Understanding the Effect of Advanced Patient Age on Outcomes and Complications of Spinal Surgery

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Introduction

- In 2020, 6.7 million individuals in the United States were older than 85. This is projected to increase to 12.6 million in 2060[1]
- The risk of developing many spinal conditions increases with age[2,3,4]
  - Decreases in disk height changes the load-bearing properties of the spine
  - Decreased bone density makes the vertebrae susceptible to fracture
  - Weakening of spinal ligaments predispose to disc degeneration
  - Hypertrophy of the ligamentum flavum and susceptibility to disk herniation can lead to spinal stenosis
- Damage of the cervical spinal cord can manifest as weakness and clumsiness in the upper extremities and gait disturbances[2], while lumbar spinal cord damage often presents with severe pain and decreased mobility
- Upper extremity weakness and clumsiness may leave patients unable to adequately feed themselves or perform other activities of daily living (ADLs)[4], while gait disturbances are correlated with falls[6,7,8,9], fractures[7,8], and increased mortality[10]
- Reduced mobility is correlated with an increased risk of developing thromboemboli[11,12], pneumonia[13], heart disease[4], and increased mortality[14,15]
- Back pain in elderly individuals is correlated with inability to perform ADLs, functional impairment, sleep disorders, depressive symptoms, increased use of healthcare resources, heart disease, and mortality[4]
- Elderly individuals present with spinal conditions more frequently than younger individuals and may greatly benefit from receiving surgery[4]. However, age is a known risk factor for surgical complications[16], particularly spine surgery[17]
- The question of how old is too old remains to be answered[18]. This study hopes to identify the relative rates of surgical complications and range of outcomes in elderly patients to determine whether super-elderly patients are likely to benefit from spinal surgery

Methods

Overview

- This project was conducted as a retrospective chart review using data obtained from the patient electronic medical record at Corewell Royal Oak
- Participants for this study were all patients older than 75 who have undergone spinal surgery at Corewell Royal Oak from September 2019 to August 2022 excepting those with confounding conditions such as impaired cognitive function or neurodegeneration
- All patient data was de-identified following extraction from EPIC and imported into the secure SharePoint database to ensure patient confidentiality.
- Data was analyzed via Fisher's Exact p-value and two-sample t-tests.

Fig 1.

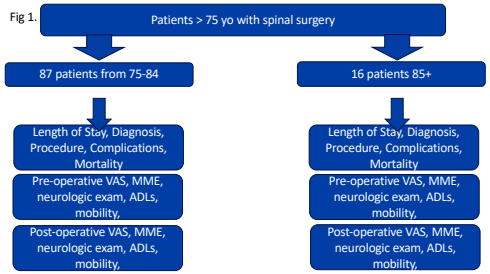

Fig 1. Figure detailing the study protocol. Patients > 75 years old who received spinal surgery without matching exclusion criteria were separated by age. Data on diagnosis, surgical procedure, length-of-stay, surgical complications, 1-year mortality, as well as pre- and post-operative pain score (VAS), pain medication use (MME), neurologic exam findings, ADLs, and mobility were collected and analyzed

Aims and Objectives

Aims

1) Identify prognostic factors to assess risk of postoperative complications and positive outcomes in super-elderly patients being evaluated for spinal surgery

2) Determine whether spine surgery has an overall beneficial or detrimental effect on the lives of super-elderly patients.

Objectives

1) Identify the rates of the most common complications of spinal surgery in super-elderly and elderly patients.

2) Identify the range of outcomes of super-elderly and elderly patients undergoing spinal surgery as assessed by pre- and postoperative VAS, morphine equivalents, neurological exams, and patient mobility.

Results

Fig 2.

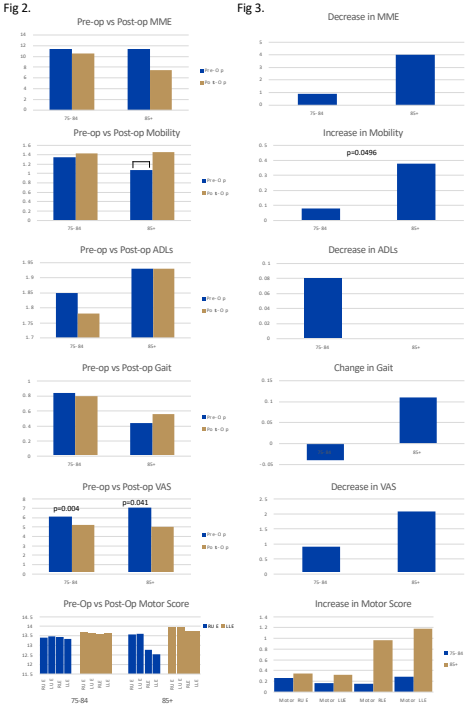

Fig 3.

Fig 2. Figure comparing the pre-operative vs post-operative assessment of participants in the elderly and super-elderly age groups. There is a significant decrease in pain score in both age groups (elderly p=0.004, super-elderly p=0.041), and a significant increase in post-operative mobility in the super-elderly group (p=0.018)

Fig 3. Figure comparing the mean difference between pre-operative and post-operative values of participants in the elderly and super-elderly age groups. There is a significantly difference increase in mobility in the super-elderly group compared to the elderly (p=0.0496)

- There was no significant difference in length-of-stay, diagnosis or procedure, adverse events, or mortality at 1-year between groups
- There were no significant differences in pre- or post-operative MME, VAS, neurologic exam, ADLs, or mobility between groups
- In patients 75-85, there was a significant decrease in VAS pain score (p=0.004)
- In patients older than 85, there was a significant decrease in VAS pain score (p=0.041) and a significant increase in mobility (p=0.018)
- There was a significant difference in post-operative increase in mobility between patients 75-85 and those older than 85 (p=0.0496)

Conclusions

- The results from this retrospective chart review study demonstrate no increase in the number of post-operative adverse events or 1-year mortality rate in elderly patients 75-84 when compared with super-elderly patients older than 85
- There was no significant difference in the outcomes between the two groups when comparing pre-operative and post-operative strength, sensory exam, gait, activities of daily living, or mobility
- These results suggest that there is no increased risk or poorer return in super-elderly individuals receiving spinal surgery compared to elderly.
- This study is limited by the sample size and lack of standardization in data collected at follow-up. These results would be strengthened by a randomized controlled trial with consistent data on post-operative pain and neurologic exam findings over an extended period of time
- This study finds that super-elderly individuals are not at increased risk of longer hospitalization, surgical complications, or 1-year mortality. They are also likely to experience significant pain relief, and improved mobility beyond that of other elderly patients. As such, spinal surgery should be strongly considered in patients of advanced age with degenerative spinal conditions

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