

CRANIOVERTEBRAL INSTABILITY TESTING.

DO THE TESTS REALLY REFLECT THE ANATOMY?

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Contraindications

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BACKGROUND

- Recommendations for screening for craniovertebral instability (CVI)
- Studies examining the validity of these ligament tests is lacking for most tests described
- No clinical stress test for CVI has ever been examined in a post-traumatic population



- Tests have been described based on published descriptions of the anatomy and biomechanics of the region (Aspinall 1990).
- Descriptions of ligamentous anatomy and role in controlling upper cervical movement is inconsistent and contradictory.



METHODS 1

Approach based on methodology of Dvorak et al (1988)

- 11 embalmed adult cadavers
- Specimens extending minimum occiput to C6
- Divested of all muscle tissues
- Posterior wedge of approximately 140° cut from the occipital bone
- Posterior arch of the atlas, axis and included cervical segments resected



METHODS 2

11 embalmed cadavers

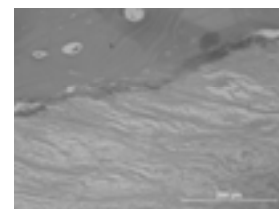
Specimens extending occiput to C2-3

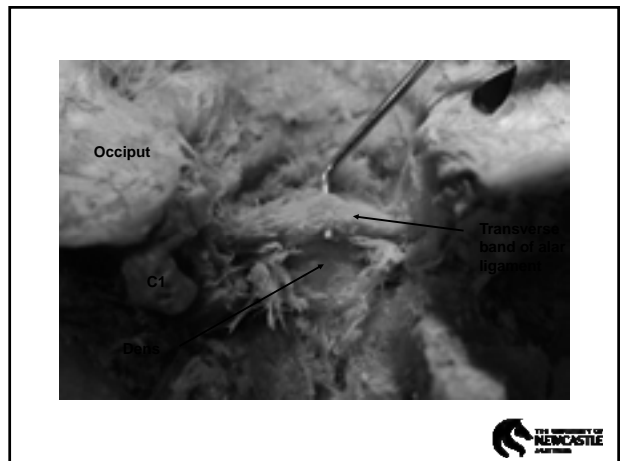
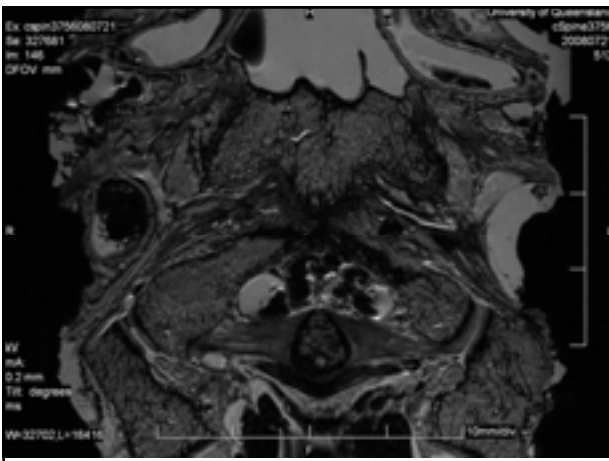
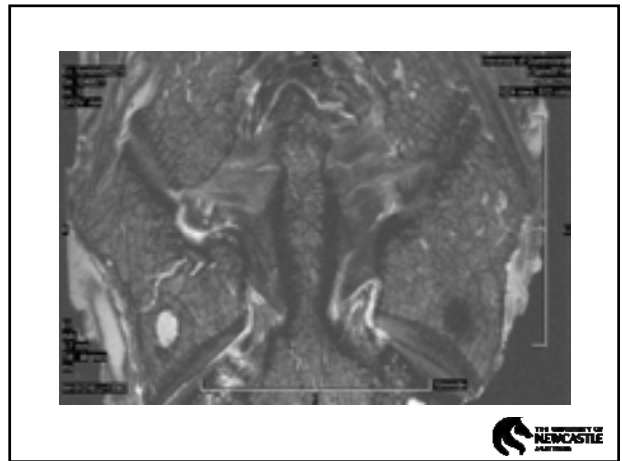
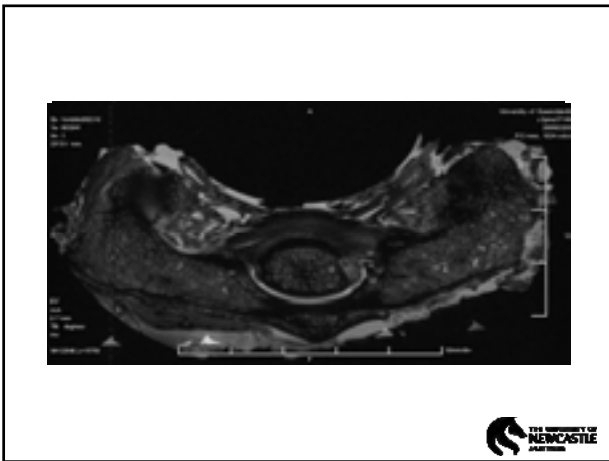
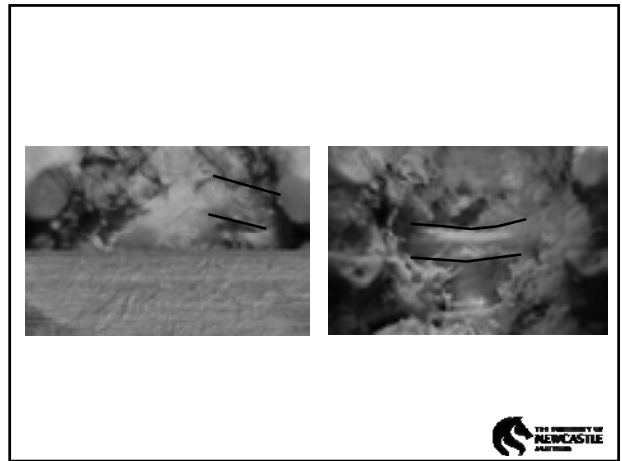
Decalcified and embedded

