

Adolescent TMJ Internal Derangement

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Presentation Outline

- Introduction to TMJ function & dysfunction
- Adolescent studies on disc displacement
- Consequences of disc displacement
- Early detection and treatment
- Conclusions

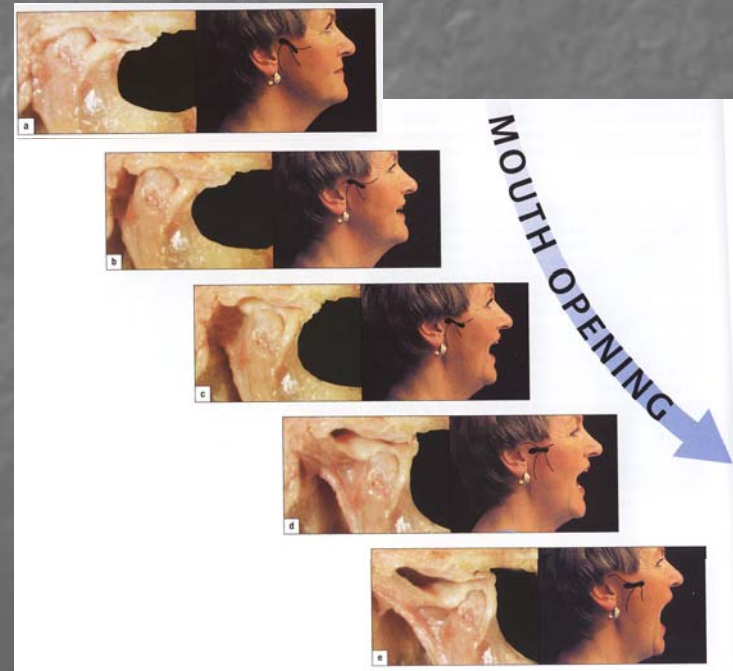
TMJ Anatomy, Function and Dysfunction



- Compound joint
 - Condyle
 - Temporal bone
 - Articular disc
- Secondary cartilage
- Synovial membrane
- Trigeminal innervation

TMJ Anatomy and Function

- Articulation and jaw movement
- Mastication, speech, deglutition
- Disc:
 - Stabilization
 - Destabilization
 - Lubrication
 - Nutrition
 - Load dissipation



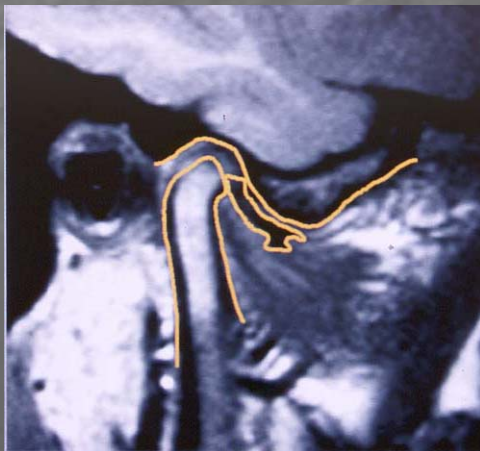
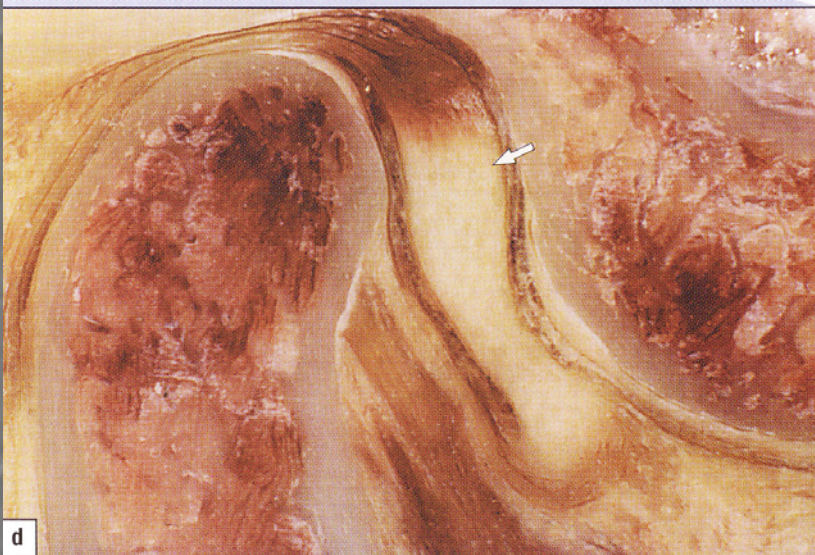
TMJ Dysfunction

Range From:



- Capsulitis
- Disc displacement
- Locking
- Fracture
- Osteo-arthritis
- Ankylosis
- Infection
- Neoplasia

TMJ Disc Displacement



- Elongated capsular ligaments
- Inco-ordinated disc movement
- Traumatization of retrodiscal tissues
- Inflammation / Dysfunction

