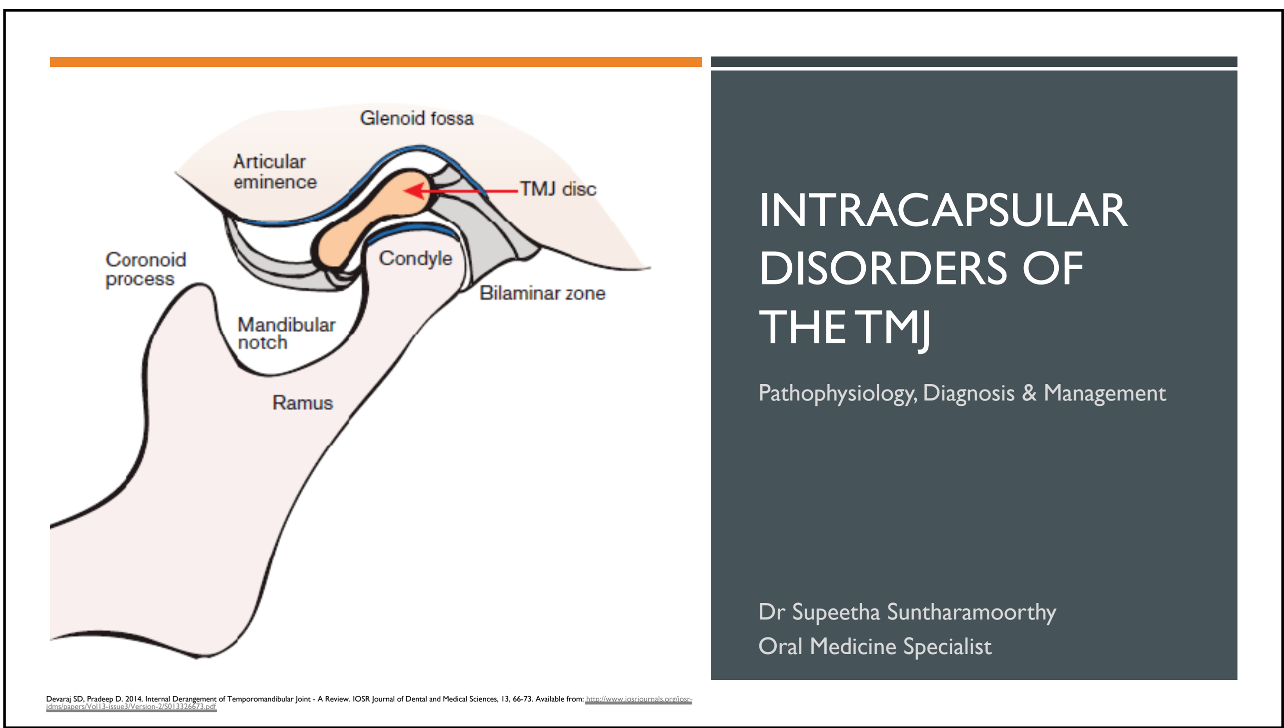

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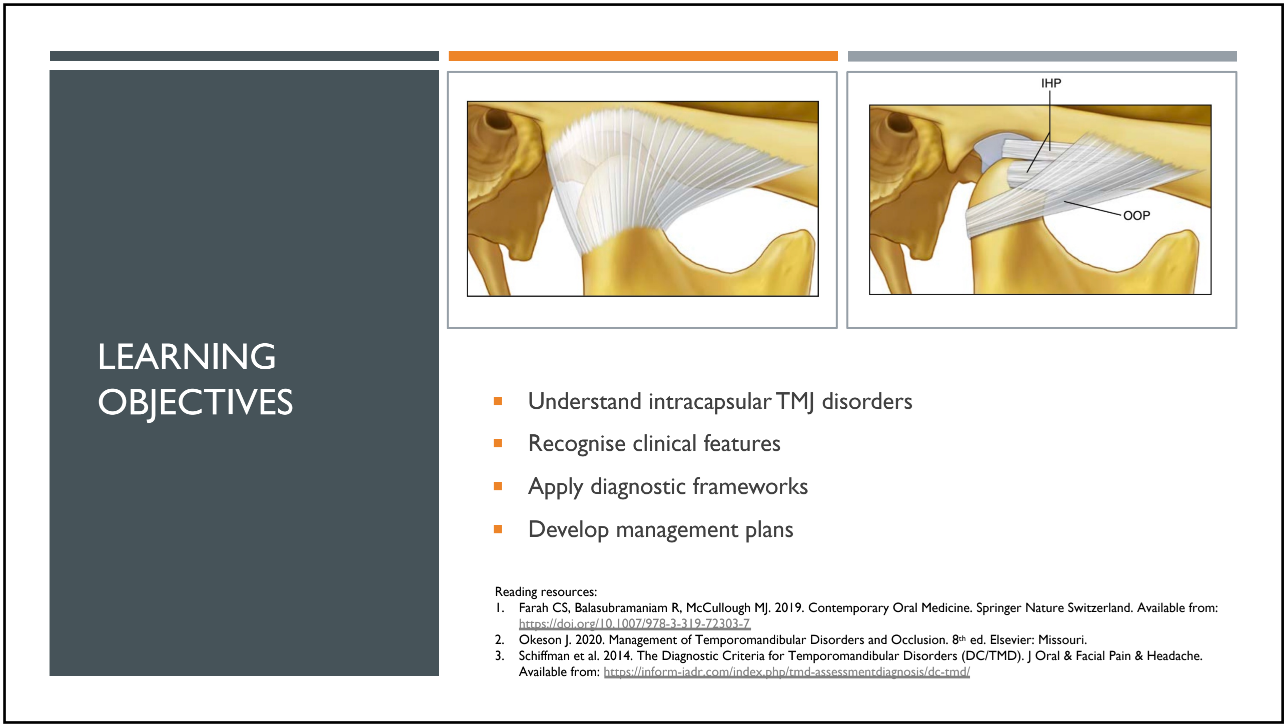

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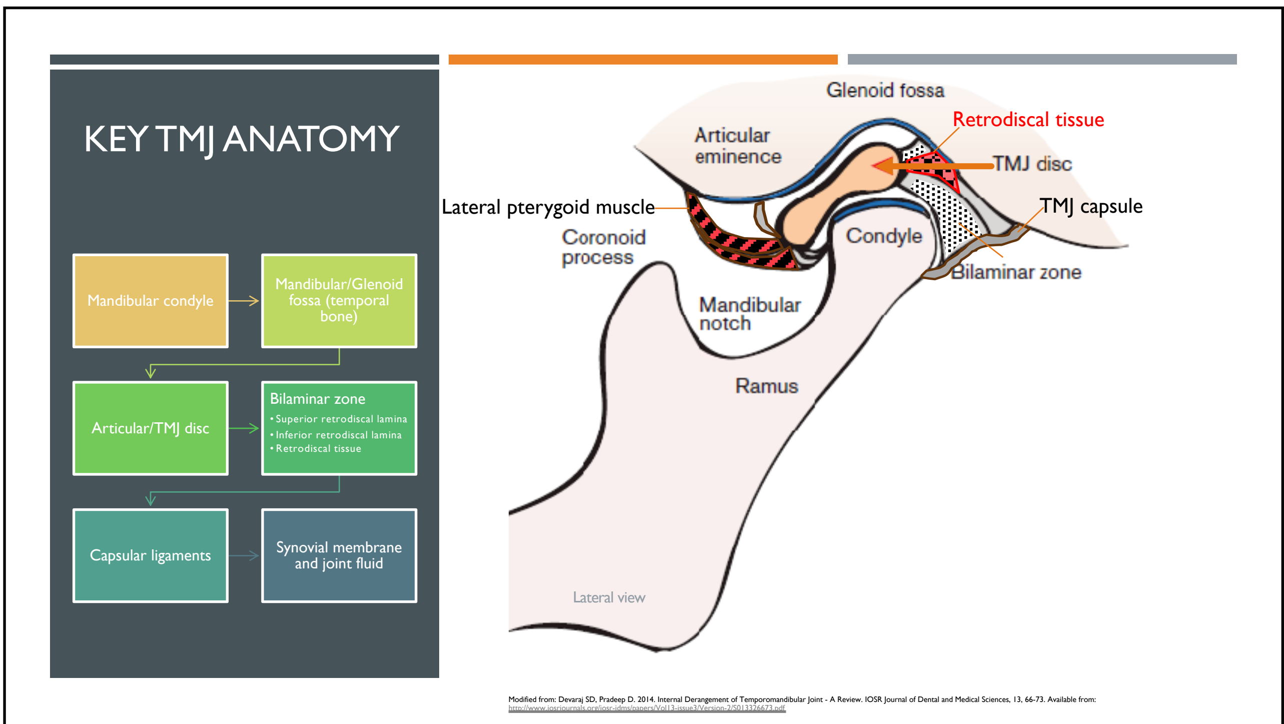

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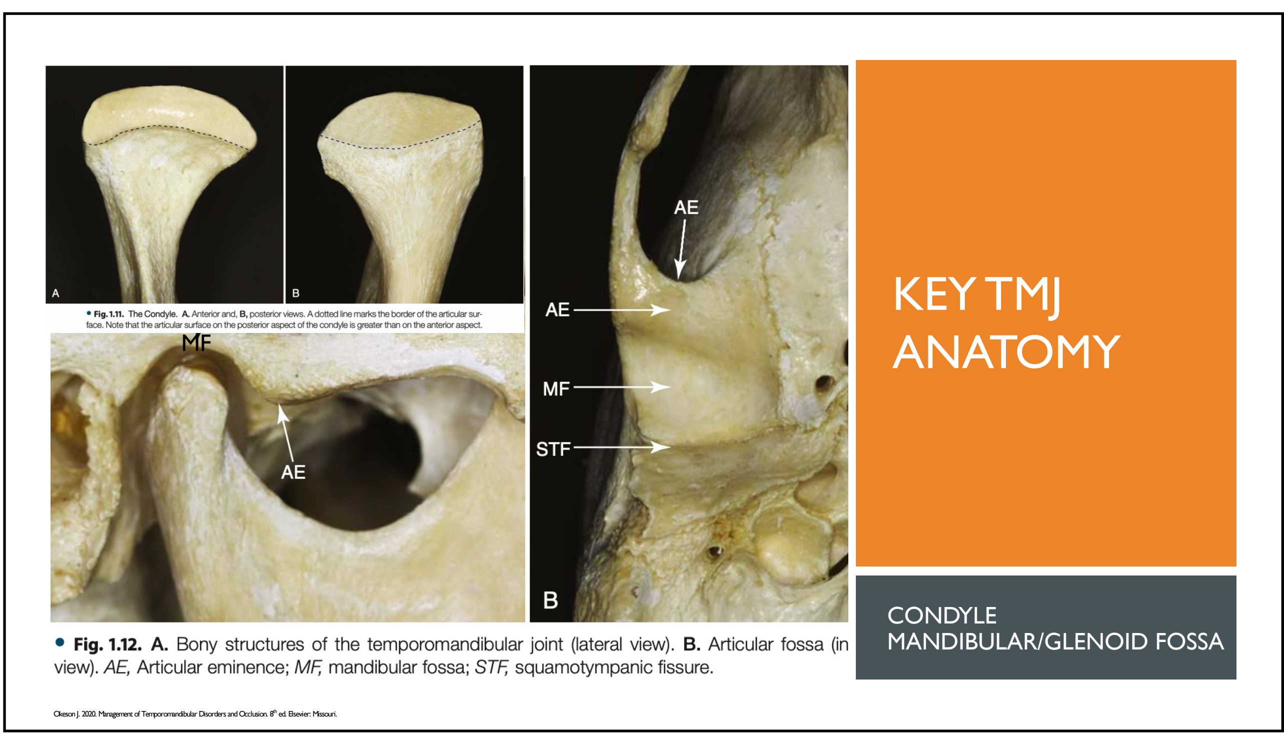

