“Doctor, do I have to lose the tooth?” “Do I have to have a crown? I’d rather not cut the tooth down like the last one.” “I hate to have my nice teeth reduced just to replace one tooth.” You have probably heard each of these comments many times. In each case, a decision had to be made as to what treatment to recommend. Every dentist has periodically practiced minimally invasive dentistry (MID) by doing “less” to get a good result. The question is, do you consider being less invasive for each dental procedure? Is less more? Should every endodontically treated tooth be crowned? Do all 6- to 7-mm pockets need surgery? When are veneers more appropriate than orthodontics? Is smaller always better? These questions lead us to think on a daily basis about how we are going to practice dentistry. In this article, I would like to call attention to some of the approaches that lend themselves to a changing focus toward MID. Each case presented could have been treated in another way. However, in each case, the less invasive procedure was chosen. Consider your own approach to dental care and see if you can preserve more by invading less. First published in Dent Today 2004; 23: 56-61.

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MID (or Microdentistry) is a mindset

Every patient deserves to have the most recently advocated care that results in the most predictable outcome. The outcome includes the concept of longevity. When one considers that a small filling preserves strength in a tooth, it seems obvious that a small filling would be the treatment of choice where appropriate. However, this is not always the case. To do less is more, especially if one constantly has a mindset that sees every treatment plan as an opportunity to be less invasive. As an example, every root canal that saves a tooth is less invasive and more preserving than an extraction. Every implant placed between virgin teeth is more beneficial and predictable than a bridge. Every onlay preserves tooth structure compared to a crown. Every tunnel prep preserves a marginal ridge. Each time a patient presents with a problem, whether it be a small area of decay or an edentulous ridge, an opportunity presents to perform the least invasive procedure for a good outcome. When the focus is on using technology to treat each condition, the outcome can be further enhanced. For example, detecting decay can set a basic standard of care. For more than a century, an explorer has been used along with x-rays to find caries. However, research has shown that an explorer often does not find decay because of the nature of decay\(^1\), especially with the new model indicating that cavitation takes place from the inside out. Figure 1 is a photomicrograph of a non-cavitated groove that an explorer would not diagnose, yet the
decay process is well underway. Further, because caries caused by \textit{streptococcus mutans} and \textit{lactobacillus} can be spread by inoculation from one tooth to another\textsuperscript{2}, an explorer is no longer the instrument of choice. Enter the use of laser florescence and the Diagnodent (KaVo) to find the degree of cavitation and provide confidence of measurement, leading to treating only that decay that meets a quantifiable standard. Why wait until the cavitation process has progressed further (Figure 2)?

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{figure1.png}
\caption{Decay not detectable by an explorer.}
\end{figure}

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{figure2.png}
\caption{Fully cavitated lesion.}
\end{figure}

\section*{Managing the problem}

Once caries has been confirmed, CAMBRA (caries management by risk assessment), the new standard of care, needs to be implemented in every practice. Before treating a tooth invasively, controlling the disease process that infected a tooth is paramount. By determining which habits, diets, and prevention methods a patient uses (or does not use) and by evaluating saliva flow and its bacterial count, a dentist can provide a plan for controlling the oral environment. For example, because caries is communicable, a family can rinse with Beta-iodine or Peridex (Zila) and reduce the quantity of \textit{S mutans} and \textit{lactobacillus} to a manageable level. Fluoride can be prescribed, and sealants can be applied. Xylitol chewing gum can cut lactic acid concentration by 22\%\textsuperscript{3}. The total concept of prevention needs to be addressed before remedial care is rendered so the disease process will be under control.

\section*{Treating problems with Technology and MID}

Today, technology provides dentists with more options to provide less invasive care. Originally, Microdentistry described treating small carious lesions by preparing the tooth for a composite restoration by using air abrasion\textsuperscript{4} (Figures 3 and 4). Over time, other modalities have come forth to attempt to do the same minimally invasive procedures, including ones advocating use of small “fissurotomy” burs and certain lasers. Regardless of the approach, the concept has become to prepare less, thus preserving more of the tooth. With this preservation comes the understanding that fewer teeth may break, resulting in fewer root canals, onlays, or crowns, and patients will have more predictable long-term outcomes. To dentistry’s benefit, fewer injections and less frequent drilling are predicted,
thereby creating a whole generation of non-fearful adults. The latest concept in treating periodontal disease includes the use of a perioscope of 48x magnification to see the accumulated calculus holding the bacteria that are causing the problem. With the visibility a Dental View affords, all the offending bacterial plaque can be removed. Dr. John Kwan, a periodontist and an expert with the use of perioscopy, reports that he has eliminated the majority of the surgery he used to perform (Personal Communication with Dr. Kwan.)

