MI Ratio

J.Sales-Llopis

Neurosurgery Department, General University Hospital Alicante, Spain

MI Ratio in Acromegaly

The **MI Ratio** is a continuous radiological metric proposed to predict surgical remission in acromegaly. It complements the Knosp Grade by quantifying lateral tumor extension more precisely [1)]

Definition

MI Ratio = (Distance from midline to the lateral edge of the tumor) / (Distance between the cavernous carotid arteries)

Mathematical formula:

MI Ratio = $$ \frac{d_{tumor\_lat}}{d_{carotids}} $$

- *d_{tumor_lat}*: distance from midline to the lateralmost part of the tumor
- *$d_{carotids}$*: distance between the cavernous carotid arteries (on coronal MRI)

Clinical Interpretation

- **Low MI Ratio** → tumor remains central → higher chance of surgical cure
- **High MI Ratio** → more lateral invasion → lower chance of remission

Advantages

- Continuous and quantifiable
- Low interobserver variability (<5%)
- More predictive than Knosp grade alone

⚠ Limitations

- Does not account for vertical/suprasellar extension
- No current external validation
- Requires high-quality coronal MRI images

Example Patient Table (editable)

Patient ID	MI Ratio	Knosp Grade	Post-op Remission	Notes
P001	0.35	1	Yes	Microadenoma
P002	0.72	3	No	Lateral cavernous spread
P003	0.50	2	Yes	Debulking + radiotherapy

Image Suggestion

Insert a coronal MRI image showing how to measure:

- Midline
- Lateral tumor edge
- Carotid-carotid distance

Critical Review: MI Ratio in Acromegaly

Article: `Is Knosp enough? A novel classification for Acromegaly: a retrospective analysis of cure rates and outcome predictors in a large tertiary centre` **Journal**: *Acta Neurochirurgica (Wien)*, 2025 **DOI**: https://doi.org/10.1007/s00701-025-06477-9 **Authors**: Feras Fayez et al.

Study Objective

To evaluate surgical outcomes in acromegaly and propose the **MI Ratio**, a new radiological predictor of remission that quantifies lateral tumor extension beyond Knosp classification.

- Addresses limitations of current imaging-based grading
- ⚠ Requires external validation before clinical implementation

Study Design

- **Type**: Retrospective cohort study using prospectively collected data
- **Setting**: King’s College Hospital (UK), 2012–2022
- **Sample size**: 150 patients with histologically proven somatotroph adenomas

Strengths:

- Large sample for a rare disease
- Rigorous image-based measurements with <5% interobserver variability

Weaknesses:

- Single-centre: limited generalizability

- Retrospective: risk of selection bias
- No external validation cohort

MI Ratio Definition

MI Ratio = (Distance from midline to lateral tumor edge) / (Distance between cavernous carotid arteries)

Interpretation:

- **Low MI Ratio** → more central tumor → higher remission chance
- **High MI Ratio** → more lateral extension → lower cure probability

Results

- **Overall surgical cure**: 53%
- **Predictors of remission**:
  - MI Ratio (**p < 0.001**)
  - Microadenoma (**p = 0.022**)
  - Knosp <2 (**p = 0.012**)
  - Post-op GH (**p = 0.016**)
  - Gender (**p = 0.005**)

⚠ **Limitations**:

- Gender as a predictor is underexplored
- Near-significant pre-op GH level (p = 0.06)
- No exploration of MI Ratio cutoff thresholds

Discussion

- Authors argue that **Knosp alone is insufficient**
- MI Ratio is a **simple, reproducible** addition with superior predictive value
- Encourages use of **multifactorial models** combining radiological and hormonal data

Study Limitations

Acknowledged:

- Retrospective nature
- Single-centre design

Unacknowledged or minor:

- No comparison with volumetric tumor data
- No functional or long-term quality-of-life outcomes

- No details on image standardization across a 10-year span

Summary Table

Category	Appraisal (1–5)
Study Design	4
Innovation	5
Clinical Relevance	4
Statistical Rigor	4
Generalizability	3
Overall Score	**4.2 / 5**

Final Verdict

A valuable contribution proposing a **practical and quantifiable metric (MI Ratio)** to improve preoperative prognosis in acromegaly surgery. Future work should validate this metric in multicentre, prospective studies and consider integrating it into comprehensive scoring systems.

1)
Fayez F, Abougamil A, Vitulli F, Knight J, Syrris C, Genel O, Shapey J, Maratos E, Thomas N, Barazi S. Is Knosp enough? A novel classification for Acromegaly: a retrospective analysis of cure rates and outcome predictors in a large tertiary centre. Acta Neurochir (Wien). 2025 Mar 8;167(1):61. doi: 10.1007/s00701-025-06477-9. PMID: 40055188; PMCID: PMC11889057.