

IN BRIEF

- Reviews and investigates evidence relating malocclusion and orthodontic treatment to TMD.
- Reviews and investigates relationships between TMD and functional occlusion and bruxism.
- Reviews the aetiology of bruxism.
- Highlights the need not only for clinicians to consider whether evidence exists but also the quality of that evidence.
- Aims to place the problem of TMD in a wider context so that more informed advice can be given to patients and hence more informed treatment decisions can be made.

Damned if we do and damned if we don't?

TMD and occlusion part I. Damned if we do? Occlusion: the interface of dentistry and orthodontics

Part II. Damned if we don't? Functional occlusal problems: TMD epidemiology in a wider context **F. Luther**¹

ABSTRACT

Part I

Objectives To review how occlusion, facial growth, TM disc position and malocclusion may relate to TMD; to review clinical studies investigating TMD pre- and post-orthodontic treatment as well as other studies linking occlusal features with TMD highlighting their limitations; and to make suggestions for improved study designs in the future in order to provide an evidence-base for clinical practice.

Design Review article.

Methods Electronic databases (MEDLINE and the Cochrane Database of Systematic Reviews) were used to select relevant and frequently cited studies (mean: 28 citations). Citation rate was confirmed using the Web of Science. Study designs are reviewed and weaknesses discussed.

Results Evidence is lacking to suggest static occlusal factors cause TMD.

Conclusions Poor study designs have led to much of the controversy over whether occlusal factors (including orthodontics) 'cause' TMD. In order to provide an evidence-base for future clinical practice, suggestions to improve study designs are made.

Part II

Objectives To review studies investigating how functional occlusion may relate to TMD and how bruxism may relate to TMD; to review the epidemiology of TMD and relate this to the context of clinical occlusal studies and other aetiological factors. Deficiencies in study design are highlighted and suggestions made to improve future study designs in order to provide an evidence-base for clinical practice.

Design Review article.

Methods Electronic databases (MEDLINE and the Cochrane Database of Systematic Reviews) were used to select relevant and frequently cited studies (mean: 40 citations). Citation rate was confirmed using the Web of Science. Study designs are reviewed and weaknesses and implications discussed.

Results Evidence is lacking to suggest functional occlusal factors cause TMD. Investigation of other aetiological factors has been relatively neglected.

Conclusions Neither static nor dynamic occlusal factors (including orthodontics) can be said to 'cause' TMD. However, other potential aetiological factors exist which would benefit from more investigation. This, together with improved study designs, would help provide a stronger evidence-base for clinical practice in the future.

EDITOR'S SUMMARY

Is there a joint that has had, and continues to have, more attention from dentists than the temporomandibular joint? I doubt it. But why are we so fascinated by it and why have the conditions that cause our patients pain from it been so elusive for so long? Dr Luther has set out to try and answer these questions with a view to using whatever evidence-based material is available. Part of the explanation of the difficulty in seeking the truth about the joint is contained in Dr Henrikson's commentary on the opposite page, in which he states that there are three main aetiological factors involved in the genesis of disorders of the joint; anatomical including occlusal factors, neuromuscular and psychological factors.

So, complicated enough without the additional debates and dilemmas over the role of occlusion itself, the complexity of the argument over the effects of orthodontic treatment and the added uncertainty over the psychological status of the patient. In reviewing the evidence, Dr Luther has concluded that we need further research with improved study designs, possibly using newer technologies such as magnetic resonance imaging. Evidence is lacking to suggest that either static occlusal factors cause disorders of the joint or that dynamic occlusal factors such as orthodontics are to blame. This fascinating and mysterious joint seems set to keep its enigma a little longer.

The full paper can be accessed from the *BDJ* website (www.bdj.co.uk), under 'Research' in the table of contents for Volume 202 issue 1.

