

Another Look at Magnification



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Outside the loupe, teeth are small

Much of what it takes to fix them may well be considered microsurgery. Our cutting instruments are even smaller. Moreover, teeth reside in a deep, dark recess that resists illumination of the areas that we are most often called upon to repair. Still, many of our colleagues (as many as 50% according to a recent industry report), don't use telescopic loupes or headlights as they work. To be sure, the use of magnification is on the rise. Dental schools are now including the use of such eyewear in their teaching programs. Yet there remains a large contingent of our dental profession (including dental hygienists) who remain "outside the loupe." Convinced that they are seeing the whole picture, many dentists still practice without the aid of magnification—astounding!

I still recall the day in 1984 at the Yankee Dental Congress in Boston, when I was waved over to what was then, the Advanced Dental Concepts booth. I was introduced to an unstylish looking pair of 2x, tortoise shell framed loupes. Upon examining their mannequin's ivory pearls through the strange telescopes, I fell in love with the concept of seeing everything better than the naked eye. It's been a torrid affair ever since.



Fig. 1: Orascoptic scopes side by side along with Zeon Illuminator fiber-optic light system



Fig. 2: Dimension-3™ (Galilean) TTL with headlight attached



Fig. 3: EyeMax™ flip-ups

In preparing this article, I enlisted the help of Orascoptic Research, the modern day descendant of Advanced Dental Concepts (and now a member of the SybronKerr family). Orascoptic Research, founded by Charles H. Caplan, DDS in 1981, specializes in the manufacturing of dental operating telescopes and operating chairs with arms (The BodyGuard). They also manufacture the Zeon fiber-optic light source. When combined, the chair, light and appropriately fitted loupes, empower the enlightened dentist to perform at peak capacity while at the same time preserving their fragile back and neck muscles. Orascoptic's philosophies stem from an appreciation of the ergonomic delivery of dentistry. Dentistry delivered with the practitioner in an upright, comfortable position, can provide a magnified, clear view of the working field; thus minimizing body and eyestrain, while being able to perform the daily micro tasks.

Having nursed along an older generation set of Orascoptic Loupes and Zeon Light for many years, I was pleased to have an opportunity to sample three of their latest entries (see figures 1, 2, and 3). In addition to the new and improved Zeon light, I sampled a pair of their Dimension-3 (Galilean) Through-the-Lens (TTL) 2.5x loupes as well as a set of flip up 4.3x EyeMax telescopes, said to be "prismatic" magnifiers. After using the 2.5 TTL set for several months, I received the EyeMax set. I owned a BodyGuard chair for several years but didn't take full advantage of its benefits until donning the EyeMax loupes. I'll discuss this in greater detail later.

After sampling both the TTL system in one set of lower magnification loupes and a much higher magnification than I was accustomed to, the strengths and weaknesses of both became evident.

Dimension-3 Galilean TTL loupes

Orascoptic's Galilean TTL loupes provide two distinct advantages. When worn in a consistent position, the operator is afforded the same view, time after time. The TTL loupes will always have the same view; and owing to the magnifying lenses' closer proximity to the user's eye, the field of view is expanded. There is also less weight on the bridge of the nose since the mounting assembly is absent. This results in a less obtrusive appearance of the eyewear.

On the "flip side," TTLs make it hard to converse with a patient without removing the glasses from your face. It's hard to see around the scopes since you can't flip them out of the way. I found myself removing them and letting them dangle on my neck when talking with patients, taking shades or digital photographs. If the TTLs don't come back from the manufacturer adjusted properly for your eyes or your new glasses' prescription, it's back to the shop since they are non-adjustable.

The most notable concern regarding the purchase of a TTL set has to do with what's called the angle of declination. Simply put, this variable determines how much head tilt you will need to employ in order to work comfortably. Experts have noted that a head tilt of between 25 and 32 degrees is considered neutral and should be comfortable.