Pathophysiology of Disc Displacement

- Disc and Posterior Attachment
 - Trauma
 - Substance P & Prostaglandins - c-fibre nerve endings – pain
 - Interleukin I
 - Catabolic response, suppressed procollagen formation, inhibits matrix synthesis, proteases – cartilage resorption
 - Possible regeneration and repair



Pathophysiology of Disc Displacement

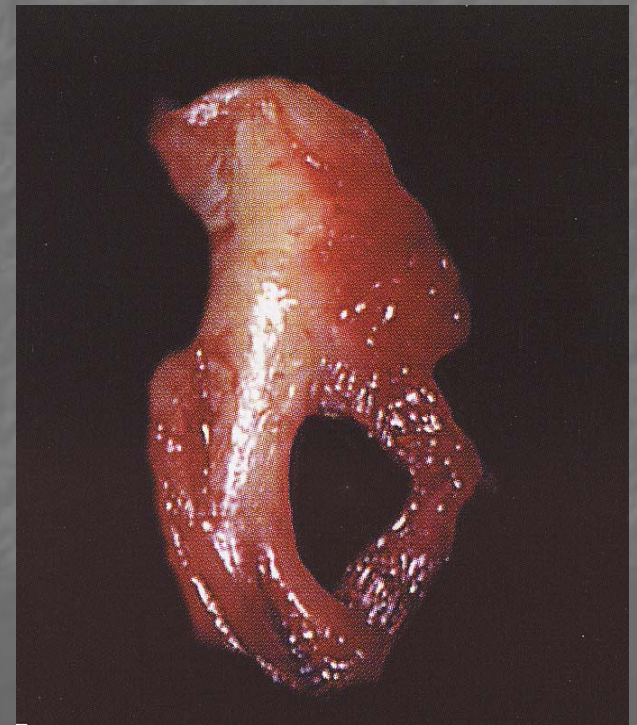
- Fibrocartilage and Osseous Articular surfaces

- Point application of loads
- Tissue fatigue
- Trabeculae fracture
- Microcyst formation
- Sclerosis



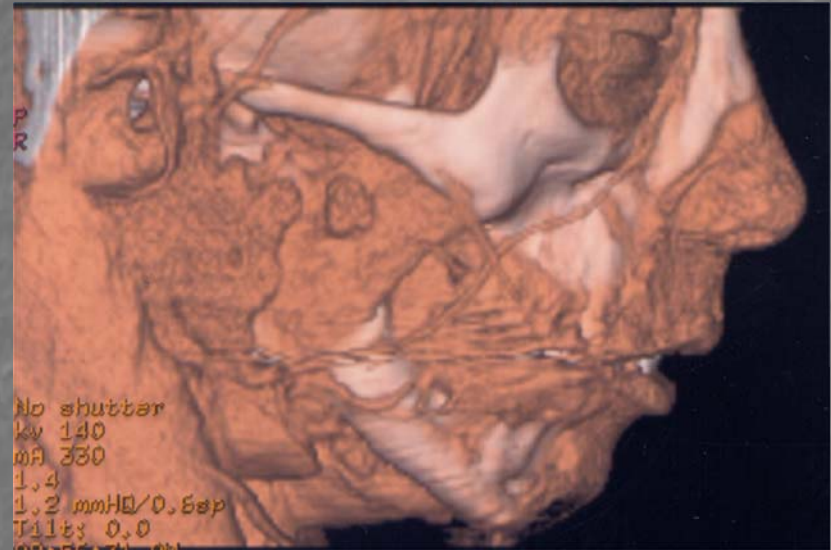
Pathophysiology of Disc Displacement

- Synovial membrane and Synovial fluid
 - Surface area reduction
 - Macromolecules
 - Reduced Proteoglycan synthesis
 - Inflammatory exudate
 - Hypoxic reperfusion



Quantification of Disc Displacement

- Clinical evaluation
- Doppler / Accelerometry
- Axiography
- Plain film radiographs
- Tomography
- Computerized Tomography and Cone Beam Tomo.
- Arthrography and Arthroscopy
- Magnetic Resonance Imaging



Symptom Complex of Disc Displacement

- Joint sounds
- Quality and quantity of condylar movement
- Muscle splinting and guarding
- Capsulitis
- Headaches
- Altered mastication / bite force

Prevalence of Disc Displacement

- Asymptomatic Adult population
 - 30% (Kircos *et al.* 87; Katzberg *et al.* 96; Tasaki *et al.* 96)
- Symptomatic Adult population
 - 77-82% (Katzberg *et al.* 96; Tasaki *et al.* 96)
- Adolescent Asymptomatic studies
 - 10% - 3428 children 6-12yrs (Keeling *et al.* 94)
 - 36% - 369 adolescents 10-18yrs (Gazit *et al.* 84)
 - 0% - 36% - Review (Mintz. 94)

Prevalence of Disc Displacement

- An MRI evaluation of 352 adolescent joints
(Male and female 10-17 yrs)

	Male	Female
Normal Disc Position	53	26.5
Slight – Moderate Displacement	15.9	12.2
Full Anterior Displacement	10.9	30.4
Rotational Displacement	20.3	30.8

