

Myths about prosthodontics

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ABSTRACT

Prosthodontics like many other clinical procedures lacks support of good evidence. The main aim of this paper is to check current evidence for selected procedures. A MEDLINE/PubMed search was conducted for articles on the selected items. Many opinions are based more on belief rather than scientific evidence; hence, many “old truths” regarding prosthodontic interventions can be called dogmas. Many common clinical procedures lack scientific support; this is one of the observations revealed while inspecting prosthodontic literature.

KEYWORDS: Complete dentures, dental occlusion, evidence-based care, jaw registration, oral implants

Introduction

Dogma is defined as an opinion or belief held to be true. In many religions, nondemocratic societies, political parties, and scientific community, questioning the dogmas may still be risky, as they are still cherished with implicit faith. Opinions that members within a scientific branch share, i.e., a paradigm, may lead to significant limit of one's field of view and attempts of a paradigm shift usually generate great resistance.^[1] Such an approach to new findings may have disturbing consequences for scientific development, as has been expressed by a famous scientist.

Essential part in the development of evidence-based care is to significantly examine current opinions of clinical methods. To review current evidence for certain selected clinical procedures in prosthodontics based on a scrutiny of the literature is the aim of this paper.

Materials And Methods

MEDLINE/PubMed searches were conducted for articles on particular aspects of clinical prosthodontic procedures. The review was limited to studies of the highest possible level of evidence, since the prosthodontic literature is profuse (78,430 hits on PubMed; April 21, 2008) [Table 1].

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Other studies were considered, if publications of the highest levels, i.e., clinical randomized controlled trials (RCTs) and systematic reviews of RCTs, were not accessible. The selected areas include various aspects of complete denture fabrication, jaw registration methods, tooth loss and the health of the masticatory system, the role of oral implants in prosthodontic treatment, and the role of occlusion in temporomandibular disorders (TMDs).

Evidence-based care

Strong significant support is given to a minor part of all methods that are routinely used in clinical dentistry, which is hardly any comfort for dentists.^[2] Assessments require high-quality investigations for valid comparisons. The RCTs give the strongest proof in the hierarchy of scientific strength [Table 1]. Comparisons of various drugs, RCTs can easily be done, but they are difficult to conduct in restorative dentistry and almost impossible for extensive treatments. To compare clinical results of conventional fixed prostheses on teeth and implant-supported

Table 1: Grading of evidence in the literature

Level	Type of evidence
Ia	Evidence from systematic reviews of RCT
Ib	Evidence from at least one RCT
IIa	Evidence from at least one controlled study without randomization
IIb	Evidence from at least one well-designed quasi-experimental study
III	Evidence from nonexperimental descriptive studies, such as comparative, correlation, cohort, and case-control studies
IV	Evidence from expert committee reports, consensus conferences, and opinions or clinical experience of recognized authorities

reconstructions for replacement of lost teeth, no RCT seems to be performed. Ninety RCTs were identified after studying prosthodontic literature till the end of 2000, but interpretation was difficult as the critical authors maintained only a small part of them was presented in accordance with current requirements of reporting scientific studies.^[3]

Conclusion

With strong evidence only a small part of all questions in clinical prosthodontics can be answered. This is similar in other dental disciplines and medical fields.^[4]

Review of some dogmas regarding complete denture fabrication

Quality of dentures and patient satisfaction

The best way to achieve a successful outcome of complete denture treatment is to follow the traditional prosthodontic rules. Studies have demonstrated that the correlation between a dentist's assessment of denture quality and a patient's satisfaction with the treatment is often poor.^[5-7] Irrespective of denture quality, and some 10-20% dissatisfied complete denture wearers, a majority of them are satisfied with their dentures, even if the dentures are constructed according to the best-recognized prosthodontic rules.^[8] In a study of 500 complete denture wearers, a close correlation was found between patient and dentist appreciation, but little or no connection when dentists and patients rated the dentures highly.^[9]

A common clinical opinion is that a relationship exists between the qualities of the anatomical conditions and the denture treatment result. However, strong correlations between such factors and patients' dissatisfaction with the dentures are unknown to several studies.^[6,7,10,11] Clinician's assessments of the quality of denture supporting tissues are poor predictors of patient satisfaction, with mandibular prostheses, is the one of the conclusions.^[7]