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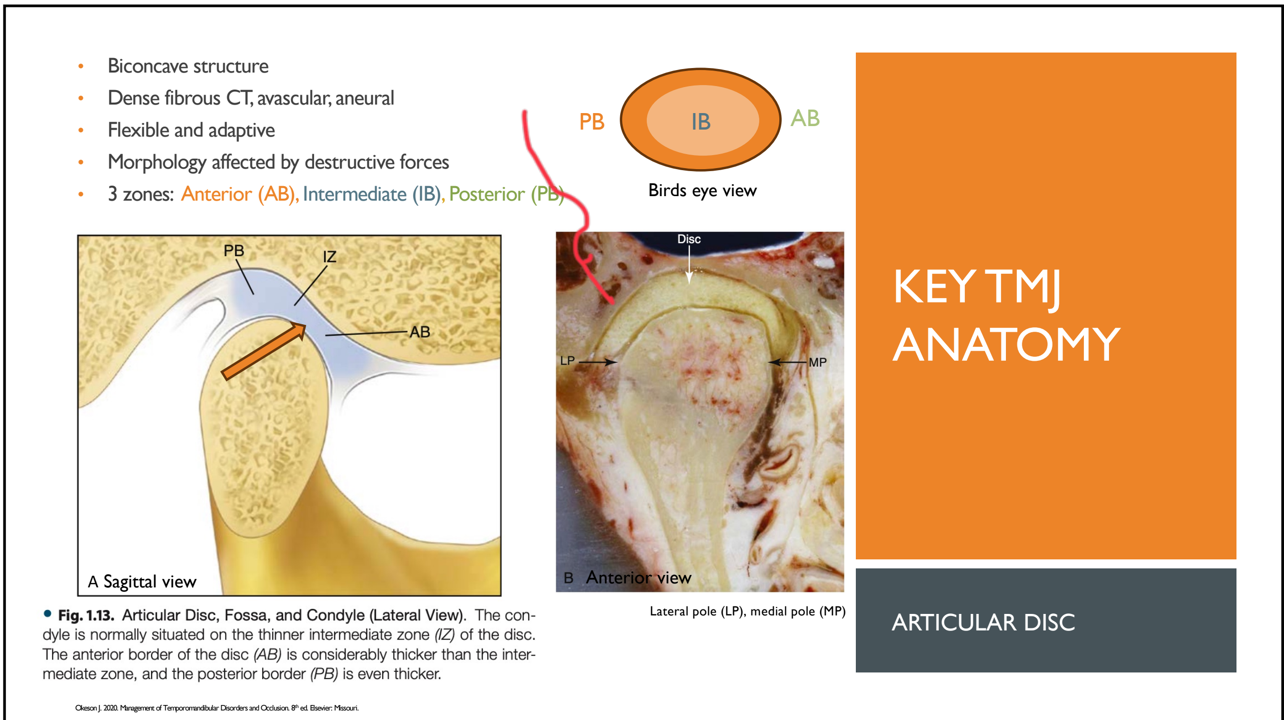
* The disc is "squishy", functional & adaptable!

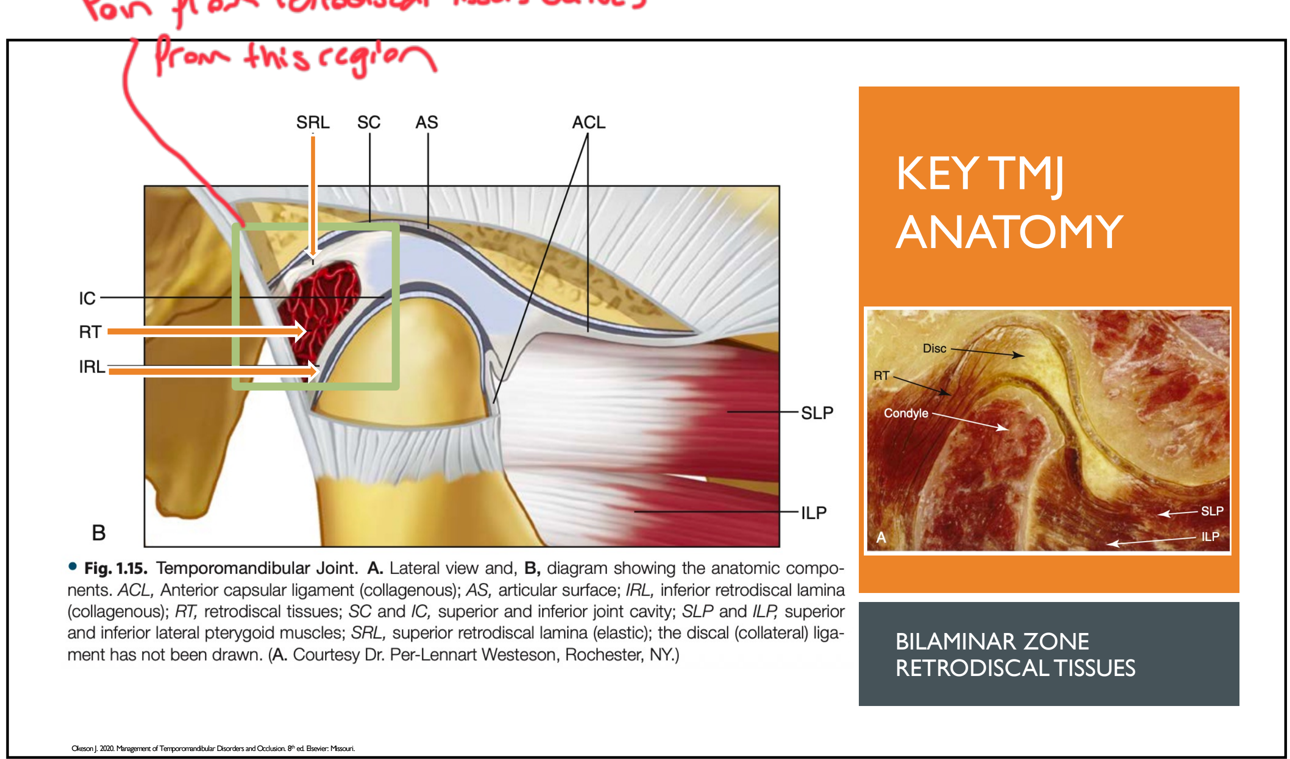


• **Fig. 1.13.** Articular Disc, Fossa, and Condyle (Lateral View). The condyle is normally situated on the thinner intermediate zone *(IZ)* of the disc. The anterior border of the disc *(AB)* is considerably thicker than the intermediate zone, and the posterior border *(PB)* is even thicker.

Okeson J. 2020. Management of Temporomandibular Disorders and Occlusion. 8th ed. Elsevier: Missouri.

5

Pain from retrodiscal tissues derives from this region



• **Fig. 1.15.** Temporomandibular Joint. **A.** Lateral view and, **B,** diagram showing the anatomic components. *ACL,* Anterior capsular ligament (collagenous); *AS,* articular surface; *IRL,* inferior retrodiscal lamina (collagenous); *RT,* retrodiscal tissues; *SC* and *IC,* superior and inferior joint cavity; *SLP* and *ILP,* superior and inferior lateral pterygoid muscles; *SRL,* superior retrodiscal lamina (elastic); the discal (collateral) ligament has not been drawn. (A. Courtesy Dr. Per-Lennart Westeson, Rochester, NY.)

Okeson J. 2020. Management of Temporomandibular Disorders and Occlusion. 8th ed. Elsevier: Missouri.

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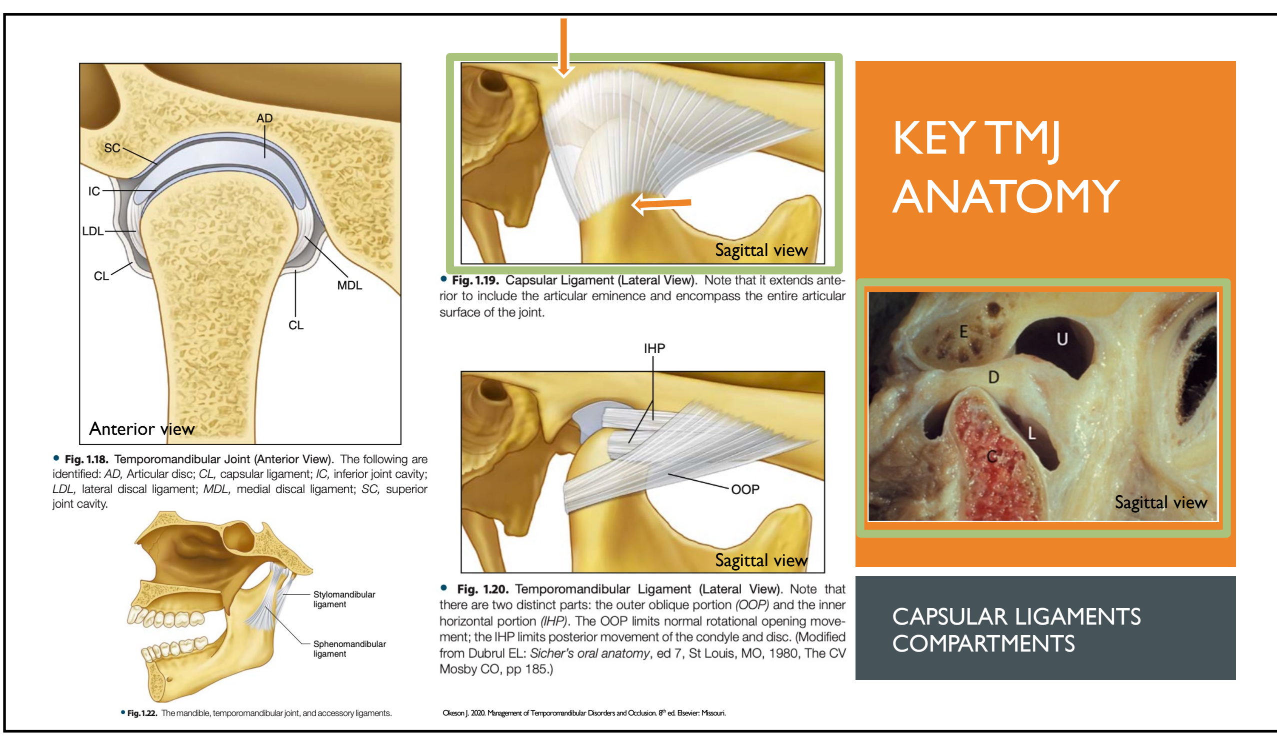

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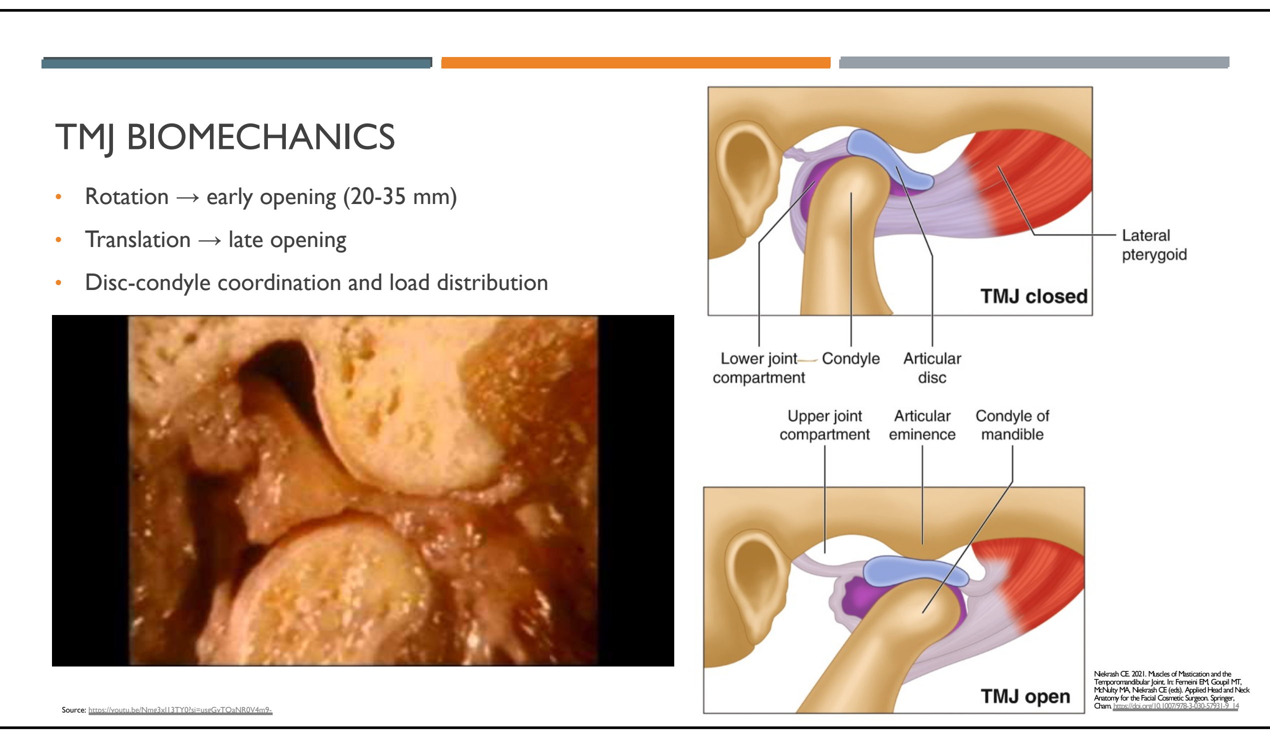

9

TMJ BIOMECHANICS

- Disc morphology is critical for maintaining correct positioning during joint function
- Normal shape, combined with intra-articular pressure, enables self-positioning of the disc → smooth and stable joint movement
- Ligamentous attachments have minimal functional impact when disc morphology is intact
- Significant alteration of disc morphology compromises this system
  - Ligaments do not stretch but become elongated with excessive force
  - Articular surfaces of TMJ are no longer maintained in constant contact
  - Resulting changes disrupt normal joint biomechanics
  - **Leads to development of TMJ dysfunction signs and symptoms**

Video: https://youtu.be/utKvFD6a_6o?si=WZHIECHQDbDeL-mW

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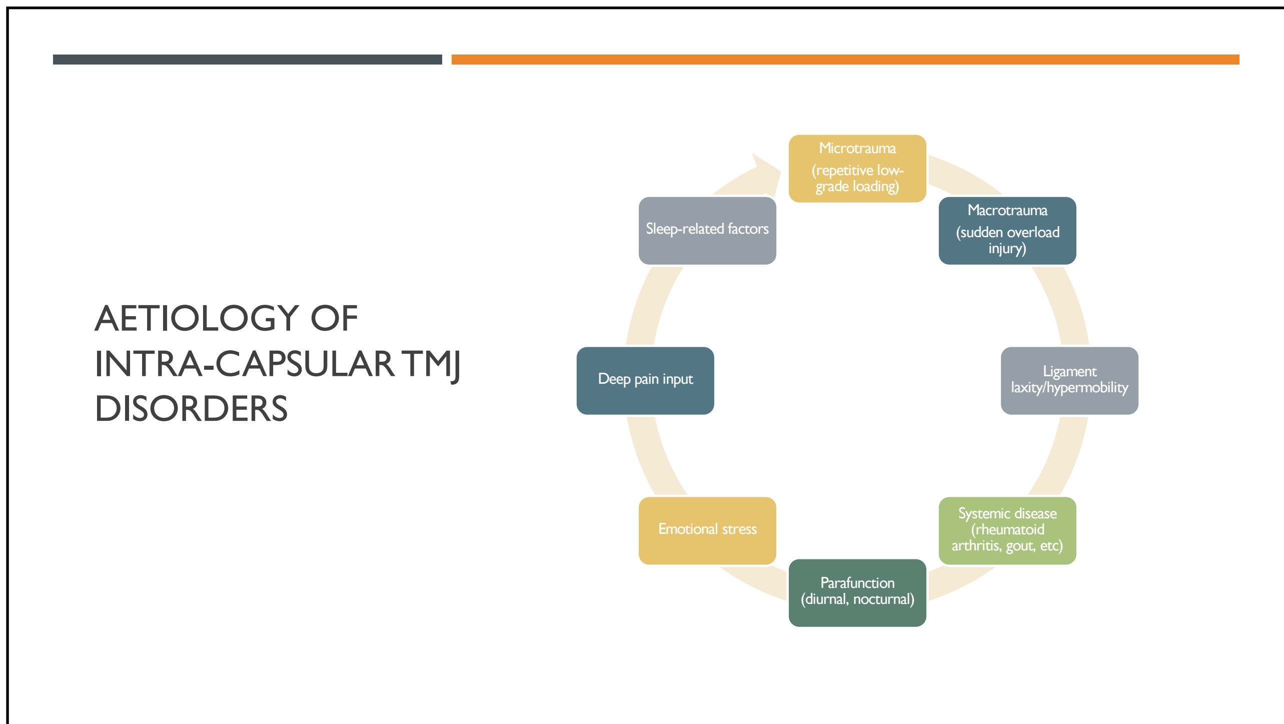

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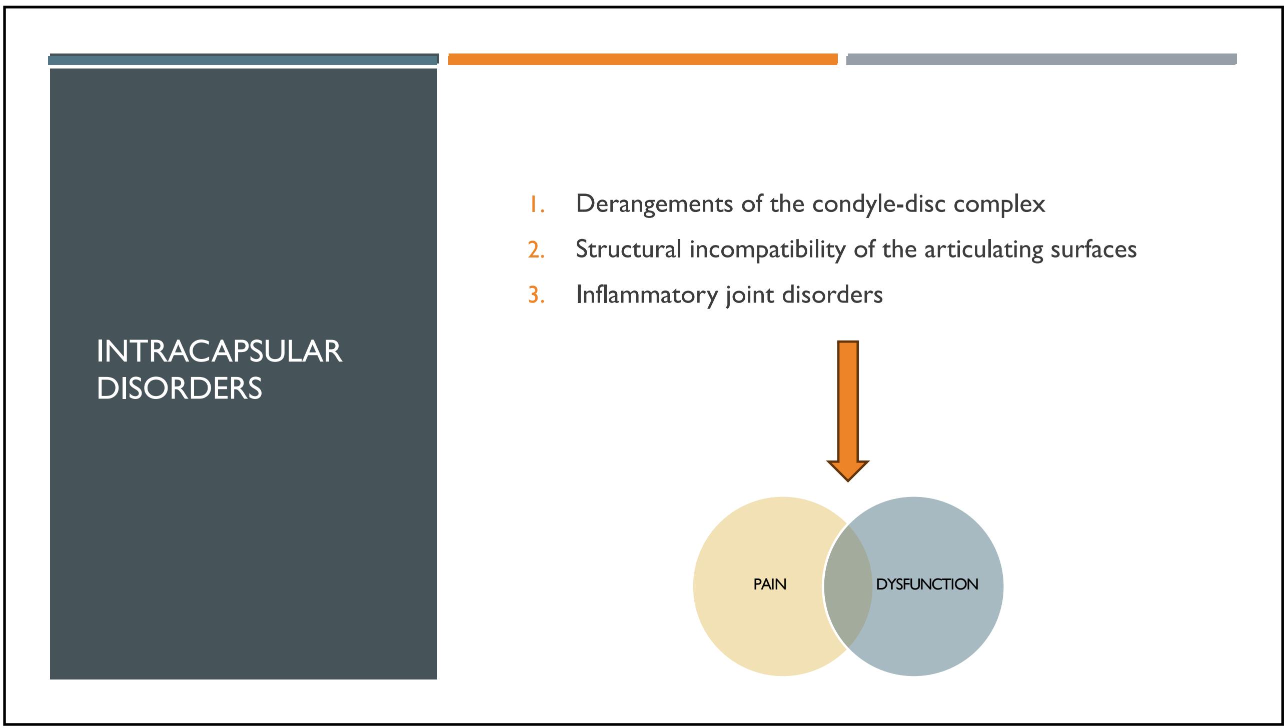


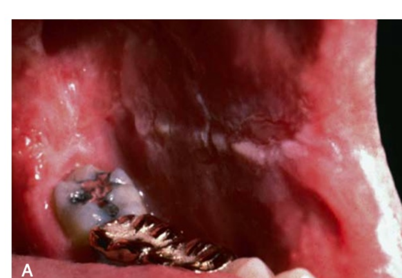
12

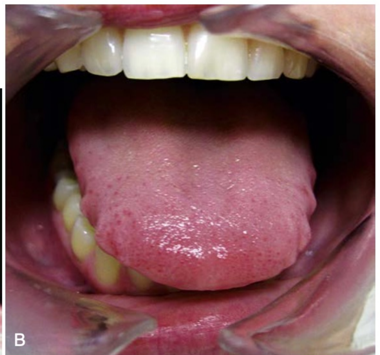
CLINICAL FEATURES OF INTRACAPSULAR DISORDERS

- Joint pain (preauricular)
- Clicking, popping, or crepitus
- Restricted or deviated mouth opening
- Locking (intermittent or persistent)
- Pain on function (chewing, yawning)

PARAFUNCTION FEATURES

+/- occlusal wear





• **Fig. 7.2** Some Clinical Signs Associated With Parafunctional Activity. **A.** Evidence of cheek biting during sleep. **B.** Note the lateral borders of the tongue are scalloped, conforming to the lingual surfaces of mandibular teeth. During sleep a combination of negative intraoral pressure and forcing the tongue against the teeth produces this altered tongue shape. This is a form of parafunctional activity.

Okeson J. 2020. Management of Temporomandibular Disorders and Occlusion. 8th ed. Elsevier: Missouri.

13

CLASSIFICATION OF INTRACAPSULAR DISORDERS (DC-TMD)

1. Disc displacement with reduction
2. Disc displacement with reduction with intermittent locking
3. Disc displacement without reduction with limited opening
4. Disc displacement without reduction without limited opening

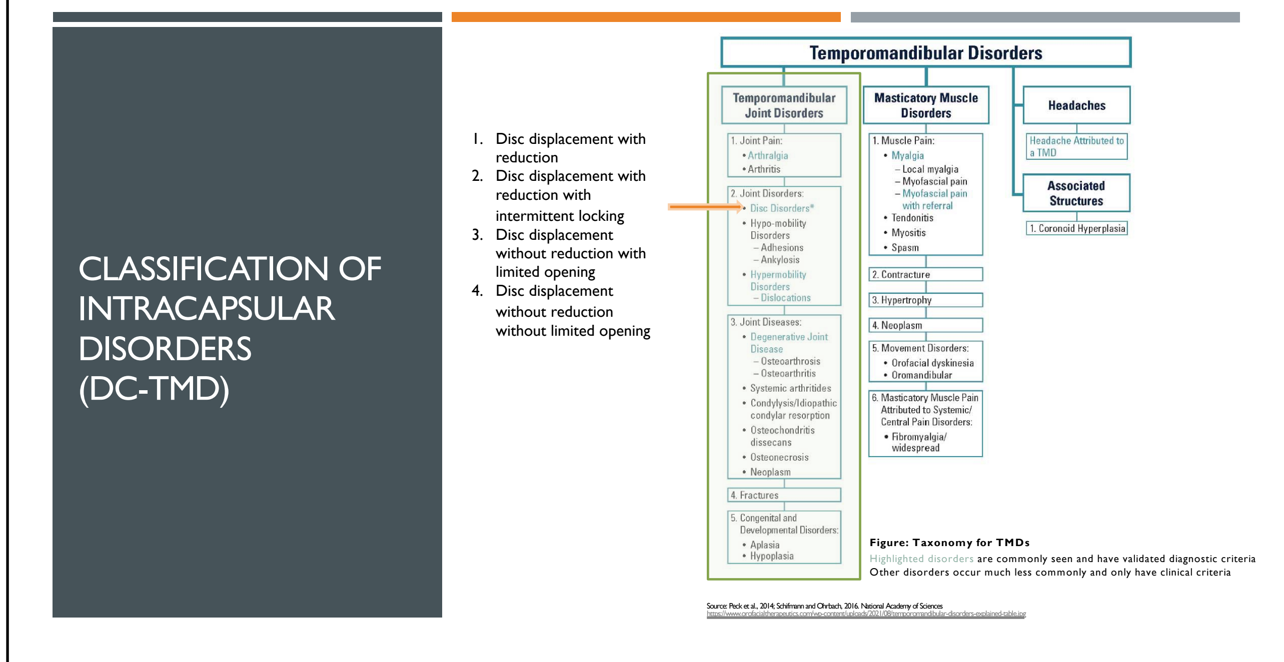


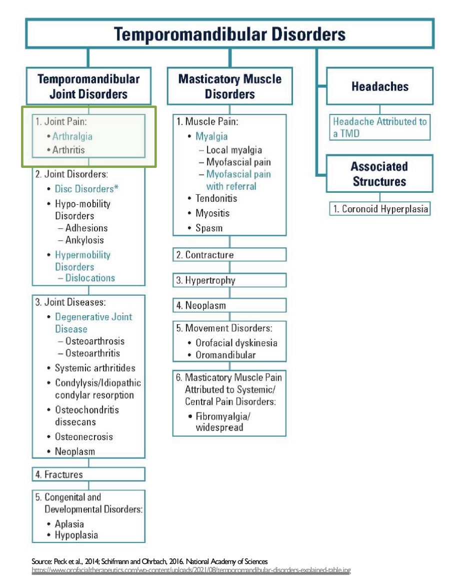
Figure: Taxonomy for TMDs
Highlighted disorders are commonly seen and have validated diagnostic criteria
Other disorders occur much less commonly and only have clinical criteria

Source: Peck et al., 2014; Schifmann and Ohrbach, 2016. National Academy of Sciences
https://www.orofacialtherapeutics.com/wp-content/uploads/2021/08/temporomandibular-disorders-explained-table.jpg

14

JOINT PAIN

- **Arthralgia** = pain in TMJ structure
  - Non-inflammatory
  - Arises from nociceptors in surrounding soft tissues: discal ligaments, capsular ligaments (capsulitis), retrodiscal tissues (retrodiscitis), synovial lining (synovitis)
  - Provoked by movement, function, parafunction or palpation
- **Arthritis** = inflammation in TMJ structure
  - Inflammatory
  - Clinical signs: pain, swelling, warmth, erythema, altered function
  - Often associated with systemic inflammatory disease e.g. rheumatoid arthritis
  - Pain often more persistent and can occur at rest
- Effect:
  - Limited mandibular movement
  - Protective co-contraction



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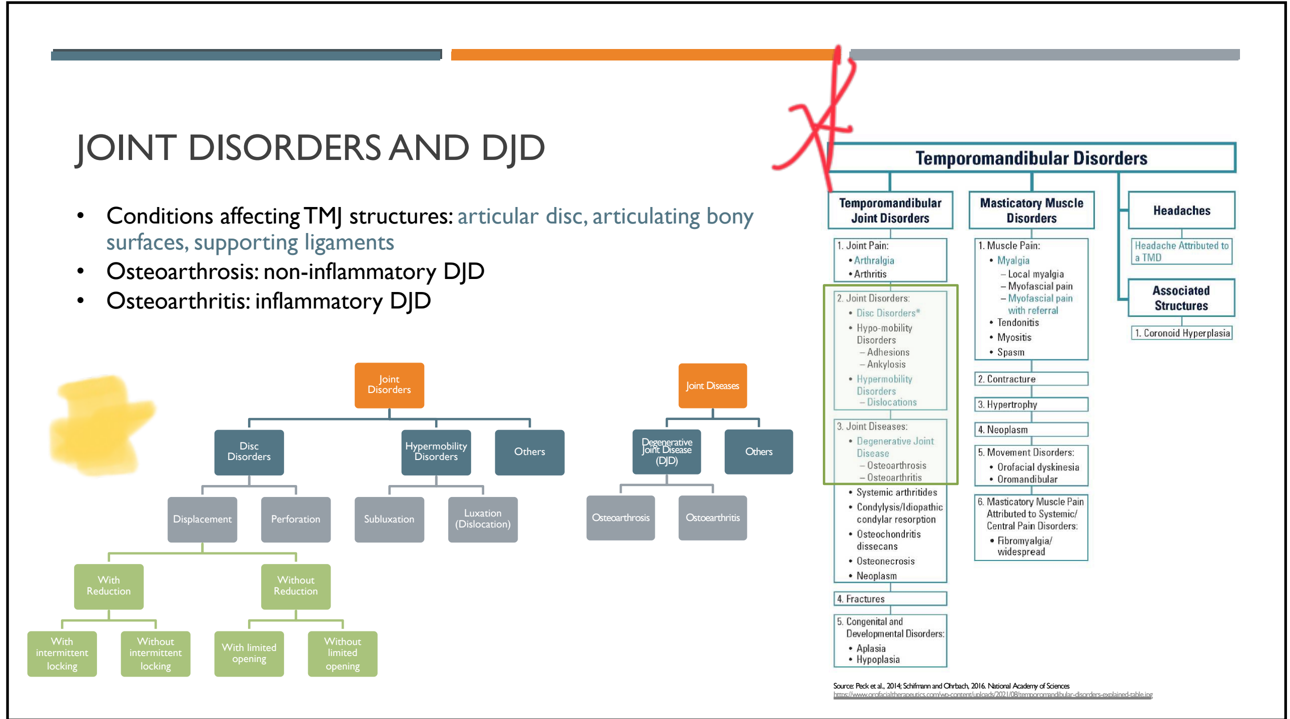
JOINT DISORDERS AND DJD

- Conditions affecting TMJ structures: articular disc, articulating bony surfaces, supporting ligaments
- Osteoarthrosis: non-inflammatory DJD
- Osteoarthritis: inflammatory DJD