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DOI: 10.1038/bdj.2006.121

FULL PAPER DETAILS

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Refereed Papers

Part I

Accepted 17 February 2006

DOI: 10.1038/bdj.2006.122

British Dental Journal 2007; 202: E2

Part II

Accepted 17 February 2006

DOI: 10.1038/bdj.2006.123

British Dental Journal 2007; 202: E3

AUTHOR QUESTIONS AND ANSWERS

Why did you undertake this research?

Occlusion and TMD seem to be amongst the most controversial subjects in dentistry. My interest arose because it was difficult to understand how, on the one hand, there were claims that a treatment could cause TMD whilst, on the other, some claimed the same or similar treatment could cure TMD. Furthermore, for TMD there are actually numerous treatment options (ranging from very conservative to highly invasive) yet often outcomes are similar.

I am not the first to notice these problems but cases in the US (and recently in the UK) suggest that clinical decision-making is not always ideal and, as a result, patient care may be suffering. It therefore seemed appropriate to consider why this might be by examining 'evidence' that might be contributing to this. One way to do this is to review highly cited papers since these might have a bigger effect than others. NB: citing something a lot doesn't necessarily mean it is correct! Highlighting some of the limitations in such work will hopefully help clinicians to weigh up the evidence in a more realistic way. It may also provide ways of improving the evidence-base for future clinical practice.

What would you like to do next in this area to follow on from this work?

Currently, I and my colleagues at Leeds (in Radiology, Oral Surgery, Biostatistics and Orthodontics) are undertaking research investigating whether malocclusion does have any relationship with TMJ variations as assessed by MRI. If a link is found, it may (for example), indicate that some individuals may be more susceptible to TMD than others, although any such links are unlikely to be simple cause and effect. However, this large scale, long-term study (supported by the British Orthodontic Society Foundation) requires over 300 orthodontically untreated volunteers to make any reasonable judgements and volunteers are still being recruited.

In the near future, I hope that more and better studies will be undertaken that are specifically designed to look for the actual causes of TMD. Once the various causes are found, the most appropriate treatments can be properly investigated. However, in order to achieve this, it is likely that temporomandibular disorders will need to be viewed in a much wider context than has often been the case to date.

COMMENT

The discussion around aetiological factors for the development of TMD is still a hot topic and needs to be addressed, further investigated, analysed and discussed. Dr Luther's two reviews are well performed and structured attempts to cover this discussion and are also made in an objective and evidence-based manner. As she mentions, 'dentists have often related TMD to occlusion'.

However, during the 1980s it became generally accepted in the literature that three main groups of aetiological factors were involved for the development of TMD: anatomical factors – including the occlusion and the TMJ itself – neuromuscular factors and psychogenic factors. If two or all three of these groups of factors were present, the risk of developing pain and dysfunction increased. In addition, no single factor has documented aetiological significance as a direct cause of TMD.¹

In part I, it is concluded that evidence is lacking to suggest that static occlusal factors cause TMD. Dr Luther mentions that poor study designs have led to much of the controversy over whether occlusal factors 'cause' TMD or not, and further on also suggests improvement in study designs to be able to give a stronger evidence-base. This is an important message to take home for future clinical researchers.

In part II, Dr Luther discusses TMD in a wider context where general health may play an important role. It is also concluded that there is no evidence that functional occlusal factors cause TMD.

Regarding research design and valid and reliable measurements, a substantial attempt to use more strictly defined diagnostic criteria for registration and diagnosing TMD was introduced by Dworkin and LeResche² who introduced Research Diagnostic Criteria for Temporomandibular Disorders (RDC TMD). RDC TMD is a tool for a standardised clinical examination and provides in addition diagnostic criteria for TMD. RDC TMD has grown in use and popularity during the last decade among clinical TMD researchers and will hopefully improve the quality of future studies.

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- Dworkin S F, LeResche L. Research diagnostic criteria for temporomandibular disorders: review, criteria, examinations and specifications, critique. *J Craniomandib Disord* 1992; **6**: 301-355.