International Endodontic Journal

Commentary by Bun San Chong
Chong BS, Pitt Ford TR, Hudson MB (2003) A prospective clinical study of Mineral Trioxide Aggregate and IRM when used as root-end filling materials in endodontic surgery. *International Endodontic Journal* 36, 520–6

'*The whole is greater than the sum of the parts*'

The above is the title of an editorial by Tom Pitt Ford published in this journal in 1983 (Pitt Ford 1983) with the purpose of informing readers of important changes to the journal. Tom alluded to the fact that the success of the journal was very much a team effort. Fittingly, and as exemplified by this study, it also applies to the dynamic and synergistic teamwork needed to ensure the successful execution of any research venture.

Mineral Trioxide Aggregate (MTA) was developed as a new root-end filling material at Loma Linda University, California, USA. Tom was there at the outset of the MTA story. He was the supervisor of Mahmoud Torabinejad's 1995 PhD thesis – *Investigation of Mineral Trioxide Aggregate for root-end filling*.

MTA was extensively investigated in the laboratory and in animals. Unlike a number of dental materials that are not moisture-tolerant, MTA actually requires moisture to set. MTA was shown to have good sealing ability and hard tissue repair was observed directly on the surface of the material, a unique property not seen with other root-end filling materials. As a result, MTA was actively promoted for root-end filling during surgery. By then, a commercially available formulation had also come on the market. Yet, there was no clinical study on the performance of MTA as a root-end filling material. As a seasoned researcher, Tom had a healthy scepticism of anything that had not been subjected to thorough scientific evaluation. Therefore, he set about planning, designing and securing funding for this, the first randomized prospective clinical study on the use of MTA as a root-end filling material. The primary aim of this study was to compare the success rate of MTA with IRM (Intermediate Restorative Material). A secondary objective was to investigate if radiological signs of healing were completed more quickly with MTA.

The study demanded diligence, perseverance and meticulous attention to detail, all the hallmarks of Tom's character. The study consisted of many stages: preoperative and suitability assessment, preparatory treatment, the surgical procedure itself, suture review, postoperative assessment and recall to determine treatment outcome. There were more than 10 forms to complete for each patient. Not unexpected, we experienced problems during this study, most of which will be familiar to veterans of clinical research. One of the difficulties encountered was the failure of patients to return for reviews and the complex reasons were analysed.

The features of note with this study include the strict entry requirements and stringent, established criteria for assessing treatment outcome. Surgery was carried out by endodontic specialists rather than general dental practitioners or junior hospital staff. In addition, IRM instead of amalgam was used as the control, as it was considered unacceptable and unethical because there are clear disadvantages with amalgam. The study commenced before the publication of the CONSORT guidelines on the reporting of clinical trials. Nevertheless, a breakdown of the flow of patients through the study, an essential and key element of CONSORT was included in this paper.

The results of this study showed that the use of MTA as a root-end filling material led to a high success rate, although it was not significantly better than using IRM. The radiological signs of healing were more advanced with MTA than IRM at both time periods.

The impact of this study was to confirm that careful case selection, the employment of modern surgical techniques and instruments, combined with newer root-end filling materials lead to a very favourable treatment outcome. This and additional studies on other potential root-end filling materials played a signi-

ficant role in improving the outcome of periradicular surgery and confining to history the use of amalgam for root-end filling.

Meta-analysis and literature reviews often conclude that there is a lack of good randomized controlled trials and more are needed. This routinely repeated mantra may be interpreted as insufficient enlightenment and appreciation of the challenges in designing, performing and securing funding for randomized controlled trials.

It is an honour and a privilege to have been a leading member of Tom's team of clinical academics and one of his long-standing research collaborators. Tom's legacy lives on.

Reference

Pitt Ford TR (1983) Editorial: The whole is greater than the sum of the parts. *International Endodontic Journal* **16**, 1.