The rationale of refining and replacing poorly fitting dentures is improving denture quality which underlines the poor correlation between denture quality and patient satisfaction.^[12,13] Bite force and masticatory performance tend to diminish for sometime after delivery of new dentures.^[14,15] Making better complete dentures improve the quality of diet in edentulous subjects, is not supported by evidence.^[16,17] Comparison with implant-supported prostheses found improved chewing ability.^[18-20]

Psychological factors

The association between anatomical and technical prerequisites lacks evidence of a successful treatment with complete dentures; the patient's and dentist's personality and psychological factors are important for the treatment result.^[21] Dentists' and patients' interpersonal appraisals of each other account for patient's evaluation of the treatment outcome.^[22,23] A good relationship with the patient seems

more important to achieve patient satisfaction than a technically perfect denture construction.^[24-26]

Jaw relation records

A face-bow record is necessary for orienting the casts to the articulator for all types of prosthetic work. Better results will be achieved when more sophisticated and complex methods are used, with respect to fabrication of complete dentures in a classical longitudinal series of RCTs initiated in 1969, this faith was refuted.^[27] The studies compared 64 edentulous patients randomly allocated to two treatment groups: One complex technique involving, hinge-axis location for a face-bow transfer to an advanced articulator. Between the groups no significant differences in outcome could be established in the short/long term follow-ups over 20 years, either in clinical results and the professional or patient evaluations of dentures.^[28] The belief in the need to use face-bows continued into the new millennium, in spite of the strong evidence the studies provided.^[29,30] The face-bow value has been questioned among many practitioners and dentists in Scandinavia leading to abandoning the use of it. The Scandinavian Society for Prosthetic Dentistry, in 1991, presented a consensus publication recommended simple methods in jaw recording for all types of prosthodontic work and that a face-bow is unnecessary. Average mounting in the articulator is sufficient and simple to perform was based on the fact that no evidence showed better clinical results using face-bows.^[29]

Similar clinical results are given that mounting articulator with or without face-bows.^[31-34] "The quality of complete dentures does not suffer when manufacturing techniques are simplified to save time and materials" was concluded by a study comparing the traditional and a simplified technique in producing complete dentures.^[33] This proposal also goes well with the concept of Appropriatech: "To provide treatment for the many, cost-effective conventional treatment is required, but with adequately quality control".^[35]

Occlusion

Complete dentures need balanced occlusion to create stability, is a dogma. This was questioned as the balanced occlusion existing at delivery of the dentures is often lost within a relatively short time, without patient's complains.^[36,37]

Complete dentures with canine-guided occlusion can function well, is believed by some gnathologically oriented dentists, but not by most prosthodontists. In a group of complete denture wearers, a controlled study compared balanced occlusion and canine guidance. In aesthetic appearance, mandibular denture retention, and chewing ability, the patients assessed canine-guided dentures to be significantly more satisfying.^[38]

More than 1000 titles have been identified by a Cochrane Review on occlusal schemes, but the inclusion criteria

of scientific quality was fully met by only one study.^[39] Lingualized teeth with cusps with zero-degree teeth was compared. A recent RCT compared three types of posterior occlusal forms for complete dentures, this study can be added to the earlier one. Compared with zero-degree posterior occlusal surfaces, lingualized and anatomic occlusal forms were perceived to be significantly superior in terms of chewing ability.^[40]

“Despite its biomechanical importance, occlusion and the technical quality of the denture, plays a minor role in determining success or failure of a denture treatment. Many psychosocial factors may be more important than prosthodontic factors for a positive outcome.”^[24]

Impressions

Initial impression, with a permanent hydrocolloid (alginate) in a stock tray, and final impression in a custom tray usually made of acrylic resin are the two stage textbook procedure.

