

# Hand Instrumentation

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At the initial meeting of the Academy of Operative Dentistry in February 1972, David Granger posed a question during his keynote address titled “What are you Operative Dentistry?” That is a question that continually requires a response of those who provide clinical operative treatment.

Part of the response is anchored in the constant need to demonstrate excellence with each of the options a clinician selects as treatment. Materials needed for treatment are to be used as recommended by the manufacturer and according to good clinical practices taught during dental school training. Long term results are dependent on the affinity of the restoring materials as related to the preparation walls of the teeth.

A clinician must give careful attention to the design and execution of all tooth preparations. These preparations must reflect the details and fineness which will lead to long term stability of the restorations. G V Black presented our initial designs for tooth preparations employing restorative materials of his time. Through the years the design of these preparations has been modified to take advantage of the improvement in dental materials as well as the change and upgrading of our dental knowledge. Newer materials, such as resin based composites and improved ceramics have been introduced since GV Black’s time, but the need for caries removal will continue to be the reason for cavity preparation. As a result of this research the materials should reflect improved convenience and also an enhanced longevity.

The improvement of dental materials is highly appreciated but, according to retrospective studies and insurance data, the clinical restorations are not maintaining the desired level of longevity. The replacement of restorations occurs at a frequency greater than one should expect with improved materials and knowledge.

The bottom line is that clinical success and longevity are intimately related to the skill and attention to detail of the operator. When high speed handpieces were fully established as the optimum method of cutting dental tissues, the attention to the state of the enamel at the interproximal cavo-surface took on less importance. Unfortunately, the burs have definite limitations in providing acceptable cavo-surface margins. This is a continuing concern of restorative clinicians.

Clinical researchers have observed that burs at high speed left enamel in unsatisfactory condition, particularly at the interproximal margins. (1–5) A variety of options have been proposed to minimize this problem, including variations in bur design and the use of discs and hand instrumentation.

The creation of smooth enamel is very compelling, and it is helpful if clinicians do their best to think and visualize at a microscopic level.

If a practitioner attempts to complete conservative interproximal preparations exclusively with use of high speed burs, it can easily cause injury to the adjoining tooth. In a conservative interproximal preparation there is no space for a bur to function without the risk of damage to the adjacent tooth. Some have estimated as high as 60% of adjacent teeth are marred during interproximal tooth prepa-

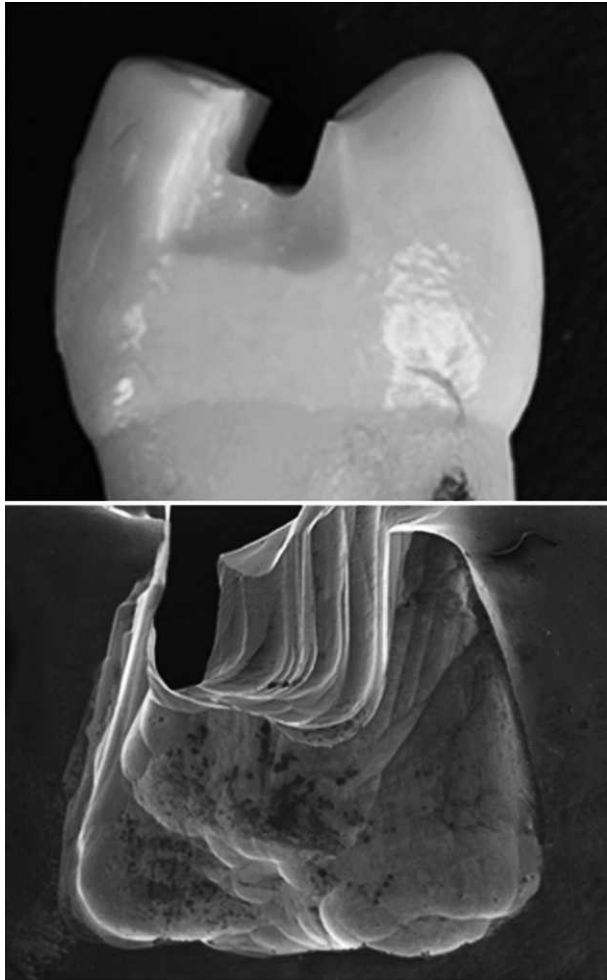


Figure 1. Mesial of bicuspid prepared with rotary instruments only: a) natural tooth b) preparation magnified 35X.

ration in the posterior sections. The normal action of a bur at high speed, as it cuts the cavo-surface of interproximal enamel also leaves the enamel microscopically irregular. This must be corrected by the use of hand instrumentation to provide smooth cavo-surface margins. The facial lingual and gingival margins, especially with amalgam and cast restoration, require a smooth finish to receive the materials used for the restorations. The only way this can be done adequately is by the careful use of hand instruments used in a planeing or scraping action.

