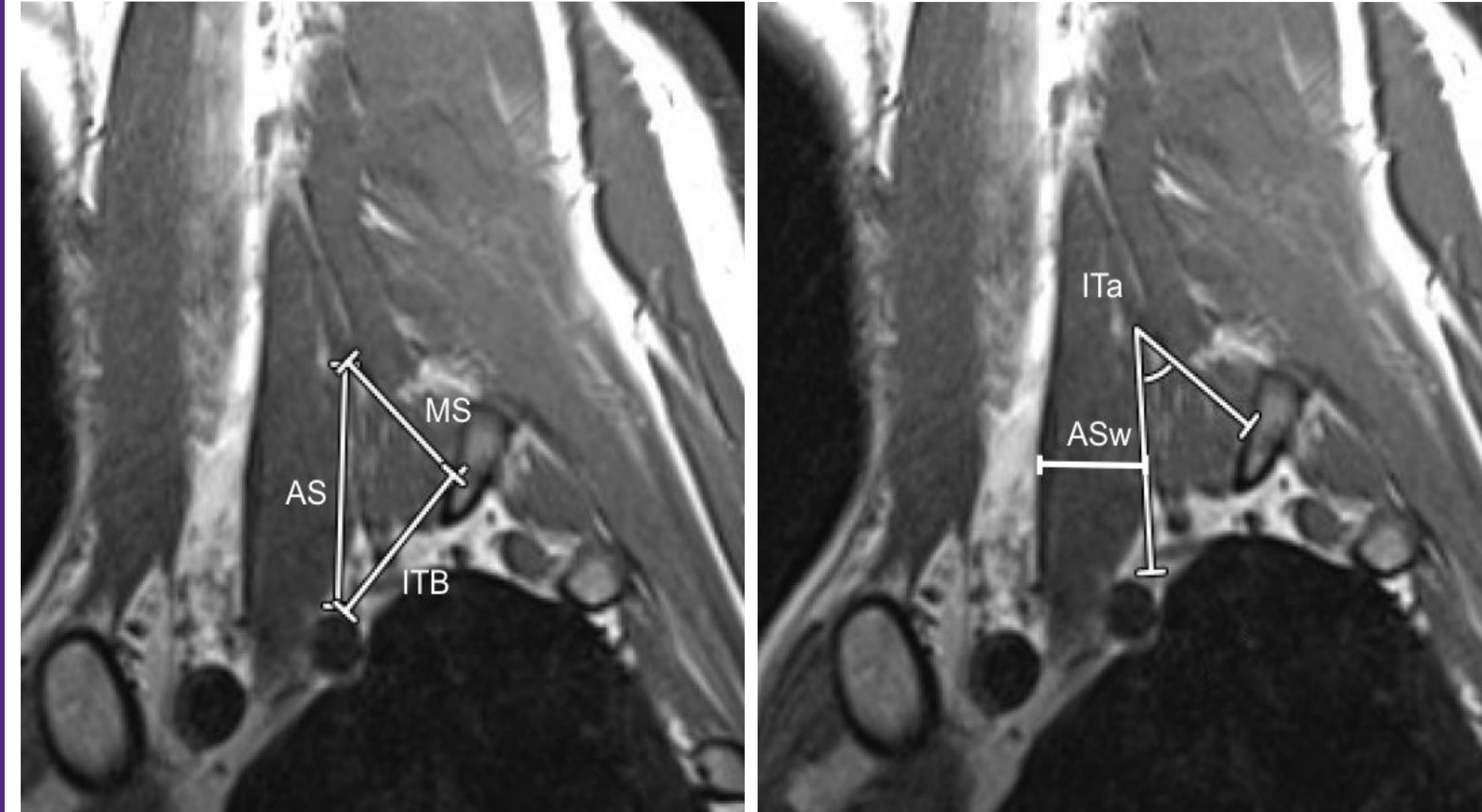


# A Volumetric and Angular MRI Analysis of the Thoracic Outlet for Predicting Surgical Success

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## Neurogenic Thoracic Outlet Syndrome (nTOS)

- **Delayed Diagnosis:** Average symptom duration is often measured in years due to overlap with cervical pathology.
- **Imaging Gap:** Traditional MRI focuses on qualitative signal change rather than restrictive architectural dimensions.
- **Interscalene Triangle (IT):** Bordered by the anterior scalene muscle anteriorly, middle scalene muscle posteriorly, and first rib inferiorly.



## Measurements

- Anterior scalene and middle scalene heights, IT base, IT height, IT angle, anterior scalene width, and calculated IT volume using square pyramid formula.

## Clinical Application

- **Consistent Correlation:** More acute preoperative angles reliably predict Excellent surgical resolution. Obtuse angles were associated with Poor outcomes.
- **Individual Measurements:**
  - Anterior scalene width, muscle heights, and base length showed weak trends and failed to reach significance in isolation.
  - Total IT angle is a stronger predictor than isolated scalene thickness.
- **Objective Metric:** MRI provides a reproducible metric to optimize patient candidacy and manage patient expectations.