Serial slicing

Stained

- Haematoxylin and Eosin
- Elastic Van Gieson
- Alcian Blue





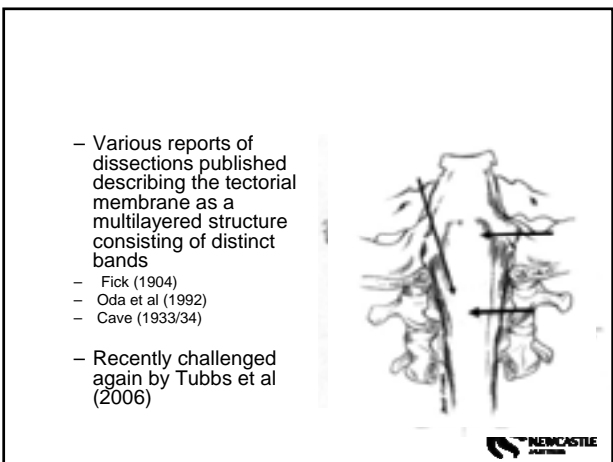
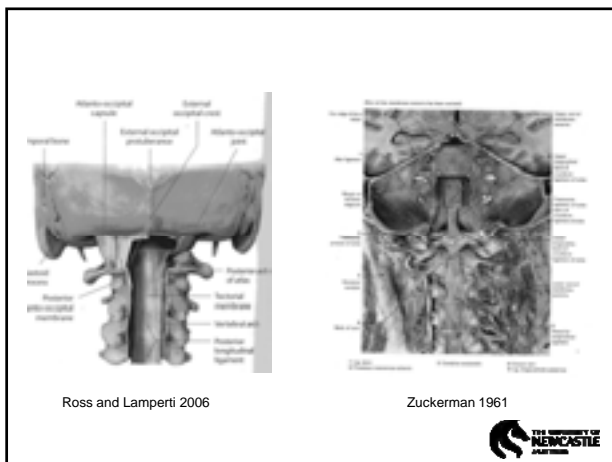
Implications

- The broader spectrum of anatomical literature needs to be considered when designing clinical tests
- Orientation of the alar ligaments may be more horizontal than typically described
- The atlantal portion of the alar ligament should be considered an anatomical variant
 - It should not be specifically tested
 - Little or no functional significance
- A proportion of alar ligaments will not act to limit O-C1/2 rotation.



Tectorial membrane

- The least explored of the passive stabilising structures of the craniovertebral region
- Usually described as arising from the posterior surface of the vertebral body of the second cervical vertebra
- Expands and broadens as it passes upwards, taking a “funnel-shaped” appearance
- Cephalad attachment of the tectorial membrane has been less consistently described



Distraction testing for the Tectorial membrane.

