

Schilder's Biological Objectives

Dr Raphael Bellamy emphasises the importance of the five biological objectives of cleaning and shaping to enhance endodontic success and patient comfort during treatment

In my last article I promised to outline the biological objectives laid down by Schilder in his 1974 article. I never hear much spoken on this subject by eminent people in the field. Is it perhaps because it is so understood it is taken for granted? It may be common sense when it is read but does that mean it is common practice? I don't think so. When I consider all the literature and lectures on the subject of pain control, post-operative pain control, flare ups, phoenix abscesses etc and the amount of endodontic surgery that is carried out in the field, I wonder whether it is naïve of me to assume that they are all common practice. If this were so then it just doesn't add up.

The developments in endodontic technology over the last 10 years have been phenomenal. More developments have occurred in both endodontic technique and endodontic technology in the last decade than the previous century. However, much as in restorative dentistry, it is easy to



Raphael Bellamy BDS (NUI) Cert. Endo. is a graduate of University College Cork and The Goldman School of Dental Medicine in Boston, Massachusetts, where he completed his postgraduate studies in endodontics. He is currently in private practice limited to endodontics in Dublin

fall into the trap of thinking purely in mechanical terms when treating an active disease process. Yes, the mechanics of endodontics are important, critical in fact, but that is not all. That alone will not meet the biological criteria for the healing of lesions of endodontic origin (LEO). How long did it take us to realise that the cause of post-operative sensitivity from a simple filling was bacterial and not simply as a result of thermal transfer of a recently placed amalgam? It is easy to become complacent, to go 'by the book' and forget the biology.

Capacity to heal

There is no doubt that the capacity of lesions of endodontic origin is 100%. (100%-X actually, where X is the operator!) Extraction of teeth with periapical pathosis results in prompt healing of bone lesions, because extraction totally eliminates the root canal system, the necrotic tissue and, regrettably, the tooth itself.

Where cleaning and shaping are practical, with equal thoroughness, equivalent healing of periapical tissues may be anticipated with healthful retention of the treated tooth.

A precondition of any dentist or endodontist embarking upon root canal therapy in practice is the real belief in this fact. Often when I talk to dentists, I am sad to say, I get the impression that belief is not at the forefront of their minds. Why is this? I'll never know. Perhaps to believe this fact is to acknowledge the enormity of the challenge. To acknowledge the challenge creates an obligation to meet that challenge. That is, anything short of excellence is failure.

It is a heavy burden to carry but if this leads us to expose our limitations then it can only be a good thing. It will keep us honest

in our endeavours. The choice of treatment and the seriousness of the task must be clear. Anyone who does not take root canal therapy seriously does the profession and patient a disservice.

Knowledge, skill and desire

Three major elements determine the predictability of successful endodontics. The first is knowledge, the second is skill and the third is desire. The endodontic disease process has been identified, the treatment developed. Discipline and skills, our levels of acuity as mentioned before, need to be developed, but the critical factor is desire. It can be done if we want to do it. Successful endodontics is a decision.

The biological objectives

Following on from the geometric aspects of cleaning and shaping root canal systems as laid down in Schilder's five mechanical objectives, I had promised to outline the biological objectives.

The biological objectives are often overlooked and we do so at our peril. We should never forget that the tooth that we treat is attached to a human being with a highly developed immune system. This factor is all too often forgotten in conservative dentistry and endodontics is merely an extension of that. The five biological objectives of cleaning and shaping enhance both endodontic success and patient comfort during treatment.

Irrespective of whatever technique is employed in cleaning and shaping, these principles will apply. There is no doubt that the rise in popularity of the 'crown down' technique has helped immensely in the reduction of many of the infamous traps of cleaning and shaping. Also, the utilisation of rotary instrumentation has

facilitated the removal of inflamed and necrotic tissue, as well as substrate, by efficient auguring of material up and out of the root canal system.

