

Minimal intervention dentistry: cavity classification & preparation

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Abstract

The concept of minimal intervention operative dentistry is being accepted and taught in more places all the time. Simply for emphasis the basic principles are repeated here, because it is essential that the reader understands the significance of the recognition of caries as a bacterial disease. Once this is established, the entire approach to its treatment needs to be modified. One highly significant aspect of treatment relates to the surgical preparation of the cavity, which is required to eliminate the more advanced lesion where the smooth tooth surface has been breached. Whilst the cavities will be considerably smaller than those designed by GV Black, they will certainly not be easier to design and prepare. Conservation of tooth structure is of prime importance and to achieve this, there needs to be a high level of visibility and an excellent tactile sense to over-avoid preparation and excess tooth loss. Preparation techniques are discussed in some detail, including rotary cutting instruments, lasers and air abrasion techniques.

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Introduction

In recent times the term “Minimal Intervention Dentistry” has been coined to describe a new approach to the treatment of the disease of caries. It is widely acknowledged that this is a bacterial disease and must be treated as such¹. The pattern of attack of the carious lesion and its progress through the enamel and dentine has been understood for many years and has tended to dictate the treatment methods used. However, the purely surgical approach to caries control, as taught by GV Black², is now recognised as being far too destructive to be used as the first line of defense. It is highly inefficient because it does not eliminate the cause of the disease and at the same time it leads to a continuing process of replacement dentistry wherein the cavity just gets larger, the restoration is subjected to an increasingly heavy load and the tooth gets weaker.

Minimal intervention means that there should be greater emphasis upon education and direction of the patient

towards self care with the intention of preventing or healing the disease in the first place and eliminating, or minimising, the need for surgical intervention³. In fact it is possible to heal and remineralise a lesion providing it has not progressed to the stage of surface cavitation. It is not suggested that this approach is any easier than traditional surgery but it is far more conservative of tooth structure and offers the possibility of far greater longevity for the dentition in general. It also means that it is unacceptable to sacrifice natural tooth structure through the preparation of relatively large architecturally designed cavities on the assumption that this will, in any way, prevent further disease.

The knowledge required for the adoption of this new philosophy has been accumulating for a number of years and the principles have been utilised in enough practices to suggest that they are sound. There have been many articles in the scientific literature over the last 20 years suggesting greater emphasis on preventive measures and modified cavity designs and there are now at least three text books covering the subject in some detail^{4, 5, 6}. There is no doubt that the old concept of “extension for prevention” should, at this point, be discarded but it is acknowledged that there is a need for further investigation into the cavity designs now being proposed to take its place^{7, 8, 9}. It must not be

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Table 1

Shows a diagrammatic representation of the classification and following that is an explanation of the number system that is used.

SITE	SIZE				
	No Cavity 0	Minimum 1	Moderate 2	Enlarged 3	Extensive 4
Pit/fissure 1	1.0	1.1	1.2	1.3	1.4
Contact area 2	2.0	2.1	2.2	2.3	2.4
Cervical 3	3.0	3.1	3.2	3.3	3.4

assumed that, just because the cavities are smaller, that they are easier to prepare.

It is understood that no restorative material can be regarded as permanent, and that there may well be further breakdown of either tooth structure or restoration. Once the integrity of a tooth crown has been breached by caries followed by preparation of a cavity the remaining tooth structure will be weakened and subject to further breakdown. With each replacement, the cycle is likely to move faster to the next stage of breakdown and replacement. Significantly, any alteration to the occlusal anatomy of a tooth, through placement of a restoration, may lead to changes in occlusal harmony¹⁰. Even a minor change in occlusal anatomy can lead to the introduction of increased stress on remaining cusp inclines or movement of opposing teeth leading to the development of deflective inclines and to functionally opening contacts¹¹. Any or all of these changes may speed the decline of the occlusion and may lead to periodontal problems as well. It is logical, therefore, to retain as much of the original tooth crown as possible and deal with a lesion in a very conservative manner.

The cavity designs suggested by Black required geometric precision with sharp line angles, flat floors and removal of all signs of demineralised tooth structure. Minimal intervention suggests remineralisation of any enamel margin that is not yet cavitated as well as remineralisation of the lesion floor to avoid irritation of the pulp. Demineralised enamel around the margin of the lesion will be restored during the stabilisation phase of treatment aimed at elimination of the disease through the application of fluoride and CPP-ACP¹². The floor of the lesion will be remineralised through the placement of a glass-ionomer foundation for the restoration and this, at the same time,

will seal the margins against microleakage.