- Tectorial membrane limits flexion and distraction. Normal distraction should not exceed 1 to 2mm.
- **Patient position:** Supine with cervicothoracic junction flexed. (this removes the stabilizing effect of the ligamentum nuchea)
- **Fixation:** Gently grasp the C2 neural arch and flex the cervicothoracic junction. Cup the occiput in your other hand
- **Stress:** perform a distraction. If the response is negative, repeat the distraction test in craniovertebral flexion.
- **Diagnostic validity:** Not evaluated



New Zealand Guidelines 2004

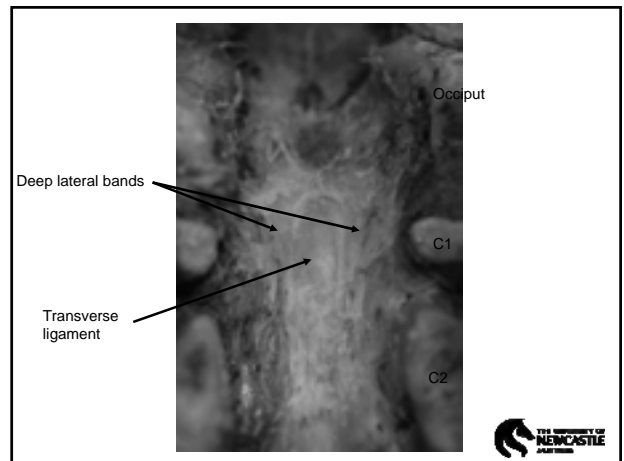
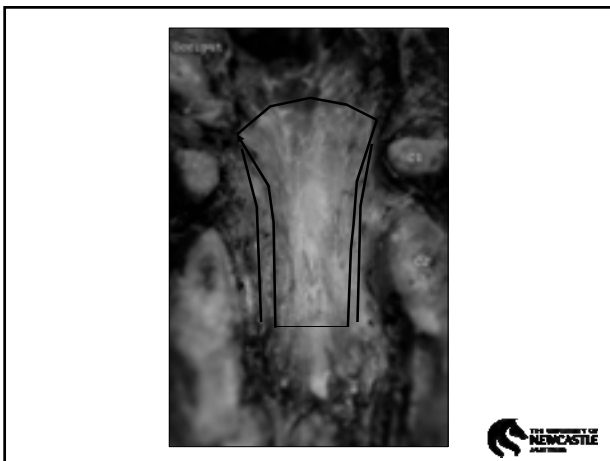
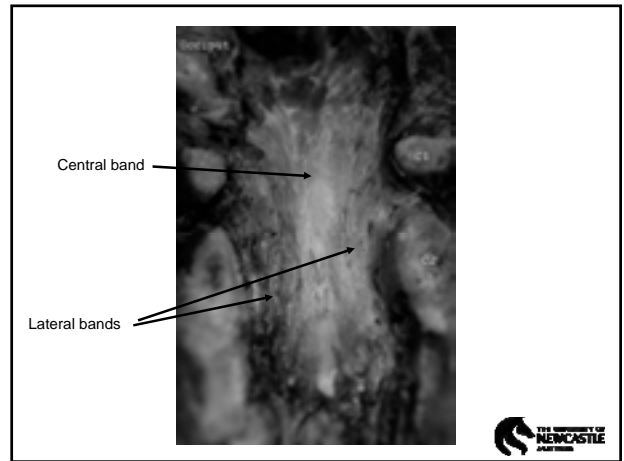
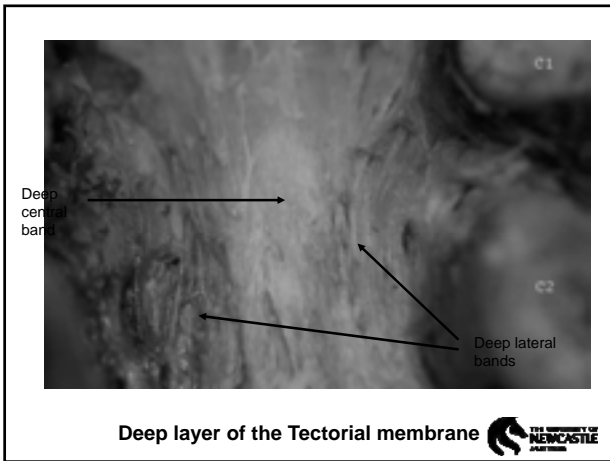
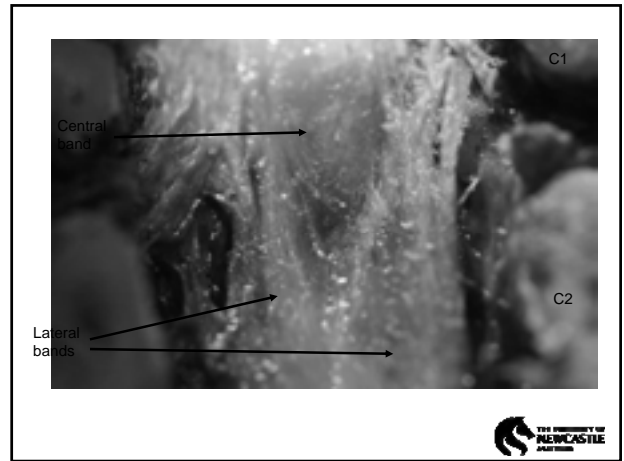
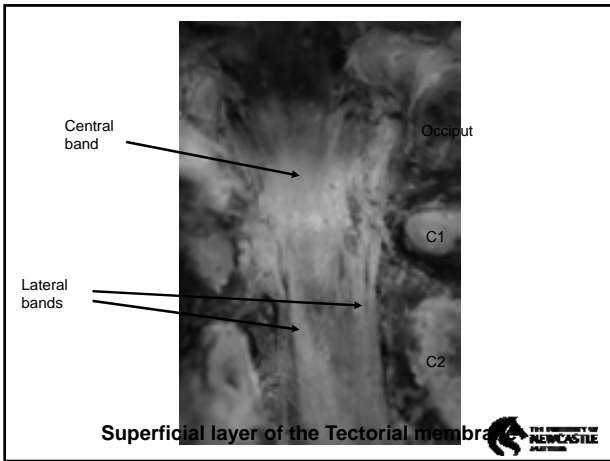
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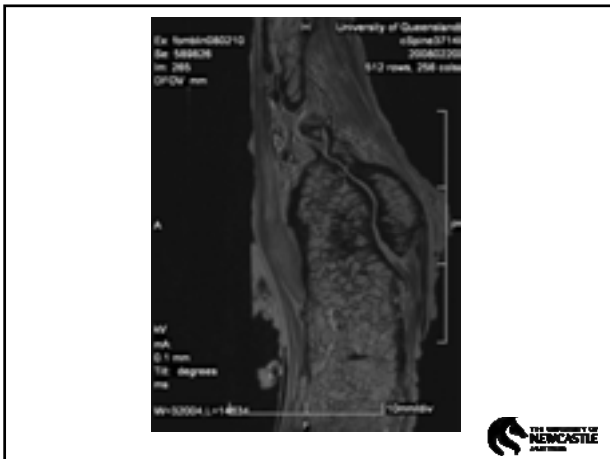
