

Focus On Your Future: Effective Use of Magnification in Dental Hygiene

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Magnification systems are not new to dentistry, but they are quickly becoming the standard for dental hygienists. Although dental offices have used some type of magnification for decades, dental professionals have only recently begun to consider the benefits magnification can bring to dental hygiene practice. The visual aspects of magnification may appear to be the primary benefit, but we also should consider significant ergonomic and clinical issues improved by using loupes.

Effective magnification with quality surgical loupes enhances vision and can reduce the risks of musculoskeletal discomfort and pain that often accompanies dental hygiene clinical practice.¹ Improved ergonomic posture resulting from wearing loupes may help to extend your career. Also, the use of magnification has the potential to increase the quality of dental hygiene clinical care.²

When we understand the benefits associated with magnification, we can evaluate the features that comprise a quality loupe system. As with any substantial investment, we must obtain knowledge about the product to make an educated decision.

Single-Lens Magnification

Single-lens magnification was the only form of readily available visual enhancement. Although a single lens may increase the image size, it does not lend itself to providing an adequate working distance.³ Single-lens magnifiers have virtually no depth of field, an inflexible working distance, and poor image resolution.¹ New magnification technology has now given us the ability to move beyond single-lens magnification.

Flip-Up vs Through-the-Lens Loupes

There are 2 different types of loupes available—through-the-lens (TTL) and flip-up. Many articles have outlined the advantages and disadvantages of both, but it is important to evaluate them based on the design best suited for dental hygiene clinicians.⁴ Dental hygienists are constantly moving around

the patient chair and positioning may change several times. Therefore, a versatile design is critical to our needs (Tables 1 and 2).

Consider the *angle of declination*—the angle from your eyes to the patient's mouth—provided by a loupe. The proper angle of declination allows you to work from an ergonomically correct position. If the declination angle is not matched to your musculoskeletal needs and positioning, along with the patient's positioning, you may experience eye-strain and/or muscle strain in your head, neck, back, and shoulders (Figures 1 and 2).

Surgical loupes with a flexible angle of declination (flip-ups) can help promote your optimum positioning; fixed surgical loupes (TTL) can lock you into an uncomfortable position leading to pain or exacerbate the pain and discomfort you already feel.^{4,5} TTL designs fix the angle in a single position, thereby eliminating adjustment for varying patient procedures and positioning or when ergonomics are altered.

Flip-up design loupes offer an adaptable hinge mechanism that provides a wide range of angles that can be changed easily while working, which is vital to dental hygienists because it is necessary to shift patient and/or operator positioning many times during a treatment. Based on 20 years of clinical experience, we understand that there are certain health-related causes whereby patients are not able to recline at the same angle. Rather than move our head and neck to accommodate different patient and operator positioning, the flip-up design makes it simple to adjust the hinge mechanism and maintain an ergonomically sound position, thereby decreasing neck, shoulder, and back strain. Ultimately, this increases the longevity of our career. For dental hygiene students, this lets them learn about instrumentation with good posture habits from the beginning.

A corrective prescription can be placed in either loupe type. When your prescription changes, you also need to change the prescription in your loupes. With TTL, you must return your loupes (at

a considerable cost) to the manufacturer for the prescription change and remounting of the barrels. This process can take up to 3 weeks. The flexibility of the flip-up design allows you the convenience of dropping these off at your local optician. Most opticians can now replace prescription lenses in an hour. The cost to change a prescription lens in the flip-up design is limited to the corrective lens because the barrels do not require replacement.

People who wear bifocals can use loupes because these prescription lenses can be dropped into most frame designs. Bifocals should be placed in a flat top or executive-cut configuration so that vision through the loupe is not distorted.

Evaluating Loupe Features

Clarity

Clarity or resolution is directly related to the quality of the optic. Not all lenses for surgical loupes are created, ground, and inspected to the same levels of quality.² Image clarity should extend the entire width of the field with no fuzziness or dark shadows in the periphery of the field of view. You want to see a crystal clear image—a better image is not defined by just being larger. Poor lens quality can be detrimental to your vision.

Enhanced visualization increases your accuracy and effectiveness during patient assessment and treatment. No longer will you strain to see the probe readings, radiographic pathology, or the marginal integrity of crowns or restorations. Craze lines and fractures will be easier to detect as well.

Magnification will also enhance your instrument sharpening skills by allowing you to clearly see the sharpness of the blade edge. Sharp instruments increase the effectiveness of scaling and reduce operator fatigue.

Field of View

The field of view must be considered when evaluating an effective loupe because it represents the height and width of the area the clinician sees.⁶ There appears to be no formal standards for levels of magnification. On personal review of various optical loupes, we found that one company's 2.5x will look different from another's. Also, the higher the magnification, the smaller the field of view becomes. Our clinical assessment and treatment is much easier if we can visualize the entire mouth in the field of view, not just 1 or 2 teeth. We feel that a magnification of 2.5x is optimal for dental hygienists because it provides a high level of magnification while maintaining a large field of view.



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Figure 1—Proper posture provided by loupes. The back is straight; shoulders are in a relaxed, balanced position; forearms are parallel and level with patient's chin; and the clinician's neck and head are positioned comfortably upright with a slight forward head tilt.



Figure 2—The “hygiene hunch.” Without loupes, the clinician must lean over and into the patient, causing significant strain on the back, neck, and shoulders. The clinician's arms cannot be lowered to a comfortable parallel position.

Some manufacturers make 2.5x magnification loupes that let you visualize the entire mouth at one time.

Depth of Field

An adequate depth of field is critical for dental hygienists. Basically, the depth of field is the nearest and farthest distance from the surface of the eye to the object being observed while remaining in focus.⁵ Having an adequate and appropriate depth of field is important because it will affect your ability to work effectively and comfortably from all positions.

This range of focus varies depending on the loupe and the clinician, so it is ideal to evaluate your working distance and depth of field in your clinical setting. Most loupe companies offer a trial period for this purpose.

The Loupe Learning Curve

After evaluating loupe features, set aside time to learn how to use them.

After years of practice, it can be difficult to break bad posture habits or incorporate a whole new piece of technology, but that is not a good justification for delaying the purchase of loupes. Students may adapt more quickly because everything is new to them. The best advice for all clinicians is to be patient and slowly implement loupe usage.

The head strap is an often-ignored accessory. Whether you choose a flip-up design or a TTL, always tighten the head strap first because it will distribute the weight evenly over your entire head. It also will stabilize the loupes so that they will not move. Nosepieces are interchangeable, so if one does not fit well, visit your local optician to check out other options. It

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Table 1—Through-the-Lens (TTL) Loupes: Advantages and Disadvantages

Advantages	Disadvantages
Slightly lighter weight.	Cannot move loupe from line of vision.
Customized declination angle and working distance.	Angle of declination not adjustable to accommodate different operator and patient positioning.
	More expensive to purchase and maintain.
	Must be returned to manufacturer, at considerable cost, for prescription changes.

Table 2—Flip-up Loupes: Advantages and Disadvantages

Advantages	Disadvantages
Lightweight, self-adjusting and easy to use.	Slight additional weight because of hinge.
Easier and more economical to replace prescription lenses.	
Can be less expensive than TTL.	
Angle of declination can be adjusted to accommodate different operator and patient positioning.	
Can easily flip up and out of line of vision, then back down for use.	

is our experience that some loupe wearers prefer a saddle type nosepiece that evenly distributes the weight on the nose; others are more comfortable in the standard 2-pad design.

Begin wearing the loupes for 20 to 30 minutes at a time. Initial exams are a great way to start. Use the loupes to probe and perform the oral exam, then take a break from the loupes to perform your scaling procedures. Replace the loupes at the end of the patient appointment to check your work. If you are wearing a TTL, this will be more difficult because you will need to switch back and forth between your loupes and another pair of safety glasses. With a flip-up design, you will only need to flip the loupes up and out of your line of vision.

Wear your loupes daily for 2 to 3 weeks until you have integrated magnification into your daily routine on a consistent basis. Some clinicians may be prone to motion sickness, but they can still wear loupes—it may just take a little longer to get used to them.

Clinicians may be concerned about becoming dependent on loupes, but actually, loupes decrease eye fatigue caused by focusing on a small area for 8 to 10 hours a day and increase our career longevity. We frequently receive feedback from dentists who are already wearing some form of magnification and are discovering lesions, deposits, or pathology that dental hygienists, who are not wear-

ing loupes, have missed or overlooked. Wouldn't our patients be best served if everyone on the dental team sees the same thing?

