



## Prosthetic Rehabilitation and the TMD patient: When and what?

Asbjørn Jokstad, DDS, PhD  
Professor and Head, Prosthodontics  
University of Toronto


## Themes to cover

1. Given question deconstructed and refocused
2. Describe current problems with TMD as a disease entity
3. Prosthodontic therapy, demand and dogmas
4. The current scientific evidence to answer the given question
5. Prosthodontic management issues relative to patients with a TMD history



### Prosthetic Rehabilitation and the TMD patient: When and what?


An individual enough distressed by real or perceived symptoms localized to the stomatognathic apparatus to seek therapy from a health professional




### Prosthetic Rehabilitation and the TMD patient: When and what?

An individual enough distressed by real or perceived symptoms localized to the stomatognathic apparatus to seek therapy from a health professional:

*Dentist... Family Physician... Kinesiology... Naprapathy... Pain expertise... Pharmacotherapy... Physiotherapy... Posturologists ++?...Craniosacral- / Sacro-occipital therapy?*



### Prosthetic Rehabilitation and the TMD patient: When and what?

An individual enough distressed by real or perceived symptoms localized to the stomatognathic apparatus to seek therapy from a health professional

Prosthetic Rehabilitation and the TMD patient: When and what?

Rehabilitate and habilitate are different entities. Infer that something pre-existing has been lost, i.e., to be restored/readapted to former (health) state/condition. In dentistry, commonly applied to restore lost tissue. In other biomedical fields often to lost function.

Date	Thursday, September 23 <sup>rd</sup>	Friday, September 24 <sup>th</sup>	Saturday, September 25 <sup>th</sup>
12:00	Registration	09:00 Registration	09:00 Registration
12:30	Welcome and Opening remarks	09:45 Opening of the Congress	09:00 A narrative based approach to the management of occlusal parafunctions (Pavane F., Charbon-Ferrand, France)
13:10	The planning in orthodontic management of tooth space	09:00 An iterative and algorithmic approach to the management of occlusal parafunctions (F. A. Antonides, The Netherlands)	09:45 Do we talk with patients about their experiences? (Shaw, DE - Utrecht, The Netherlands)
13:20	Some clinical problems in Restorative Dentistry (Laine, E. - Naipali, India)	09:45 Efficacy of Bimax for the treatment of mandibular dysfunction and bruxism (Baker M., Copenhagen, Denmark)	10:20 Coffee Break
13:30	Orthodontic treatment of malocclusion: a review of current concepts (Telford, G. - London, UK)	10:30 Coffee Break	11:00 Many have noted diffuse tenderness of pain language and quality of life in occlusal parafunctions (C. Mann - Paris, Italy)
14:15	Prosthetic rehabilitation of TMD patients: a review (Jokstad, A. - University of Toronto, Canada)	11:45 Management of bruxism: patient or dental practice? (Pavane F., France)	11:45 <b>Discussion on TMD</b> (Jokstad, A. - University of Toronto, Canada)
14:30	Coffee Break	12:30 Round table discussion	12:30 Lunch
15:00	Update on tooth supported prosthesis: from crown and bridge to implant (Kilberg, L. - Uppsala, Sweden)	12:30 Round table discussion	13:00 Lunch
15:30	Round Table Discussion	14:00 Can paraflexion over the mandibular space? (Wang, L. - Cheng, New Zealand)	14:00 Communication with bruxism patients (Chen, M. - Zurich, Switzerland)
		14:45 Class of supracranial mandibular pressure (Wada, A. - Chuzuma-Ferrand, France)	14:45 Further understanding of central aspects of Occlusal Parafunctions (Z. Zech, Zurich, Switzerland)



### Prosthetic therapies to restore primarily lost hard & soft tissues

Tissue/Tooth/ Implant -supported Fixed / Removable dental prostheses



### Prosthetic therapies to restore/readapt to a former functional state/condition

Splints; sleep apnea devices, maxillofacial prostheses, etc.)



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**Primary refocused question to answer**

**Are patients undergoing therapy for their TMD problems affected by rehabilitation of form and/or function using a prosthetic therapy with regard to *precipitating* or *alleviating* their existing TMDs?**

**Primary refocused question to answer**

Are patients undergoing therapy for their TMD problems affected by rehabilitation of form and/or function using a prosthetic therapy with regard to *precipitating* or *alleviating* their existing TMDs?