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Fig. 4: Note the upright posture using EyeMax loupes with the BodyGuard chair system

Exceeding this angle can lead to poor neck posture with resultant neck pain. The angle of declination is ultimately determined by the operator's working posture and where they habitually position their patient. Due to the fixed nature of the TTL systems, it's important to accurately determine the value that will make you comfortable. Thus, professional hands-on intervention, by a skilled technician is a must when making a purchase decision. **DO NOT** order via mail or the Internet. **BE FITTED PROPERLY!** Fortunately, my Orascope set was dead on.

The "always in focus" aspects of the TTL as well as the relative unobtrusiveness of the TTL systems may very well appeal to those willing to sacrifice adjustability.

Flip-Ups

The benefits are obvious—pop them out of the way and you can resume normal vision and they ARE adjustable. If you don't like the settings when they arrive from the manufacturer, you can tweak them until you find your sweet spot. However, as mentioned above, flips-ups are more apt to get out of whack as hinge screws loosen or if the lenses are inadvertently bumped. The "movable" nature of such scopes CAN be significantly reduced by tightening several screws, in essence rendering the scopes "fixed" in nature. I preferred the ability to easily make eye

contact with my patients by simply nudging the scopes skyward.

One other technical note, you should know there are two types of flip-up telescopes. Traditional flip-up scopes have a single or double hinge that enables movement up and down. A newer design has both double hinges and a vertical adjustment. The addition of the vertical adjustment allows for a wider range of declination adjustment (remember...the look down angle). The EyeMax set I tested featured this expanded adjustability.

When making your selection, keep in mind there are trade offs between the simplicity of the TTL against the versatility and adjustability of the flip-up. You will need to decide which qualities are the most beneficial to you.

Power Up:

Moving from a 2.0x to a 2.5x magnification was an easy transition. The change was subtle. The most noticeable advantage of the TTL 2.5x was the wider and brighter field of vision. It really wasn't peaches and cream when I first used the 4.3x EyeMax loupes. They arrived slightly out of alignment and as a result I began seeing double. After spending a few frustrating days with the EyeMax, I decided to back up and spend some time with the well-illustrated adjustment pamphlet that came

with the EyeMax. During a "Eureka moment," I dialed in a single image. My advice, read the book first!

The next morning, as I gazed down at #30 with the newly adjusted loupes, the familiar phrase, "oh...now I get it..." came to mind and quickly turned into "holy cow"! After 24 years of practice, I saw a Class II cavity prep for the first time up close and personal. It was unnecessary to guess where the spinning carbide needed to be restrained while breaking contact because feel wasn't an issue now. I could see EXACTLY where the circumference of the now "huge" spinning carbide was about to engage. Dodging tissue as well as the adjacent bicuspid was accomplished with newfound ease; while sitting dead straight up in my BodyGuard chair. Damn! This was what they meant by 'ergonomic delivery' of dentistry. My assistant looked puzzled as I smiled like a kid in a candy shop, though nothing had been said. My dental abilities had just changed dramatically; for the better!

This brings us to the issue of working distance and posture. Unlike the 2.5x system, that found me leaning in slightly to better visualize the field, the 4.3x system literally forced me to sit back and upright owing to the working distance that I had chosen and the reduced depth of field inherent to the 4.3x system. The depth of field (thought of as the difference between the extremes, close and far, of the working range) while more than adequate, is much less with the 4.3x magnification than the 2.5x. To remain in focus, one MUST sit back. In some respects, with the supporting arms of the BodyGuard chair, the comfort is like that of an easy chair. When I looked over the loupes, sans 4.3x magnification, I had to laugh at how far away I was and how small everything looked. The visual enhancements must be experienced to be appreciated. It really comes home when prepping the maxillary second molar. Imagine doing this in an upright position, distanced from the patient by nearly two feet. My back is far less fatigued at the end of the day because less bending equates to less pain and fatigue. It would seem entirely plausible that the busy practitioner might extend his career simply by practicing ergonomically (See Fig. 4).

