©Operative Dentistry, 2016, **Supplement 7,** S3-S6

Guest Editorial

Operative Dentistry in a Changing Dental Health Care Environment

NJM Opdam • R Hickel

INTRODUCTION

A century ago, GV Black introduced his principles in operative dentistry and most of the dentists who had graduated before the end of the 20th century had been educated according to this work. However, changes in health care and patient status and behavior enabled development from this traditional type of operative dentistry.

The introduction of adhesive techniques has brought a major shift in the concepts of operative dentistry. Additionally, the possibilities of working in a minimally invasive fashion when restoring a tooth or even of utilizing noninvasive interventions can allow practitioners to overcome the disadvantages of traditional restorative dentistry, such as the high biological price that is paid for such restorations in terms of increased loss of tooth structure and, in turn, the higher risk of pulpal complications. Because the desire for placing lifelong, lasting restorations is a goal that is almost impossible to achieve with all of the different types of restorations (including implants), preserving tooth structure is a crucial issue. As most of the first restorations in a nonrestored tooth are placed as a result of caries, which is mainly a lifestyle problem, prevention should always be the first option. Since carious lesions can be active or inactive, nowadays it is recommended that the practitioner be much more conservative with operative interventions. As a result, operative intervention is recommended only in those cases where a caries lesion is clearly progressed into dentin and are cavitated, as these cannot be kept clean as a result of biofilm formation.1

At the same time, in developed countries, an increasing number of dentists are working in the field of dental care which has contributed to the availability of better information, increased motivation of patients, and improved oral health. From this perspective, it is not unusual that dentists are still focused on placing dental restorations, partially because reimbursement systems stimulate this. Meanwhile, as reimbursement systems have not been sufficiently adapted to the progress in prevention, diagnosis, and minimally invasive dentistry, the use of these developments is often discouraged.

The shift in health care is not only toward a more conservative and minimally invasive approach but also toward a more personalized approach.[2] New diagnostic methods, technologies, and knowledge have caused this shift that enables a personalized treatment plan for patients related to their individual diagnostic profile and risk assessment. In addition, the increased awareness of patients has led to the demand for a proper informed consent conversation during which all possible treatment alternatives are discussed with patients, leading them to make an informed choice.

This tendency in health care toward more tailored care and involvement of the patient in treatment choices cannot be ignored in terms of the principles of restorative dentistry. In guidelines for dental check-ups for patients, individual risk assessments and clinical vignettes were introduced,[3] enabling individualized treatment decisions and intervals for oral examinations. Risk factors that are to be recorded include caries risk, periodontal disease risk, erosion risk, and general health, but also possible aspects such as tooth wear susceptibility and parafunctional activity, such as grinding and clenching. These are possible risk factors that

*Niek JM Opdam, Radboud University Medical Centre, Preventive and Restorative Dentistry, Nijmegen, The Netherlands

Reinhard Hickel, LMU Munich, Operative Dentistry and Periodontology, Munich, Germany

*Corresponding author: PO Box 9101, Nijmegen, NL 6500 HB, The Netherlands; e-mail: n.opdam@dent.umcn.nl

DOI: 10.2341/15-186-E

combine to yield a personalized risk profile that enables the provider to offer tailor-made informed treatment choices.

The final aims of this personalized treatment plan should be to identify early on those changes in risk factors and to help patients keep their oral function as long as possible during their lifetime and to provide the patients with a good quality of health and satisfaction about their dentition.

TRADITIONAL RESTORATIVE CONCEPTS

In light of the above, traditionally based concepts of restorative dental care should be subject to debate. Individual risk profiles and other factors potentially have a major influence on restoration longevity. Therefore, specific materials, depending on their properties, can result in long-lasting restorations in one patient and early failure in other individuals. Caries risk is identified as a factor that increases the risk for restoration failure by as much as four times,[4,5] and the limited information available on bruxism shows that an almost three times higher risk for restoration failure of composite resin is found in bruxing patients.[5] A higher failure rate by fracture is also true for ceramic restorations. In most clinical studies on newly formed ceramic and composite materials, severe bruxing patients are excluded, likely in an attempt to achieve a high restoration survival rate, but later the limitations on indications in daily practice are not well described.