To be effective clinically, these instruments must be maintained at the highest level of sharpness. A carbon steel instrument will stay sharp longer than a stainless steel instrument but they are very subject to corrosion when subjected to autoclave sterilization.<sup>(6)</sup> This can be minimized by using dry heat sterilization (the turnaround time is increased) or

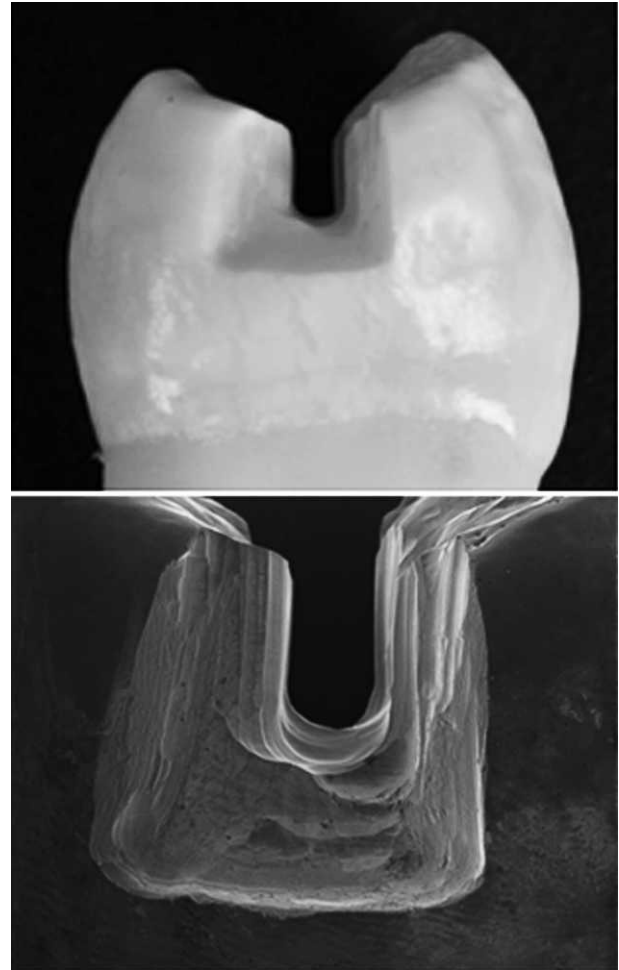


Figure 2. Mesial of bicuspid prepared with rotary and hand instruments: a) natural tooth, b) preparation magnified 35X.

chemical sterilization that requires ventilation to the external environment

Hand instruments are expected to require frequent resharpening. This involves using a high quality sharpening stone that may be stationary or revolving. As far as possible, the sharpening process is directed against the cutting edge of the instrument.

Several researchers have explored the action of high speed dental burs on enamel and have provided photographic evidence indicating less than perfect margins. To gain additional information we placed natural teeth in a controlled manikin setting in an ideal proximal contact relationship. Using the best clinical skill possible, interproximal preparations were made on the lower posterior teeth. These preparations, by design, were made using a 330 bur only (Figure 1) or a 330 bur plus hand instrument finishing (Figure 2). The SEM prepara-

tions were photographed at 35X. The preparations formed exclusively by burs provided microscopic irregularities that would leave a restoration with less than ideal margins. The irregularities were markedly reduced when a sharp hand instrument was applied to margins. This reinforces the fact that hand instrumentation contributes in a positive manner to the improvement of our restorative preparations.

When concerned with the details of operative preparations, visual acuity is mandatory. Thus it is helpful to use rubber dam isolation, which is a traditional recommendation for the operative discipline. This has a positive impact on both our vision and access to our margins. It also is very helpful in maintaining the sensitive physical and chemical requirements of our restorative materials.

Our opening paragraph contained a question asking us to reflect on our identity. G. V. Black let it be known that we are to function in the role of being continual students of our discipline. Many years ago Peter K. Thomas would make the statement "If you have it on the shelf, you can

deliver". Thus, the question is best answered by those who are willing to develop clinical skills and enhance their knowledge level, so as to solve our clinical challenges.

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