ORIGINAL RESEARCH PAPER

Volume-8 | Issue-4 | April-2019 | PRINT ISSN No 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

INTRAORAL SCANNER: A NEW ERA OF DIGITAL DENTISTRY

Dental Science

Dr. Dattatraya Bhajibhakare* PG Student, Department of Prosthodontics & Crown and Bridge, CSMSS Dental College and Hospital, Aurangabad. *Corresponding Author

Dr. Babita Yeshwante HOD and Professor, Department of Prosthodontics & Crown and Bridge, CSMSS Dental College and Hospital, Aurangabad.

Dr. Nazish Baig Professor and PG Guide, Department of Prosthodontics, CSMSS Dental College and Hospital, Aurangabad.

Dr. Vivek Jadhav Reader and PG Guide, Department of Prosthodontics & Crown and Bridge, CSMSS Dental College and Hospital, Aurangabad.

Dr. Krishna Gorde PG Student, Department of Prosthodontics & Crown and Bridge, CSMSS Dental College and Hospital, Aurangabad.

Dr. Pranali Vaidya PG Student, Department of Prosthodontics & Crown and Bridge, CSMSS Dental College and Hospital, Aurangabad.

Dr. Preeti Patni PG Student, Department of Prosthodontics & Crown and Bridge, CSMSS Dental College and Hospital, Aurangabad.

ABSTRACT

Since the eighteenth century, conventional impression techniques have been used to register the three-dimensional geometry of dental tissues. Nevertheless, volumetric changes of impression materials and expansion of dental stone seem error-prone. To overcome these difficulties, impression with IOS (intraoral scanner) was developed for dental practice .The implementation of the IOS device in dental practices coincided with the development of CAD/CAM (computer-aided design and manufacturing) technology in dentistry, with numerous advantages for practitioners. Now-a-days, IOS and CAD/CAM provide easier planning of treatment, case acceptance, communication with laboratories, reduced operative time, storage requirements and reduced treatment times. The fully digitized model-free workflow in a dental practice is possible due to the use of intraoral scanner and the computer-aided design/computer-assisted manufacturing (CAD/CAM) of the restorations. The following case report describes the steps and procedure involved in using IOS for fabrication of an anterior monolithic zirconia crown in a patient.

KEYWORDS

Intraoral scanner, zirconia, 3D printing, powder-spray, CAD-CAM.

INTRODUCTION:

The fast and continuous advances in computer sciences have resulted in increased usage of new technologies. Paperless office is now a reality and although the transition has been slow, it has been steady.[1] "Impression" has different meaning in life but in dentistry, impression is negative form of teeth or other tissues of the oral cavity.[2] It has been every dentist's desire to be able to scan plaster models, or even patient's teeth directly.[3] This would help in avoiding discomfort, speeding up work, improving communication between colleagues and prosthetic labs, and reducing the physical space needed for storing these models.[4] The concept of taking impressions to make models, from which appliances could be constructed, goes back to the early 18th century.[5] Many dentists are reluctant to embrace the new technologies because they simply believe elastomeric impression materials and techniques have been in use for so long and work so well that they are irreplaceable.

Digital impression and scanning systems were introduced in dentistry in the mid-1980s and have evolved to a great extent.[6] The advent of intraoral digital scanners coincided with the development of Computer-Aided Design and Manufacturing (CAD/CAM) technology.

Intraoral scanners (IOS) are devices for capturing direct optical impressions in dentistry. Similar to other three-dimensional (3D) scanners, they project a light source onto the object to be scanned. The images of the dento-gingival tissues are captured by imaging sensors are processed by the scanning software, which generates point clouds. These point clouds are then triangulated by the same software, creating a 3D surface model (mesh). The 3D surface models of the dento-gingival tissues are the result of the optical impression and are the 'virtual' alternative to traditional plaster models.[7]

The following case report describes the steps and procedure involved in using IOS for fabrication of an anterior monolithic zirconia crown in a patient.

CASE REPORT:

A 35 yrs old male reported to the Department of Prosthodontic, Crown and Bridge, in Dental College and Hospital in Aurangabad, with the chief complaint of unaesthetic crown in his anterior maxillary region 11 which was 18 years old (Fig.1). Patient had no systemic disease. After clinical and radiological examination, it was found that 11 had undergone root canal treatment 18 yrs ago with no present clinical symptoms and radiological findings.

Fig.1 Pre-Operative

Fig.2 Crown Modification & Gingival Retraction done

A two visit appointment within 48 hrs was planned for patient from removal of old restoration to delivery of final prosthesis using intraoral scanner (ADIN VIZ SCANNER, Israel). Full digital workflow was followed for fabrication of monolithic zirconia crown of anterior tooth to savetime, avoid inaccuracies and technical and operator errors caused by traditional workflow. Patient was informed about the treatment plan and consent was taken.

In first visit, the old crown was sectioned and removed without damaging the tooth. Crown modification was done (Fig. 2). Shade selection was performed by using a conventional shade guide (VITA PAN CLASSIC, Germany).Prior to digital impression making, two layers of non-impregnated retraction cord were placed. After few minutes, the retraction cords were removed. Powder-spray was evenly applied on tooth of interest and its adjacent and opposing teeth and gingiva. Intraoral scanning was performed by using Intra Oral Scanner (ADIN VIZ) (Fig.3). Firstly, the tooth of interest and adjacent teeth (upper anterior quadrant) were scanned and then lower anterior region was scanned. A labial scan was taken to record the bite in maximum intercuspal position.

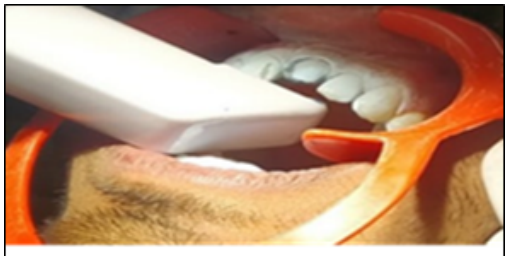

Fig.3 Intra-oral Scanning of Prepared Tooth

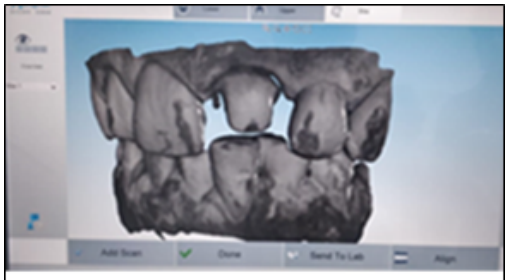

Fig.4 Scanned Image

The system implemented the digital registration to create a 3D occlusion relation. All scanned data was immediately mailed to a fully digital lab for further lab processing (Fig.4). EXOCAD designing software (AMMAN GIRBACCH) was used to design the crown and it was milled in Ceramill motion 2 milling unit.

A 3D model was printed of upper and lower arch (Photon 3D printer) (Fig.5). Small layering was done on monolithic anterior zirconia crown to produce incisal translucency. In second visit, the intraoral try-in of the restoration done. After verifying fit, marginal adaptation and occlusion, shading and glazing of restoration was done at dental laboratory. After patient acceptance about esthetic, final crown was cemented with glass-ionomer cement (Fig.6).

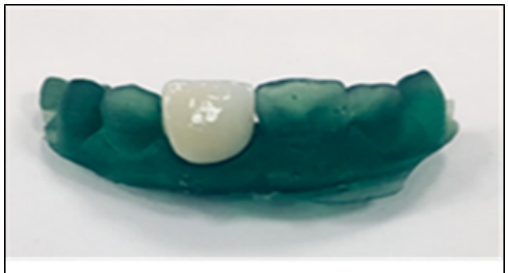

Fig.5 3D Printed Model of Crown

Fig.6 Post-Operative

DISCUSSION:

Intra oral digital scanners are becoming integral to the modern dentistry, improving both practice efficiency and the patient experience compared to conventional alginate and PVS impressions. In this case report, a digital impression was recorded; this reduced the discomfort of the patient. As storage and transport of impression and the fabrication of plaster cast were omitted, their resulting errors were avoided. The data storage and reuse of the stored data is much convenient and easy. In addition, Lee and Gallenni suggested that digital impression taking was more efficient in terms of the preparation time, working time and impression re-taking time than the conventional method and the evaluation of the difficulty in implant impression taking through visual analogue scale was easier with digital method. The restorations fabricated by using digital impression technique require minimal or no occlusal adjustments. But they have disadvantage of been expensive and most scanners require powder-spray to be sprayed on regions to be scanned. Powder-based digital impression has been previously shown to be very accurate for partial impressions.[8] However, powder could be relatively uncomfortable for patients, and additional scanning time has been reported when powder is contaminated with saliva during impression as this requires cleaning and reapplication of powder.[9] Moreover, concerning full-jaw scans, IOS using powder-free technologies appears to be recommended due to the difficulty to maintain powder coating on all the teeth for the duration of the scan.[10]

It is imperative that clinicians should critically evaluate the digital impression, being aware of technical limitations and system specific variations among various IOS available in market, in particular when challenging sub-gingival conditions apply.

CONCLUSION:

Intra oral digital scanners are becoming integral to the modern dentistry, improving both practice efficiency and the patient experience compared to conventional alginate and PVS impressions. Digital Impressions tend to reduce repeat visits and retreatment while increasing treatment effectiveness. Patients will benefit from more comfort and a much more pleasant experience in the dentist chair.

REFERENCES:

1. Lands B. The accuracy and reliability of plaster vs. digital study models: a comparison of three different impression materials.
2. Mistry GS, Borse A, Shetty OK, Tabassum R. Digital impression system—virtually becoming a reality. J Adv Med Dent Scie. 2014; 2:56-63.
3. Polido WD. Digital impressions and handling of digital models: the future of dentistry. Dental Press Journal of Orthodontics. 2010 Oct; 15(5):18-22.
4. Kravitz ND, Groth CH, Jones PE, Graham JW, Redmond WR. Intraoral digital scanners. J Clin Orthod. 2014 Jun; 48(6):337-47.
5. Bremner MD. The Story of Dentistry. New York & London. Dental Items of Interest Pub Co. 1958:91.
6. Birnbaum NS, Aaronson HB, Stevens C, Cohen B. 3D digital scanners: a high-tech approach to more accurate dental impressions. Inside Dentistry. 2009 Apr; 5(4):70-4.
7. Mangano F, Gandolfi A, Luongo G, Logozzo S. Intraoral scanners in dentistry: a review of the current literature. BMC oral health. 2017 Dec; 17(1):149.
8. Patzelt SB, Lamprinos C, Stampf S, Att W. The time efficiency of intraoral scanners: an in vitro comparative study. The Journal of the American Dental Association. 2014 Jun 1; 145(6):542-51.
9. Joda T, Brägger U. Patient-centered outcomes comparing digital and conventional implant impression procedures: a randomized crossover trial. Clinical Oral Implants Research. 2016 Dec; 27(12):e185-9.
10. Zimmermann M, Mehl A, Mörmann WH, Reich S. Intraoral scanning systems-a current overview. International journal of computerized dentistry. 2015; 18(2):101-29.