In the last century, it was assumed that crowns protect damaged teeth; therefore, for more severely compromised teeth, crowns were normally recommended as "the best" restorative solution. But, it has been described that crowns on weakened teeth in high-risk patients may also result in more complications compared to more conservative solutions. For example, it has been shown that endodontic complications in painful cracked teeth are limited to less than 10% when a conservative, minimally invasive treatment concept is chosen,[6-8] while crowns placed on cracked teeth have resulted in 20% endodontic treatments after six years,[9] and the choice of an immediate endodontic treatment results in 14.5% tooth loss after two years.[10] A tendency in restorative dentistry today is to reduce the number of crowns and to develop more tooth-saving indirect concepts when large restorations have to be made. The bur can remove in a few seconds more tooth substance than the caries may destroy in months or even years.

Every preparation and restoration that is placed onto ground dentin possibly affects the dental pulp and in certain instances may result in pulp necrosis, which severely compromises tooth longevity. Therefore, new concepts for excavating deep caries lesions have been developed, such as ultraconservative caries removal leaving affected dentin,[11] stepwise excavation,[12] and indirect pulp capping, in an attempt not to expose the pulp and in the knowledge that lesion progression is stopped by the sealing of a restoration placed on top of carious dentin.

Longevity of the restoration is important, but it is also important to prevent future re-restorations that will lead to a much larger preparation size and increased risk for pulpal complications. Especially in those cases in which high- and multi-risk patients are treated restoratively, this more conservative approach and the practice of including "disease management" seems to be important.

The dental practitioner who desires to deliver restorative excellence, also must decide how to manage an imperfect restoration. Criteria have been developed to evaluate the quality of restorations over time[13] and are mainly used in scientific clinical studies. Updated and broadened FDI criteria were published in recent years.[14,15] But, in daily practice, many dentists are guided by gut feeling or misunderstanding of those criteria sending the dentist on the path to replacement. The tooth-saving concept that repairs defective restorations instead of replacing them is still not fully accepted. For imperfect restorations, Hickel and others[16] published four options on how to handle this situation depending on the type and extent of defect and they clearly supported to not always replace defective restorations. Gordan and others[18] and Martin and others[17] showed that repair/sealing had better results than did leaving the teeth untreated.

Guidelines for the general practitioner related to whether to monitor, repair, or replace a restoration while taking into account specific risk factors, including a proper informed consent procedure during which all options are well explained to the patient, were traditionally absent. This led to a non–evidence-based operative dental practice that may varied considerably among dental practitioners.

NEW RESTORATIVE CONCEPTS

Taking into consideration the principles of personalized health care and individual risk factors, a decision to restore a tooth should be based on risk assessment and diagnosis, resulting in an individual risk profile and disease management. The first treatment should aim to stabilize oral conditions

and should result in disease control by proper oral hygiene and adjusting dietary habits. First-time restorative interventions—if really necessary—should be kept to a minimum in terms of their extent with the realization that nearly every restoration needs to be replaced in the future. When restorative intervention is needed, a minimally invasive approach should be the first option, as this restoration will preserve the possibility for future restorative interventions without pulpal complications. This will lead to a so-called "dynamic restorative concept" in which the longevity of the tooth, rather than the longevity of the restoration, is the most important goal. According to this principle, a more conservative approach toward operative intervention for defective restorations is also the more favorable option compared with replacement. Although depending on the type and cause of repair, these restorations may have a limited longevity compared to new restorations, repaired restorations can be considered to have "survived: and therefore to have prolonged the longevity of existing restorations."[19]

Trends toward new concepts can also be seen for indirect restorations. The traditional concept that a crown should replace or at least cover all direct underlying restorations is often too invasive, and new concepts that include an additional indirect restoration on top of a direct restoration have been introduced. This has the further advantage that subgingival margins can be protected from moisture contamination by wedges and matrix bands instead of placing a crown with a sub-gingival adhesive luting agent, which is rather unpredictable in terms of good adhesion.

THIS SPECIAL ISSUE OF *OPERATIVE DENTISTRY*

This special issue of *Operative Dentistry* aims to put new trends and developments in restorative dentistry in a contemporary perspective. The key aspects of these new concepts in operative dentistry will be the subject of different articles that will deal with modern treatment planning, criteria for primary intervention, criteria for intervention on existing restorations, new principles for differentiating between direct and indirect techniques, considerations for repair, modern operative procedures, and clinical examples of cases treated according to modern principles. The aims of this issue are to share these considerations with the reader and to stimulate discussions on how to integrate these new concepts into general dental practice and dental education.

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