By Larry Burnett, DDS

There's a massive change occurring in the treatment of periodontal disease ... a shift in philosophy so profound that it will change the way hygienists and dentists treat their patients.

I teach periodontal therapy to hygienists and dentists. Six years ago my course consisted primarily of traditional hand-instrumentation technique. (Which curette to select. The proper way to hold it. How to minimize iatrogenic damage to the tooth and tissue.)

Today I still teach hand-instrumentation, but only as an adjunct to ultrasonic scaling. In my practice, in my courses, and increasingly in dental offices throughout the country, ultrasonics supplemented by antimicrobial therapy has become the nucleus of a new periodontal regimen.

The ultrasonic scaler has been around now for about 30 years. In most practices it's used (assuming it's used at all!) primarily for gross removal of supragingival calculus. That's a shame. Because new research suggests that the lowly ultrasonic scaler may be our most potent weapon against periodontal disease.

But first we have to “unlearn” much of what we know about ultrasonic scaling.

Oral hygiene is no longer the art of calculus removal.

As recently as the 1960’s we believed that periodontal disease was due primarily to irritation caused by rough calculus deposits.

We were wrong.

Periodontal disease is caused by pathogens. Bugs. It’s not caused by calculus ... or pockets ... or bony defects. If you focus on those bugs, you can often arrest severe periodontitis, without extractions or surgery. If you ignore the bugs, surgery generally won’t help ... at least not long term. (In fact, as you can see in Table 1, all the etiological factors normally cited as contributing to periodontal disease are pathogen-related.)

If you examine plaque from a healthy mouth under a phase-contrast microscope, you almost always see bacteria. That’s natural.

But at some point, certain types of bacteria may reach a critical mass and begin behaving in a very destructive manner.

If you examine plaque from an inflamed pocket, you usually see far more motile pathogens. Here, the balance between microflora and the patient’s immune system has been disturbed, and the microflora are winning.

If you disrupt the pathogens or reduce their number below the critical level, the immune system often reasserts itself. The patient stops deteriorating. The bone stops receding. And the tissue regains the firm, pink glow of health.

Putting calculus in perspective.

Today, everybody accepts the bacterial foundation of periodontal disease.

Yet many practices continue to treat patients as if calculus were the primary enemy. To some, calculus removal has become almost an obsession. In their attempt to create smooth roots, free of any deep accretions, they tear into the fragile periodontal ligament and vigorously scrape off tooth structure, creating countless cases of hypersensitivity.

Don’t misunderstand. I don’t mean to disparage well-intentioned attempts to remove subgingival calculus. Calculus provides sanctuary to the real villains (bacteria), so it certainly is a contributing factor in the progression of disease. But it’s one of many contributing factors. Fact is, periodontal health does not require cal-
calculus-free roots.

This is fortunate, because creating calculus-free roots is virtually a clinical impossibility.1,2,3

The new role of ultrasonics in periodontal therapy.

Ultrasonic scalers were developed back in the days when calculus was seen as the primary enemy. In the war against calculus, early ultrasonic scalers were like a bazooka ... powerful, but imprecise.

Experts cautioned against using the devices on regular maintenance patients who did not have gross supragingival deposits.4

Things have changed dramatically in the past few years. New superthin tips are now available that fit into deep pockets and small furcal areas where a standard curette is ineffective. Some manufacturers are now designing machines with a far wider power range, so they can create effective cavitation at the low power settings needed for subgingival use.

In my opinion (and that of a number of other researchers in periodontal therapy)5,6,7,8 ultrasonic scalers are now the preferred method for subgingival debridement. Research has shown that subgingival ultrasonic scaling not only removes calculus as well as (maybe better than!) traditional hand instrumentation, but that it also kills bacteria and reduces the level of endotoxins.

Ripping bacteria to shreds.

The water that flows through an ultrasonic scaler’s handpiece doesn’t just cool the tip ... it actually destroys bacteria.

Back in the early 70’s researchers noticed that an ultrasonic scaler’s cleaning ability dropped significantly when the waterflow was interrupted. They speculated that this was due to the irrigating effect of the water. The vibrating tip loosened the plaque ... the water washed it away. Sort of like using a hand scaler and Water-Pik® at the same time.9

Experts cautioned against using the devices on regular maintenance patients who did not have gross supragingival deposits.4

Things have changed dramatically in the past few years. New superthin tips are now available that fit into deep pockets and small furcal areas where a standard curette is ineffective. Some manufacturers are now designing machines with a far wider power range, so they can create effective cavitation at the low power settings needed for subgingival use.

