, and 6 months postoperatively

c. Paired Sample t-test

To compare preoperative and postoperative McCormick scores

d. Multivariate Logistic Regression Analysis

To evaluate the relationship between scoring factors (tumor-dura relationship, number of intervertebral spaces crossed, relationship with vertebral artery, distance from the most lateral end of the tumor to the center of the spinal canal) and surgical difficulty and postoperative complications

Odds ratios (OR) and their 95% confidence intervals will be calculated

Handling of Missing Data

For small amounts of randomly missing data (<5%), multiple imputation will be used

For non-random or large amounts of missing data, sensitivity analyses will be conducted to assess the potential impact of missing data on the results

The quantity, type, and handling method of missing data will be detailed in the results report

Statistical Software

Significance Level

All statistical tests will be two-sided with a significance level set at $\alpha=0.05$

Sample Size Estimation

Sample size will be estimated using G*Power 3.1 software based on expected effect size, significance level, and statistical power