1. Confine instrumentation to the root canal

Do not routinely instrument bone or periapical lesions. It may needlessly enlarge and deform the apical foramen, violating mechanical objectives. It may cause perforation of the maxillary sinus, the floor of the nose, or the mandibular canal. It is prevented by the use of instrument stops on files, the rigid employment of radiographic control during canal preparation and understanding on the part of the operator. The practice of patency is not a violation of this objective.

2. Beware of forcing necrotic material beyond the foramen

Many instances of post-treatment flare-up have been caused by necrotic tissue and micro-organisms being seeded into the periapical tissues during canal preparation. Instrumentation beyond the apices of infected teeth will produce demonstrative bacteraemia in blood cultures, while if kept within the confines of the canal it will not.

It would seem that flare-ups associated with necrotic debris insertion into the periapical tissues are directly related to the quantity of material deposited beyond the foramen and inversely related to the thoroughness of cleaning and shaping the canal.

3. Remove all fissure debris from the root canal system

This is self evident. This material is the single cause of periapical lesions and its elimination is critical for success. There is no doubt that the most effective

solution to aid removal of tissue remnants and disinfect the canal is 3-5% sodium hypochlorite.

4. Complete cleaning and shaping of single canals in one visit

Early practitioners of endodontics feared approaching the apical foramen of infected canals before several treatments of antiseptic drugs and caustic chemicals. On sealing these teeth between appointments they set themselves up for the very flare-ups they sought to avoid. The drugs did little to sterilise the infectious debris in the system.

Today, it is still commonplace among the profession to treat teeth endodontically over four or five visits with the use of highly potent, volatile phenolic agents that do nothing but harm the periapical tissues. Leaving substrate in necrotic canals predisposes to post-treatment complications. The sooner, the more thoroughly and more intelligently substrate is removed, the more uneventfully and quickly the canals will be

disinfected and obturated, and the more effective the root canal treatment will be performed. In a multi-rooted tooth do not enter a canal unless you can completely clean and shape that canal.

5. Create sufficient space during canal enlargement for intracanal medication and for potential exudates reception

There is only one intracanal medicament to consider today and that is calcium hydroxide. For many years, canal enlargement was specifically for the placement of medicaments. Depositing drugs in root canals that have been inadequately or insufficiently enlarged encourages percolation of medicament apically. The emphasis has now shifted from a primary reliance upon medicaments to that of primary reliance on cleaning and shaping. That is the way it should be. Leaving space in the body of well-shaped root canals to receive small amounts of

periapical exudates that may accumulate between visits relieves apical pressure and prevents percolation of medicaments beyond the apex. The benefits to the patient and the operator are obvious.

In conclusion

So what is Schilder saying in the biological objectives? He is reminding us of the fact that this business is not just mechanical but also biological.

We must understand and respect the biology as much as the anatomy, and it is clear that both sets of objectives are inextricably linked. Cleaning and shaping without disinfection is useless. Scrupulous attention to detail is the order of the day. Modern instrumentation has allowed the clinician to shape canals in less time than ever before. Less time equals less irrigation and less disinfection of the deeper parts of the system. If an upper molar root canal is completed in one hour, then one must ask how

much disinfection has occurred in the apical extent of the MB2 if it is the last canal to be shaped. If, indeed, the MB2 was found in that amount of time.

There are no X-rays, no graphs, drawings nor pictures to show you how these objectives are attained. We can only rely on ourselves. I spoke of knowledge, skill and desire. The greatest of these is desire. Adherence to these objectives is the difference between endodontic success and failure, post-operative pain or no pain, and ultimately having a patient that is appreciative of your skills, your values, your judgement, your attention to detail and your work. It is only by adherence to these basic, uncompromising principles that ask so much of us that we can truly place confidence in our work. 📌

References:

Schilder H (1974) Cleaning and shaping the root canal. *Dental Clinics of North America*. **18(2)**