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ABSTRACT

For last several years, researchers have been trying to automate conventional manual processes of impression making with the hope of making the procedure more accurate, simpler, and quicker. In this article we provide an overview of current digital impressioning procedure, its advantages over conventional procedures and suggest future possibilities.

KEYWORDS Digital impression, CAD-CAM, Digital Crowns

INTRODUCTION - Dental impressions are common procedures in dentistry. Conventional impression procedures involve use of materials that range from hydrocolloids to elastomers. Both clinical and scientific evidences have shown that these materials i.e., reversible hydrocolloids, vinyl polysiloxane, polyethers, and newer vinyl siloxane ether produce excellent reproduction of teeth and tissues. Manufacturers have developed and refined these materials to the level at which it is nearly impossible to blame the impression materials for restoration misfit. But by their very nature traditional impressions are susceptible to inaccuracies. Anyone of the several steps involved in the fabrication of restoration using a traditional impression can introduce an error, either because of human element or material defect.

Impression materials can be influenced by the way they are manipulated, the temperature at which they are stored, or the manufacturing lot in which they are produced. Additionally, the techniques used by the clinician can lead to inaccuracies. However, techniques have evolved over time but the human element and material involved in the procedure makes impressioning a delicate process.

A digital impression is an advanced alternative to traditional impressions. Rather than use of a tray with messy impression material to mold around the teeth, the dentist moves a wand around the mouth. The continuous digital images are taken during this process. The entire procedure lasts for a couple of minutes. Once the images of the mouth are captured, they are reviewed immediately for accuracy. The digital images are then sent to lab where physical model is fabricated.

The use of digital impressions offers dentists a more precise and detailed scan of the teeth and the area to be worked on. The advanced technology also improves communications between the dentist and dental lab. Productivity is increased as well, because the turnaround time is faster with digital impressions. Digital impressions allow a patient to experience a more comfortable, quicker, and convenient encounter with the dentist.

DIGITAL IMPRESSIONING PROCEDURE

Digital impressioning devices remove much of the guesswork and unpredictability from the impressioning process. The device used has a Chairside Oral Scanner and a monitor on which the impression image is displayed as it is captured, allowing dentists to review impressions in real time and ensure they are complete before sending them to the laboratory. After the digital impression is captured, the dentist can submit the information electronically to the laboratory. The electronic file travels to the lab, where a technician uses software to perform virtual model and die work. This includes, setting the bite plane, cutting out the dies and defining the margins. Next, the electronic file goes through some digital post processing and subsequent model and die fabrication. Model manufacturing is currently performed by the milling of models from a block as well as the additive process known as SLA, stereolithography (no more conventional M&D
fabrication). Once the virtual modes have been post processed, simultaneous manufacturing of the final restoration can begin. A laboratory can complete CAD CAM process immediately. CAD design and automated manufacturing does not require the initial completion of models and dies. Once the models and other digital crown parts are fabricated, all parts are merged, finalized and put through quality control processes. Digital impressions also support all conventional analog approaches for crown fabrication.

WHY ARE DIGITAL IMPRESSIONS MORE ACCURATE

Digital impressions appear to be far more accurate than the conventional approach. The primary reason for this is the elimination of many potential problems that occur during the conventional impression procedures. Some of the errors that are routinely found in conventional method includes:

- Movement of tray during impression making
- Tearing of impression material
- Bubbles and voids in the set impression
- Deflection of tray during impression making
- Lack of tray support (overhanging material)

In addition to these there are dimensional changes associated with set impression material as well as stone used for pouring these impressions 2, 15, 16. Digital impression eliminates all these inaccuracies resulting from human errors or material defects.

Other than these, certain advantages associated with digital impressions include patients comfort and operators convenience, better visualization and no need of repetition, no transportation cost and infection control concerns.

Conclusion

Intraoral digital impressions are coming as a forefront of dentistry. These digital impressions may eliminate the conventional method of impressioning patients with a highly detailed digital scan of the tooth preparation area. Having an impression with a digital system can actually be an interesting, positive experience. Patients who have had traditional impressions taken in the past are relieved not to have a mess in their mouth. Many are very interested in the technology and in watching the chairsde monitor as the scan is captured. The ability to see the impressions live on the screen is an eye opening, interactive experience, as opposed to unpleasant wait for a traditional material to set. It also improves communication between the dental laboratory and the dentist, increases productivity and lowers rejection rates. With significant benefits such as increase patient satisfaction, improved clinical outcomes, and enhanced office efficiencies, will change clinician’s impression of digital impressions. The device can become an important tool in marketing once practice and attracting new patients. The combination of greater patient comfort and greater accuracy of final restoration is a powerful incentive for dentists to look more closely at the technology. Furthermore, the greater efficiency made possible by these devices can have an important impact on a practice bottom line.

However, most clinicians are comfortable with conventional impression methods and techniques used for crowns and fixed prosthesis. It appears very unrealistic for anyone to change from a well successful, and low cost technique to an unknown and expensive one. However, advantages of using digital impressions cannot be ignored.

Digital impressions appear to be practical, and the concept is being perfected, but the need for further research is clear. 2 The acceptance of the digital impression concept is promising.

References