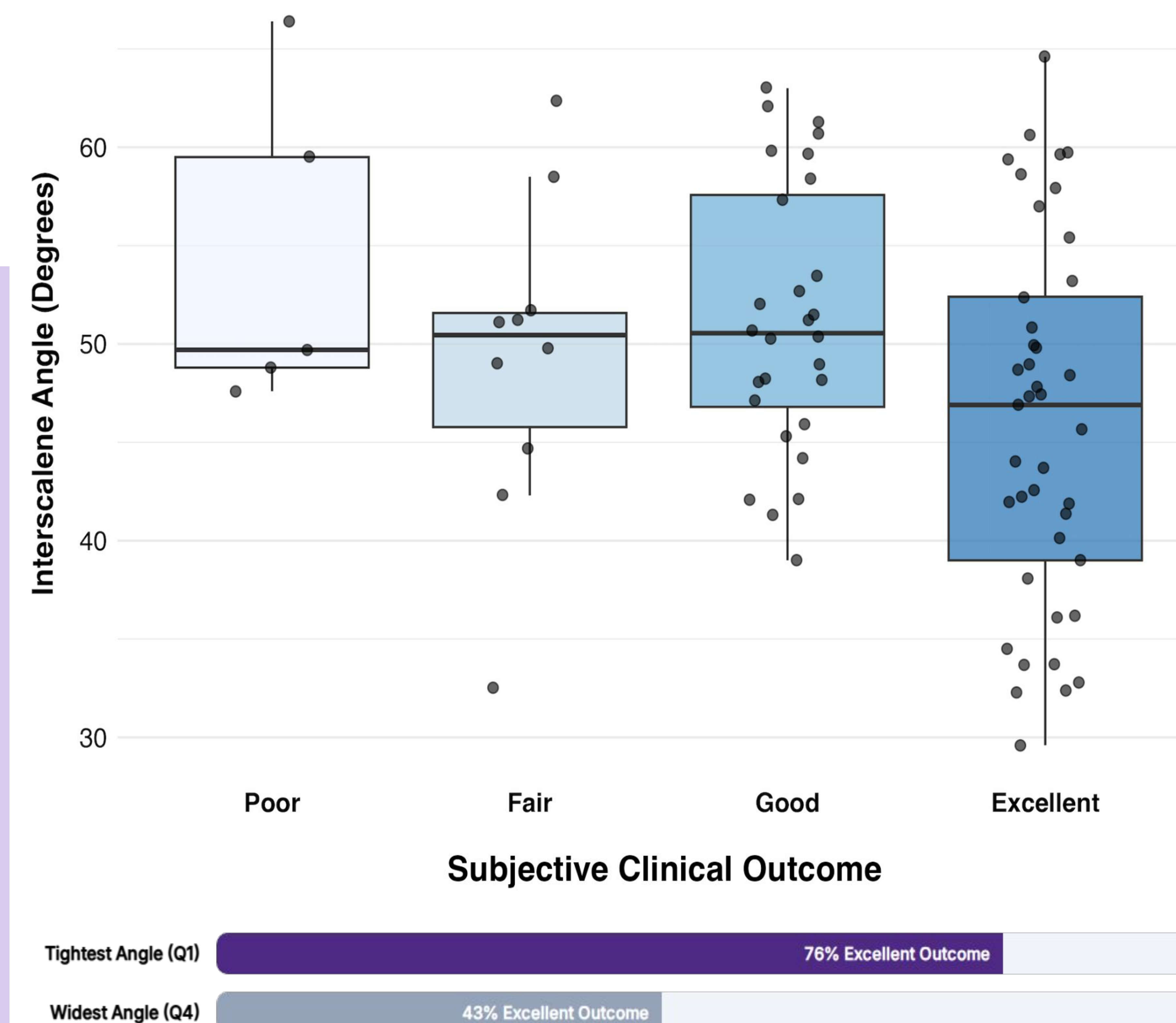
## Study Objective

- Quantify interscalene triangle architecture via high-resolution MRI to establish a reproducible, radiographic predictor of surgical efficacy.

## Methods

- **Cohort of 84 surgical decompression patients** with preoperative MRI (Jan 2020 - Sept 2025)
- **Excluded** prior surgery, malunion, or signal artifacts limiting accurate visualization of first rib/scalenes.
- **Measurements** performed on Sagittal T2 MRI by independent, blinded reviewers trained by MSK radiologists.
- **Clinical outcome assessment** based on minimum 6-month follow-up; patients stratified into four categories (**Excellent, Good, Fair, Poor**)

Preoperative Interscalene Angle by Surgical Outcome



## Conclusion

- Patients with a more acute angle relative to their frame appear to be the ideal candidates for surgical decompression.
- Incorporating IT measurements into pre-operative planning can enhance patient selection and provide more accurate prognostic counseling.