Proper Loupe Care

Proper care is essential in maintaining your investment. All loupe manufacturers have different warranties and cleaning standards, so check with your manufacturer's recommendations. Generally, loupes can be cleaned with a soft lens cloth—gauze and paper towels usually contain fibers that can scratch the optics—moistened with a disinfectant or 70% isopropyl alcohol. Submerging your loupes in water is not recommended because of the possibility of introducing moisture into the barrels.

Depending on the manufacturer, side shields, lens covers, and a head strap may be provided with the initial magnification kit. These items are removable so that you can spray and wipe them down with a disinfectant.

Paddles are used to flip the loupe barrels up and down on flip-up loupes without touching the barrels with your gloved hands. These removable paddles are attached to the center of the barrels, provide an effective solution for preventing cross-contamination, and are easily disinfected.

If you are not practicing with a face shield, which can be used with surgical loupes, side shields and lens covers should be worn at all times.

Side shields are a protective measure for the operator while the lens covers serve as protection for the optics. These covers, which can be easily removed and disinfected, prevent scratching of the optics by flying debris such as calculus, prophy paste, or aerosols from a prophy jet. Most companies provide a storage kit.

Incorporating Loupes into Dental Hygiene Curriculum

Many dental hygiene schools are now requiring surgical loupes for their students. This forward-thinking concept allows students to incorporate magnification while they are learning instrumentation skills. They develop good ergonomic posture and do not have to unlearn bad posture habits. The enhanced vision translates into improved patient care. Students can perform more thorough and accurate exams, clearly read probes, and sharpen instruments with excellent precision.

Wearing loupes will make a long-term difference for the students in their dental hygiene practice. Research highlights the need for ergonomics education for dental hygiene students and a redesign of the instruments and working environment of dental hygienists.⁷ Having worked with dental board examiners nationwide, we know that most are now wearing surgical loupes. By working with magnification from the beginning, students can approach clinical boards with the confidence of enhanced vision.

What's Blocking Your Vision?

Loupes may be the most important investment in your dental hygiene armamentarium because of the reduced strain on your eyes, decreased fatigue at the end of the day, improved ergonomic posture, and career longevity. However, many reasons have been cited for not wearing loupes, such as:

- “My vision is fine. I'm still young, so I don't need loupes yet.”

Vision is not the only benefit of loupes. As stated earlier, loupes provide important ergonomic benefits to all dental professionals. Your focus should be on preserving your health for a long and fulfilling career. Magnification makes this possible. Even people with 20/20 vision will benefit from enhanced vision and improved ergonomics.

- “Patients won't understand. They might think I can't see well.”

Your vision will be more accurate with loupes, so discuss all the benefits

with your patients and give a loupe demonstration for them. Because dentists have been wearing loupes for years, this won't be a new thing for most patients. Many patients view loupes as a part of your professionalism.

- “I work in a pediatric dental office. I'm afraid the loupes will scare my patients.”

Children perceive fear when faced with the unknown, so provide an explanation of your loupes just as you would with typical dental procedures. We make up interesting names for the saliva ejector, prophy cup, and fluoride trays. Children will love to hear your explanation about your new “magic glasses” or “space spectacles.” Make a game out of it. Children's primary dentition can be much harder to view than adult mouths and magnification will enhance your ability to detect anomalies in those small teeth.

- “I can't afford them and my employer won't purchase them for me.”

Magnification loupes are definitely an investment, so look for a loupe that is flexible and easily maintained. A loupe system is more of a personal item rather than shared property, so most dental hygienists purchase their own magnification loupes. Based on the length of your career, purchasing loupes is a small price to pay for visual acuity and ergonomic benefits. As dental professionals, we have accepted the responsibility of taking care of our patients to the best of our ability. Taking care of our own health to ensure this commitment seems only logical. Consider your purchase a personal responsibility that benefits you and your patients.

Conclusion

Magnification use by dental hygienists is becoming a standard of care for patients and a proven resource that can enhance your visual acuity, improve your ergonomics, and extend your career. Research the type of surgical loupe that suits you the best. Top-quality optics, flexibility of the declination angle, a wide field of vision, and an extended depth of field are important features. Your patient care, your health, and your ability to perform clinical dental hygiene for years to come may depend on your decision to incorporate surgical magnification into your practice. **COH**

Disclosure

The authors are employees of SheerVision.

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