Preparation of a cavity may therefore be very conservative indeed. The ultimate aim will be simply to restore the surface of the crown of the tooth to prevent further accumulation of plaque on to or in to any roughness or cavitation that has arisen from the caries process. Access to the lesion should therefore be very conservative and undertaken with care. Open only as far as necessary to allow clear vision in to the lesion. Clean the walls of the lesion sufficient to provide a clean dentine surface around the full periphery so that there can be an ion exchange adhesion between the tooth structure and the glass-ionomer base. Demineralised dentine can remain on the floor providing there is sufficient strength in the glass-ionomer to withstand occlusal load. Both clear vision and a tactile sense are valuable in limiting the depth and extent of the preparation and to thus maintain the maximum strength in the remaining tooth crown.

New Classification

The following discussion of the proposed classification is included to clarify the significance of the minimal intervention approach to the treatment of a caries lesion. There is a basic problem within the concept of the original GV Black classification because it identifies the position of a lesion and prescribes a cavity design regardless of the size and extent of the lesion. This means that there will be a standard amount of tooth structure removed whether it is involved with the disease or not¹³. The result is that the cavity prepared for the initial lesion is often larger than it needs to be and subsequent replacements will therefore be larger still. The GV Black classification does not make allowance for this progression and it is therefore difficult for the profession to gain proper recognition for the increasing

complexity posed by preparation and restoration of the enlarging lesion. This problem is taken into account with the proposed new classification, to the advantage of both the patient and the profession.

The concept of minimal intervention cavity designs should not be difficult to accept and visualise as a replacement for the traditional GV Black classification. After all, the latter is a classification of cavities wherein the cavity design is specified for each lesion. However, the understanding of the disease process and the materials used to repair the lesions have both changed considerably in recent years and it is quite apparent that an infectious disease cannot be cured by surgery alone.

Therefore, if minimal intervention is to be adopted as a philosophy, there is a need for an entirely new classification that will identify both the position of a lesion on the exposed crown of a tooth and the extent to which it has progressed¹⁴. It is neither necessary nor desirable to specify any particular design for the cavity that may have to be prepared. It is important to be able to identify a lesion before it becomes cavitated so that it can be subjected to treatment by remineralisation and subsequently kept under observation until healed. However, it is accepted that, following loss of surface integrity and cavitation, there will be a need for surgical intervention simply to eliminate surface cavitation and prevent further plaque accumulation. At the same time the restorative material must be able to properly seal the margins against microleakage so that remaining bacterial infection within the cavity will be isolated and further invasions will be prevented¹⁵. This means that glass-ionomer is the primary material of choice and it can be laminated with a resin composite if required¹⁶. The result will be stasis within the lesion with the potential for remineralisation¹⁷. Thus the cavity design, and the material used to repair it, should be dictated solely by the position and extent of the lesion rather than any pre-ordained geometric cavity design.

Lesion Site

Carious lesions occur in only three different sites on the surface of the crown of a tooth.

Site 1 - the pits and fissures on the occlusal surface of posterior teeth and other defects on otherwise smooth enamel surfaces.

Site 2 - the contact areas between any pair of teeth, anteriors or posteriors.

Site 3 - the cervical areas related to the gingival tissues including exposed root surfaces.

Lesion Size

A neglected lesion will continue to extend as an area of demineralisation in relation to one of the Sites noted above. As it extends so the complexities of restoration will increase. The sizes that can be readily identified are as follows

Size 0 – the initial lesion at any Site that can be identified but has not yet resulted in surface cavitation – it may be possible to heal it.

Size 1 – the smallest minimal lesion requiring operative intervention. The cavity is just beyond healing through remineralisation.

Size 2 – a moderate sized cavity. There is still sufficient sound tooth structure to maintain the integrity of the remaining crown and accept the occlusal load.

Size 3 – the cavity needs to be modified and enlarged to provide some protection for the remaining crown from the occlusal load. There is already a split at the base of a cusp or, if not protected, a split is likely to develop.

Size 4 – the cavity is now extensive following loss of a cusp from a posterior tooth or an incisal edge from an anterior.

