

## Are electric handpieces an improvement?

The high-speed air-rotor handpiece has been the most significant advancement in dentistry during my career. I was just entering private practice when they were introduced, and they were such a phenomenal change from the belt-driven handpieces I had used previously that my acceptance of them was immediate. The first high-speed air-rotor handpieces had only one speed—the top speed. In spite of this handicap, the concept caught on immediately, and dentistry would never go back to the low-speed handpieces of the past for gross tooth reduction.

The handpiece concept that had gained popularity just before the air-rotor handpiece was introduced was the high-speed belt-driven mechanical handpiece. These handpieces were highly superior to their lower-speed predecessors, but they required high maintenance, were noisy and had so much torque that when a cotton roll was caught in the bur, it took several seconds to stop the bur and calm the patient and the dentist.

The original air-abrasion units were introduced around 1960, and confusion about the best way to cut tooth structure reigned for a few years until the air-rotor handpiece took over completely for gross reduction of

teeth. In the mid-1960s, some low-speed electric handpieces entered the market and were popular for a few years, but the major tooth-cutting concept used in the American dental profession has remained the high-speed air-rotor handpiece.

Low-speed electric handpieces have made a significant impact in American endodontic therapy during the past few decades. However, in spite of their popularity in other parts of the world, high-speed electric handpieces have been unable to achieve a significant market share in America.

Is now the time to consider this tooth-cutting concept? Current advertisements in most of the journals seem to agree: the answer is yes.

In this article, I discuss the advantages and disadvantages of the current generation of high-speed air-rotor handpieces, compare electric high-speed and air-rotor handpieces, and make suggestions about the best handpiece concept for 2002.

### ADVANTAGES AND DISADVANTAGES OF AIR-ROTOR HANDPIECES

Air-rotor handpieces have the following advantages:

- they remove tooth structure rapidly;
- they require only a light touch;
- when used correctly, they

cause minimal trauma to tooth structure;

- they have low torque, reducing the danger that arises when burs are caught in tissue or other objects;
- they are moderately resistant to damage caused by current sterilization techniques;
- they are relatively easy to repair.

Air-rotor handpieces have the following disadvantages:

- they have poor concentricity after a relatively short period of use;
- they have a high-pitched, loud noise;
- they need repair frequently;
- the lighting on some brands degenerates after only a few sterilizations;
- the swivel stiffens after a moderate period of use;
- their torque degenerates after a relatively short period of use;
- they are expensive.

Most dentists are relatively satisfied with high-speed air-rotor handpieces, but they see the need for some changes, most of which I outlined in a previous JADA column.<sup>1</sup> It appears there is no need for revolutionary changes in the gross tooth-cutting concept. When considering a change to high-speed electric handpieces, one must consider the apparent advantages to be gained by moving to an entirely new concept. What are the advantages and disad-

vantages of high-speed electric handpieces?

### ADVANTAGES AND DISADVANTAGES OF ELECTRIC HIGH-SPEED HANDPIECES

Electric handpieces have been used for years in several parts of the world. Their advantages are well-known:

- they have high torque with very little stalling;
- they are quiet, with a reduced potential for hearing damage and a less irritating sound for patients;
- they offer low levels of vibration and smooth operation;
- they provide precision cutting with high concentricity;
- one electric motor runs several handpiece attachments, including a high-speed contrangle, a straight handpiece, an endodontic handpiece and a general low-speed handpiece;
- low-speed attachments for the electric motor allow for easy cutting of dentures, temporary resin restorations, orthodontic appliances, occlusal splints, plaster or stone.

The disadvantages of high-speed electric handpieces may not be as well-known:

- they are expensive, and the expense is a significant consideration when equipping multiple operatories;
- the heads on the contrangles are comparatively large;
- they are heavy compared with high-speed air-rotor handpieces;
- because of their high torque, the dentist inadvertently may place excessive load on a tooth during cutting;
- a learning period is required

to change from air-rotor to high-speed electric handpieces;

- infection control measures must be observed carefully to avoid damaging the handpiece with repeated sterilizations.

### SHOULD YOU CHANGE FROM AIR-ROTOR TO ELECTRIC HANDPIECES?

About 10 years ago, I converted my office to allow use of high-speed electric handpieces. After an initial learning period, it became evident that the handpieces did have the desirable characteristics that have been listed above. I immediately observed positive clinical characteristics such as low noise, precision, high-torque cutting, improved tooth preparations and absence of the air-rotor whine. However, I missed the gentle, low-torque, almost load-free cutting of an air-rotor. I found myself using the electric handpiece when I was finishing a tooth preparation that I knew would be observed by another dentist or if I had to show the tooth preparation in a course or video, because the tooth preparation would be smoother and more precise when cut with the electric handpiece. The clinical procedure was not any shorter when using a high-speed electric handpiece than when using an air-rotor handpiece.

Importantly, the electric low-speed attachments soon became indispensable equipment. Since the introduction of electric handpieces in our office, we have accepted the low-speed versions completely. Today we still use electric low-speed straight handpieces for trimming any hard substance such as dentures,



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temporary resin restorations, orthodontic appliances, occlusal splints, plaster or stone. I believe that the low-speed attachment should provide up to 40,000 rotations per minute to be effective.

Low-speed electric handpieces are a

major improvement over air-driven handpieces. On the other hand, high-speed electric handpieces do offer the advantages promoted for them, but at significant expense.

### CONCLUSION

Low-speed electric handpieces are a significant improvement over low-speed air-driven handpieces, and they have replaced their air-driven predecessors in our office. High-speed electric handpieces offer some distinct advantages over air-rotor handpieces, but these advantages are less impressive than those observed with low-speed electric handpieces vs. air-rotor handpieces. For some practitioners, these handpieces will replace air-rotor handpieces. ■

The views expressed are those of the author and do not necessarily reflect the opinions or official policies of the American Dental Association.

Educational information on topics discussed by Dr. Christensen in this article is available through Practical Clinical Courses and can be obtained by calling 1-800-223-6569.

1. Christensen GJ. The high-speed handpiece dilemma. JADA 1999;130:1494-6.