Minimal intervention (MI) in dentistry

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Abstract
The intention of minimal intervention dentistry is to treat the patient for the disease of caries in the simplest manner possible commensurate with the problems diagnosed in that patient’s oral environment. The term does not define or limit the extent of the treatment in any way. It simply suggests that the least complex treatment is generally the most desirable and prevention is better than cure. The use of the word intervention covers all types and complexities of treatment without specifying the method. Specifically it allows for treatment both with and without surgical intervention and recognises that nonsurgical treatment is just as important as preparation of a cavity.

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This is the first of a series of articles by Dr Graham Mount concerning MI in dentistry that were first presented in the MI Compendium 3rd Edition, online: http://www.midentistry.com/compendium.html
As this version is now superseded by the new ‘MI Compendium of systematic reviews’ http://www.mi-compendium.org the JMID takes honour to reprint these interesting and clinically instructive articles in its forthcoming issues.

It is now one hundred years since acceptable standards for operative dentistry were first proposed by GV Black. Fifty years after he published his tome his principals were strictly adhered to with almost no variation. Since then there has been a considerable increase in our knowledge of the actions of the fluoride ion, improvements in local anaesthesia, progress with dental materials and the development of more sophisticated methods for surgical treatment of a caries lesion. In fact, by the 1970s the productivity of the average practitioner had more or less doubled. At the same time the effect of wider use of the fluoride ion in water supplies and in tooth paste were becoming obvious and the caries rates in the more advanced societies were reducing to some degree.

In Black’s day it took an hour on average to restore a complex lesion involving both mesial and distal surfaces of a molar tooth. By 1970, with the advent of high-speed drills, this had become the average time to restore similar lesions in an entire quadrant of four posterior teeth. The profession had increased its efficiency.

There was only one problem. The continuing use of the surgical approach to the treatment of the disease of caries was all wrong and thoroughly out of date. It is interesting to note that GV Black himself drew attention to the fact that caries is a bacterial disease. Even though the microscope was only about 30 years old at the time he identified the lactobacillus as being related to the demineralisation of tooth structure and suggested the profession investigate caries as a disease if it was to succeed in controlling it by means other than surgical.

Since then there has been a continuum of researchers, both inside and outside the profession, who have paid attention to the bacteriology of caries. In 1949 Hurst [1] and his group at the University of California College of Dentistry offered a progress report on their programme of caries research suggesting that the actinomyces, streptococci and probably lactobacillus were involved in the development of caries in hamsters and later it was shown that strep mutans was certainly involved [2]. In 1972 Fitzgerald [3] was investigating the use of antibiotics for the control of caries and then in 1976 Jordan [4] was prepared to identify the complexities of the oral flora at that time recognising that it is a transmissible disease. The following year Rogers [5] confirmed this concept.

About this time the Royal Society of Medicine published an editorial signed by Prof. T Lehner confirming this relatively new line of research [6]. Subsequently both the pace and sophistication of research increased. As early as 1985 people like Krasse evolved the concept of the “specific plaque hypothesis” [7] and research continued with a number of well known names becoming more and more deeply involved.
At the same time the Federation Dentaire Internationale (FDI), generally regarded as the voice of the profession, released Technical Report #20 [8] suggesting that caries be dealt with via oral hygiene, dietary control and fluoride application. There is no mention of control of a bacterial disease.

Thylstrup and Fejerskov published their definitive text entitled “Textbook of Cariology” [9] in 1986 in which a broad spectrum of Scandinavian researchers set out their concept of caries as a bacterial disease. Two years later Wilson and McLean [10] published their definitive text on glass-ionomer cements and suggested a number of variations in conservative cavity design based on the physical and chemical properties of this unique material.

By 1995 Loe [11] was suggesting that the profession recognise a new paradigm for restorative dentistry and in the same year Mount and Hume [12] proposed a new classification for caries lesions. This was designed to escape from the shackles of the GV Black system and promoted the introduction of minimal intervention in the treatment of the caries lesion. Three years later the same authors expanded on the concept with the publication of a text book that formalised the introduction of minimal intervention dentistry [13].

Since the turn of the 21st century a number of authors [14-17] have embraced the concept with enthusiasm and skill to the extent that now it is acknowledged that caries is primarily a bacterial disease. The story is now relatively clear and it is important that the profession acknowledge and accept that the discipline of basic operative/ restorative dentistry has irrevocably changed. We have entered a new paradigm [18].

Acceptance of this proposition is basic to the remarks and comments that follow. These observations are based upon many years of general practice, which include a considerable amount of clinical observation and research. For the last 30 years of practice and for some years thereafter I had the privilege of access to the Dental Materials Laboratory at the Dental School, The University of Adelaide. This in turn gave access to the Centre for Electron Microscopy and Microstructure Analysis (CEMMSA) in the Medical School. I worked under the immediate direction of a skilled materials researcher, Dr Owen Makinson, and with the ongoing support of several other workers in the same area. One of them, Dr Hien Ngo, began as a student and ended as a leader in the area of microscopy and helped me to gain a wonderful insight into the biology and biochemistry of tooth structure in its natural living environment. It is easy to be convinced when you can actually see it happening. The concept of minimal intervention dentistry is so new that so far there is little evidence in the literature to support many of the proposed concepts and techniques. There is also confusion because the “old school” finds it difficult to avoid superimposing old concepts on to new techniques. It is not easy to “forget” and to completely accept a new approach to an old discipline.

MI Terminology

A number of bodies have been formed recently to recognise and explore new concepts arising from modern theories of the cause, prevention and treatment of dental caries. As with any evolving concept there is a lack of unanimity in nomenclature and it is suggested that there would be some advantage in developing a common approach. It is essential to develop a common perception of the breadth of the changes to be invoked with recognition of the scope. A number of variations have already been offered and the following takes these in to account but at the same time offers a rationale for acceptance of a simplified title.

It is suggested that the term "Minimal Intervention Dentistry" be adopted as the overall description of modern operative dentistry, which is based upon the concept that caries is a bacterial disease. The rationale comes from a dictionary definition of the chosen words and they were selected as a result of a series of discussion workshops with a number of interested parties.

The following are the significant words and their description:

"minimal" = very small in amount or extent; smallest possible in amount or least possible in extent; relating to or displaying attributes associated with minimalism.

"intervention" = an action undertaken in order to change what is happening or might happen in another’s affairs, especially in order to prevent something undesirable.

There have been a number of variations of this terminology suggested but it is apparent that the above words are the most logical and explains the intention clearly and concisely [19,20] The intention of minimal intervention dentistry is to treat the patient for the disease of caries in the simplest manner possible commensurate with the problems diagnosed in that patient’s oral environment. The term does not define or limit the extent of the treatment in any way. It simply suggests that the least complex treatment is more desirable and prevention is better than cure. The use of the word intervention covers all types and complexities of treatment without specifying the method. Specifically it allows for treatment both with and without surgical intervention and recognises that non-surgical treatment is just as important as preparation of a cavity.

Most importantly it does not relate solely to the treatment of a cavity but takes in to account the potential for intervention of the disease process leading to prevention and healing of the early stages of demineralisation. At the same time it recognises that, having overcome the disease state, cavity designs can be limited in extent and thus natural tooth structure remineralised and preserved.
References