In my opinion (and that of a number of other researchers in periodontal therapy)5,6,7,8 ultrasonic scalers are now the preferred method for subgingival debridement. Research has shown that subgingival ultrasonic scaling not only removes calculus as well as (maybe better than!) traditional hand instrumentation, but that it also kills bacteria and reduces the level of endotoxins.

Ultrasonic lavage destroys plaque far beyond the surface actually touched by the tip. When researchers compared the deplaqueing ability of the same tip with and without the cooling water, the water was found to enhance effectiveness by 500%.10

Take furcation involvements, for example. Research has shown that more than half the furcations (58%) are smaller than the smallest curette.11

Now how do you debride a surface manually, when you can’t even get a hand instrument in there (let alone activate the working tip at the proper angle)? The answer, of course, is you don’t use a hand instrument. You use your ultrasonic scaler fitted with one of the new superthin Perio tips. The tip slides into the furca, and the energy from ultrasonic streaming destroys the plaque.

Forget what you learned in school about ultrasonics and subgingival calculus.

Don’t kid yourself. No matter how good you are with a Gracey® curette, you’re not removing all the subgingival calculus. A recent study found that more than half the root surfaces that had been rigorously hand scaled (57%) still supported residual deposits.12

The belief that hand instrumentation is more effective than ultrasonic scaling in removing subgingival calculus is a myth.

It’s probably rooted in our Puritan work ethic. After all, how could anything as easy as ultrasonic scaling possibly be as effective as hand instrumentation? There is a subtle, unspoken belief that REAL HYGIENISTS actually prefer going home at the end of the day with fingers numb and arms aching. “Cavitron® Queen” is not generally used as a compliment.

But the truth is, if you use a thin periodontal tip that slides easily into pockets, ultrasonic...
scaling is every bit as effective in removing cal-
culus as hand instrumentation. And that’s not
just one person’s opinion. There’s a library of
supporting documentation.1,14,15

I subscribe to the Medline computerized
database, which allows me to quickly survey
thousands of scientific papers in hundreds of
journals. Since 1980, every published study that
has compared hand instrumentation to ultrason-
ic debridement has found either that there is no
difference in effectiveness ... or that ultrasonic
scaling has a slight edge. And, as I mentioned,
ultrasonic scaling wins hands down when debridng
class II and class III furcation areas.

Ultrasonics: Gentler to the
periodontal tissue.

The deeper the calculus, the harder it is to
remove with a curette and the greater the chance
of tissue damage.

Hand instrumentation isn’t a problem if
you’re working just 2 or 3 mm into a 5 mm
pocket. But what do you do if you’re attacking
calculus that’s 4 mm deep or (worse!) right at
the apex of the pocket? Since pockets taper, the
deeper you go, the less room there is for your
instrument. As you descend, it becomes harder
and harder to manipulate the curette without
damaging the sulcular epithelium.

It is impossible to remove calculus at the
bottom of a pocket using a hand instrument
without violating the periodontal attachment. It
cannot be done! (Illustration 2) That’s because
a curette must be placed apical to the deposit in
order to be effective.

An ultrasonic scaler breaks up calculus
using high-frequency vibrations. You never
apply pressure. Just a light tapping at the coro-
nal edge as you work your way down is gener-
ally all that’s necessary to disintegrate even
tenacious, old deposits.

In contrast to a curette (which works from
the bottom up), an ultrasonic tip works from
the top down, so there’s less chance of damaging
the tissue.

A number of studies have confirmed that
ultrasonic scaling is kind to soft tissues.16,17

After periodontal surgery, patients seem to heal
faster if the hygienist debrides with an ultrason-
ic scaler rather than hand instruments.1,14

After ultrasonic debridement, should
roots be planed?

Traditionally, we’ve planed roots for two
reasons: (1) To eliminate toxins and (2) to cre-
ate a smooth, glasslike surface.

It used to be common knowledge that
cementum absorbed bacterial endotoxins like
a sponge. It followed that the only way to restore
health to a diseased periodontium was to scrape
off this toxic reservoir. Cementum was the ton-
sils of the alveolar process.20

This ‘common knowledge’ was just flat
wrong.21

We now know that toxins are only superfi-
cially involved in the cementum. A number of
studies have shown that they are easily diluted
and rinsed off by the cavitation provided by an
ultrasonic tip. (In fact, root planing may actual-
ly increase complications due to endotoxins. As
it strips off the root’s protective cementum, root
planning exposes tubules and reduces dentin
thickness. This may increase the danger that
bacteria and their toxins will irritate the pulp.)

