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Digital versus Conventional Impression in Complete Denture

A project submitted to The College of Dentistry, University of Baghdad and Department of Prosthodontics in Partial Fulfillment of the requirement for the degree of B.D.S.

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Declaration of the Supervisor

I certify that this project entitled "**Digital versus Conventional Impression in Complete Denture**" was prepared by the fifth-year student **(Ayat taha hmood)** under my supervision at the College of Dentistry/University of Baghdad in partial fulfillment of the graduation requirements for the Bachelor Degree in Dentistry.

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Date:

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Introduction

Complete denture:is an appliance replacing all the teeth of one jaw, as well as ass ociated structures of the jaw **(Farlex *et al*, 2012).**

Complete dentures can improve appearance, speech and function, resulting in more self-esteem and participation in social activities **(Wissanee *et al*, 2017).**

Dental Impression defines as a negative imprint of an oral structure used to produce a positive replica of the structure to be used as a permanent record or in the production of a dental restoration or prosthesis. The impression procedure is most significant step **(Deepak, 2017).**

In dentistry, impression was taken with conventional methods for many years and nowadays elastomeric impression materials especially polyvinyl siloxane and polyether are used very reliably in terms of impression accuracy **(Mehl *et al*, 2009; Seelbach *et al*, 2013).**

Prosthodontics rehabilitation of a patient with compromised edentulous ridges in a conventional manner is a difficult task. Modifications in the treatment procedures should be considered to fulfill the patient's functional and esthetic desires. **(Tunkiwala and Ram, 2013).**

At the beginning of the 1980s, digital impression systems occurred as Werner Mörmann began to think about what could be done to develop one session treatment. He shared this idea with his electronic engineer friend, Marco Brandestini. In this way, it has been started to develop digital impression instruments with optical reading systems **(Mörmann, 2006; Rekow, 2006).**

Digital and conventional impression methods have some advantages and disadvantages compared to each other **(Amin *et al*, 2017).**

In the conventional impression method, having a greater number of steps increases the possibility of making extra mistakes **(Chochlidakis *et al,* 2016).**

Digital methods are more preferable in terms of time and preference of clinicians **(Schepke *et al*, 2015).**

In the digital impression method, the possibility of a problem because of inadequacy of impression details is less than conventional method.

Intraoral camera has less effect on the gag reflex than the impression tray. It is easier to store digital impression. In addition, the other disadvantages of the digital impression method are cost and requirement of extra education for using **(Ahlholm *et al,* 2018; Mühlemann *et al,* 2018).**

Aim of the review

The aims of this review are:

1) Assessment of conventional and digital impressions.
2) Showing different techniques and technology involved in both of them.
3) Makes a comparison according to different aspects including, the advantages and disadvantages, accuracy, effectiveness, time and preferences for both operators and patients, and which one is the best in use.
4) Makes an electronic survey between 100 dentists from different branches to find out which type they prefer digital or conventional impression.

Chapter one

REVIEW OF LITERATURE

1.1 Complete denture impression

Complete denture impression: it's a negative registration of the entire denture bearing, stabilizing and seal area of either the maxilla or the mandible.
(Lakshmi *etal*, 2018).

Construction of complete dentures and its performance in function depend on accurate impression of the denture bearing and limiting areas.

1.1.1 Requirements of dental Impression.

For any dental impression several requirements:

1. It should be as complete as possible. i.e. it should include the entire denture bearing area.
2. It should be closely contacting the tissues. In other words, it should reproduce the tissues without any distortion.
3. The periphery of the impression should closely contact the resilient tissues in the vestibule.
4. It should not displace the tissues**.(Bolender ,2001)**

1.1.2 The objectives of the dental impression.

The objectives of the dental impression are:

1. **Retention**: e is the resistance of the denture to the forces acting in a vertical direction. (Removal forces in a direction opposite to the denture insertion.)
2. **Stability**: is the ability of the denture to be firm, steady and constant and the resistance of the denture to forces acting in a lateral or horizontal direction.
3. **Support**: is the ability of the denture to resist vertical and other forces in a direction towards the basal seat
4. **Esthetics and preservation of residual alveolar ridge and soft tissues. (Lakshmi *etal*, 2018).**

1.2Type of dental impression:

1.2.1 Conventional dental Impression

Conventional dental Impression can be classified depend on the sequence of the impression into:

1.2.1.1 Primary impression.

Is define as it is a negative likeness made for the purpose of diagnosis, treatment planning, or the fabrication of a tray. It is the first impression made for the patient and from which the study cast was produced. **Fig (1 .1) (Deepak, 2017).**

The materials used for Primary dental impression are:

1. Impression compound: is the favorable material because it is reversible and can be modified to obtain the finer details.
2. reversible and irreversible hydrocolloid
3. Impression putty: This is a rigid material and, like impression compound, should ideally be used in a metal stock tray, but a plastic tray will suffice (tray adhesive is necessary for putty). It is more elastic than compound, and therefore suitable for use in undercut areas. Its main disadvantage is its cost. **(Deepak , 2017)**

Primary dental Impression Procedure:

1. The patient should be seated in an upright and relaxed position in the dental chair.
2. The jaw should be at the level of the operator‘s elbow for the upper impression and at the level of the operator shoulder for the lower impression, so for the upper stock tray.
3. the posterior border of the tray should cover the maxillary tuberosity & hamular notch, anteriorly should include the anterio-alveolar ridge
4. While the lower stock tray posteriorly should cover the whole area of retro molar pad area and anteriorly include the alveolar ridge**.**
5. The impression compound should be softened in hot water at the correct temperature. **(Deepak, 2017)**
6. The tray should be loaded adequately with sufficient bulk of compound.
7. The tray should be inserted into the mouth with a rotatary movement so that contact with the corner of the mouth does not displace the material

8. The patient's mouth should not be wide open because the border tissues will be stretched in this position and a distorted impression will be obtained
9. After the compound hardens, the tray is withdrawn and the impression should be chilled in cold water.
10. The impression should be checked for completeness, distortion or any gross surface defects.**(Bolender,2001)**

Figure (1.1): Primary impression for complete edentulous patient maxillary and mandibular ridges with Impression Compound material **(Azad, *etal* 2014).**

1.2.1.2 Secondary (final) impression.

Is define as it is the negative registration of the entire denture foundation (including denture bearing and stabilizing areas) and border seal areas present in the edentulous mouth, which is used for making master cast. It is the impression that represents the completion of the registration of the surface. **Fig (1.2) (Deepak, 2017)**

The material used for final impression:

1-ZOE impression.

2-Alginate impression.

3-Impression plaster.

4- Elastomeric impression [Polysulfide (rubber base), Polyether, Silicon (light body)]. **(Deepak, 2017).**

Final Impression Procedure

1. The custom tray should be checked on the cast to confirm that the tray border should have an all round clearance of 2-3 mm from the marked outline on the cast.
2. The tray borders should be smooth and rounded.
3. The tray should cover the entire denture- bearing area.
4. The tray border should be uniformly short of the periphery by 2-3 mm.
5. The compound tracing stick should be softened adequately to prevent undue distortion of border tissues.
6. The tray is inserted and seated in the correct position and the border molding is done by simulating the tissue function. No facial gymnastics should be performed while molding the borders.
7. On the labial and buccal aspects, simulation of tissue function is carried out by straight pull outwards (labially) on the lips and lateral and distal pull of the cheeks from the corner of the mouth.
8. Patient is trained to perform limited tongue movements by touching the tip of the tongue to the upper lip and then touching the tip of the tongue to the

buccal mucosa on the right and then the left side for recording the lingual borders of the mandibular impression.

9. Extending and dropping a line on the lingual side from the base of the retro molar triangle guides formation of disto lingual limit of the mandibular impression **(Collet et al, 1970).**
10. Distolingual border should be functionally moulded so as to be least conspicuous to the tongue when the tongue is moved in anterior direction.
11. The hamular notch is located with a 'T' burnisher. The line of minimal movement when the patient says 'Ah' is marked and joined to the hamular notch. This forms the posterior vibrating line.
12. The round end of the 'T'burnisher is used to palpate the tissue anterior to the posterior vibrating line. The junction between the resilient and the hard unyielding bone is marked which forms the anterior limit in the form of cupid bow.
13. The low-fusing compound is softened and placed in the posterior palatal seal area, the marking of which is transferred on to the tray from the mouth.
14. The contact of the material with the tissue may cause some material to flow beyond the posterior palatal seal area, which has to be trimmed and rerecorded to obtain the proper extension and depth of this area
15. The spacer is removed and escape vents are made in the mid palatine raphe area and on either sides to permit excess material to flow out. The loaded tray is inserted into the patient's mouth, centered correctly and seated in position.
16. Tissue function is simulated and pressure is maintained till the material has set. The tray is then withdrawn and the impression is rinsed in cold water, followed by thorough examination of the impression surface **(Collet et al, 1970).**

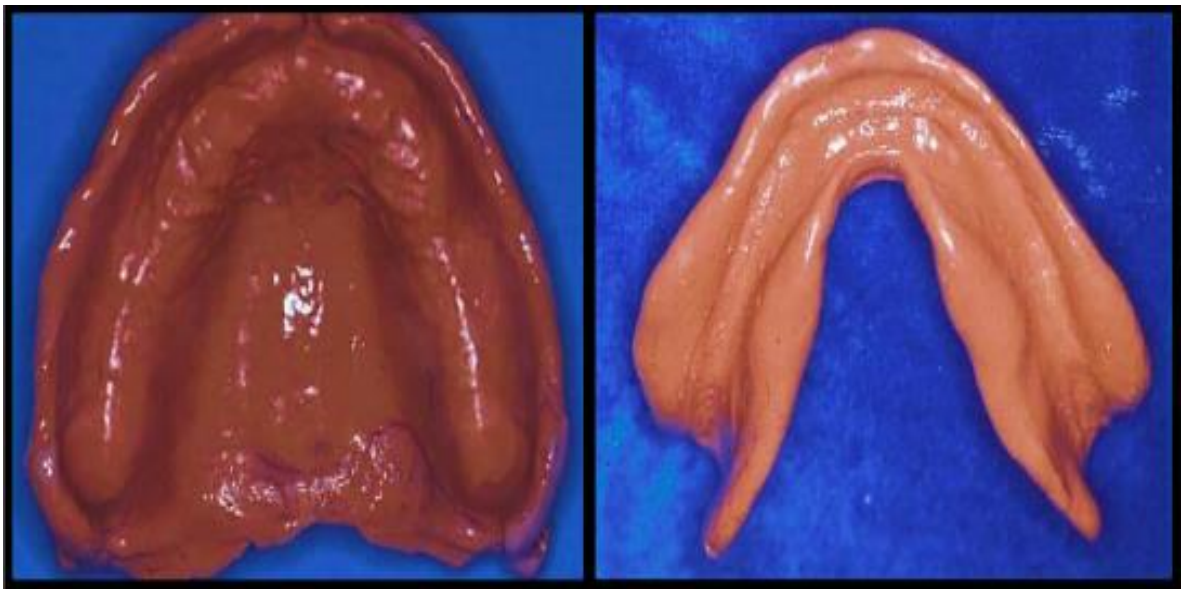


Figure (1.2): Final impression for complete edentulous patient maxillary and mandibular ridges **(John Beumer *et al.*, 2011).**

1.2.2 Conventional Dental impression for Implant supported over denture.

Conventional implant impressions have been a standard procedure for fixed prosthodontics for a long time. The workflow associated with has limitations that affect the efficiency. Selection of tray and impression material, impression technique, time consumption, impression disinfection, transportation, and storage issues are the main reasons for considering alternative impression techniques in fixed prosthodontics. Digital implant impressions proposed as a possible alternative to the conventional workflow a few decades ago**. (Baig *et al,* 2014)**

Similar to crown and bridge prosthodontics, **impression trays** can either be stock trays or custom made trays. Custom trays are preferred as they are generally more rigid and permit the impression material to be used in its optimal thickness. In implant prosthodontics, trays can further be classified as open or closed. An open tray permits direct access to the implant fixture head with the tray seated intra-orally. **The impressions materials** of the implant should he made using rubber based impression materials as dimensional accuracy is required in the impression and to achieve predictable results in the fit and for precision in the implant prosthesis. The impression material used should be easy to mix, accurate, rapidly setting and dimensionally stable following removal from the mouth. Most commonly used materials include, Alginate, Agar, Polysulphide, Polyether, Condensation Silicone, Addition Silicone. Considering all the advantages Polyether and Polyvinylsiloxane (addition silicone) are preferred to make implant impressions. **(Kalamalla *et al,* 2020)**

1.2.2.1 Open tray technique

The open tray technique for making a definitive impression. The open tray technique is specifically indicated;

- Multiple numbers of implants which are not parallel to each other.
- Full arch implant supported fixed prosthesis.
- Abutment level impressions of multiple to full arch implant case.
- Joint screw-retained prosthesis over multiple implants.
- Deep seated implants.(**Chang and Wright,2006)**

The impression tray is coated with adhesive and loaded with heavy-body impression material. Concurrently light-body impression material is expressed around the copings to capture the morphology of the soft tissue.

Monophase impression material can be used as a convenient and practical alternative to the combination of heavy-body and light-body consistency. The loaded custom tray is placed and a finger or Q-tip is used to wipe across the occlusal opening to expose the occlusal aspect of the copings so their screws can be located before polymerization of the impression material occurs and for subsequent easy access for loosening **(Gallucci *et al*, 2011).**

After the impression material polymerizes, the screws in the temporary copings are loosened and the impression removed. The impression should record the edentulous ridges and contains the temporary or impression copings **(Fig1.3).** An alternate approach would be to make the definitive impression using a modified stock tray. Implant analogs are fastened to the copings and then the impression is sent to the laboratory for the fabrication of the definitive cast and occlusion rim

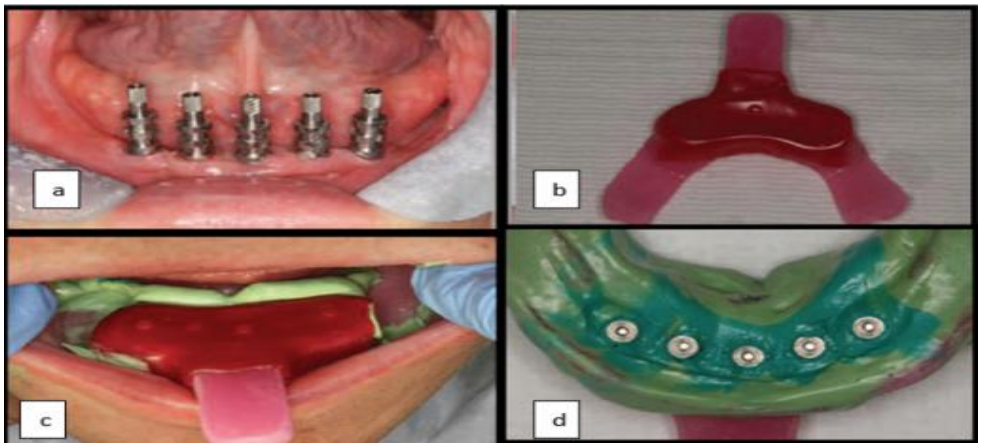


Figure (1.3): Open tray impression technique: impression copings in place (a), open custom tray with window sealed with wax (b), impression in place with the tips of the impression copings projecting through the wax window (c), the completed impression with the impression copings in situ (d). **(Kalamalla *et al*, 2020)**

1.2.2.2 Closed tray technique

The closed tray impression technique is utilized:

- When the implants are sufficiently parallel to each other
- In situations with limited interarch distance and insufficient space for use of screw-retained impression copings

A stock tray or a custom tray can be used in the fabrication of a closed tray impression for a fixed complete denture. Closed tray impression copings are placed on implants or multi-unit abutments and the impression made. Once the impression material polymerizes the impression is dislodged from the closed tray impression copings. The closed tray impression copings are then removed and implant or abutment analogs attached to the copings. The combined coping-analog assembly is then inserted into the definitive impression **Fig (1.4) (Gallucci *et al*, 2011).**

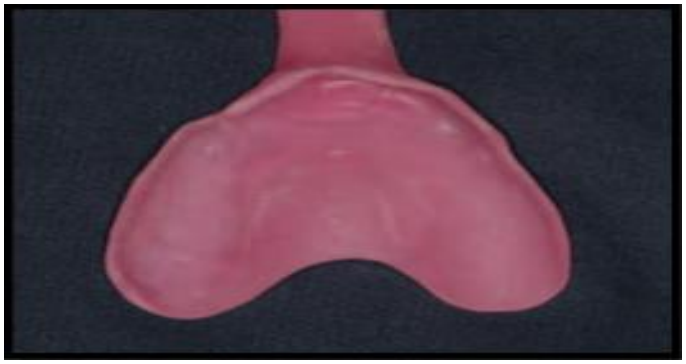


Figure (1.4): Closed custom tray **(Kalamalla et *al*, 2020)**

1.3 Special cases impression technique for complete denture

Compromised ridges may be broadly classified as:

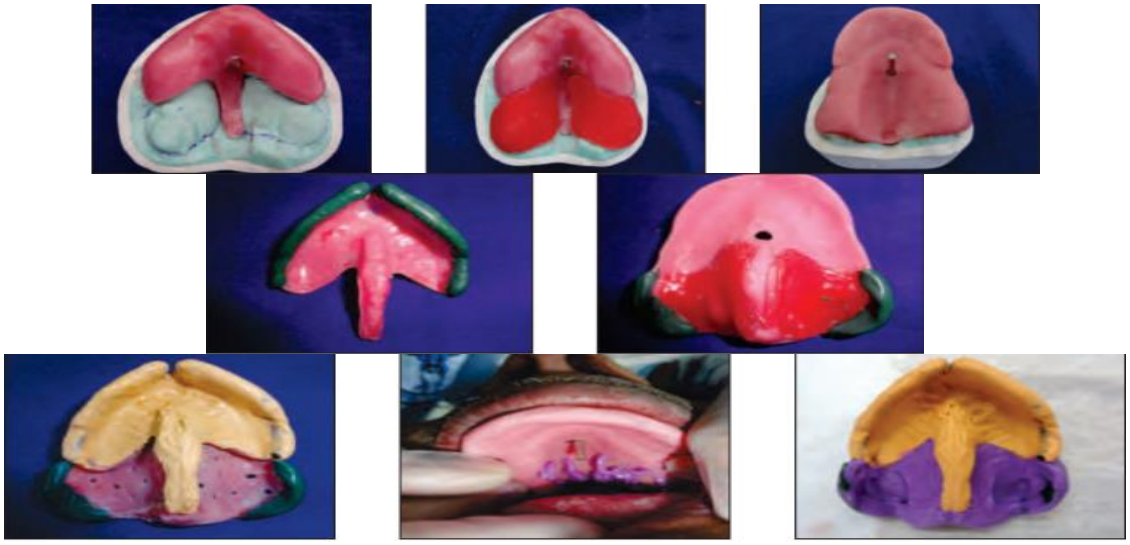
1.3.1 Atrophic Ridges:

Severe ridge atrophy results in increased inter-arch space, unstable and non-retentive dentures with inability to withstand the masticatory forces, severely atrophied ridges are a more common finding with the mandibular residual ridges than the maxilla. This is because the mandible resorbs at a faster rate than the maxilla. A good impression holds the key to a successful treatment in cases of resorbed mandibular ridges where we have minimum tissue to fulfill the fundamental requirement of retention, stability and support. No matter how good the prosthesis is constructed, it will not function as intended if it was not made on an accurate impression **(Kumar *et al*, 2012).**

1.3.2Flabby Ridges:

The alveolar mucosa over the ridges in completely edentulous patients is with unusual thickness and mobility. In some areas, it is thick from 2 to 4 mm.The flabby ridge or movable tissues are frequently seen in maxillary anterior ridge when the edentulous maxilla is opposed by natural teeth in the 3 mandibular anterior regions. Soft tissues that are displaced during impression making tend to return to their original form. Complete dentures fabricated using this impression will not fit accurately on the recovered tissues. This results in loss of retention, stability discomfort and gross occlusal disharmony of the dentures **(Krishna *et a*l, 2014).**

For Window Technique A custom tray with a spacer wax was fabricated on the primary cast. A window was cut in the custom tray which corresponds to the flabby part of the ridge. A blunt instrument was used to determine the relative amount of displacement or mobility of the flabby tissue. After border molding, the final impression was made with zinc oxide eugenol impression material .**Fig (1.5**) **(Krishna *eta*l, 2014).**



Fig(1.5) : Special tray with the locating rod(a), : 3 mm wax spacer over the flabby region(b), Pick up tray covering the first part of the special tray(c), Border molding of the 1 tray(d), Border molding of the 2 tray(e), Wash impression using Zinc oxide eugenol(f), Light body elastomeric impression in the pickup tray(g),Final Impression(h). **(Krishna *etal*, 2014)**

1.3.3 Knife Edge Ridges

A sharp bony ridge is a frequent problem among the edentulous patients and commonly occurs in the mandible in the edentulous patient as the Effect in the underlying bony structure of the residual ridge may be the cause of chronic pain under dentures especially during mastication. Knife edge ridge is formed due to rapid resorption of labial and lingual side of the lower anterior ridge. A Technique which will distribute loading onto alternative areas over the ridge and relive the mucosa over the sharp bony ridge producing differential pressure is preferred. Final Impression for maxillary arch was made using selective impression technique**. (Katna *etal*, 2011)**

1.4 Digital impression for CD

A relatively new approach employs Computer-Aided Design/ Computer-Aided Manufacturing (CAD/CAM) technology to take a digital impression intra orally, fabricate the master model, and design as well as produce the final restoration. This method aims to overcome certain physical limitations of conventional means, such as the dimensional changes of impression materials, the expansion of dental stone, and human errors associated with final restoration fabrication, thus reducing processing time as well as cost**(Miyazaki ,2009).**

The evolution of the CAD/ CAM technology decreases the duration of prosthesis manipulation and provide superior functional and esthetic outcomes. Also changes of the prosthesis volume and/ or shape is reduced or eliminated in this approach compared to the conventional procedures. Thus, the produced prosthesis adheres tightly to the tissue and uniformly transferring loads on it. Furthermore, it permits easy duplication of the denture and manufacture of new one using stored digital data **(Williams, 2006; Person, 2009).**

1.4.1 CAD/CAM systems parts

(1) A data acquisition unit, which gathers the information or data from the mouth and then converted into visual or optical impressions which are created directly or indirectly at the same time.

(2) Different software's: are used for the designing of the final restorations which are secured in optical impressions and prepared for the milling parameters.

(3) A computerized milling system for the final manufacturing of the restoration with solid blocks of the appropriate restorative material. The first two parts of the system are associated in the CAD phase, while the third one is the CAM phase **(Galhano, 2012).**

1.4.2 Digital scanner

A digital scanner is a non-contact measuring device that records and reconstructs three-dimensional (3D) surfaces or volumes. It consists of an optical acquisition system in association with 3D reconstruction software **(Lo Russo *et al*, 2018).**

- IOS is a medical device composed of a handheld camera (hardware), a computer, and software. The goal of IOS is to record with precision the three-dimensional geometry of an object. The most widely used digital format is the open STL or locked STL-like (**Raphaël Richert *et al.*, 2017).**
- The IOS devices use an advance optical surface scanning technology that are similarly to a camera using the sensors measure light reflection times from various texture through processes to capture the object threedimensionally instead of simply capturing lights and colors in the camera. The information is then captured by the 3D software that uses specific alignment algorithms to allow for registration of the object. **Fig (1.6)**

  Mobile and record directly in the mouth
- Extra-oral scanners (EOS) are used to digitize impressions/models in laboratories.
- Facial scanners can be used for recording aesthetic lines or extra-oral defects in maxillofacial prosthetics **(Lo Russo *et al*, 2019).**

Figure (1.6): Intra-oral Scanner Device **(Logozzo *et al*., 2011).**

1.4.2.1 Digital Intraoral Scanner Technique.

The digital impression of edentulous jaws is described by a certain technical difficulty, thus adequate clinical training is required **(Lo Russo and Salamini, 2018)**.

In the past, the use of intraoral scanners was not recommended to perform the impression of edentulous jaws due to alleged feasibility and accuracy limits **(Mangano *et al*., 2017).**

Many articles showed that digital impressions of edentulous jaws are feasible and predictable. **(Lo Russo *et al*., 2019; Chebib *et al*., 2019)**

On the other hand the same studies showed that optical scanners are not suitable to capture areas of high mobility tissue zone, that are usually considered the basic determinant in the retention of complete denture **(Preti and Gassino; 2007; Marino *et al*., 2014)**.

The differences between the two types of impressions (conventional and IOS) in those areas are related to two reasons: **Firstly** the specific software implementations in the scanner delete automatically areas that not steady over time. Current IOS focuses on capturing tissues that remain immobile, thus the software algorithm automatically removes scans of mobile tissue such as the tongue, vestibule, mobile areas of the palate as well as retractors or similar dental instruments **(Hack *et al*., 2020)**.

Secondly, when an important part of peripheral sealing zone is impressed, those areas will be different from those registered by the impression materials. This is because the scanner does not determine any pressure to the tissue compared to conventional impression materials **(Hack *et al*., 2020).**

1.4.2.2 Digital scanning of edentulous ridges

Presents three recording challenges:

1- The lack of anatomical landmarks.
2- The functional borders.
3- The posterior palatal seal. **(Tasaka *et al*,2019)**

Borders stretching are the most difficult area to record with digital scanning. **(Chebib *et al*, 2019).**Proposed to match conventionally registered functional borders with the original digital scanning. Other authors proposed mobilizing soft tissues with a finger or a mirror to record their position**. (Goodacre *et al*, 2018)**

Concerning the posterior palatal seal, the anterior and posterior vibrating line on the soft palate could be delineated by using an indelible pencil or small spots of light-polymerized gingival barrier material before scanning. The accuracy of digital scanners is sensitive to other factors such as learning curve, brightness during scanning, presence of saliva or scanning strategy. Each IOS requires specific settings and training**. (Ender *et al*. 2013)**

1.5 The procedure for a digital impression

It is initiated after meticulous examination and treatment planning. It is performed as follows:

• An intraoral or extra oral scanning of the patient's arches is performed. Intraoral scanning is performed with an intraoral scanner, thereby, eliminating the requirement of a physical impression. This includes several scans of both arches requiring about 3– 17 min. The scans are then joined by the software resulting in a full-mouth image.

• Alternatively, impressions materials are used to make impressions, which are then scanned directly with an extra oral digital scanner or made into master casts and then scanned. In general, bench top scanning of the cast models achieves comparable accuracy regardless of the type of dental stone used.

• Extra oral scanning of either the impressions or the stone-model scans can both provide adequate precision, although, digitalized the impressions present considerably better dimensional accuracy than stone models **(Lima JM *et al*, 2014).**

• The scanner generates a stereo lithographic file (STL) of the master cast that is imported into the designing software **(Lima JM *et al*, 2014)**

1.6 Advantages and disadvantages with digital impression

1.6.1The advantages of digital impressions are

1. Enhanced patient comfort and simplicity.
2. Eliminates the possibility of errors like air bubbles incorporated while making impressions, displacement of the tray, and deflection of the tray during insertion, inadequate use of impression material, insufficient use of impression adhesive, or distortion of impressions during disinfection.
3. Reduces the risk of contamination and eliminates the need to disinfect the impression.
4. Storage of conventional models require additional office space, may even break or chip when physically stored, whereas digital scans can be stored on hard disks indefinitely.
5. The most significant advantage for dentist and dental lab technicians in using digital technology is the elimination of many lab procedures like pouring cast and shrinkage of conventional impressions materials **(Birnbaum NS *etal*, 2008).**

1.6.2The disadvantages include

1. The lack of knowledge among dentists and dental technicians.
2. It is a new concept and not known by all.
3. The equipment is sophisticated, but newer versions are simplified but require training and practice to use the newer technique.
4. The cost of equipment is high. **(Kim SY *etal*, 2013).**

1.7 Digital versus Conventional Impression in complete denture

Digital impressions have several advantages over traditional impressions they are very beneficial today as a boon to both the dentists and laboratory technicians by enabling them to achieve greater accuracy in any restorative procedures. Dental students learn the conventional impression method in the dentistry education. It is also necessary to be informed the students about the technological innovations such as digital impression systems and how to apply them in their professional life. **(Sun *et al*, 2016).**

1.7.1 Accuracy

According to the International Organization for Standardization (ISO), accuracy is evaluated in terms of trueness and precision. **Trueness** is defined as the measurement bias or systematic error between the reference object and the target object**. Precision** is defined as the random error (reproducibility) between the objects when the process is repeated. The evaluation of trueness showed that digital impressions obtained using an intraoral scanner with a large scanning head had significantly lower deviation than the conventional impressions. Similarly, the evaluation of precision showed that digital impressions obtained using an intraoral scanner with a small scanning head had significantly higher deviation than the conventional impressions. The results suggested that the accuracy of digital impressions is superior to conventional impressions in terms of trueness, but inferior to conventional impressions in terms of precision, and that accuracy can be improved by increasing the scanning head size **(Malaguti , 2017).**

1.7.2 Time and appointments

Digital impression may reduce the number of clinical appointments required and the chair time and can simplify laboratory procedures. The overall treatment time for the conventional impression technique was longer than that for the digital impression technique. Digital impressions tend to reduce repeat visits and retreatment, while increasing treatment effectiveness **(Beuer , 2008).**

1.7.3The effectiveness and clinical outcomes

The effectiveness and outcomes of the conventional impression technique was evaluated by measuring the total treatment time, including the individual steps:

a. tray selection
b. adhesive application
c. upper/lower impression
d. Bite registration. **(Ashtiani, 2018).**

The effectiveness and clinical outcomes of the digital impression technique were evaluated by measuring the total treatment time, including the individual steps:

a. entering patient information (including name, last name, date of birth)
b. laboratory prescription
c. upper/lower scan
d. Bite scan. The results indicate that the efficiency outcomes of the digital impression technique were higher than that of the conventional impression technique, with respect to treatment time taken up and the perceptions of the subjects. **(Ashtiani, 2018).**

1.7.4 Patient preferences

Digital impression was the preferred choice.., stated that both the impression techniques were equally acceptable. **Benic et al**

Preference for digital impression is another indication that today's patients have more concern on comfort. This is because the digital impressions are associated with reduced invasiveness .Unacceptable conventional impressions require remaking of entire impression. However, with digital impression technique missing and unacceptable areas can be corrected by a segmental rescanning. This reduces working time and increases patient comfort **(Burhardt , 2016).**

1.7.5 Operator's Preferences

The digital impressions were preferred by the operator. Operator centered outcome were measured for digital and conventional impressions by assessing working time, operator perception and procedure difficulty. The work flow of digital impression technique took reduced time. Even though when a remaking was necessary, the time required for rescan of the digital impression was significantly less. Rescans were done mainly due to the difficulty in scanning the interproximal contact areas and in areas of reflection from light source. **(Gjelvold , 2016).**

Operator perception was measured on the level of difficulty in performing the procedure and was significantly lower for the digital impression technique. Manipulation and learning curve for the intra- oral scanner were less and they seem to be more user-friendly. Operators perceived that missing and unacceptable area

can be corrected more easily with digital impressions while the conventional technique demanded remaking of entire impression **(Gjelvold, 2016).**

1.7.6 Dental students

Students were more familiar with the conventional method before taking the impression. This situation is thought to be due to the fact that the students took conventional impression in the prosthetic courses at the preclinical laboratory while they did not take digital impression. They knew digital impression only as a theoretical course. Students found the digital method easier than conventional method in the study of **Lee and Gallucci in 2013.**

1.8 The type of Impression preference:

To know the opinion of specialized dentists about the type they prefer to take the impression, so we surveyed electronically 100 dentists from different branches (In the period from December 2o21 _April 2022) to find out which type they prefer digital or conventional impression.