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JOINT DISORDERS AND DJD

Condition	History (Patient Report)	Clinical Examination Findings
Disc Displacement with Reduction (DDwR)	Clicking or popping during opening and/or closing	Reproducible click on opening and/or closing (≥1 of 3 cycles)
DDwR with Intermittent Locking	Episodes of jaw "locking" with temporary inability to fully open	Click present + occasional limited opening that resolves
Disc Displacement without Reduction (with limited opening)	History of locking with sudden reduction in mouth opening	Limited opening (<40 mm), deviation to affected side, no click
Disc Displacement without Reduction (without limited opening)	Previous history of locking, now improved opening	Normal opening but persistent deflection, no click
Subluxation (hypermobility)	Jaw "goes out" on wide opening but self-reduces	Excessive opening with terminal "clunk" on closing
Luxation/Dislocation (open lock)	Inability to close mouth after wide opening	Patient presents with mouth open, requires assisted reduction
Degenerative Joint Disease (osteoarthritis / osteoarthrosis)	Joint noise (grating, grinding), may or may not have pain	Crepitus on movement (coarse, gravel-like sound)

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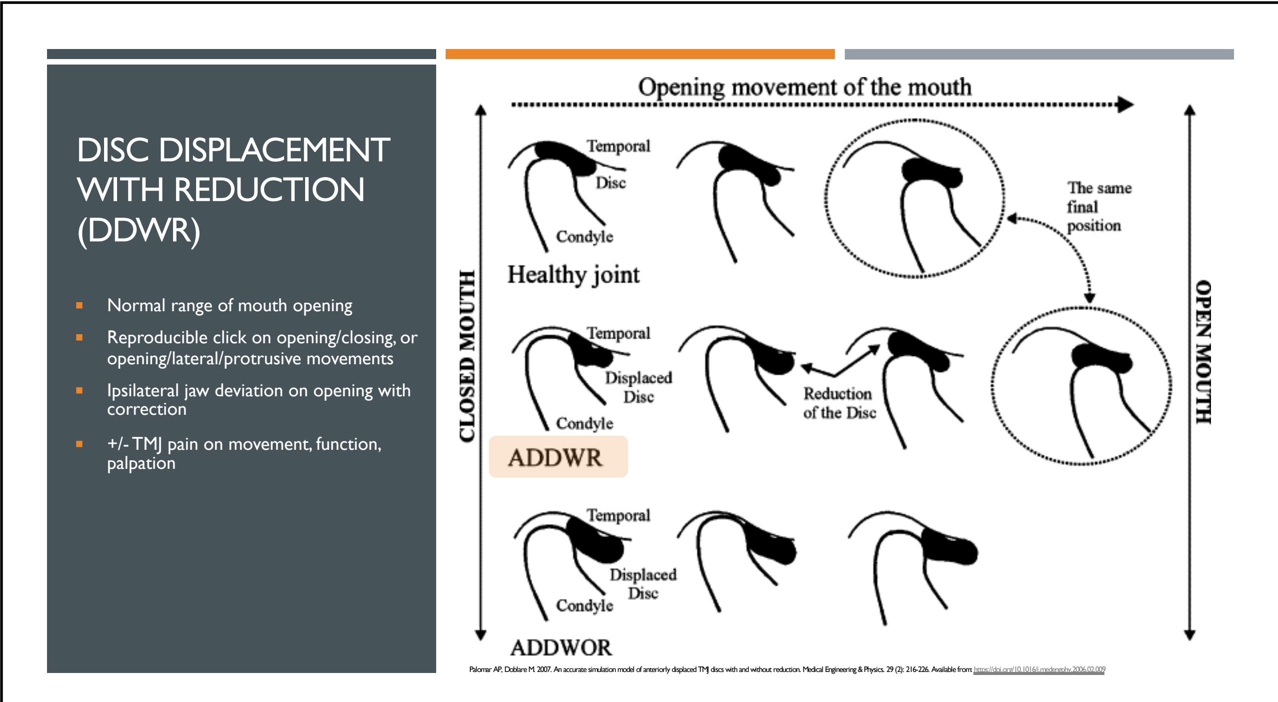

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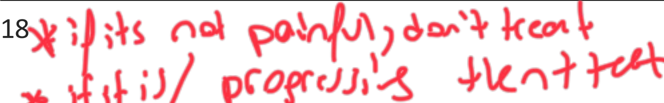

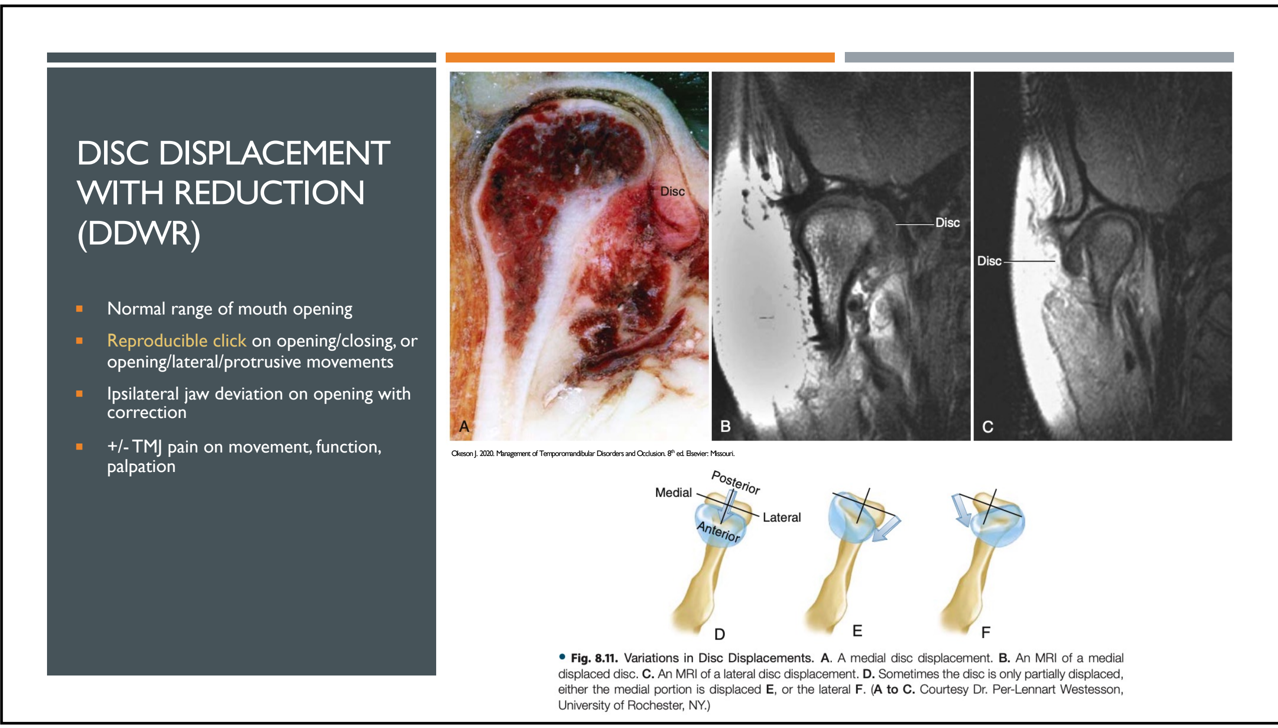

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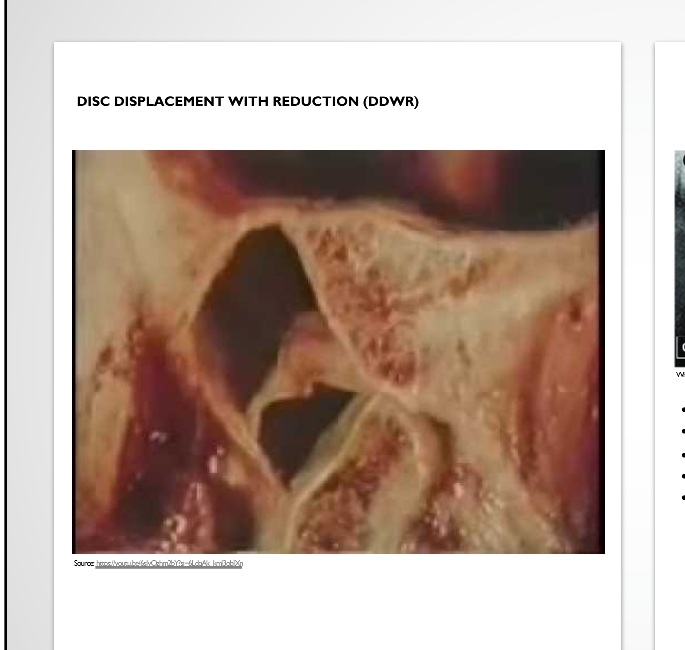
DISC DISPLACEMENT WITH REDUCTION (DDWR)



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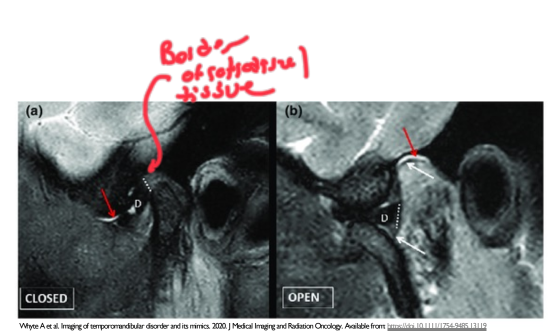

Whyte A et al. Imaging of temporomandibular disorder and its mimics. 2020. J Medical Imaging and Radiation Oncology. Available from: https://doi.10.1111/1754-9485.13119

- MRI fat-saturation T2 sagittal sequence
- Anterior DD of a crumpled disc (D) in closed-mouth position
- Reduction of disc in open-mouth position
- Effusion (red arrow)
- Bilaminar zone of retrodiscal tissues (white arrow)

