The ultimate goal - clean canals

Michael Sultan discusses the challenges of getting root canals clean

Nowadays dentists have such a wide range of exciting gadgetry at their disposal to help prepare root canals quickly and easily that sometimes the biological focus of treatment is somehow overlooked.

Of course, the latest NiTi systems can certainly help improve efficiency in the surgery, but they don’t necessarily help us achieve our ultimate goal – clean root canals. Even if the post-treatment radiograph does reveal a beautiful shape, without fully disinfected canals, the treatment will fail.

When we look closely at the complex structure of the canal systems in cleared teeth it is immediately evident that it is impossible that our files can ever come close to cleaning the intricate shapes. It doesn’t matter which NiTi system we use or how cleverly we can manipulate a rigid stainless steel file – we are just deluding ourselves. For this reason, irrigants are the weapon of choice for eliminating bacteria that are harboured in the intricate channels of the root canal systems. The irrigants work in inflamed teeth by dissolving the organic pulp tissue and in infected teeth by killing and removing bacteria. This is further enhanced by opening up tubules and removing the smear layer using chelating agents. The files are merely making space for our irrigants to get in.

The importance of a rubber dam cannot be overestimated. The rubber dam is a brilliant tool to prevent the inhalation of files, protect the airways and maintain a clean, dry area in which to treat the patient. It is also vital for medico-legal reasons and moreover ensures that the irrigants stay in the tooth and are not swallowed. If a rubber dam is not being used the only thing the tooth is being irrigated with is probably saliva. Some studies have shown that the success rate of teeth treated under rubber dam is double those that are poorly isolated.

Sodium hypochlorite is the irrigant of choice for disinfected root canals. The solution works by dissolving pulp tissue, killing the bacteria and flushing debris away to prevent canals from becoming blocked during instrumentation. This, in turn, helps prevent ledging and other procedural errors so that the canals can be thoroughly cleaned. Sodium hypochlorite also happens to be a very cheap solution. Also recommended is chlorhexidine solutions (two per cent): This, like sodium hypochlorite, is strongly anti-microbial but cannot dissolve pulpal tissue; it is also expensive.

The concentration of bleach that is used varies from country to country.

Citric Acid 40%

Citric Acid 40% removes the smear layer from the root canal walls, allowing precise penetration of root canal sealer.

Isopropyl Alcohol

Reduces the surface tension enabling Sodium Hypochlorite to penetrate the tubules.

Endo-Solution EDTA

Endo-Solution is used during mechanical preparation of the root canals. The preparation supports widening and cleaning of the root canal, removes the smear layer and exposes the dentinal tubules.

Chlorax 2% or 5.25%

(Sodium Hypochlorite)

Chlorax dissolves organic matter. It has cleaning properties and has a bleaching effect on tooth and hard tissue.

Gluco-Chex 2.0%

Chlorhexidine digluconate 2% - antibacterial dental preparation for rinsing the root canals. It is more efficient than sodium hypochlorite in destroying such microorganisms as E. faecalis which are often responsible for unsuccessful endodontic treatment.

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to country. In Scandinavia the is- 
sue of toxicity and possible prob-
lems with bleach have led practi-
tioners to err on the side of caution 
and concentrations of 0.5-1 per 
cent are traditionally used. In the 
United States on the other hand, 
dentists tend to use concentra-
tions that are traditionally used. In the 
United Kingdom we generally use 2.5 per 
cent but can increase effectiveness 
by either heating it or using ultra-
sonics. The bleach can be warmed 
in a bottle warmer and its effect is 
further increased by constantly 
flushing the solution through the 
canals rather than just letting it sit 
passively in the canals.

Nickel Titanium instruments 
can lead us to falsely assume that 
we have fully prepared the canal. 
However, often the walls have not 
even been touched due to the files 
staying very centred. The speed 
at which the canal system is pre-
pared also means that our irrig-
ants may not have had sufficient 
time to be effective. The optimum 
soaking for this should be half an 
hour to ensure that the tissues are 
fully dissolved and the bacteria are 
killed - no matter how quickly the 
canals are prepared with the NiTi 
files. Recently a new file system 
has been launched - the SAF (self 
adjusting files). These are hollow 
files shaped as a thin metal lattice 
that are very flexible and prepare 
all the walls especially in very ir-
regular shapes. Sodium hypochlo-
rite is continuously pumped 
through the files as the walls are 
being prepared and the pub-
lished data is very promising. The 
manufacturers recommend four 
minutes preparation per canal.

No matter which system is 
used it is important to remem-
ber that sodium hypochlorite is 
a very toxic fluid. If it is extruded 
out of a canal under pressure it 
can cause severe complica-
tions. There have been recent 
cases of severe hony necrosis 
and nerve damage but even 
small amounts can cause pain, 
bleeding and marked bruising.

If a hypochlorite accident 
occurs the patient will get sud-
den pain and bleed profuse-
ly. The best plan of action 
in this situation is to remain calm 
and if necessary top up the lo-
cal anaesthetic. The canal 
should be rinsed out with saline 
and the contents aspirated to di-
lute the irritant. Antibiotics may 
be indicated as well as analgesics 
and ice packs for the bruising.

As previously mentioned, high 
concentrations of bleach are used 
to dissolve tissues. Obviously, 
the higher the strength of the bleach, 
the higher the danger it potential-
ally poses to the patient. But for the 
bleach to be effective it needs to be 
placed within 2nm of the apex and 
so precautions have to be taken. 
I always inject bleach slowly, un-
der low pressure, always ensuring 
that the needle is moving so that 
it doesn’t become jammed. I am 
always very cautious with short 
teeth and immature teeth with 
open apices and tend to place a 
rubber stop on the needle so that I 
always know where I am.

As is the case in all treat-
ments, prevention is always 
better than cure. I advocate 
the use of sodium hypochlorite as 
the only effective way of disinfec-
ting root canals, but it must be used 
with care and caution to avoid 
problems from occurring.

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