Of the two controlled studies, the first one demonstrated that there was no difference in adjustment of the dentures up to one year after delivery and compared fluid wax and polysulfide rubber for mandibular complete denture impression.^[41] The other had a sample of 11 patients and compared three materials for the final impression in them. The least favored material was found to be ZOE, while constructing mandibular complete dentures and selecting impression materials, utmost care must be exercised.^[42]

Practically all responding dentists used alginates for primary impressions, was revealed by a survey in UK. Irreversible hydrocolloid was mentioned as an option by 94%, ZOE paste by 29%, and polyvinyl siloxane by 13% for secondary impression. For the final impression laboratory special trays were used by 75%.^[43] 98% of dental schools in North America used custom trays with border molding for final impressions, but with varying materials.^[44] However, better clinical long-term results, without border molding, are not supported by evidence.^[45]

For the construction of complete dentures, a single alginate impression as the definitive impression is used, which conflicts with dental school teaching. Hence, an RCT found neither patient assessed nor dentist evaluated differences between dentures fabricated according to a traditional or a simplified method is useful. The traditional technique included an individual tray with border molding and polyether for the final impression, where by the simple technique used alginate in a standard tray for the definitive impression.^[33] However, varying materials and methods used in denture fabrication have a wide difference cannot be concluded. These and other aspects of variation in methods and techniques are discussed in a review of an evidence base for complete dentures.^[45]

Loss of teeth and the health of the masticatory system

The American prosthodontist De Van, who already in 1951, when discussing indications for removable partial dentures (RPDs), wrote: “Many times it is much better to preserve what is left instead of replacing what has been lost.”^[46] The International Prosthodontic Community seems to agree with this statement on RPDs.^[47] Dutch prosthodontist Käyser, wrote on the shortened dental arch (SDA) in 1981.^[48] There is sufficient adaptive capacity in subjects with SDA when at least four occlusal units are left, was his message. Many people can manage well with a reduced number of teeth without severe negative consequences have been demonstrated, according to professional clinical examination of the masticatory system function or as assessed by the patients. Any systematic clinical studies from other centers refuting the main results of the Dutch group could not be identified by an extensive review of the literature on SDA.^[49]

The SDA concept, was considered heretical by those who believed in the necessity of a complete dentition, was gradually accepted.^[50,51] The SDA concept was a possible clinical alternative when economy and service resources were limited, as recommended by the WHO guidelines published in 1992.^[52] The requirements of a functional dentition were fulfilled by shortened dental arches comprising anterior and premolar teeth, this is important for people who cannot pay for expensive dental care. Extensive parts of the population do not have economical means to ask for complete prosthodontic treatment when affected by tooth losses.^[35] Patients’ should be individually assessed as needs and demands vary, but in the treatment planning process the SDA concept deserves to be included as it offers alternatives that are less complicated, time-consuming, and expensive. It has influenced prosthodontic thinking receiving well-earned attention and requires continuing research and discussion.^[49]

The earlier professional belief in full reconstitution of reduced dental arches *per se* as a prerequisite for optimal oral health and function lacks compelling scientific support.^[51] Perceived oral health is related to psychological factors along with the level of oral function, is receiving importance. The relationship between missing occlusal units and oral health-related quality of life (OHRQoL) in patients with SDA was examined by a Japanese study.^[53] Missing occlusal units were related to impairment of OHRQoL in subjects with SDA, was concluded.

Oral implants will solve all problems

After the introduction of osseointegrated implants,^[54] to help patients suffering of functional and psychological problems with conventional removable dentures, previously unanticipated possibilities have been developed. Implants solve all problems related to tooth loss, is a false dogma. The greatest barrier is economic. Less than 1% of edentulous

people in the world have received implant treatment till now. More than one third (36%) of edentulous subjects declined implant treatment despite it being offered free of charge.^[55] The common reason of refusal amongst many was fear of the surgical operation and the subsequent treatment. Fairly high proportions of individuals, who say that they would never consider receiving dental implants, have been reported.^[56,57]

Systematic reviews concluded that the survival rate of teeth are higher than that of implants are contradicted by the recommendations expressed above all by implant manufacturers to extract teeth and replace them with implants. This was correct also for compromised, but successfully treated and maintained, teeth.^[58,59]

Prosthetic complications

Complications after implant treatment are common and repair and remaking of the reconstructions can be both time-consuming and costly.^[60] Systematic reviews have shown that the incidence of technical complications was higher for implant supported than for tooth-supported reconstructions, in the absence of RCTs comparing long-term results of conventional fixed prostheses and implant-supported reconstructions.^[61]

Implant failure

Especially in the mandible, loss of implants after loading is rare.^[62] Often the most important cause of late failures has been projected by occlusal conditions and overloading, which is a dogma. It has been difficult to prove an association between overload and implant failure in human studies, however only in a single animal study evidence for this opinion has been demonstrated. Although it has been postulated from clinical studies that occlusal forces have been associated with a loss of oral implants, a causative relationship has never been convincingly demonstrated.^[63] Heavy occlusal loads may have negative effects on the implant supraconstruction have been made very clear e.g., fractures of components.^[64]

In general practice the most common treatment alternatives in the future will continue to be tooth-borne crowns and fixed dental prostheses as well as removable dentures.

