ATM: ALGOLOGICAL DIAGNOSIS, TREATMENT STRATEGIES AND REHABILITATION
Temporomandibular disorders: “a group of clinical problems involving the structures in and around the TMJ, the masticatory musculature or both” (De Leeuw, 2008, 2013)

PAIN: masticatory muscle pain (MMP) or TMJ-arthralgia (synovitis, capsulitis, osteoarthritis) (Benoliel & Sharav, 2008)
Pain can be spontaneous or associated with joint function and loading.

TMD may also include symptoms of DYSFUNCTION (limitation, interference, internal derangement, locking,…). Pain can be, but is not necessarily associated with dysfunction.
Pathophysiology

- many etiological aspects are unclear
- from a mechanical (occlusion, teeth) to a biopsychosocial model (Greene 2006; Suvinen et al. 2005)
- Complex interaction between biological factors (hormonal (LeResche et al 1997), adrenergic (Light et al. 2009)), psychological states and traits (Glaros 2005, 2008; Reismann et al 2008), environmental and general health conditions (Burris et al 2010; Janal et al 2008) and (macro- or micro) trauma (Yun & Kim 2005)
Diatchenko et al. model (2006)

- Interaction of 2 sets of intermediate phenotypes: psychosocial distress and pain amplification
- Each of the phenotypes influenced in itself by risk factors (mood, anxiety, depression, somatisation but also pro-inflammatory states, impaired pain regulation, cardiovascular en neuroendocrine function), depending on genetic regulation
- On top of this: environmental contributions
Based upon: Diatchenko et al. 2006, Tracey and Mantyh 2007 and Benoliel et al. 2011
Tested in OPPERA study (Maixner et al 2011)

- Large case-control study on predictive value of sociodemographic, clinical, genetic factors, pain amplification …

- Evidence provided for:
  - genetic association TMD with HTR2A, COMT and NR3C1, CAMK4, CHRM2, IFRD1, GRK5: risk identification and ? therapeutic intervention (Smith et al 2011)
  - ↑ sensitivity for PPT, cutaneous mechanical pain threshold, heat pain,… (Greenspan et al 2011)
- significant gender and ethnic group differences regarding psychosocial measures. TMD is associated with more psychosocial symptoms, somatic awareness, pain catastrophising (Fillingim et al. 2011)

- TMD is associated with autonomic dysregulation (elevated heart rate variability, reduced baroreflex sensitivity) (Maixner et al; 2011)

- Important role of catecholamine effects. This has potential implications for treatment of TMD using β – adrenoreceptor antagonist medication (Maixner et al. 2011)
Further follow-up OPPERA (2013)

- First onset of TMD: 4% per year. Incidence positively correlated with age, but only slightly more women than men.
- Significant anamnestic predictors:
  - oral parafunctions
  - prior facial pain and its impact
  - TMJ noises and locking
  - nonspecific orofacial symptoms
Significant clinical predictors:
- pain on jaw opening
- pain upon palpation: masticatory system, neck AND body muscles

Their conclusion: only few orofacial findings influence TMD incidence, and only to modest degree

Complex pattern of TMD etiology: influenced by local disorders AND systemically in pain-regulating systems
Systemic involvement:

- Increased pain sensitivity
- Cardiac autonomic function (heart rate and heart rate variability)

These factors were profoundly associated with *chronic* TMD cases, but less predictive in *developing* TMD.

? Difference in predicting chronic TMD versus first-onset TMD
Masticatory Muscle Pain

- ongoing overloading, micro-trauma, local inflammation leads to sensitization of peripheral and central nervous system (Arendt-Nielsen & Graven-Nielsen 2003; Svensson & Graven-Nielsen 2001; Yu, Ge & Arendt-Nielsen 2010)
Role of parafunctions (clenching, bruxism) (Lavigne et al 2008). Day-time clenching as risk factor (Chen et al. 2007)
But also: more pain with less frequent sleep-bruxism (Rompré et al 2007)
TMJ-arthralgia

- Often some kind of trauma (De Boever & Keersmaekers 1996; Yun & Kim 2005) or intrinsic/extrinsic overloading of the TMJ that overcomes the adaptive capacity (Dieppe & Lohmander 2005)
Adaptive capacity may be reduced by intrinsic factors (systemic disease, blood supply, nutrition, Milam 2005, 2006). Genes and gender are modulating factors (Goldring & Goldring J. Cell Physiol 2007).

Inflammation, pain and progressive tissue changes will be mediated by free radicals, enzymes, BMPs, growth factors, nociceptive and proinflammatory neuropeptides (Loeser 2008; Milam 2005)
Initially, MMP and TMJ-arthralgia are inflammatory types of pain. Development of chronicity and persistent pain may imply central sensitization and neuropathic pain components.
Clinical features of MMP

- dull regional aching pain in jaw-closing muscles and around the ear
- spontaneous and aggravated by function or stretching of the muscles
- morning, evening or variable (Glaros et al. 2008)
- relation with TTH?
- overlap between MMP and fibromyalgia (Cimino et al. 1998; Fricton 2004; Leblebici et al. 2007)
Clinical features of TMJ-arthralgia

- sharp pain of moderate intensity, in or around the joint and irradiating in the ear
- loading or movement stretching the TMJ will aggravate the pain.
- secondary to pain also limitation of mouth opening and joint function
- often associated with disk dysfunction (clicking, locking, …)
TMJ osteoarthritis

- sometimes part of generalised arthritis
- crepitation
- acute arthritis: increased pain
- “settled” osteoarthritis /osteoarthrosis: except for crepitation, often no clinical pain complaints
Diagnostic criteria

- 1992: Research and Clinical Diagnostic Criteria (Dworkin & LeResche; Truelove et al.) define most common subgroups:
  - Myofascial pain (MMP) with/without limitation
  - Anterior Disk Displacement with (clicking) or without (locking) reduction
  - TMJ arthralgia, osteoarthritis, - osis

- Recently: validation studies and refining of criteria, development of the DC/TMD (Ohrbach et al 2010, Schiffman et al 2010, 2014)
Management of TMD-pain

- pain is usually self-limiting and follows a benign natural course (Stohler 2003)
- management aims at creating optimal environment for the body to adapt and heal
- reversible treatment approaches that fit into the biopsychosocial model (NIH 1996, AADR/FDA Standard of care 2010)
Specific management tools

- Information, reassurance: patients should avoid overloading (clenching) and be active in self care (Michelotti et al. 2005)

- Physical therapy is reported successful, especially during initial phase. After 1 year: no difference with “information only” (Craane et al. 2012a,b)
- intraoral occlusal appliances: commonly used. Avoid irreversible changes (Klasser & Greene 2009).


- medication for limited period of time (Dionne & Berthold 2001)
Persistent arthralgia might be helped by arthrocentesis: faster pain relief and improved function, but no difference with conservative treatment (counseling + physical therapy + splint) after 26 weeks (Vos et al. 2013)

Dexamethasone did not improve clinical outcome (Huddleston-Slater et al. 2012)
TMJ-surgery proved not better than medical management or conservative therapy (Onder et al. 2009; Schiffman et al. 2007, 2013)
“COMPLEX” Muskuloskeletal masticatory pain

- In patients with chronic TMD pain, these approaches should even more intensively be accompanied by psychological support (CBT, relaxation therapy, Orlando et al. 2007)

- Low-dose TCA or SSRI might be considered. Early psychological screening (Türp et al. 2007)
THANK YOU !!