The second reason for planing was correct ...
but only partially. Cementum has an irregular
contour. Since plaque prefers rough surfaces,
we believed that planing off the cementum
would deny the plaque a happy home.

I’ve seen plenty of ceramic crowns just cov-
cered with plaque. Now you can’t get any more
“glasslike” than a ceramic crown, so obviously
bacteria will attach to a smooth surface.
Furthermore, we now know that regular subging-
ival ultrasonic debridement blasts plaque from
both smooth and rough surfaces.

Though a smooth surface may be somewhat
more hygienic, it’s hard to justify the hundreds
of thousands of cases of hypersensitivity we’ve
created over the past decades in our dedication
to “glass-like surfaces.”

While I often use a curette as an explorer
after ultrasonic scaling, I no longer plane roots
to achieve glassy dentinal surfaces. In my
opinion, this rigorous planing can be overtreat-
ment.

Subgingival calculus ...
a different beast.

Depending on the patient, supragingival cal-
culus can form in a matter of days.

But subgingival calculus is much more
delicate. Though I haven’t seen any studies
documenting the rate of deep calculus forma-
tion, it’s been my experience that accretions
take at least seven months to show up on the
radiograph.

The slow rate of subgingival calculus forma-
tion has some significant implications for the
periodontal maintenance program.

For one thing, it means that once you get the
root surfaces relatively clear of calculus, the
patient on a normal 3-to 6-month recall is
returning primarily for plaque removal ... not
calculus removal. The patient is in the chair not
for you to scrape the roots ... but for you to kill
bugs!

Of course you may discover a bit of old cal-
culus missed at earlier appointments. But at
each recall you should discover less ... because
new calculus doesn’t have time to form.

This makes the recall appointment more
effective too. Periodontal disease is episodic
and site-specific. When you don’t waste your
time scraping non-existent calculus, you can
spend more time looking for sites suffering
recurrence or reinfection.

Proper periodontal maintenance is much
more than simply scraping teeth every three
months. It’s an ongoing process that involves
continual diagnosis, prevention and treatment.
It includes subgingival deplaqueing to prevent
recurrence, as well as detection and treatment
of small flare-ups at specific sites. In my opin-
ion, the recall appointment is the most impor-
tant part of periodontal therapy.

Ultrasonics and the periodontal mainte-
nance program.

Ultrasonic scaling using the new probe-
like tips can make the recall appointment easier
and more effective. My primary instrument for
the maintenance appointment is an ultrasonic
scaler and several Perio inserts with fine tips
that slip deep into pockets and furcation areas.
(Traditional tips are far too big for this.)

I adjust the power way down, because low
power is all you need to wash away toxins and
destroy the bacterial cell walls. Then I lightly
run over all the root surfaces. At this low power
there isn’t much heat generated, so there’s no
need to anesthetize the patient. If I see some
localized bleeding, I look closer to see if there’s
a bit of residual calculus. If so, I either turn up
the power on the scaler, or switch to a hand
curette. In severe cases, particularly when the
patient is immuno-compromised, I combine
ultrasonic debridement with antimicrobial
agents ... but space is limited, so that’s the sub-
ject of another article.

The bottom line.

In too many practices “periodontal therapy”
consists largely of scraping roots with assorted
sharp instruments. This treatment is based on
the misconception that calculus is the ultimate
enemy in the war against gingivitis and peri-
odontitis. In our obsessive fixation on calculus,
we may forget that the real enemy is bacteria.

New research has shown that calculus-free
roots are not necessary for periodontal health,
and in fact, are impossible to achieve.

Exciting new developments in ultrasonic scalers and tips, have made subgingival ultrasonics the foundation of a modern, conservative approach to periodontal therapy.

Ultrasonic debridement is ...
1.) Highly effective in eliminating plaque and toxins, the causes of periodontal disease.
2.) Faster and at least as effective as hand scaling in removing deep calculus.
3.) Gentler to the soft tissue than hand scaling.
4.) More comfortable for the patient.
5.) And significantly less stressful for the dentist or hygienist.

If you’re using your ultrasonic scaler as an adjunct to hand instrumentation, you’ve got it backwards.

References: