



# CLINICAL-TECHNOLOGICAL SYNERGY TO IMPROVE CLINICAL OUTCOMES



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## Abstract

**T**echnological advances have enabled *Dentistry* to provide patients with better and longer lasting outcomes, where in some instances and not so long ago respective technological treatment options were not a possibility. The use of any technology has its challenges and in many instances depending on various factors the learning curve can be steep. It is difficult to change course when we feel we are already providing patients with time dependent excellent results, which leads to some fundamental questions: a) is it worthwhile to make the change? b) does it justify the disruption given the learning curve for a guaranteed improved outcome? and c) is it worth the investment? As we consider the advantages and disadvantages of decisions to be made, the clear answer rests in favor of patient result benefits and financial sustainability of access to treatment.

## Introduction

The changes *Dentistry* is experiencing technologically are at an exponential pace. In many instances we are tasked with the question of speed of market entry, penetration allowance for appropriate temperate testing and outcome evaluation as opposed to shortened segment *Beta* testing. Which is justified and when: first generation implementation in the market place or time tested protocol in favor of optimal outcome? In 1974, a statement that will probably never change stated: "There could be many treatment options, but only one correct diagnosis".

The list of these technological advances is endless, but the article will cover only some that are at present making significant impact to benefit patient clinical outcomes. It was stated 2 10,000 hours of practice on average are needed to be an expert in respective field. The premise and assumptions need careful consideration. Does average practice skill at point in time perform at maximum output and if so what is the standard of measure of outcome in function of technological

performance? Historical clinical skill and experience, generational transfer of adaptive executional skills, foundational concept merit of excellence, and clinician pace and temperament all lead to real time proficiency potential in grand scale on clinical outcomes and professional advancement.

At the same token, evidence-based *Dentistry* has become quite popular, with truthful observations of incomplete or partial expert participation to the comprehensive question and analytic scientific demand. Therefore, every article we read and lecture we attend must be critically evaluated.

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**Cases presentations & Technology**

Digital radiography has enhanced diagnosis, elimination of chemicals and improved communication amongst the interdisciplinary team.



**Fig. 1.** Digital extra-oral radiograph in normal and inverted mode have valuable diagnostic values traditional radiographs cannot offer.

Even with outstanding technology such as the microscope, initially used mostly for Endodontic treatment, all technologies are successfully dependent through the operator.



**Fig 2.** Central canal on mesial buccal root untreated by an Endodontist.

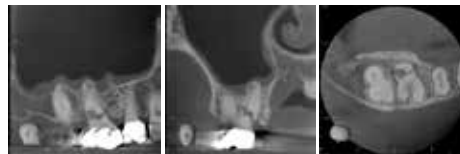


**Fig 2a.** Through the proper use of the microscope, a more detailed evaluation can be established while providing best possible treatment.

In addition, in some instances, diagnosis can be difficult to established when a patient is in pain, and or a root canal treatment is suspected. Normal course of action is to take a 2 D digital radiograph, and until diagnosis can be established clearly it is notable the tooth has been identified as requiring some type of treatment.



**Fig 2b).** While patient complains the tooth is in pain, clinical evaluation and periapical radiograph do not always provide a conclusive diagnosis.



**Fig 2c.** 3D evaluation determined the tooth was clearly fractured and required an extraction. Diagnosed by Dr. Scott K. Bentkover, DDS (Endodontist)

From the introduction of the jacket crown in 1889 until the 1950's clearly showing some success however with multiple failures due to internal microcracking<sup>3</sup>, porcelain fused to metal was appropriately mass market introduced in 1960 with having a great success track record for decades<sup>4</sup>. Understandably, many of these failures led to the newer improved ceramic restorations: pressed, milled and monolithic<sup>5</sup>



**Fig 3).** Ceramic restorations on natural teeth replaced with lithium disilicate restorations. Treatment by Sergio Rubinstein DDS, laboratory work by Toshiyuki Fujiki, RDT

Digital scanning in dentistry is evolving incredibly fast and is enabling the restorative dentist to copy the prepared tooth so the crown can be designed and fabricated either on the computer or still through a traditional model. This technology is penetrating the dental market with immense speed compared to historical tempo of technology integration,

especially as it is related to implants. For many patients, not having to have the final traditional analog impression taken is a great comfort.



**Fig 4).** Tooth prepared for a crown and digitally scanned.



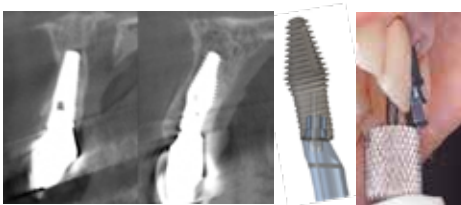
**Fig 5).** Computer generated custom abutment designed™ simultaneously with a virtual crown for proper contours on both. The abutment designed for soft tissue support, proper emergence profile and design to accommodate the final crown.

**Prosthetic-Surgical Dilemma**

From the inception of the osseointegration, dental implant<sup>6</sup> for the most part predictably integrate within the surrounding bone. Since then, heavier emphasis has been placed on preservation of the bone and soft tissues. It took decades to understand how critical it is to have attached gingiva surrounding the implant(s) for long-term maintenance. Equally as important is the preservation of the bone, with ideally a minimum of 2 mm of bone on the buccal and lingual walls. It is the authors preference when possible to have the crown screw retained, to eliminate the possibility of peri-implantitis risks due to the often-contributory residual subgingival cement associated with the delivery of a cemented crown. Regardless of the choice for the final restoration, cemented or screw-retained, the 2mm principle applies. The restorative dentist may want the implant placed in a position that would conflict with surgical position and otherwise compromise the surgery and its location due to the prosthetic design choice. Even with more advanced bone regenerative techniques, the risk of compromising clinical outcome persists typically due to the thinner or insufficient bone in the apical portion, or in the coronal



and middle third; still leaving a noted preference to preserve at least 2mm of bone being the consensus for long-term stability. When immediate placement of implants takes place after an extraction, most critical in the anterior region, and the implant body is too wide, surgeons tend to use a narrower implant, which may not be the restorative dentist design choice. As an alternative, the surgeon may have to change the implant position (sometimes with the addition of bone grafting). An example of the concept is illustrated in Figure 6.



**Fig 6, Fig a, Fig 6b).** While available as a straight implant (with internal conical connection or external hexagon), the Co-Axis implant® can be placed on the existing root position but the screw access is shifted by 12° to enable the delivery of a lingual access screw retained crown. Radiograph from Dr. Stephen J. Chu reflects a comparison of traditional implants vs. The Inverta Co-Axis® and clinical treatment by Dr. Barry P. Levin DMD. For orthodontic cases, the use of TAD screws, anchor plates and new wires have a significant impact on how patients' problems are treated since anchorage is significantly helpful. This does not only implement the treatment sequence optimally, but also reduces undesirable movement of teeth since anchorage is superior, while inherent treatment planning remains only limited to the orthodontist knowledge and imagination.



**Fig 7).** Use of TAD screws help facilitate and, in some instances, simplify and reduce length of treatment. Treatment by Dr. Yan Razdolsky DDS.

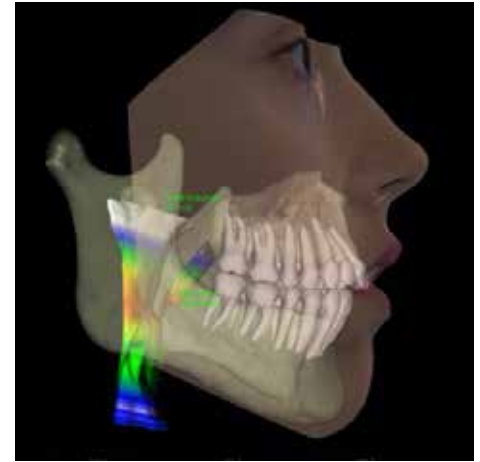


**Fig 8).** Through the use of anchor plates, intrusion of molars was facilitated. Orthodontic treatment by Dr. Yan Razdolsky, DDS.



**Fig 9).** Using 3 D technology, the orthodontist can visualize the position of the teeth and with the use of robotic technology, wires are precisely bend. This technology shortens treatment time while facilitating the proper alignment of the teeth in their best position.

The CBCT can provide essential information for a proper diagnosis and treatment planning, especially when orthodontics is indicated. It is not only how the when airway is in question. For child as for adult patients, airway along with proper jaw alignment as it relates to occlusion and esthetics, is visualized and analyzed. Analysis of the current airway is extremely important, as this could determine in what direction teeth should be move to. If airway is deficient as a child<sup>78</sup> and the extraction of 4 premolars is elected, it could compromise the airway even further, since it can have an effect on patients for life.



**Fig 10).** Example of airway evaluation on a patient with TMJ discomfort referred for possible orthodontic treatment. Interdisciplinary approach is essential, especially when growth spurts are considered, not ignoring "silent" adult changes.

#### Discussion

The available technologies enable us to provide outstanding treatment modalities to patients, however they are always operator and the decision process dependent. What, when and how to utilize them is of extreme importance, equal to interdisciplinary communication.

#### Conclusion

In today's market place where technology is making a swift sweep in dentistry as in other healthcare related sectors, patients are more exposed, informed- right or wrong, and knowledgeable, with high expectations at treatment delivery. With a proper diagnosis, astute planning and detailed treatment, it is possible to restore the patients' dental health into a merged and reinstated synergism of esthetics, function. Patient seeks not only proper dental treatment with equal comprehensive guidance. Patients also need to understand the different available options with a clear view of advantages and disadvantages for patient elected treatment.

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