Kenneth Serota continues his look at the Endodontic Implant Algorithm

Four thousand years ago, a number of Babylonian legal decisions were compiled in what came to be known as the Code of Hammurabi. The one referencing the construction of dwellings and the responsibility for their safety begins; if a builder engineers a house for a man and does not make it firm, and the structure collapses and causes the death of the owner, the builder shall be put to death.

We are all builders or engineers of sorts; we calculate the path of our arms and legs with the computer of our brain and we catch baseballs and footballs with greater dependability than the most advanced weapons system intercepts missiles. In our professional lives however, in contradistinction to the paradigm of evidence-based dentistry, our efforts as builders often rely solely upon personal experience, intuitive cognition and anecdotal accounts of successful strategies.

Vigilant interaction

The challenges posed by implant-driven treatment planning mandate vigilance of the interaction between those involved in research and development, manufacturing and distribution and the leaders of ideologically diverse disciplines. Temporal shifts and trends in the service mix are part of the evolution of the art and science of dentistry; to some degree, the implant-driven vector has captured the heart and minds of those who seek to nullify preservation of natural tooth structure in the oral ecosystem and deify orthobiologic replacement. The corporate entities from which we derive our tools too often fail to distinguish the point where science ends and policy begins.

By positioning advocates and acolytes at the vanguard of their marketing campaigns, they effect change; however, their support for education is directed towards dissemination of product, not the fundamentals and rudiments of biologic imperatives. Prospective large cohort clinical trials with clearly defined criteria for survival, with and without intervention, quality of life information and economic outcomes are essential to compare alternative foundational treatments. These studies will require expertise, time, and financial support from the various stakeholders, professional and corporate alike. According to Cicero, “The authority of those who teach is often an obstacle to those who want to learn.”

Sacrificing teeth

The prosthodontic pundits maintain that the spiraling costs of saving endodontically retreated teeth, where extraction may prove to be the common endpoint, begs the question of whether such teeth should be sacrificed early. Ruskin et al concluded that implants have greater success than endodontic therapy, are more predictable, and cost less when you consider the “inevitable” failure of initial root canal treatment, retreatment, and periapical surgery.

Is it responsible therapeutics or irresponsible expediency that justifies the removal and restoration of such teeth from the outset with an implant-supported restoration? Can one ethically argue that extraction is warranted as the financial cost of orthodontic extrusion/soft tissue surgery, endodontic retreatment and post/core/crown fabrication is greater than extraction with an implant-buttressed restoration, and in all likelihood, more predictable?

Jokstad et al (4) identified over 220 implant brands in the dental marketplace. With variability in surface, shape, length, width and form, there are potentially more than 2000 implants for any given treatment situation. A systematic review by Berglundh et al (5) assessed the reporting of biologic

![Fig 2a](https://example.com/fig2a.png) The use of dyes, colouring agents and micro-etching is invaluable in visualizing a suspected crack in tooth structure. Cohen et al found that when premolars were used as bridge abutments, a surprising number of these abutments sustained a VRF. [J Am Dent Assoc 2003; 134(4)434-441].

![Fig 1](https://example.com/fig1.png) The term tipping point refers to the moment of critical mass, the threshold, the boiling point. The colour sequence highlights the diagnostic steps to be followed in each tipping point algorithm for the listed pathologic states.
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Dosage & Administration: Adults and children 12 years and over: 10ml rinse for 1 minute twice daily or pre-surgery. Soak dentures for 15 minutes twice daily. Treatment length: Gingivitis 1 month; ulcers, oral candida 48 hours after clinical resolution.

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and technical complications in prospective implant studies.

Their findings indicated that while implant survival and loss were reported in all studies, biologic difficulties such as sensory disturbance, soft tissue complications, peri-implantitis/mucositis and cortical bone loss were considered in only 40 to 60 per cent of studies. Technical complications such as component/con- nection and superstructure failure were addressed in only 60 to 80 per cent of the studies. Are we as a profession standing idly by and watching marketing pressures force treatment decisions to be made empirically, with untested materials and techniques? There is an un- settling similarity between these events and the early days of implant development 14.

Favouring endodontics

The endodontic pundits argue that major studies published to date suggest there is no dif- ference in long-term prognosis between single-tooth implants and restored root-canal-treated that in the comprehensive care decision making process.

Salvaging teeth

Whenever possible, the treat- ment choice should be an at- tempt to salvage a tooth us- ing a multidisciplinary team approach, putting aside pre- conceived notions and biases. Finances should not dictate the advice prof ered. Further- more, it is advisable to forego being clinically ‘conservative’. Treatment should not be initi- ated in the absence of a critical evaluation of the potential for all contributing factors to eugate with a positive outcome.

When needed, care must be taken to carry out every diag- nostic procedure available, even those of a more invasive nature (see Fig 1). Before arriving at a de finitive diagnosis and treat- ment plan, the clinician should obtain consent from the patient to remove any restoration in order to analyse the residual tooth structure and assess the potential to carry out reliably predictable treatment. The patient must understand in detail, the feasibility of and margin for success of each treatment option presented 16.

There are few studies in the endodontic literature ana- lysing the reasons for extraction of endodontically treated teeth. Root-filled teeth are invariably prone to extraction due to non- restorable carious destruction and fracture of unsupported cusps. Tamse et al found that mandibular first molars were extracted with greater frequen- cy than maxillary first molars; cusps. Tamse et al found that mandibular first molars were extracted with greater frequency than maxillary first molars; the most significant causal dif- ference was the incidence of vertical root fracture (VRF = 1.8 per cent maxillary molar, 9.8 per cent mandibular molar) 14.

‘Whenever possible, the treatment choice should be an attempt to salvage a tooth using a multidisciplinary team approach, putting aside preconceived notions and biases.’

References


Table I. As reported by Chugal et al., the most significant causes impacting the occurrence and magnitude of para-endodontic apical periodontitis.

<table>
<thead>
<tr>
<th>Size (mm)</th>
<th>Success</th>
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<tbody>
<tr>
<td>0mm</td>
<td>87.6%</td>
</tr>
<tr>
<td>1-5mm</td>
<td>65.7%</td>
</tr>
<tr>
<td>&gt;5mm</td>
<td>35.6%</td>
</tr>
</tbody>
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4a. The incidence of vertical root fracture is shown. VRF = 1.8 per cent maxillary molar, 9.8 per cent mandibular molar. 14.

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Teeth not crowned after obtura- tion are lost with six times the frequency of those restored with full coverage restorations 16. Procedural failure, iatro-genic perforation or stripping, idiopathic resorption, trauma, and periodontal disease all contribute to a lesser degree. The major biologic factor in- fluencing endodontic treatment outcome failure with the pos- sibility of extraction appears to be the extent of microbi- ological insult to the pulp and periradicular tissue, as reflected by the periapical diagnosis and the magnitude of periapical patho- sis 17. (See Table I and Fig 2a, 2b and 2c).

The endodontic/implant algorithm mandates the use of cbCT to detect and evaluate the degree of periapical pathosis. Analysis of the size, extent, nature and position of periapical and resorptive lesions in three dimensions is essential for the optimal level of standard of care in diagnosis.

The multivariate nature of the endodontic implant algorithm mandates the use of cbCT to detect and evaluate the degree of periapical pathosis. Analysis of the size, extent, nature and position of periapical and resorptive lesions in three dimensions is essential for the optimal level of standard of care in diagnosis.

Fig 2b. The dental literature reports a statistically higher level of accuracy using cbCT (cone beam volumetric tomography) scans for detecting vertical root fractures than with the use of periapical radiography alone.