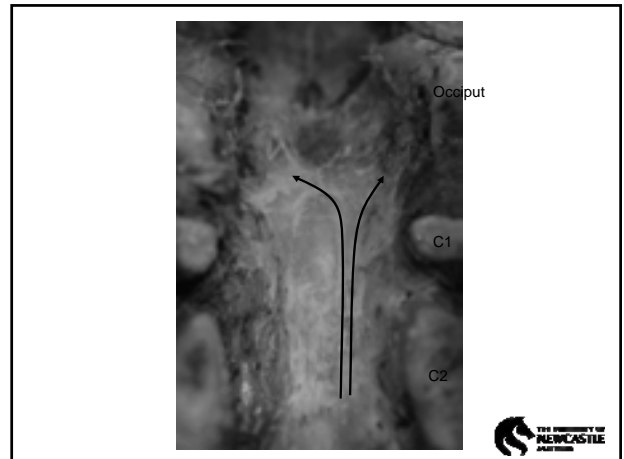
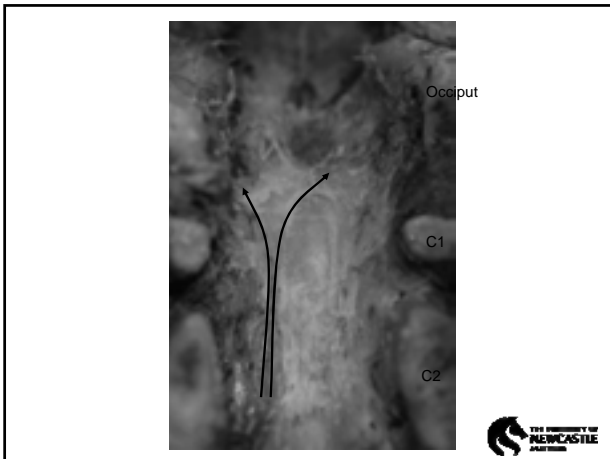


RESULTS – TECTORIAL MEMBRANE

- Each tectorial membrane was composed of 2 distinct layers;
 - Superficial and deep
- Within these layers lay bands of ligament
 - Superficial layer composed variably of 3 or 4 bands
 - Deep layer consisting of 3 bands







Implications

- A more complex structure than has been described by most standard anatomical textbooks
- Strong similarity to the descriptions given by the older European anatomists
- Multilayered and composed of distinct bands of dense tissue
- Curve nature of the structure suggests that it may play a role in limiting craniocervical rotation

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THANK YOU

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