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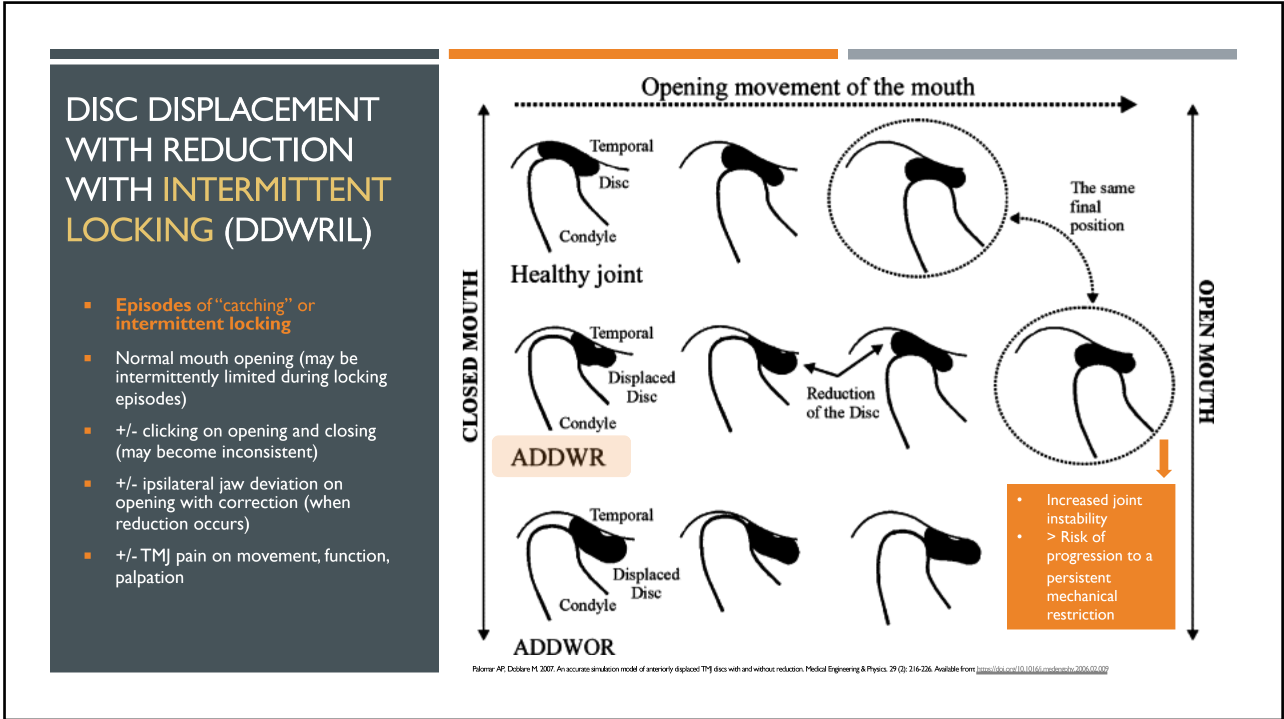

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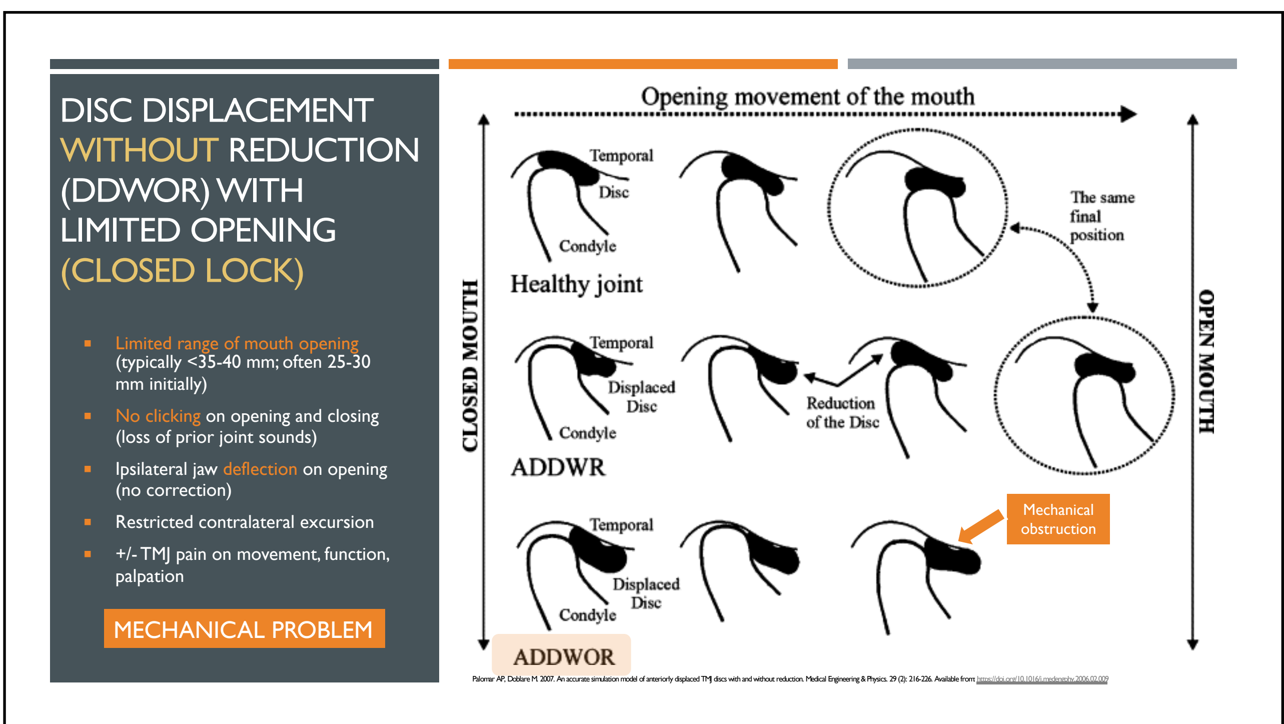

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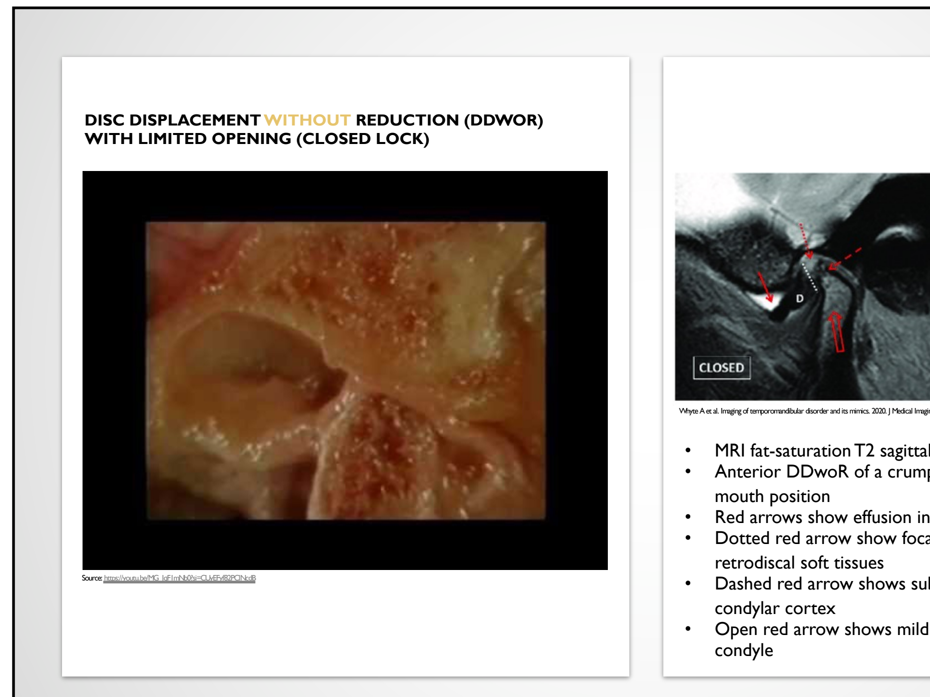
DISC DISPLACEMENT WITHOUT REDUCTION (DDWOR) WITH LIMITED OPENING (CLOSED LOCK)



Whyte A et al. Imaging of temporomandibular disorder and its mimics. 2020. J Medical Imaging and Radiation Oncology. Available from: https://doi.10.1111/1754-9485.13119

- MRI fat-saturation T2 sagittal sequence
- Anterior DDwoR of a crumpled disc (D) in open and closed-mouth position
- Red arrows show effusion in the superior joint space
- Dotted red arrow show focal hyperintensity of the anterior retrodiscal soft tissues
- Dashed red arrow shows subtle erosion of the superior condylar cortex
- Open red arrow shows mild oedema of the marrow in the condyle

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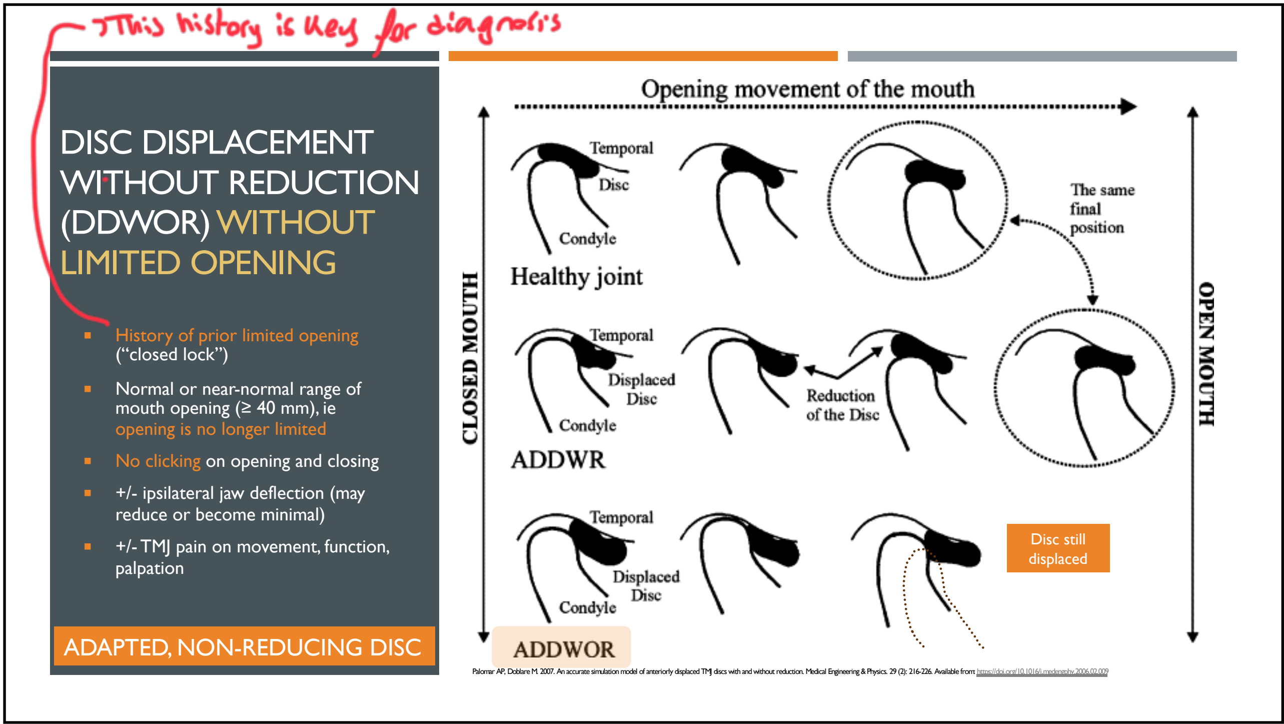

