



# The Severity of Basilar Invagination and Atlanto Axial Dislocation Correlates with Sagittal Inclination (of the C1-C2 Joints) And Cranio-cervical Tilt: Description of New Indices for the Cranio Vertebral Junction

Nishant Goyal MBBS, MCh; P. Sarat Chandra; Avnish Chauhan MPhil; Bhawani S Sharma MCh

All India Institute of Medical Sciences, New Delhi, India.



## Emerging concepts of treatment for CVJ anamoly

- Standard: Trans-oral surgery followed by posterior instrumented fixation
- Based on the premise that the deformity of the CVJ cannot be corrected
- Aimed at achieving cord decompression and stabilization

- **Recent Trends: Joint distraction to reduce BI- Single axis motion**
- **Emerging Trends: Specific intra-operative manipulation: 2 axes motion**

## Objective of the study

- Thus, there has been a recent shift of focus to the (atlanto-axial) joints
- Hence it is important to study the joint morphology
- All future paradigms of treatment based on joint modification
- No indices described based on joint morphology

## Material and methods

- **70 cases VS 70 normals (total=140)**
- Non syndromic developmental bony cranio vertebral junction' (CVJ) anomalies with BI & AAD
- All had C1 assimilation
- AGE: 15- 45 years (mean 27+8 years)
- Age and sex matched controls
- Exclusion criteria- Traumatic, Rheumatoid arthritis, Inflammatory pathologies like tuberculosis and Known genetic syndromes like Down's, Marfan's

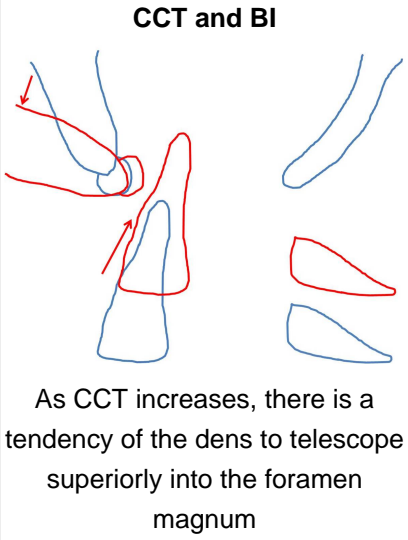
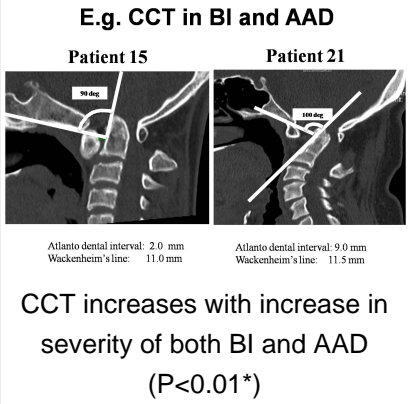
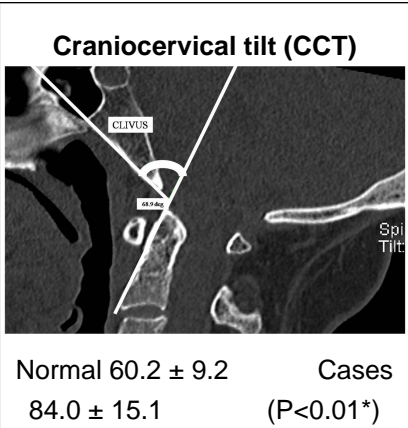
## NEW INDICES MEASURED

- **Cranio-cervical tilt**
- **Sagittal inclination**
- **Coronal inclination**
- **Joint surface area (AP and Lat diameters)**
- **Joint overlap index**
- **Joint congruity**

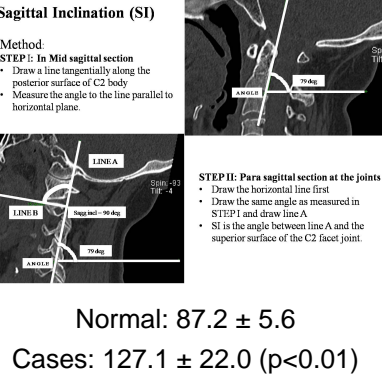
## TRADITIONAL INDICES MEASURED

- Atlanto dens interval (ADI)
- Wackenheim's clival canal line
- Chamberlein's line
- Mc Rae's line
- Modified Ranawat line

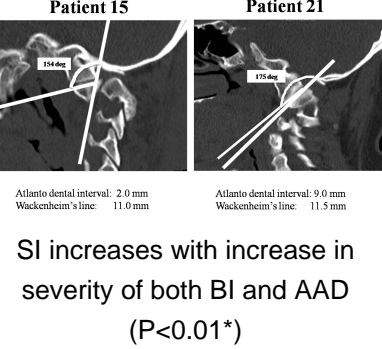
## RESULTS



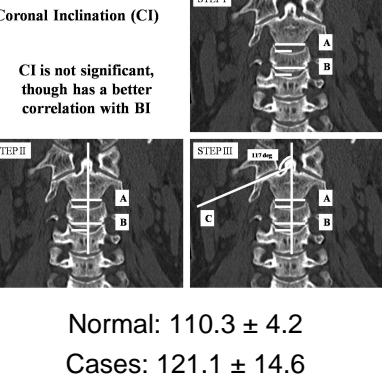
## SAGITTAL INCLINATION (SI)



## E.g. SI in BI and AAD

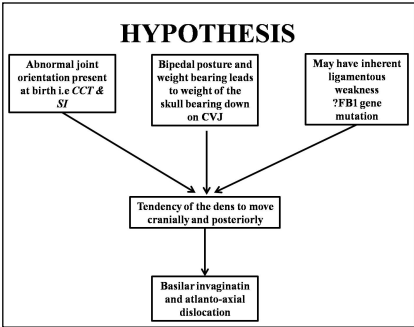


## Coronal inclination (CI)



## INDICES MEASURED

- **Cranio-cervical tilt\***: ( $p<0.01$  for both BI and AAD)
- **Sagittal inclination\***: ( $p<0.01$  for both BI and AAD)
- Coronal inclination: N.S
- Joint surface area (AP and Lat diameters): N.S
- Joint overlap index: N.S
- Joint congruity: N.S
- N.S = Not significant
- \* = Significant



## Conclusion

New Indices (Cranio cervical tilt and Sagittal Inclination) correlate significantly with the severity of BI and AAD

These should be considered as a part of routine quantitative measurement for assessing the severity of BI and AAD