Making the transition

Certainly, there is a transition when working under increased magnification. As your field

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of view is much reduced, you won't see your arms or your entire hands; just fingers. At first, I found it necessary to peak over the loupes when positioning my hands to work. Failing to do this will result in bumping into noses, chins, incisors, etc. After a few days, I was able to skip that and land safely on target. I still approach the mouth slowly, just in case I'm off line. Additionally, motions by your head and the patient's head are magnified so you need to remain fairly still so you don't jostle the field of view. Again, this does not pose a lasting problem.

I also noticed that my perception of size needed adjustment; that is, a millimeter now looked like two or three millimeters. The result was a tendency to under reduce crown preps; particularly in the occlusal plain. Again, a brief learning curve reversed this trend. I'm still getting used to a 330 carbide looking like an oversized gross reduction instrument. It's a heady feeling.

Difficult to wear all day long, I currently reserve the 4.3x for intricate procedures such as crown and cavity preps and endodontics. The 2.5x are wonderful when the big picture is desired.

Can you say "Coaxial Lighting"?

This experience is not complete until you've donned a head light. In fact, higher power telescopes literally demand it. (The longer focal length reduces the light reaching your eyes). Coaxial lighting simply refers to a light source that will always remain in line with the telescope's, and the operator's line of sight. No longer relying upon my operatory light for proper illumination is a pleasure. The Orascoptic supplied Zeon Illuminator provides up to 4,400 foot-candles (47,359 Lux) of intense, shadowless, fiber-optic light in a tidy package. Having owned its forerunner, I was pleased to find all of my past objections had been addressed. The standard halogen bulb lasted nearly two months before needing replacement and when it was time for a replacement, a convenient pop out bulb compartment streamlined the process.

The docking mechanism has also been improved and now enables easy docking and undocking. I appreciate both a variable iris and voltage control that allows me to tune in the illumination to a comfortable level with respect to the color and intensity of the light. Even the cooling fan had been silenced.

When teamed up with the right set of loupes, the Zeon Illuminator even makes the fiber-optics in your handpiece redundant. The soon forgotten inconvenience of having to connect and disconnect from the light source was more than outweighed by the advantages of operating with brilliant illumination at all times. Once the Zeon or similar is


- 2.5x compound loupe
- European style frame with plano lenses
- Fully lined wooden box
- Side shields
- Safety croaky strap
- Flip paddle
- Lens cloth
- Protective lens covers

experienced, your operatory light will seem primitive. Finally, don't be fooled into thinking that current day mobile, battery powered, light packs will equal what a fiber-optic light source will do. Having tried the best out there, I can comfortably tell you, that technology has yet to arrive. While serviceable, the level of illumination falls well short of that afforded by the fiber-optic source.

As one might guess, several companies offer head-lights similar to the Zeon Illuminator. Patrolling the floors of your next regional dental

meeting is the best way I know to sample the market.

Be All That You Can Be

Consider this brief report an impassioned plea for any "unenlightened" dentist to see the light (I couldn't resist). I contend that taking a different continuing ed course on a monthly basis for an entire year is much less likely to make you a better dentist than simply adapting magnification into your routine. Be sure that you are properly fitted and DO sample the various magnifications. Compare the various frame designs, nose pads and look down angles. You know what to look for now! Don't be afraid to consider purchasing two different magnifications; a 2.5x or 3.0x for tasks where the bigger picture is desirable (exams, occlusal adjustment, simpler restorative, hygiene) and the 4.x series for the tough stuff (preps of any kind and endo). The difference in how you operate and feel at the end of the day will be profound—I guarantee it! 

Dr. Marty Goldstein is a 1977 graduate of the University of Connecticut School of Dental Medicine and practices general dentistry in a group setting in Wolcott, Conn. He enjoys promoting the cosmetic side of his practice and has found it helpful to incorporate high-tech methodology into his daily routine to accomplish this. Dr. Goldstein has been published in many leading dental publications.

Marty can be contacted by email at: martyg924@cox.net or at his office at 203-879-4649. He is prepared to speak on both digital imaging in dentistry and on the use of high-tech methodology to further the cosmetic and restorative practice.

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