Endodontics as practiced by general practitioners has been evolving for thousands of years. Archaeologists have exhumed mummified corpses from tombs in Egypt, finding copper wire embedded in the canals of the corpses’ teeth. It is assumed these copper wires were heated and placed into a necrotic canal for some form of endodontic therapy. Imagine how good that must have felt!

In approximately 1848, Hill introduced gutta percha, which is a unique naturally occurring thermoplastic polymer produced from the leaves of the *palquim oblongifollum burck* plant in Malaysia and the Phillipines. This discovery gave dentists a material to put into the tooth that was sufficiently pliable and effective; however, as dentists began using gutta percha, they didn’t really understand why.

In recent decades, research has proven that gutta percha is an effective filling material for endodontic therapy, and newer modalities include warming gutta percha to increase pliability and mold-ability inside the canal.

In 1930, the “apical stop” technique came into existence where the dentist would stop at the apical end of the root. There was a definite sound with each vertical compaction. This eventually led to apical problems because dentists were inadvertently damaging the apex of the canal and causing microfractures.

In the 1970s, lateral condensation began to be popular, but problems surfaced with this technique as well. Basically, dentists placed gutta percha cones into the canal, compressed them and kept adding cones until there was no room left. The technique did nothing for lateral canals and led to endodontic failure.

Today, endodontic therapy techniques call for reduction of instrumentation inside the root of the tooth, trying to follow the anatomical shape on the interior of the canal, similar to the techniques used on the exterior surfaces of the tooth. Additionally, current endodontic technique involves using filling material to allow a true three-dimensional filling material. If the dentist keeps it small, there is no reason to unnecessarily enlarge the canal and add excess gutta percha.

With new and innovative instruments like the Waterlase YSGG laser, root canal treatment is on the rise. In 1960, there were approximately three million root canal treatments. In 1990, dentists and specialists were performing as many as 50 million root canal procedures each year. Now, there are probably close to 80 million root canal procedures each year. This has had a dramatic impact on dentists and the size of their available patient pool. In 1970, a huge proportion of the population had dentures. That number is much lower today. Dentists are able to see a greater number of patients with healthy, treatable teeth at a much older age in life.

With more conservative techniques on the rise in endodontic care and with precise clinical tools like the Waterlase YSGG laser at the center of the revolution, patients are seeing dramatic reductions in post-operative suffering, and far fewer endodontic failures.

I have personally completed over 50 endodontic cases with the Waterlase YSGG laser. Many of the cases allowed for comfortable completion without anesthetic. There are times—and dentists using the YSGG laser for endodontic treatment must learn this technique—patients still may require anesthetic. Certainly, the amount is reduced when compared to the amount needed in more aggressive endodontic therapy. But the reduced amount allows for faster recovery time for the patient, much higher levels of comfort. If a patient is comfortable after one root canal treatment, they could agree to more than one in the same visit, maximizing your time, and billable procedures.

**Case Study**

The following steps outline the process to complete an EndoLase therapy using the Waterlase. Please note that there are varying approaches to completing an EndoLase procedure, depending on personal technique. The steps, as outlined, demonstrate a basic method for the removal of necrotic and infected tissue from root canals (Fig. 1), and enlarging and tapering the canal as preparation for obturation.

**Preparing Access to the Pulp Chamber for Pulpotomy and Pulp Removal**

1. In most cases, there is no need to anesthetize the patient prior to conducting an endolap procedure. (There are circumstances from time to time where anesthetic is necessary.)
2. Initially, use the Waterlase with very little laser energy to desensitize the tooth. Use the 600µm endo laser tip to complete this first step, and also to condition the enamel for removal (Fig. 2).
3. Next, increase the laser energy slightly, together with the air and water spray, to start to ablate the enamel and dentin until the pulp of the infected tooth is exposed (Fig. 3).
4. Once the pulp is exposed, perform a traditional pulpotomy using the Waterlase. Typically, this is a good point to check with...
the patient to see if they have felt any pain or discomfort. Usually, the patient is very comfortable and has no complaints about pain. (If they feel anything at this point, you may need to inject anesthetic directly into the pulp, which takes the pain away).

5. Continue with the procedure using the thinnest Waterlase endodontic fiber tip by gradually adding laser energy. Desensitize and ablate the infected pulpal tissue and dentin until there is clear access to the canal (Fig. 4).

Cleaning and Shaping the Canal with the Waterlase

1. Once access to the canal is gained, continue with the thinnest Waterlase endodontic fiber tip and work to about two-thirds of the length of the diseased canal.

2. At this point, determine the working length of the root with a #15 K file and either a digital or traditional periapical x-ray before proceeding (Fig. 5).

3. Usually, the patient has still not expressed any discomfort or pain. Continue the EndoLase procedure by cleaning and enlarging the middle-third and apical end of the canal.

4. Using a sequence of highly flexible Waterlase endodontic fiber tips (from thinnest to thickest), gradually increase the laser energy and continue to clean and shape the canal to achieve final preparation.

5. Use a series of measurements, starting with the #30 K file; determine if the canal is ready for obturation. If the #30 K file can easily reach the working length of the canal, and no debris or material impedes the insertion of the file, the canal is ready for obturation.

Canal Obturation

1. At this point, the gutta percha master cone should fit into the entire working length of the canal. If so, the canal is ready for sealing.

2. Use paper absorbing points to thoroughly swab the canal of any moisture, as a precautionary step.

3. Use EndoRez (or a comparable sealant material) to seal the canal. I also insert one gutta percha cone, which allows for a pathway for a post or re-treatment.

Remarkably, patients who received the EndoLase treatment had little or no discomfort during the entire procedure. Instead, they express satisfaction that they are leaving the office without any numbness.

Generally, using the Waterlase to complete an EndoLase procedure allows me to be very conservative in the treatment of the anatomy of the inside of the tooth. I can easily follow the anatomy that is already there and do not have to enlarge the canal any more than necessary. I have always been conservative during treatment of a tooth; now, I can be similarly conservative during endodontic treatments. The Waterlase allows for precise and clean removal of necrotic tissue, and has been fully integrated into my practice as the primary method of endodontic treatment.

Dr. James Jesse graduated Loma Linda University in Southern California in 1973. He has been running a private practice in Colton, California for the past 29 years. In addition to his busy practice, Dr. Jesse has returned to his Alma Mater, Loma Linda University as an assistant professor teaching applications of the YSGG laser dentistry and restorative dentistry. Dr. Jesse has been independently published in many scientific and dental trade journals, and has appeared at regional and national association meetings presenting on topics ranging from YSGG laser dentistry, endodontic technique, and microdentistry. Dr. Jesse is not affiliated with any dental manufacturers in any official capacity.

You can contact Biolase at: 888-424-6527 for additional information on the Waterlase and its many capabilities or send general inquiries by email to: dentists@biolase.com.

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