The Site 1, Size 0 is represented by the occlusal fissure on a newly erupted tooth, or similar defects on an otherwise smooth surface, that is not yet carious but it deserves some discussion in this context. By the time the lesion reaches a Size 1 some form of restoration is mandatory because these lesions (fissures) will be under constant occlusal load and it is difficult to keep them plaque free. The Site 2, Size 0 and the Site 3, Size 0 lesions will generally not require restoration in the early stages because they are not under occlusal load. However, every effort should be undertaken to heal them through patient education and remineralisation.

The Size 1 and Size 2 lesions at all three Sites generally represent initial lesions and in many cases can be dealt with using the most conservative cavity designs and restoration with either or both of the adhesive restorative materials currently available. Once the lesion reaches the Size 3 category, or beyond, it will in many cases be “replacement dentistry” and a stronger restorative material will be indicated. With Site 1 and Site 2 lesions in either of these Sizes there will be a need to protect or restore cusps and this calls for more complex restorative techniques. It should be noted that this classification, unlike the GV Black classification, recognises these increased complexities thus encouraging greater reward for more difficult techniques.

Cavity Preparation Techniques

At the time of the development of the GV Black classification radiographs had yet to be developed so a cavity was already moderately extensive before it was detected. Rotary cutting instruments had just been introduced and these were used in conjunction with hand instruments for cavity preparation. The resultant cavity was expected to be of a very precise design with flat floors, sharp internal line angles and precisely positioned walls. Dovetails and other retentive details were based upon the carpenter's principles and retention of tooth structure was of secondary importance. Undermined enamel had to be removed because it was regarded as weak and subject to fracture during restoration placement or subsequent occlusal stress and margins had to be placed in so-called "caries free areas". Hand instruments were mandatory to complete the cavity to ensure the achievement of the required precision.

The concept of minimal intervention is based upon very early detection of a lesion with surgical treatment undertaken only if surface cavitation has occurred. In view of the potential for remineralisation and the presence of adhesive restorative materials, as much natural tooth structure as possible should be retained, leading to minimal further damage to the tooth. This is logical on the grounds that no restorative material is the equivalent of enamel and dentine in aesthetics or function and the more tooth structure removed the weaker the remainder. The principles of carpentry no longer apply, hand instruments have been largely abandoned and methods for surgical treatment of the carious lesion have been refined.

It is suggested that cavity preparation is even more demanding than previously in as much as preservation of remaining tooth structure is of the greatest significance. Extension through the entire fissure system on the occlusal surface is undesirable because areas that are not extensively involved in the caries lesion can be sealed with glass-ionomer. Inclusion of the occlusal fissure in the design for restoration of a proximal lesion is often not necessary. Maintenance of the entire ring of enamel around the crown of a tooth is desirable even though there is a proximal lesion below the contact area. Areas of demineralised enamel that are still smooth can be remineralised and/or sealed with glass-ionomer.

Techniques for the preparation of cavities of limited extent have been modified considerably in recent years. The rotary cutting instruments have now reached a very sophisticated level of precision using burs made of mild steel, tungsten carbide or diamonds of various grit size.

There has also been progress in alternate methods of removing tooth structure such as lasers and air abrasion and each of these techniques deserves some consideration.

Rotary Cutting Instruments

The original rotary cutting instruments were hand driven and very slow. The introduction of the electric motor allowed speeds up to 2000rpm with mild steel burs and these remained the method of choice until the late 1940s. Improvements in gearing the rotating handpiece and the introduction of air/water coolants and lubricants lead to rapid improvements in the 1950s¹⁸. Speed of rotation has increased from the standard 500-2000rpm up to 400,000rpm and is now recognised in three different groups¹⁹.

1. Slow speed handpiece and bur rotates at 500 – 5000rpm

Steel burs are indicated in this speed range and the use of a lubricant is optional. Visibility is better without a lubricant but cutting is faster and cleaner with an air/water spray. Diameter of steel burs can range from 3.0mm down to 0.5mm. The size should be selected to fit the task in hand. Tasks include removal of caries and development of retentive designs, placement of pins, grooves and ditches, as well as all stages of polishing to a final finish.