Dogmas related to TMDs

Views on the etiology are differently indicated by the numerous names given to the disorders in the past, which naturally have had influence on the management of the patients. TMD patients were managed in prosthodontic clinics in many countries for a long time with a focus on occlusal etiology which has changed to psychological factors and pain physiology, during the past few decades as special TMD clinics have appeared in many places.^[65,66] The role of occlusion and occlusal splints are the two controversial areas where this review will be limited.

The role of occlusion in TMD etiology

The dominant cause of TMDs was long believed to be occlusal disturbances. For many clinicians the close relationship between TMDs and occlusion was a dogma. In general practice, various types of occlusal therapy such as occlusal adjustment was used in elimination of occlusal interferences became a common treatment modality for TMD. After occlusal adjustment TMD patients often get better. Other therapies without effects on occlusion provided equally good or better results, was revealed in the TMD field only when RCTs were introduced. The association between occlusal factors and TMDs is weak, this was demonstrated by systematic literature reviews and as a result there is seldom a suggestion for irreversible occlusal therapy in TMD patients.^[67-70] Majority of patients with TMD can be helped with simple treatments.^[65,66] The treatment outcome between two clinics were compared by a recent Japanese study on TMD patients, one focusing on occlusal therapy and splints, the other on patient education and physiotherapy, found better results for the latter.^[71] Simple versus multimodal therapy in TMD patients was compared in a systematic review.^[72]

Occlusal splints/intraoral appliances

The occlusion is etiologically important is an argument that the good treatment outcome of occlusal splints. The stabilization appliance, the name of the most common splint, suggests that a development of the occlusion should explain the treatment effect. However, other mechanisms also exist [Table 2]. An anterior bite plate with occlusal contacts only on the incisors and canines has proven to be as effective as a stabilization splint. A so-called placebo splint that only covers the palate without touching the occlusion is largely as effective as an occlusal splint was surprising.^[73] Like crutches in orthopedic treatment, occlusal splints has been proposed as a temporary means, and placebo, the time factor can be explained as effects of the outcome, and the fluctuation of the complaints.^[74] There is currently a consensus among TMD experts that an occlusal splint provides an efficient treatment in the management of TMD patients, in spite of the more critical attitude towards traditional explanations of the efficacy.

Discussion

Belief overpowering science is the basis of dogmas, where many "old truths" in prosthodontics and occlusion, are

Table 2: Proposed mechanisms explaining the treatment effect of intraoral appliances (besides the possible influence on the occlusion)

Mechanisms discussed in the literature
Occlusal disengagement
Neurophysiologic effects on the masticatory system
Change of vertical dimension
Change of caput-fossa relation
Cognitive awareness of harmful behavior (e.g., parafunctions)
Stress absorber/reduced load on masticatory system components
Placebo effect

characterized. In a recently published extensive review, some dogmas have been exemplified in the article, but many more exist as demonstrated.^[75] Strong evidence supports only a minor part of all opinions that governs the activities in clinical dentistry and medicine. Making clinical decisions without good evidence is unnecessarily difficult. To answer many controversial questions and improving the quality and security of clinical care, the need for more research with systematic and controlled studies exists. Besides clinical comparisons between different therapies biological, psychological, economical, and quality-of-life aspects should be incorporated. The evaluation of studies on lower evidence levels is necessitated by the scarcity of RCTs and difficulty in conducting such trials [Table 1] to draw any relevant conclusions. To provide valuable guidelines for clinicians in decision-making, systematic reviews of available literature have been shown.^[76-78] Best-possible evidence, clinical experience, expertise of the therapeutic team, as well as the patients' wishes and preferences must be the basis of clinical practice. Many of today's "truths" will be questioned, in the long term, and dogmas that lack strong evidence will be abandoned. The prosthodontic community should take an active part in this process.

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