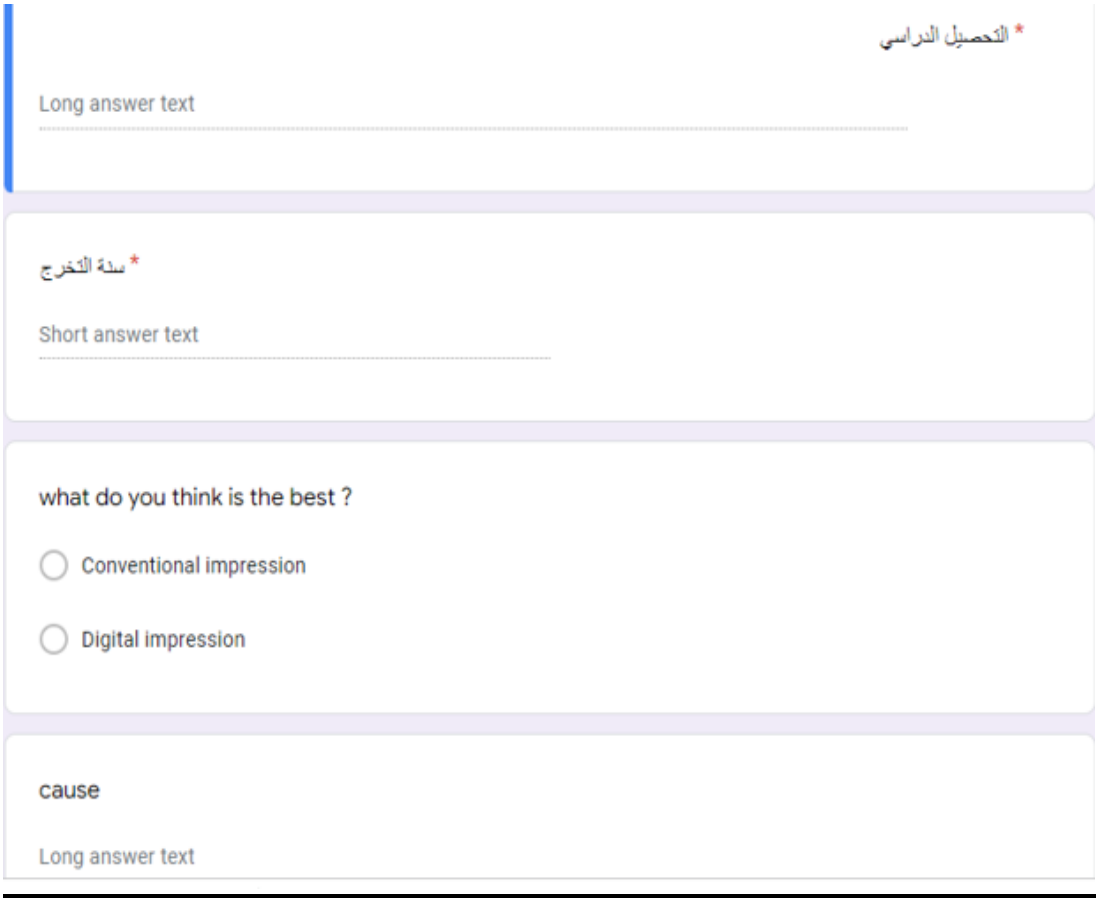


Fig (1.7): The electronic formula for the questioner

According to the following electronic formula we found that 22.2 percent of them prefer conventional impression and 77.8percent prefer digital impression and they write the causes by their own word .

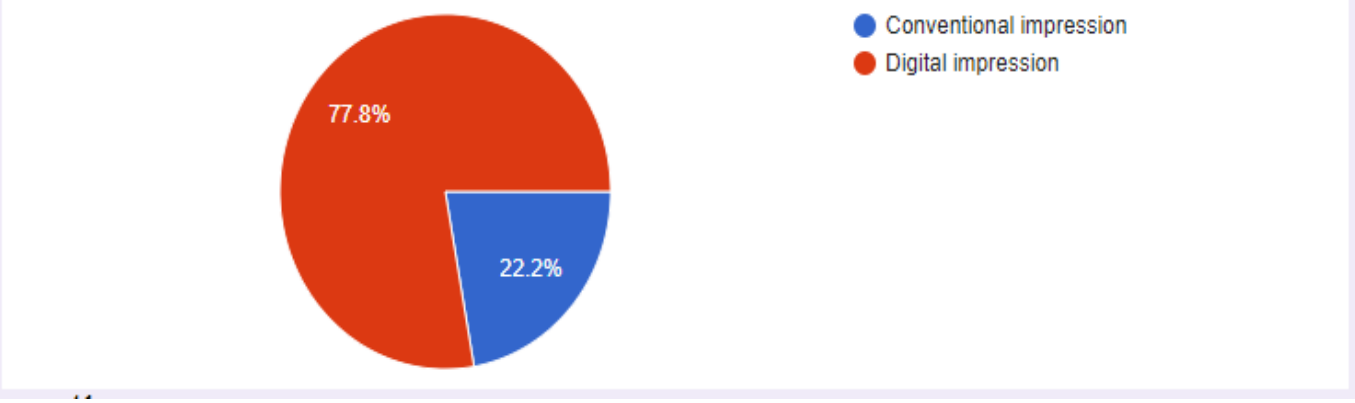


Fig (1.8):Bie diagram showed the percentage of dentist who prefer conventional versus the dentist who prefer the digital impression technique

And their preference duo to the following causes (in their own words)

Reasons for choosing the digital impression:

1. It is faster and more accurate
2. Easy
3. comfortable, accurate and gives more details
4. Digital impression easier & give more details & more comfortable for patient and dentist
5. no gag reflex
6. More presice and provides 3d imaging and better view of all the oral structures
7. Less discomfort
8. no pain
9. digital impressions can increase productivity and efficiency and provide a high degree of accuracy
10. lesser or no shrinkage, lesser failures, easily tolerated by the patient, could be saved and no need for repeating nor secondary impression
11. more quickly And can transfer to computer without the need of plaster models cast
12. It more convenient
13. does not require manipulation of sensitive impression materials

Reasons for choosing the Conventional impression:

1. Give more details according to my knowledge but actually I don’t use digital impression with best regards
2. Not work by used digit impression so i have little information about digit impression
3. Due to expensive price of intraoral scanner.
4. Easy and less costly

Chapter two

Conclusion and suggestion

Conclusion

Within the limitations of this review, the following conclusions can be drawn:

1. Conventional full-arch impression exhibited higher accuracy compared to direct intra oral scanner and the conventional impression would require more experience to achieve the same level of proficiency than digital impression.

2. Digital impressions offer speed, efficiency, ability of storing captured information indefinitely and transferring digital images between the dental office and the laboratory. The advantages of the digital impressions and scanning systems are improving patient acceptance, reducing the distortion of impression materials, 3D pre-visualization of tooth preparations, and potential cost- and time-effectiveness.

3. The treatment comfort of the digital impression technique was higher than that of the conventional impression technique when it was performed by an experienced dentist.

4. Digital denture technology has simplified the designing and manufacturing Process for complete dentures, and produces better-adapted prostheses with superior material properties.

5. The digital workflow has reported some advantages comparing to the conventional technique used for fabricating complete dentures, reducing the clinical procedures, number of visits, treatment time and costs.

6. It is importance for the clinician to have a comprehensive overview on both the techniques to choose the best technique based on evidence.

Suggestion

1. Compare the both impression clinically.

2. Increase the number of surveyed dentist and involve the patient in it.

3. Long term evaluation of the final prosthesis for each type of impression technique.

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