restored (Figures 5 to 7). An anterior tooth with loss of a papilla due to a periodontal pocket can have that papilla restored without surgery, and a good result can be obtained by super-erupting the tooth. A less invasive orthodontic procedure (Invisalign) is now available for the patient who has difficulty with periodontal conditions and must floss. Every implant in a dentulous mouth saves 1 or more abutment teeth from preparation.

Figure 5. Fractured No. 10.

Figure 6. Force-erupted No. 10 prepped for a crown.

Each onlay may preserve a large amount of tooth structure compared to a crown (Figure 8). The first procedure each dental student does for a patient is a cavity preparation. The G.V. Black model was to remove more of the tooth than the decay dictated in order to obtain resistance form and retention.

Examples of MID

As one considers the aforementioned, it becomes apparent that for every treatment, the concept of MID can be applied. Broken teeth, especially at the gum line, need not be extracted but can be super-erupted for a feral effect, then
Modern dentistry has made that model obsolete, and Dr. Black would, in his wisdom, be an advocate of changing his model to meet the new standard of care now possible. With technology leading the way to discovery, a Diagnodent helps find the location(s) of the decay on a tooth surface and quantify it. Is there any reason to prepare a whole central groove of a bicuspid or molar if the caries is only located in a small area of that surface? Marginal ridges of teeth have been shown to provide up to 50% of the support for cusps, so why would one want to invade that area if not necessary? When interproximal caries is found on an x-ray, tunnel preps can work well and be restored with a resin-reinforced glass ionomer (Figure 9).

Avoiding a bridge

Figure 10 shows 2 primary teeth the patient wanted removed because of loosening and the unpredictability of retention. The choices were a bridge (requiring reduction of 2 virgin teeth), a partial denture, or implants. In this case, in order to gain adequate space, orthodontics was used so that 2 implants could be placed (Figures 11 and 12). The outcome was truly appreciated by the patient (Figure 13).
The concept of MID also incorporates the communication skill needed to help the patient perceive that options are available for which he or she is not knowledgeable. For example, the patient expecting to lose the rest of his or her teeth can now be informed of alternate, less invasive procedures for saving “hopeless” (in the patient’s mind) teeth, thus avoiding a poor prognosis. Figure 14 shows the teeth a patient wanted removed, which would have required a lower denture. After a period of communication, the patient, who stated she had very little money, reconsidered and accepted a far less invasive approach. Figure 15 shows the result achieved with veneers and a partial denture.

When considering the replacement of a tooth, we all know that bridges or implants are commonly done. However, it is often possible to save tooth structure by doing inlay-supported bridges where implants are not done. Figure 16 shows an inlay-supported bridge. An inlay-supported bridge can also be done with gold inlay. I have found these
bridges to be successful and preserve considerable tooth structure. Full-coverage bridges often fail since decay occurs along the margin(s) of crowns. An inlay offers less opportunity for this, with minimal margin area along the gingival aspect.

When an implant is not possible

When 2 molars are missing, how often is a partial denture recommended? Probably, the vast majority of the time. Then, along came implants, offering a tremendous stride forward. However, when adequate bone is not available for an implant, an option can be used to provide a distalized abutment for a bridge. Figure 17 shows missing teeth Nos. 30 and 31. By moving the second bicuspid distally, an abutment was provided for a bridge. (This could also be accomplished using Invisalign.) Once tooth No. 29 was in position and retained for 3 months, a bridge was prepared and seated (Figure 18). (Note that Figures 17 and 18 are mirror view images.)

Figure 17. Distillation of second bicuspid for a bridge.

Figure 18. Bridge with distalized bicuspid abutment.

For example, the darkened virgin tooth, diagnosed nonvital, would not need anything other than a resin restoration to fill the access hole and internal/external bleaching. Figure 19 shows extensive decay from the facial aspect in a 79-year-old man’s tooth. After a root canal was performed, a composite was used to close the minimum access hole, and a Cerec inlay was created to close the defect (Figure 20).