** Expressed as Percentage Distribution **

Clinical Symptom Association with Disc Displacement

- 194 Edmonton Adolescents
- Age range 10-17 yrs
- TMJ MR Imaging
- 75 male, 119 female
- Stepwise Multiple Regression analysis

Clinical Symptom Association with Disc Displacement

- Female Model

	Sig.	Corr. Coef.	Adj R ²
Repro. Joint sounds	0.0017	+ 0.3342	
Overbite	0.0011	- 0.2912	
Deviation on Opening	0.0006	+ 0.3527	0.284

- Male Model

Repro. Joint sounds	0.0009	+ 0.3905	
Masseter tenderness	0.0026	+ 0.4278	0.255

Clinical Symptom Association with Disc Displacement

- Liebermann *et al.* 92
 - MRI associated with joint sounds, muscle tenderness, joint tenderness
- Katzberg *et al.* 96
 - MRI association with clinical signs and symptoms
- Nebbe (PhD Thesis 98)
 - Joint sounds, muscle tenderness
 - No symptoms of joint pain
 - Other indicators ?

Adolescent Facial Morphology and Disc Displacement

- Edmonton Adolescent sample (10-17 yrs)
- Asymptomatic and TMJ Symptomatic referrals
- Exclusion of TMJ Rheumatoid Arthritis
- Lateral Cephalometric Radiography
- MRI determination of disc position

Adolescent Facial Morphology and Disc Displacement

- 17 Bilateral normal TMJ females
- 17 Bilateral total disc displacement females
- No Age difference
- MRI determined disc position
- Two-tailed t-test

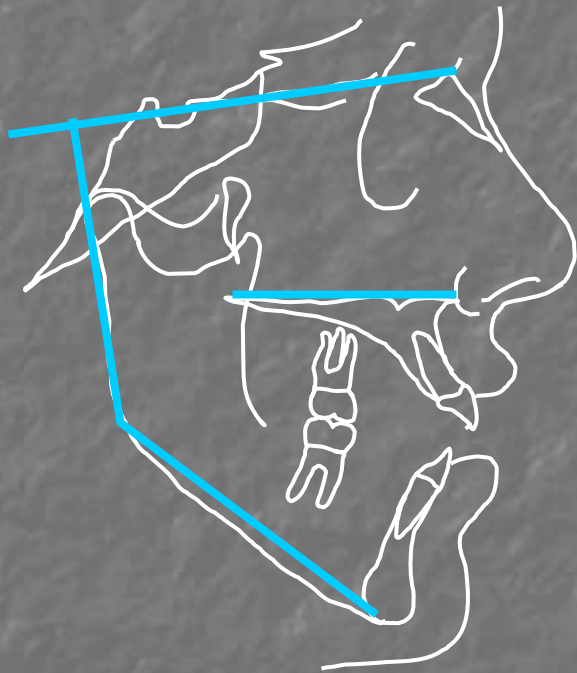
Adolescent Facial Morphology and Disc Displacement

Linear Variables		2 tailed significance	Mean Diff.
	Posterior cranial base height	0.004	5.571 mm
	Mandibular ramus height	0.041	3.631 mm
	Anterior facial height	0.039	2.564 mm

Adolescent Facial Morphology and Disc Displacement

Angular Variables		2 tailed significance	Mean Diff.
	Cranial base to ramus	0.001	5.53 °
	Cranial Base to palatal plane	0.003	4.51 °
	Cranial Base to mandibular plane	0.003	5.99 °

Adolescent Facial Morphology and Disc Displacement



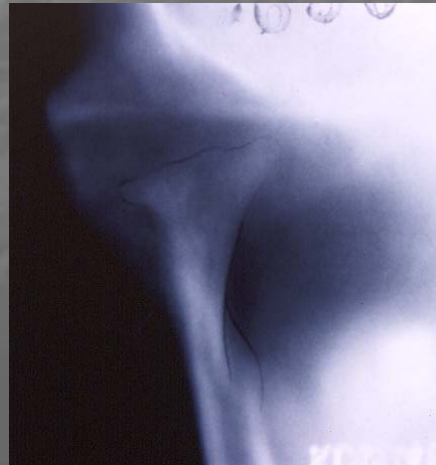
Angular Variables



Linear Variables

Early Detection and Treatment

- Habit modification
- Diet Modification
- Exclusion of Juvenile Rheumatoid Arthritis
- Counseling regarding growth alterations



Early Detection and Treatment

- Nocturnal Nightguard therapy?
- Glucosamine Sulphate ?
- NSAIDS?
- Doxycycline?
- Bone Scan Imaging?

Conclusions

- Adolescent Disc Displacement is prevalent
- Females more commonly affected
- Clinical Signs and Symptoms may not be evident
- Further evaluation should be considered

Conclusions

- Altered facial morphology and dental function
- Careful diagnosis and treatment
- Counseling regarding growth alterations
- Affected adults – reactivation – adaptive capacity - Degenerative Joint Disease