Upfront At Last!

Targeting the Ventral Cervicomedullary Kink with Transnasal Odontoidectomy

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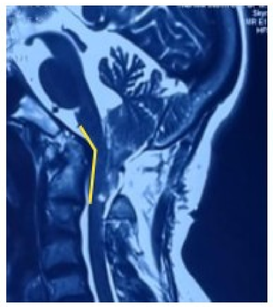
Introduction:

- The higher accessibility of the posterior elements has made the posterior approach to the craniovertebral junction (CVJ) the workhorse in compressive pathologies even when the dominant pathology is ventral.
- Odontoidectomy / ventral decompression is often currently practiced when the indirect / posterior approach is completely unsuitable or has been tried and failed for compression of the cervicomedullary junction (CMJ).
- The transnasal route for managing complex CVJ anomalies (Transnasal Endoscopic Odontoidectomy (TENO)) has gradually come to be the default approach over the traditional transoral approach with the evolution of endoscopic equipment and expertise. It provides ease of access to high pathologies, low infection rates and avoids velopharyngeal insufficiency / soft palate split.

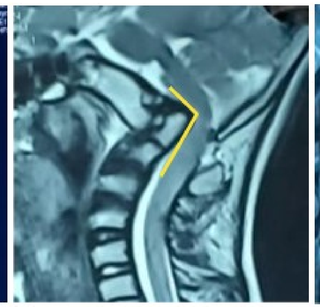
Indications for TENO in CVJ anomalies:

Ventral compression / indentation of the CMJ secondary to:

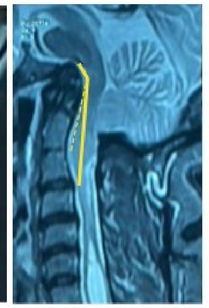
- Congenital Basilar Impression / Retroflexed odontoid process with anterior cervicomedullary kink: Primary TENO may be considered when the kink is severe.
- Cases with other bony CVJ anomalies / Chiari Malformation following posterior decompression / fusion surgery and demonstrate a ventral cervicomedullary kink (often mild): secondary TENO is considered when patients fail to improve / develop new or progressive neurological symptoms.



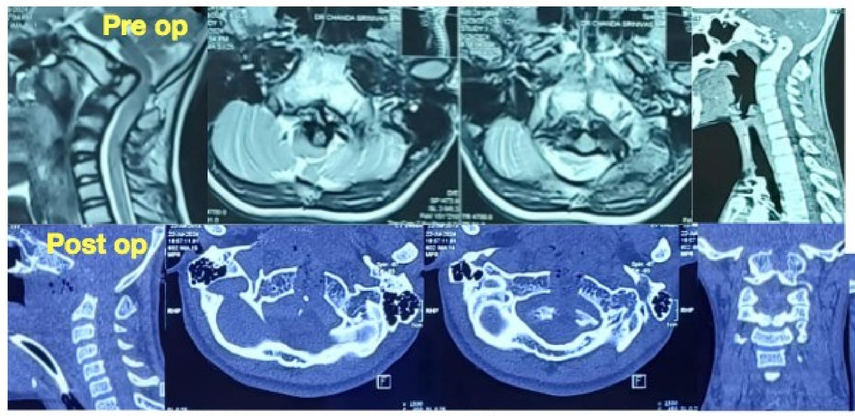
Low CMJ kink with mildly retroflexed odontoid in ACM 1 with failed posterior decompression and fusion



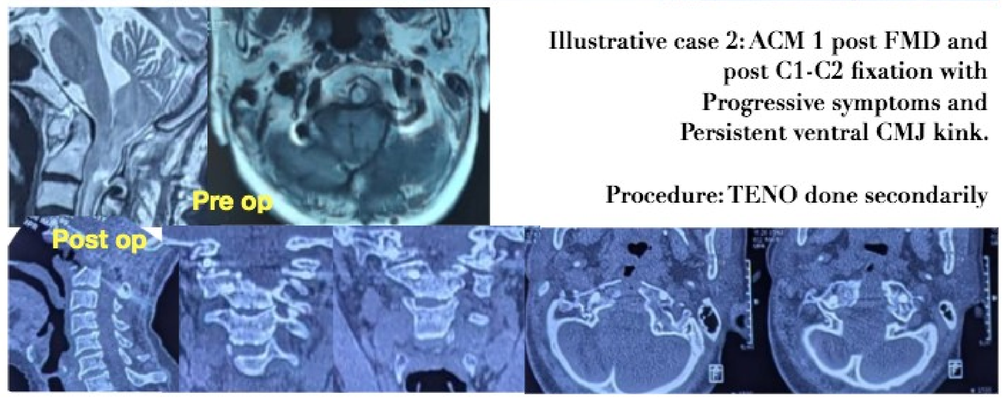
High CMJ kink with platybasia, Basilar Invagination and highly retroflexed odontoid



Very high brainstem kink with severe platybasia, Basilar Impression and ACM1 with syrinx



Illustrative case 1: BI with retroflexed odontoid Procedure: Primary TENO



Illustrative case 2: ACM 1 post FMD and post C1-C2 fixation with Progressive symptoms and Persistent ventral CMJ kink.

Procedure: TENO done secondarily

Our Experience:

6 cases including:

2 cases: primary TENO done for severe ventral medullary compression

4 cases: TENO done in cases of type 1 Chiari Malformation where patients had progressive symptoms despite Foramen Magnum Decompression and C1-C2 distraction + fixation.

Outcomes: significant clinical improvement in 5 cases.

Complications: 1 patient who required additional transoral access had post op surgical site infection which resolved with antibiotics and no eventual neurological improvement.

Technical Notes:

Factors to consider and prepare for

- Anatomical challenges of the compressive pathology: superior extent of the kink / indentation, need to remove bone other than the odontoid (eg: clival edge)
- Anatomical challenges of the approach: depth and angle of the surgical field, need for trans-oral access
- Equipment: longer drill and dissectors to work in the depth, angled scope, doppler for planning mucosal incision and flap away from the parapharyngeal carotids, image guidance is essential
- Fixation: C1-2 or O-C2 may not be mandatory in all cases. Dynamic imaging done post TENO may guide subsequent fusion procedures when not done as part of earlier primary treatment strategies.

Conclusions:

- ***Aim to eliminate the ventral cervicomedullary kink.***
- TENO is the primary strategy in cases with a significant ventral kink and the rescue strategy in cases with combined anterior and posterior pathology where primary posterior approaches have failed.
- In ACM 1, in the presence of a ventral CM kink / retroflexed odontoid process (even when mild, TENO must be considered early when the result of posterior decompression +/- fixation is suboptimal)
- Further studies are needed to study and characterise the ventral indentation / kinking of the CMJ / brainstem instead of the current focus on the CVJ skeletal metrics.

References:

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