Figure 19. Severe decay into pulp.

Figure 20. Cerec class V restoration.

Root canals needing crowns

Often, teeth needing root canal treatment are fractured, extensively restored, or already crowned. Those teeth that do not fit these descriptions may not need extensive restoration.
Reducing fear with MID

It is remarkable to hear of a patient’s bad experience for which he or she left a previous dentist. The research of Rankin and Harris' attributes 14 concerns leading to fear of dental visits, all referring back to an attending dentist. MID can be focused on the encounter between any members of the dental team so that the dentist/patient relationship is based upon trust. Invasive care as seen by the patient is not limited to the physical only. Gale8 surveyed patients’ fears associated with dentistry and found that 2 of the most highly fear-arousing stimuli were associated with the dentist’s behavior toward patients. Kleinknecht10 and Scott11 similarly found dentists’ behavior affected patients’ feelings about seeing a dentist. With this research in mind, it would seem that to truly practice MID, one would understand the patients’ psychological needs. Rendering care with the support patients need, through helping them feel trust and understanding, would go a long way toward the concept of least invasion.

Conclusion

There is now a change underway in the standard of care when treating patients’ dental needs. Dr. Ed Zinnman, a California attorney representing plaintiffs in dental malpractice cases, stated in one publication that he considered MID to be “the standard of care.” Regardless of how one comes to accept MID, whether on your own or through education, the patient benefits from the concept. Every day, dentists face the options of what treatment to recommend for a given clinical condition. When those options are offered to patients with sufficient explanation, they usually prefer the least invasive procedure. The long-term treatment outcome can also be measured vis-à-vis the extent of invasion. Less invasive procedures generally would seem to provide for a greater degree of predictability. On the other hand, it should be incumbent on each practitioner to know the expected outcome for any procedure, however invasive it may be.

摘要

“医生，我必须得拔掉这颗牙吗？”“我必须得安牙冠吗？
我宁可不要像上次那样拔掉牙齿。”“我痛恨只是为了换一颗牙齿就把我的漂亮的牙齿糟蹋了。”很可能所有这些评论你都听过很多遍了。
每一次，都需就该当推荐哪种治疗做出决定。
每位牙医都周期性地实践过最小侵害牙医（MID），通过“少做”来获取好的效果。
问题是，你是否在每个牙科程序上都考虑要最小侵害？
少是否即是多？
是否每颗经过牙髓治疗的牙齿都需安牙冠？
是否所有6-7-mm的牙周袋都需要手术？
什么时候薄瓷贴面比磨牙矫正更合适？
更小是否总是更好？
这些问题让我们每日思考我们究竟应该怎样从事牙科医疗。
在篇文章中，我希望指出一些适用于向MID转变的方法。
列举的每一个个例都可能本使用了其它方法治疗。
然而，在每一个案例中，都选择了最小侵害的方法。
考虑一下你自己进行牙科护理的方法。看一看你是否可以通过侵入更少来保存更多。

Resumen

“Doctor, ¿tengo que perder el diente?” “¿Necesito una corona? Preferiría no rebajar el diente como la última vez.” “Detesto que mis dientes buenos sean reducidos sólo para reemplazar un diente.” Probablemente haya escuchado varias veces cada uno de estos comentarios. En cada
caso, se tuvo que tomar una decisión sobre el tratamiento a recomendar. Todo dentista ha practicado periódicamente la odontología mínimamente invasiva (MID) al hacer “menos” para obtener un buen resultado. La pregunta es, ¿considera usted que es menos invasiva en cada procedimiento dental? ¿Es menos ‘más’? ¿Debería todo diente tratado endodónticamente recibir una corona? ¿Se necesita operar toda bolsa dentaria de 6- a 7-mm? ¿Cuándo son las veneers más apropiadas que la ortodoncia? ¿Es lo más chico siempre mejor? Estas preguntas nos llevan a pensar a diario sobre cómo vamos a practicar la odontología. En este artículo quisiera llamar la atención sobre algunos de los planteamientos que se prestan a un enfoque cambiante sobre la MID. Cada uno de los casos presentados se podría haber tratado de manera distinta. Sin embargo, en cada caso se seleccionó el procedimiento menos invasivo. Considere su propio planteamiento hacia el cuidado dental y vea si puede preservar más al invadir menos. Publicado primero en Dent Today 2004; 23: 56-61.

References

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