Less focus: Can rehabilitation of form and/or function using prosthetic therapies *initiate*, alternatively *prevent* future TMDs?

**Themes to cover**

1. Deconstruct and refocus the given question
2. Describe current problems with TMD as a disease entity

**Problem 1 – Clear understanding/consensus of the TMD disorder/disease subcategories?**

- ▶ The Helkimo Index
  - (Helkimo, 1974)
- ▶ The Craniomandibular Index
  - (CMI, Friction & Shiffman, 1986)
- ▶ The Research Diagnostic Criteria for TMD
  - (RDC/TMD, Dworkin and LeResche, 1992)
- ▶ The Diagnostic Criteria for TMD
  - (DC/TMD 2010/2011(?))

**Problem 1 – Clear understanding/consensus of the TMD disorder/disease subcategories? (KD-10: K07.6)**

Helkimo / CMI/RDC-TMD/DC-TMD index/criteria?

Entity separate from other health conditions?

- Pain local to oral, face, head, neck & shoulder, elsewhere (Diseases of the Nervous system (G00-G99)/ Musculoskeletal system and Connective tissue (M00-M99)
- Somatoform disorders (F45.8), e.g., Bruxism
- (Pathological) Tooth attrition (K03.0)
- Sleep Disorders (G47), e.g., obstructive sleep apnoea

**Problem 2 – The Inter-examiner reliability of assessing clinical signs and symptoms of TMDs is highly variable**

**Trained, Calibrated Examiners**

Clinical finding	Degree of reliability
Vertical mandibular opening (mm)	high
Lateral excursion (mm)	adequate
Opening pattern (left, right, left corrected, right corrected, straight)	low / unacceptable
Joint sounds (click, hard grating, soft crepitus, none)	adequate
Pain on palpation: intraoral & extraoral muscles	adequate
Pain on palpation: temporomandibular joint	low / unacceptable
Pain on mandibular movement	adequate
RDC Axis I diagnoses (various combinations of the above)	adequate

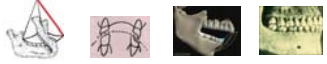
From: The Pain Symptom Research Web: <http://painconsortium.nih.gov/symptomresearch>

**Problem 3 – Current measurements of subtle changes of the patients' TMD symptoms are rather crude with uncertain validity and/or poor reliability**

- ▶ Pain: Patient VAS vs Palpation tenderness? Frequency? Intensity? Unpleasantness? #/type drug?
- ▶ Quality of life / subjective improvement / comfort
- ▶ Functional criteria
  - Max. inter-incisal opening/ range of motion?
  - Chewing: Displacement, velocity, "pattern", border of envelope, etc.
- ▶ Joint sounds / quality & quantity; episodes
- ▶ Tissue condition
  - e.g. condyle positions in glenoid fossae / disc size & position, as determined by radiographic, MRI, cbCT or ultrasound imaging...


**Themes to cover**

1. Deconstruct and refocus the given question
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3. Prosthodontic therapy, demand and dogmas



**We don't have a clear understanding why patients elect to undergo "prosthetic rehabilitation" of their teeth.**


1. Self-esteem? ...young, beautiful, successful,...
2. Self-esteem?
3. Wish for a nicer smile?
4. Because they can show they can afford prosthodontic treatment?
5. Hope for improved chewing?
6. Other reasons?



### Dogmas in prosthodontics arrived by deductive logic

Schwartz (33-63), Rayson (44-85), Pankey (48-80), Namjoshi (70-94), Dawson (88-10) ++

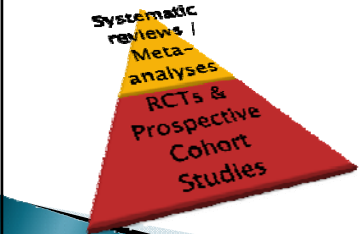
- Condyles resting in their most superoanterior position against the posterior slopes of the articular eminence
- Articular disks properly interposed between the condyles and the fossae
- Even and simultaneous contact of posterior teeth in CR
- Anterior teeth should contact and disclude the posterior teeth upon eccentric movement
- In the upright head position the posterior teeth contacts more prominent than the anterior tooth contacts
- Provide the most shallow anterior guidance patterns that disclude posterior teeth
- Etc.

Great textbook: 


### Themes to cover

- Deconstruct and refocus the given question
- Describe current problems with TMD as a disease entity
- Prosthodontic therapy, demand and dogmas
- The current scientific evidence to answer the given question?

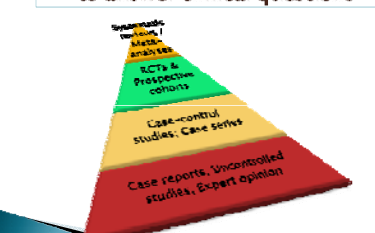
### Usefulness of Medical Information to answer clinical questions



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### Usefulness of Medical Information to answer clinical questions



### Alternative PICO(S) questions:

Patient	Intervention	Comparative intervention	Outcomes
TMD and desire for rehabilitation of oral form/function <b>Modifiers:</b> 1. Relatively Intact dentition 2. Loss of molar support 3. Edentulous jaws 4. Loss of VDO 5. Disc Displacement 6. Bruxing 7. General diseases			

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**Medical Information addressing whether rehabilitation of form and/or function using prosthodontic therapies precipitate or alleviate existing signs and symptoms of TMD?**

**Journal of Oral Rehabilitation**

Review Article  
Management of TMD: evidence from systematic reviews and meta-analyses  
J Oral Rehabil 2010; 37: 430-451

Case reports, uncontrolled studies...  
Expert opinion: NONE

28

**Medical Information addressing whether rehabilitation of form and/or function using prosthodontic therapies precipitate or alleviate existing signs and symptoms of TMD?**

**Prosthodontic management of temporomandibular disorder and orofacial pain**

Ronald Liviak, DMD, MS,\* and Kenneth A. Malsbenden, DDS, PhD†  
New York University College of Dentistry, New York, New York

Indications for advanced occlusal adjustment in temporomandibular disorders require consistent interdisciplinary teams. The complete series of temporomandibular disorder (TMD) and oral and maxillofacial pain (OMFOP) diagnostic and management protocols, including the application of occlusal adjustment, are discussed. The management goals for the prosthodontist as a member of a multidisciplinary team are outlined, and clinical protocols are presented.

J Prosthet Dent 1993;69:77-84

Suggestions:  
•Refer the patient to resolve problems before embarking on prosthetic therapy  
•*"The TMD patient is not an ideal patient source for establishing a prosthodontic practice"*

Personal viewpoint 1993

27

**Medical Information addressing whether rehabilitation of form and/or function using prosthodontic therapies precipitate or alleviate existing signs and symptoms of TMD?**

**Temporomandibular Disorder Prosthodontics: Treatment and Management Goals**

*Signs of the Century in Temporomandibular Disorders of the American College of Prosthodontics*  
Edited by Kenneth L. Eliason, DDS

Committee Chair: Kenneth L. Eliason, DDS, Editor; Ronald Atkinson, DDS, MS, MSCE; Carrie Berklin, DDS, PhD; James Gump, DDS, MSCE; Ruth Krasner, DMD; David Marx, DDS, MS, MSCE; Joseph Neeb, DDS, MS; David Repp, DDS, MS, MSCE; William Scully, DDS, MS. Contributing authors: Charles McNeil, DDS, and Donald Price, DDS, PhD.

J Prosthodont 1995;4:58-64

Practicing Defensive Dentistry

- Contraindications
- Precautions
- Documentation of all sequences of treatment
- Maxillomandibular relations
- Maintenance needs

Personal viewpoint 1993  
Risk management 1993

30

**Medical Information addressing whether rehabilitation of form and/or function using prosthodontic therapies precipitate or alleviate existing signs and symptoms of TMD?**

**Prosthetic rehabilitation in patients with temporomandibular disorders**

John C. Frick, Dr. Med. Dent., and Jing H. Heick, Prof. Dr. Med. Dent.  
School of Dentistry, University of Western Australia, Perth, and School of Dentistry, Monash University, Victoria, Australia

Reasons leading to prosthetic instability and to the management of patients suffering from temporomandibular disorders is largely influenced by the clinical decision-making process of the dentist. The combination of factors, such as the choice of materials, the design of the prosthesis, the clinical decision-making process, and the patient's expectations, can lead to a variety of clinical outcomes. The author's clinical approach to the management of temporomandibular disorders in patients with temporomandibular disorders is discussed.

J Prosthet Dent 1996;76:418-23

Reviewed

- Decision-making in prosthodontics
- Controversies in prosthetic rehabilitation
- TMD patients in need of prosthetics
- Conclusions: Occams razor → Prosthetic parsimony

Personal viewpoint 1993  
Risk management 1993  
Inductive logic 1996

31

**Medical Information addressing whether rehabilitation of form and/or function using prosthodontic therapies precipitate or alleviate existing signs and symptoms of TMD?**

**On the Management of Temporomandibular Disorders: A Plan for a Low-Tech, High-Precision Therapeutic Approach**

William B. Miller, DDS  
J Prosthet Dent 1999;82:157-161

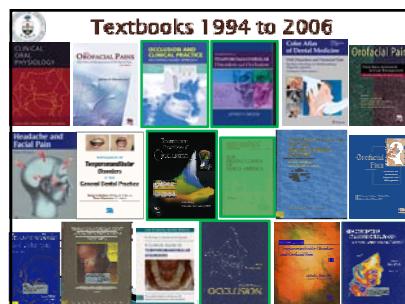
The author discusses the management of temporomandibular disorders (TMD) and orofacial pain (OP) in a low-tech, high-precision therapeutic approach. The author discusses the importance of a thorough history and physical examination, the use of diagnostic procedures, and the selection of appropriate treatment options. The author emphasizes the need for a multidisciplinary approach to the management of TMD and OP, and the importance of patient education and self-management strategies.

J Orofac Pain 1999;13: 255-61

- Many treatments -no cure
- Patient heterogeneity
- Symptom management focus
- Guiding principles
- Challenges

Personal viewpoint 1993  
Risk management 1993  
Inductive logic 1996  
Plea 1999

32



**Newer textbooks 2010 & 2009 2008 2007**

**No evidence of effectiveness is not equivalent to: Evidence of no effectiveness**

35

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36

**Prosthetic Rehabilitation and the TMD patient: When and what?**

A question that is no longer relevant...if ever it was:

**Do patients with existing TMDs get better if the curative therapy consists of the provision of a tissue/tooth/implant-supported fixed/removable dental prosthesis?**

**Prosthetic Rehabilitation and the TMD patient: When and what?**

A question that is no longer relevant...if ever it was:

**Do patients with existing TMDs get better if the curative therapy consists of the provision of a tissue/tooth/implant-supported fixed/removable dental prosthesis?**

**NO!**

• Since 1975 approx. 2800 implant trials

- 3 reports include TMD as (insignificant) outcome
- NO reports identified where therapy associated with TMD/TMJ problems

**Why have dentists traditionally believed that elements of the maxillo-mandibular complex caused or could cure TMD?**

- ▶ "Orthopedic stability" of joint
- ▶ Altered proprioceptive input to CNS
- ▶ Since 70-ies, "disk recapturing" using an anterior displacement splint advocated (Farrar, 1972)

E.g., Summer & Westesson. Mandibular repositioning can be effective in treatment of reducing TMJ disk displacement. A long-term clinical and MR imaging follow-up. Cranio 1997; 15: 107-20.

**Anterior disk displacement**

- ▶ Anterior repositioning of jaw by habitual 24-hour use of repositioning splint with the intention of promoting adaptation of retrodiscal tissues
- ▶ Subsequent orthodontic or prosthodontic correction of space? Originally Yes
  - YES: Moloney ea 1986, Lundh 1997, Summer ea 1997
  - NO: Keeling ea, 1989, Tallents ea 1990, Parker 1993, Orenstein 1993, Okeson 1988
- ▶ Literature inconclusive - primarily due to vague / surrogate outcome reporting

**Degenerative processes in the tmj can significantly alter the occlusion 1/3**

**Degenerative processes in the tmj can significantly alter the occlusion 2/3**

**Degenerative processes in the tmj can significantly alter the occlusion 3/3**

**Bruxism (ICD-10 F45.8)**

Patients with bruxism having received a prosthodontic intervention have had:

- ▶ no effects on incidence or level of nocturnal or diurnal bruxism

### Bruxism (ICD-10 F45.8)

Patients with bruxism having received a prosthodontic intervention have had:

- no effects on incidence or level of nocturnal or diurnal bruxism

conversely,

Patients having received a prosthodontic intervention therapy have shown:

- no development of nocturnal or diurnal bruxism

### Bruxism & rehabilitation

Minimize risk of technical/mechanical problems:


- FDP: Minimize number of:
  - Units in FDP(s) (multiple short rather than long segments)
  - Pontics
  - Cantilevers (especially if non-vital teeth)
- High strength material versus aesthetic compromises
  - All-metal >> Metal ceramic >> All ceramic
  - Cobalt-chromium >> Gold-alloy -DELTA
- RDP: Bulk+composite fibre/metal reinforcement
- Consider full coverage splint during sleep

### Reduced Vertical Dimension of Occlusion

Is tooth substance loss without compensatory tooth eruption and/or alveolar crest height increase

- ...that remain unchanged a risk factor for initiating TMD?

**NO**




### Reduced Vertical Dimension of Occlusion

Is tooth substance loss without compensatory tooth eruption and/or alveolar crest height increase

- ...that remain unchanged a risk factor for initiating TMD? Alternatively,
- ...that is changed with a prosthetic solution a factor for preventing TMD?

**NO**




### Reduced Vertical Dimension of Occlusion

Is tooth substance loss without compensatory tooth eruption and/or alveolar crest height increase

- ...that remain unchanged a risk factor for initiating TMD? Or 2. ...that is changed with a prosthetic solution a factor for preventing TMD?
- ... that is changed with a prosthetic solution possible prognostic factor for precipitating or alleviating TMD?

**Data are inconclusive**




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Is tooth substance loss without compensatory tooth eruption and/or alveolar crest height increase

- ...that remain unchanged a risk factor for initiating TMD? Or 2. ...that is changed with a prosthetic solution a factor for preventing TMD?
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How much? How fast?  
Splints for determining VDO is debatable

**Data are inconclusive.**

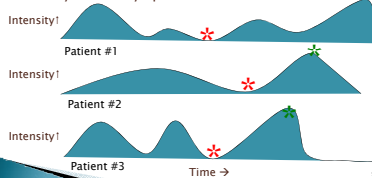


### Information and Communication and is essential!

- Patients should be specifically reminded that there is a chance of symptoms exacerbating during or after the prosthetic rehabilitation.
- Relapses can happen independently from the intervention and just by chance alone.
- Excessive time in patient chair may exacerbate symptoms. Use bite props and limit / break up the operation time

### When is the timing of prosthodontic therapy appropriate for a patient with a past or current history of TMD?

Many have unpredictable recurrence and inconsistent intensity of their symptoms.



### Caveats if treating patients with current history of TMD

- The registration of the maxillo-mandibular relations can be incorrect if the movement range is affected
- Registration can also be hampered by voluntary or reflexive muscle splinting upon attempt to guide the mandible into centric relation

### "How much incorrect registration?"

- Poor basis for estimate – only 1 experimental study that is potentially biased

*How muscle pain and its effect on gubler arch tracings*

### Caveats if treating patients with current history of TMD

- The registration of the maxillo-mandibular relations can be incorrect if the movement range is affected
- Registration can also be hampered by voluntary or reflexive muscle splinting upon attempt to guide the mandible into centric relation
- The use of a splint can disrupt the existing neuromuscular engram so that the recording of centric relation can be facilitated

### Do patients with current or past history of TMD have a different threshold for adapting to maxillomandibular relation changes?

- The literature is inconclusive

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- The literature is inconclusive
- Dahl principle experience is good

### Do patients with current or past history of TMD have a different threshold for adapting to maxillomandibular relation changes?

- The literature is inconclusive
- Experiences using the Dahl principle is positive
- Precautionary steps are
  - Fabricate a robust semi-permanent FDP first for long term use
  - Always delay the final cementation

### Classic paper from 2000 summarized the contemporary state of the science

Review  
Need for occlusal therapy and prosthodontic treatment in the management of temporomandibular disorders.  
Part II. Tissue loss and prosthodontic treatment  
J Oral Rehabil 2000;27:647-59

Functional Occlusion  
The Dahl Principle  
Dawson, P. 2007

Contrast perspectives in a very influential North American textbook  
Prosthetic Rehabilitation in TMD Management.  
Chapter 28. De Boever JA, De Laat A. 2010

### Is our current interpretations of the basic research as a basis for clinical practices correct?

"I think you should be more explicit about it, Steve."

### Thank you for your kind attention