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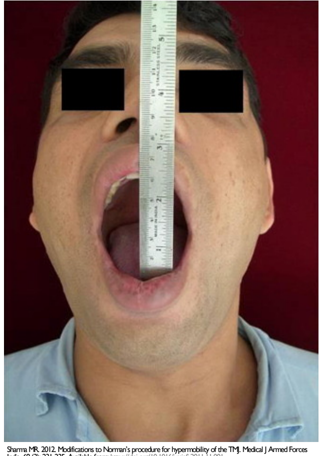
SUBLUXATION (HYPERMOBILITY)

- Excessive anterior translation of the condyle beyond the articular eminence
- Mouth opening > 40 mm
- Sudden "jump" or "thud" at maximal opening
- No clicking (not a disc displacement)
- Often visible preauricular depression at full opening
- Usually painless and **not pathological**
- May be associated with ligamentous laxity
- Repetitive episodes may predispose to joint instability or disc disorders



Sharma MR. 2012. Modifications to Norman's procedure for hypermobility of the TMJ. Medical J Armed Forces India. 68 (3): 231-235. Available from: https://doi.org/10.1016/j.mjafi.2011.11.001

Video 1:
https://www.tiktok.com/@mor10web/video/7367052507878591750?is_from_webapp=1&sender_device=pc

Video 2:
https://www.instagram.com/reel/DPR1S5ajOty/?utm_source=ig_web_button_share_sheet

Excessive movement rather than restricted movement

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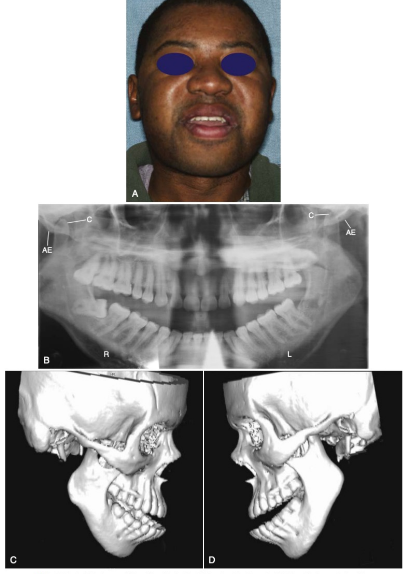
LUXATION (OPEN LOCK)

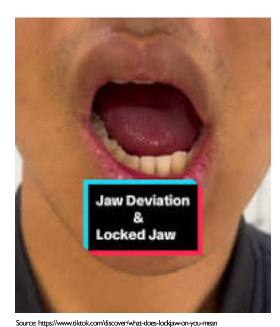
- Condyle displaced **anterior to the articular eminence**
- Unilateral or bilateral
- Inability to **close the mouth**
- Typically occurs after **wide opening** (yawning, dental procedures)
- Often preceded by **hypermobility / subluxation tendency**
- Patient may appear anxious and unable to self-reduce
- Not a disc disorder (do **not** confuse with closed lock)
- Usually non-pathological but requires **manual reduction**

CLINICAL EMERGENCY



• **Fig. 8.22. A.** Clinical presentation of a patient with a bilateral luxation (open lock). This patient cannot close his mouth. **B.** A panoramic radiograph of this patient. Note both condyles (C) are anterior to the articular eminences (EM). **C.** Three-dimensional destruction of the left temporomandibular joint and right luxation. Note the condyles anterior to the eminences. (Courtesy Dr. Larry Cunningham, University of Kentucky, Lexington, Kentucky.)

Okeson J. 2020. Management of Temporomandibular Disorders and Occlusion. 8th ed. Elsevier: Missouri.



Source: https://www.tiktok.com/discover/what-does-lockjaw-on-you-mean

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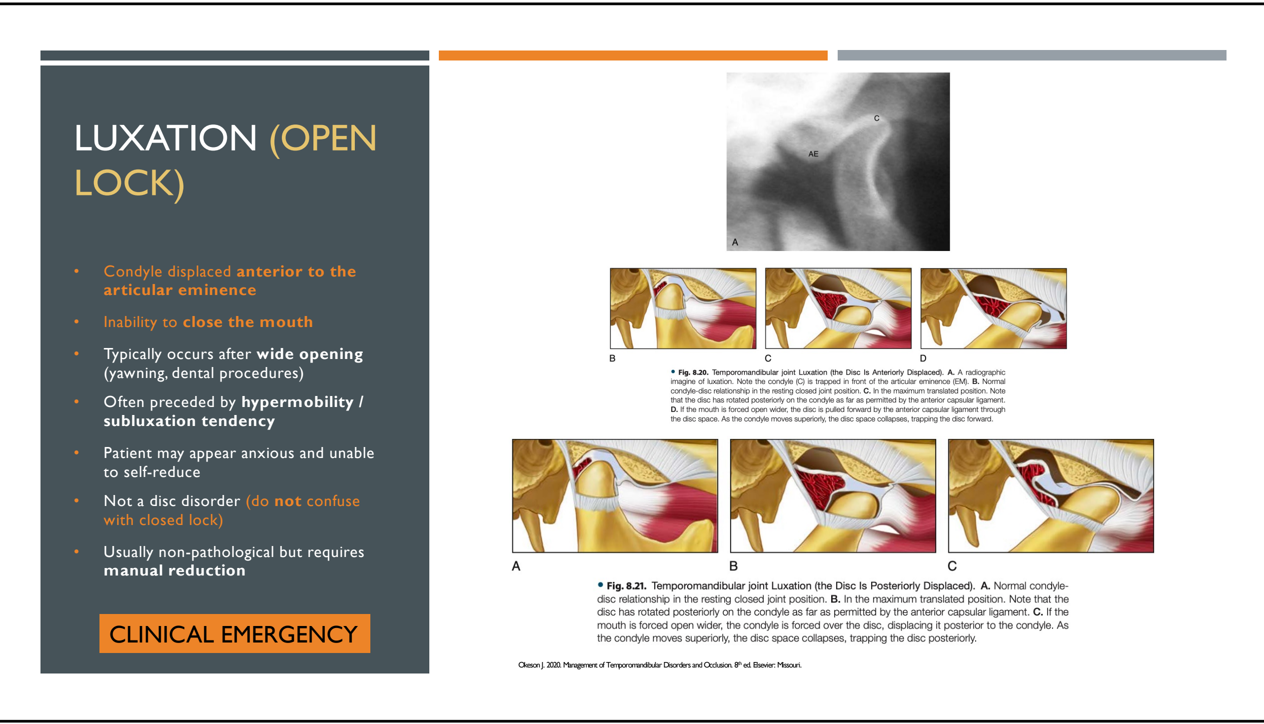

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INFLAMMATORY INTRACAPSULAR TMJ DISORDERS

Synovitis:
- Inflammation of synovial lining of joint recesses
- Constant deep intracapsular pain
- Pain increases with joint movement
- Often due to irritation, microtrauma, or joint dysfunction
- Clinically difficult to distinguish from capsulitis

Capsulitis:
- Inflammation of the capsular ligament
- Localised tenderness at lateral pole of condyle
- Pain present at rest and increases with function
- Commonly associated with macrotrauma (e.g. wide opening injury)

Retrodiscitis:
- Inflammation of retrodiscal tissues
- Constant dull aching pain, often worsened by clenching
- May cause acute malocclusion if swelling displaces condyle
- Typically associated with disc displacement or trauma

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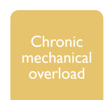
DEGENERATIVE JOINT DISEASE (DJD)

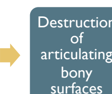
- Crepitus on opening and closing
- Limited mouth opening (<35 mm)
- Osteoarthrosis: DJD without pain (non-inflammatory); wear-and-repair imbalance → structural change
- Osteoarthritis: DJD with pain (inflammatory)
- Ipsilateral jaw deflection
- TMJ pain on movement, function, palpation
- May lead to functional limitation

Key Features:
- Destructive bony changes of articular surfaces (condyle & fossa)
- Response to **chronic increased joint loading**
- Cartilage softening (**chondromalacia**) → subchondral bone resorption
- Progressive **bone erosion and remodelling**
- Late radiographic changes: flattening, erosion, sclerosis

Associations:
- **Disc displacement without reduction**
- **Disc perforation or loss of cushioning**
- Increased loading of condyle on fossa accelerates degeneration

Early disease may be **clinically present but radiographically silent**
Reduced loading can allow **adaptive remodelling (osteoarthrosis)**





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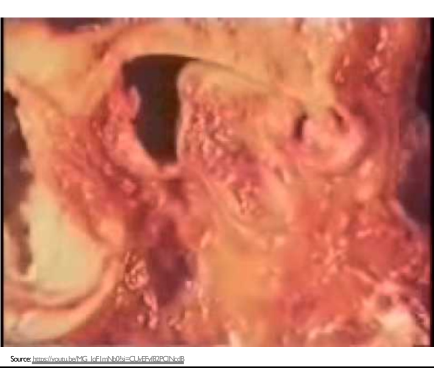
DEGENERATIVE JOINT DISEASE (DJD)

5 radiographic findings:

Sclerosis | Erosion | Flattening

Pseudocyst | Osteophyte



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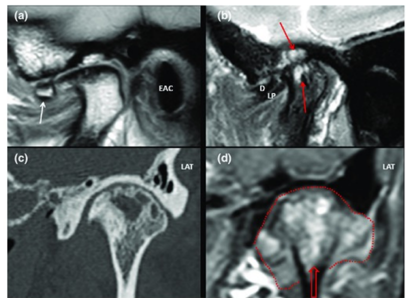

Whyte A et al. Imaging of temporomandibular disorder and its mimics. 2020. J Medical Imaging and Radiation Oncology. Available from: https://doi.10.1111/1754-9485.13119

- MRI proton density sagittal sequences
- Loss of joint space, articular surface flattening, cortical thickening, osteophytosis, ossified body (white arrow) (a)
- Anterior DD, bone on bone contact, synovial cysts (b)
- Advanced DJD (c)
- Red arrow shows large effusion distending the anterior recess of the superior joint space
- White arrows indicate remnant of retrodiscal laminae
- Dashed red arrow shows extensive erosion
- Open red arrow shows extensive sub-articular marrow oedema
- Glenoid fossa appears normal (often the case)

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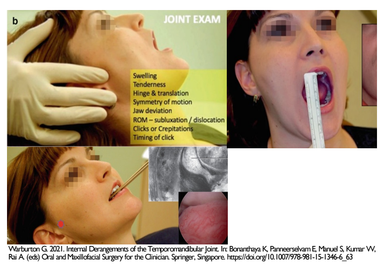
DIAGNOSTIC APPROACH

History

1. Clicking?
2. Grating?
3. Locking - transient, persistent?
4. Pain pattern
5. Habits



Warburton G. 2021. Internal Derangements of the Temporomandibular Joint. In: Bonanthaya K, Panneerselvam E, Manuel S, Kumar V, Rai A. (eds) Oral and Maxillofacial Surgery for the Clinician. Springer, Singapore. https://doi.org/10.1007/978-981-15-1346-6_63

Exam

- Muscles of mastication (another lecture)
- Range of motion (active, passive)
- TMJ palpation, swelling, tenderness
- TMJ range (rotation, translation)
- TMJ sounds (click, crepitus)
- Jaw deviation, deflection, asymmetry
- Subluxation or dislocation
- Direct pressure loading (bite on tongue-blade contralateral side
- Intra-oral (occlusion, parafunction signs)

Investigations

- TMJ MRI, CT, OPG
- Serology if indicated

Key features of internal derangement:

- **DDWR** → clicking
  - Early click: mild displacement
  - Late click: greater displacement
- **Intermittent locking** → occasional catch
- **DDWoR** (closed lock) → limited opening
- **DDWoR** (no limit) → normal opening
- **Subluxation** → increased opening
- **Luxation** (open lock) → movement stuck
- **DJD** → crepitus
- **Perforation** → crepitus
- **Pain in loaded TMD** → retrodiscitis

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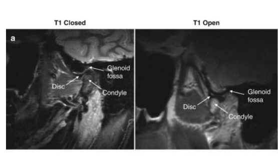
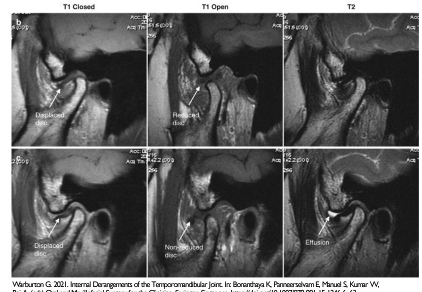
RADIOGRAPHIC EXAM





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(**a–c**) MRI scan—T1 and T2 images in closed and open mouth positions. (**a**) Normal disc position. (**b**) Anterior disc displacement with reduction. (**c**) Anterior disc displacement without reduction and superior joint space effusion

Imaging modalities:

- **Plain radiographs / CT** → assess **bony changes**
- **MRI = gold standard** for **disc position & soft tissues** (~90% accuracy)
- **MRI protocol**: **T1 + T2 sequences**, **closed & open mouth views,** additional: **fat-suppressed / STIR** → detect **oedema**

What MRI evaluates:

- **Bone**: sclerosis, erosions, flattening, osteophytes, cortical breaks
- **Disc**: position, shape, size, continuity (perforation)
- **Joint space**: collapse
- **Effusion**: best seen on **T2**
- **Disc displacement patterns**

Key interpretation point:

- Compare **closed vs open mouth**
- Determines **disc displacement and reducibility**

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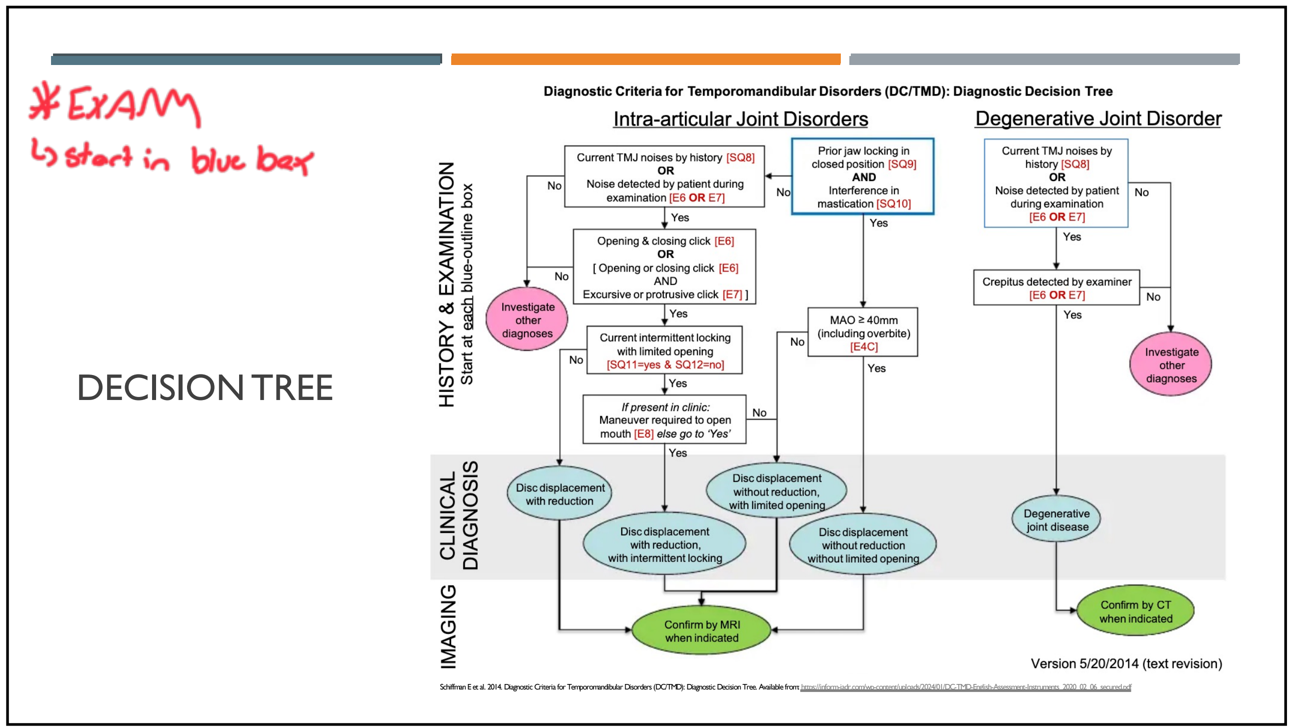
DECISION TREE



Schiffman E et al. 2014. Diagnostic Criteria for Temporomandibular Disorders (DC/TMD): Diagnostic Decision Tree. Available from: https://inform-iadr.com/wp-content/uploads/2024/01/DC-TMD-English-Assessment-Instruments_2020_02_06_secured.pdf

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MANAGEMENT

- Education, reassurance
- Pain free jaw function
- Nutrient-dense softer diet
- Habit control
- Thermotherapy
- Physical therapy (jaw exercises, massage, other)
- Stress management
- Oral appliance
- Pharmacotherapy (NSAIDs, muscle relaxants, TCAs, SSRIs, botox)
- Specialist referral for further assessment and management

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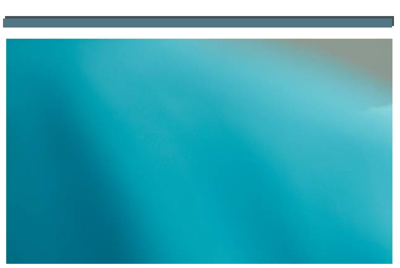

SPECIALIST MANAGEMENT

Indications for referral:

- Persistent symptoms despite conservative management
- Recurrent locking or restricted mouth opening
- Suspected internal derangement or degenerative joint disease
- Significant functional limitation or progressive symptoms
- Diagnostic uncertainty

Specialist management options:

- Conservative measures
- Custom stabilisation splints
- Targeted physiotherapy programs
- Pharmacological optimisation
- Management of DJD
- Intra-articular injections (e.g. corticosteroids)
- Arthrocentesis (joint lavage)
- Arthroscopy (adhesiolysis, synovial assessment)

Advanced / surgical (rare):

- Open joint surgery for refractory cases
- Disc repositioning or repair procedures

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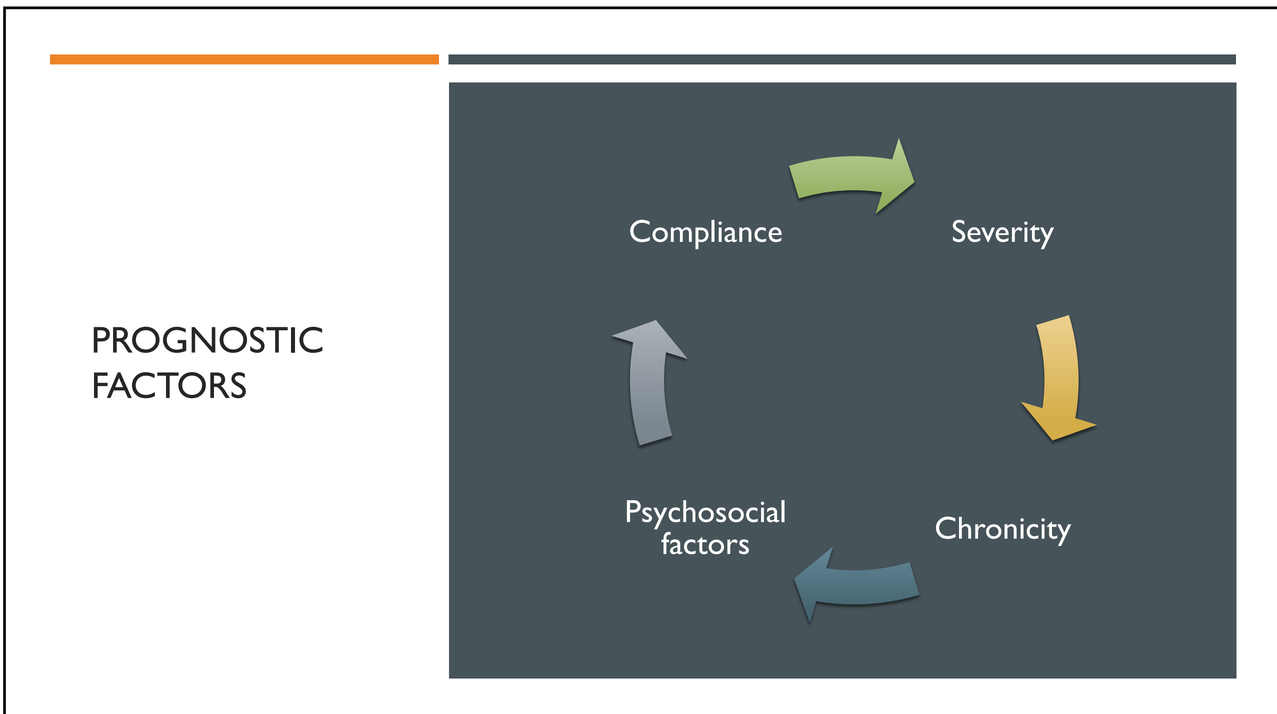

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