2. Intermediate high speed rotates at 30,000 – 120,000rpm

Diamond burs with a medium to fine grit are the most efficient in this range and use of a lubricant is mandatory²⁰. Air alone for very short periods is acceptable because it will enhance visibility but cutting will be faster under air/water spray. Tungsten carbide burs tend to "chatter" at this speed and may cause micro-cracks in enamel and steel burs will not cut at these speeds.

There is a very fine tactile sense available within this speed range and the risk of over-cutting is minimal. Therefore it should be used in the development of small cavities as well as to refine final cavity outline for all restorations. It is also useful for initial contouring of most restorations leading to a final polish. It is the correct speed group for refining the occlusion.

3. Ultra-high speed rotates at 250,000 – 450,000rpm

Tungsten carbide burs are at their most efficient in this range but diamond burs are also very useful²¹. Lubrication is mandatory with a copious water jet being the most efficient for temperature control. Tungsten carbide burs cut dentine very smoothly providing they are not chipped or eccentric. They can also develop a fine margin in

enamel although it must be noted that they cut more smoothly along the margin where the rotating bur enters the cavity. The opposite, exit margin, is likely to chip more readily. As they are essentially a side cutting bur they should not be used to enter through healthy enamel into a new lesion. They cut old metal restorations well.

Diamonds are more versatile and a coarse end cutting diamond is the preferred bur to enter a new lesion or remove bulk enamel, even though both entry and exit margins will be relatively rough depending upon the grit size being used. The diameter of burs for use in this speed group range from 2mm down.

Initial entry to extensive lesions and the removal of old restorations is achieved best in this speed range. The tactile sense is minimal and over cutting is possible if visibility is at all limited. Use these speeds for gross reduction of tooth structure only and then step back to intermediate high speed to refine the cavity.

A combined air/water spray is used at the higher speeds always as a coolant and lubricant and can be used at slow speed also if desired. Selection of the correct bur for the appropriate function is important because none of the three types of cutting method is universal and each has its place²².

1. *Steel burs*

These were the burs originally used when rotary cutting instruments were developed well over one hundred years ago. They are still valuable for removal of caries and development of retentive elements in dentine and are designed for slow speeds under 5000rpm. Each bur generally has eight blades and some of them have a positive rake angle to facilitate the cutting of the dentine or removal of caries. This, however, makes them relatively fragile and subject to chipping along the leading edge and they should not be expected to have a long life in normal practice.

2. *Tungsten carbide burs*

Following the development of higher speed handpieces there was a need for stronger steel burs to withstand the heavier stresses involved and to lengthen their useful life. Tungsten carbide burs are designed almost exclusively for friction grip handpieces because concentricity is essential and they only cut efficiently at greatly increased speeds. In fact, they do not begin to reach effective cutting capacity until 100,000rpm and are best used at speeds beyond 300,000rpm. One of the main variations in these burs in recent years has been to increase the number of blades and to vary the rake angle of the blades. The usual bur has six blades and a negative rake angle to provide better support for the cutting edge. For the same reason many

have a radial clearance as well. They cut metal and dentine well but are prone to produce micro-cracks in enamel thus weakening the cavo-surface margin. They are not indicated for minimal intervention type cavities. Probably only a new bur will be truly concentric because any loss of a blade, or even a piece of a blade, will alter the balance so that only every third or fourth blade will actually contact the tooth and remove a piece. This means that the clinical life is generally quite short.

3. *Diamond stones*

Diamonds abrade tooth structure rather than cut or chip it and are therefore more efficient over a greater range of speeds and are less likely to chip or break either themselves or the tooth. They are most efficient when used against hard materials such as enamel and porcelain although very fine diamonds are excellent for reducing enamel and dentine to a fine finish. Initially diamond burs were covered with large diamond particles and were regarded as rather coarse leaving a finish with a surface roughness index of up to Rt. 50µm. In recent times there have been considerable improvements in the methods of embedding the diamond particles in the metal of the bur head so they last longer and there is a far better distribution of particle size. Large particle size ensures rapid removal of porcelain and enamel but leaves a rough surface. Fine particles leave fine scratches and it is possible now to produce a polished surface with particles down to a surface roughness index of Rt. 4µm. There are a variety of grit sizes in between to be selected according to the task in hand. They are the preferred choice for development of minimal cavity designs. Also as adhesion is greatly enhanced in the presence of smooth surfaces, it should be regarded as mandatory to finish all cavity margins with a fine diamond stone of 25µ grit, or less, at 40,000rpm.

Probably the greatest risk with the use of rotating instruments is the removal of more tooth structure than necessary. The higher the speed of rotation the lighter the tactile sense and the more tooth structure can be removed inadvertently. It is particularly dangerous to use an air-rotor handpiece at ultra high speed to try to refine the out line of a cavity design because of the speed of removal of tooth structure. Obviously, the larger the cavity the weaker the remaining tooth and one of the prime objects of minimal intervention dentistry will be promptly lost.

It is suggested that ultra-high speed should be used only for removal of old restorations and for gross reduction of tooth structure in the initial stages of the preparation of cavities that are Size 3 or larger.

Intermediate high speed is a very useful speed group

because there is a fine tactile sense available while at the same time reduction of tooth structure is carried out promptly. At 100,000rpm. a small cavity can be accessed readily with minimum vibration or discomfort and maximum control over depth of penetration and extension. Using a fine diamond bur at 30 – 60,000rpm. it is possible to place a fine bevel on the enamel margin with great precision.

A small round mild steel bur, rotating at about 2-5000rpm, is the preferred instrument for removal of infected dentine around the margin of the newly accessed lesion with the object of exposing the sound dentine that will be required for proper adhesion and sealing of the cavity. It is interesting to note that infected dentine will not show a pain response to a bur or hand instrument so there is often no need to use local anaesthesia and pain can be used as a control for cavity extension.

Laser cutting of hard tissues

Laser stands for Light Amplification by Stimulated Emission of Radiation. In essence, a dental laser is a medical device that generates a precise beam of concentrated light energy. A laser's characteristics are based upon the absorption rates of its wavelength in hard or soft tissue and in other dental materials. Certain wavelengths have an affinity for red pigmented structures which makes them particularly effective for use in the oral cavity in relation to soft tissues while other wavelengths have been found to be effective on hard tissues²³.

Patient discomfort can be reduced with lasers and the need for local anaesthesia is reduced but not completely eliminated. Some procedures can be completed in less time than normal but the lack of any tactile sense means that accuracy and precision may be compromised particularly in relation to cavity preparation in hard tissues and in areas of difficult access.

A laser's wavelength determines many of its properties and capabilities because different wavelengths are absorbed by tissue at varying rates. Specific wavelengths can enable greater precision and accuracy and at the same time minimise the potential risk of lateral tissue damage. There are lasers available in varying wavelengths ranging from the Argon Laser, with a wavelength varying from 488nm to 514nm, to the Carbon Dioxide Laser with a wavelength of about 10,600nm.

Currently the one of choice for cavity preparation is the Er:YAG [Erbium Yttrium Aluminium Garnet] Laser with a wavelength of 2940nm. This wavelength is highly absorbed in water so it is useful for the selective removal of caries and for actual cavity designs in limited situations.

The laser itself is generated within the machine then guided via a series of gold mirrors along the handpiece to emit from the tip within a water jet. It is the energy released through the water that does the cutting and guidance is achieved through a red guide light. Both the power and the pulse rate of the laser are variable and the type of tissue being removed can be detected through the sound of the pulse. Progress of tooth removal can be monitored, particularly with the use of magnification, and the resultant cavity floor and walls are sufficiently rough to accept adhesion with resin without etching.

It would seem at this time that the laser is most useful for smaller Site 1 and Site 3 lesions where access is simple and in many cases local anaesthesia is not required. Preparation of larger cavities can be tedious and time consuming with little gain from the patient point of view.

It must be noted that, even though the Er:YAG laser is designed for cutting hard tissue it will also cut soft tissue and therefore care is required to avoid damaging the surrounding periodontium. Rubber dam application is desirable for all applications on hard tooth structure. The main limitation in the application of a laser for cavity preparation is the lack of tactile sense and therefore the difficulty of limiting penetration in to sound dentine. The laser cuts hard tissue more rapidly and efficiently than softer tissues such as demineralised dentine on the floor of a cavity. Its greatest value then is in entering a lesion but it is probably more accurate to define the cavity limits using a conventional rotating bur.²⁴

Air Abrasion

Air abrasion, also called kinetic cavity preparation, particle beam or kinetic abrasion technology, uses the kinetic energy of microfine (20-50 micron diameter) particles of alumina (aluminium oxide – Al₂O₃) in a high pressure air stream to remove tooth structure by brittle micro-fracture.^{25,26} The failure of brittle materials during air abrasion occurs by a process of crack creation, extension, and erosion. When the abrasive particles impact such a surface, the depression grows, and radial and lateral cracks are generated in the area. The cracks ultimately join together to isolate and remove a piece of the material. The alumina particles are delivered intra-orally using a handpiece with contra-angle or sickle configuration, fitted with a nozzle through which the particle beam is directed on to the tooth. Alternative powders that can be used for air abrasion include sodium bicarbonate, urea, and dolomite.

It should be regarded as an adjunct to, but not a universal replacement for rotary instruments. The main

indications include the preparation of minimal access through enamel for occlusal lesions on posterior teeth as well as limited debridement of dentine lesions without local anaesthesia. However, it must be noted that large areas of softened infected dentine are not hard and brittle so it has limited ability to undergo brittle fracture. Therefore, these areas cannot be cut efficiently with air abrasion and alternate techniques are recommended.

There are now several suppliers of air abrasion technology and a range of equipment is available. Quite complex units with advanced features such as supersonic handpieces, which increase particle velocity and thus cutting speed, are available. Pulsing of the particle stream through the cyclical operation of valves is possible and air desiccation and particle agitation can be incorporated to prevent clumping and blockages of the powder. Microprocessor control of air pressure is available and the particle parameters can be varied. With more complex equipment, a remote control unit, small enough to fit into the palm of a hand, provides control of the basic parameters of the instrument, allowing fingertip control without having to move away from the patient.

The energy delivered by the abrasive particles is directly related to the airflow and the particle size. Doubling the particle size from 27 to 50 microns multiplies the mass, and thus the kinetic energy, by a factor of eight. While this will accelerate tooth removal it will lead to more discomfort for the patient, particularly during the cutting of dentine, although the relationship between energy and discomfort is not linear. In addition, there may be an increase in dehydration which is often interpreted as a cold sensation. There is, therefore, an inherent trade-off between increasing cutting power (energy) and the level of patient comfort i.e. the annoyance factor.

In practice, this means that a range of particle sizes should be employed beginning with 34 microns for cutting enamel and moving to 27 microns for removing caries. Note also that air abrasion will not effectively remove the smear layer from dentine, but rather creates one. Acid etching should be used to remove the smear layer prior to bonding of resins to dentine.

It must be recognized that there are both advantages and disadvantages arising from the use of this equipment for cavity preparation. There is a reduced need for local anaesthesia as well as a reduction in the "annoyance factor" for the patient. However, the use of rubber dam is

strongly recommended to help control the distribution and inhalation of the dust. Both conventional intra-oral high velocity evacuation and additional extra-oral high performance vacuum systems are required. The extra-oral system removes the small amount of dust, approximately 10%, which escapes the intra-oral evacuation system, and also provides filtration of the air in the room. In terms of personal protective equipment, a mask is considered adequate protection but both staff and patient must wear eye protection because alumina particles may cause mechanical injury to eyes.

The main limitation in the use of air abrasion is the lack of control in the depth of penetration in to hard healthy tooth structure. While it may be of value for entering a lesion there is a complete lack of tactile sense and it is often necessary to revert to a rotary cutting instrument to define the limits of the cavity.

Conclusions

It is apparent from the foregoing that caries is now recognised as a disease and therefore a revised approach to its treatment and prevention is required from that suggested by GV Black. His approach was necessarily limited by both knowledge and equipment but at the present state of science, the profession must adopt an entirely new set of principals.

Having decided that caries is essentially a disease of bacterial origin then it is mandatory that we think in terms of early recognition of its presence in the mouth, followed by elimination of the active disease, prior to undertaking moves to repair the damage that it has caused. In undertaking repair it is imperative that remaining tooth structure be preserved and protected as far as possible. Remineralisation is possible on any surface that remains smooth and not cavitated so repair or replacement of damaged tooth structure should aim at redevelopment of a smooth surface only, thus eliminating the potential for further plaque accumulation.

Modern methods for removal of diseased tooth structure should be used primarily to enhance patient comfort but at the same time undue loss of sound tooth structure must be avoided. Whilst precise geometric cavity designs are no longer to be contemplated any sacrifice of sound tooth structure is to be deprecated. Good visibility and a high level of tactile sense are useful tools in limiting the extent of surgical removal of tooth structure.

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