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IMPRESSION TAKING IN COMPLETE EDENTULISM

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Abstract. Complete edentulism is a complex prosthodontic condition in which successful rehabilitation depends greatly on the accuracy of impression taking. The final impression determines the quality of the denture base, the extension of borders, the distribution of functional pressure, retention, stability, and patient comfort. The aim of this study was to evaluate the clinical effectiveness of different stages of impression taking in completely edentulous patients and to determine the most frequent difficulties observed during primary and final impression procedures. The study included 58 patients with complete edentulism who were examined and treated at the Department of Orthopedic Dentistry and Orthodontics of Andijan State Medical Institute. All patients underwent clinical examination of the prosthetic field, primary anatomical impressions, fabrication of individual trays, border molding, and final functional impressions. The condition of residual alveolar ridges, oral mucosa, vestibular depth, muscle attachments, saliva, and previous denture experience was assessed before impression procedures. The results showed that the most important factors affecting impression quality were residual ridge atrophy, flabby mucosa, shallow vestibule, high muscle attachments, reduced salivary lubrication, and poor neuromuscular coordination. In 39.7 percent of patients, additional correction of tray borders was required during functional border molding. Selective pressure impression technique was clinically useful in patients with uneven tissue resilience and moderate or severe ridge resorption. The study concludes that impression taking in complete edentulism should not be performed as a mechanical procedure only. It must be based on individual anatomical and functional assessment of the prosthetic field. Proper primary impression, accurately fabricated individual tray, careful border molding, and final functional impression significantly improve retention, stability, and comfort of complete dentures.

Keywords: complete edentulism, impression taking, complete denture, individual tray, border molding, selective pressure impression, residual ridge, prosthodontics, functional impression

ПОЛУЧЕНИЕ ОТТИСКОВ ПРИ ПОЛНОЙ АДЕНТИИ

Аннотация. Полная адентия является сложным ортопедическим состоянием, при котором успех реабилитации во многом зависит от точности получения оттиска. Окончательный оттиск определяет качество базиса протеза, правильность границ, распределение функционального давления, фиксацию, устойчивость и комфорт пациента. Целью данного исследования явилась оценка клинической эффективности этапов получения оттисков у пациентов с полной адентией и определение наиболее частых трудностей, возникающих при первичных и окончательных оттисках. В исследование

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были включены 58 пациентов с полной адентией, обследованных и пролеченных на кафедре ортопедической стоматологии и ортодонтии Андижанского государственного медицинского института. Всем пациентам проводились клиническая оценка протезного ложа, получение первичных анатомических оттисков, изготовление индивидуальных ложек, функциональное оформление краев и получение окончательных функциональных оттисков. Перед началом ортопедического лечения оценивались состояние остаточных альвеолярных гребней, слизистой оболочки, глубина преддверия полости рта, прикрепление мышц, слюноотделение и опыт пользования ранее изготовленными протезами. Результаты показали, что на качество оттиска наиболее часто влияли атрофия альвеолярного гребня, подвижная слизистая оболочка, мелкое преддверие, высокое прикрепление мышц, снижение слюноотделения и недостаточная нейромышечная координация. У 39,7 процента пациентов потребовалась дополнительная коррекция краев индивидуальной ложки во время функционального оформления. Метод селективного давления был клинически полезен у пациентов с неравномерной податливостью тканей и умеренной или выраженной атрофией гребня. Сделан вывод, что получение оттисков при полной адентии не должно рассматриваться как простая техническая манипуляция. Оно должно основываться на индивидуальной анатомо-функциональной оценке протезного ложа. Правильный первичный оттиск, точно изготовленная индивидуальная ложка, тщательное функциональное оформление краев и окончательный функциональный оттиск повышают фиксацию, устойчивость и комфорт полных съемных протезов.

Ключевые слова: полная адентия, получение оттиска, полный съемный протез, индивидуальная ложка, функциональное оформление краев, селективное давление, остаточный альвеолярный гребень, ортопедическая стоматология, функциональный оттиск

INTRODUCTION

Complete edentulism remains one of the most important problems in prosthodontic dentistry. The loss of all teeth changes not only mastication and speech, but also the anatomical structure of the jaws, facial appearance, oral mucosa, temporomandibular function, and psychological well-being. In complete denture treatment, impression taking has a decisive role because the denture base is formed according to the information recorded in the impression. If the impression is inaccurate, the final prosthesis may cause pain, instability, poor retention, mucosal trauma, and dissatisfaction even when the laboratory stage is technically well performed.

The impression of an edentulous jaw must record both the anatomical form and the functional limits of the prosthetic field. Primary impressions help obtain a preliminary model and prepare an individual tray. Final impressions reproduce the denture-bearing tissues more accurately and define the borders of the future denture during functional movements. The final impression stage usually includes border molding, because the vestibular tissues and movable muscles must be recorded in a way that allows the denture to remain stable during speaking, swallowing, and chewing. Clinical studies describe border molding as an essential part of complete denture impression procedure, particularly for capturing vestibular extensions and improving the adaptation of the denture border.

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Several impression philosophies have been described in complete denture prosthodontics. The mucostatic technique records tissues with minimal pressure. The mucocompressive technique records tissues under pressure. The selective pressure technique attempts to distribute pressure according to the functional tolerance of different areas of the prosthetic bed. Reviews of complete denture impression methods commonly classify techniques into mucostatic, mucocompressive, selective pressure, functional, and neutral zone approaches. In clinical practice, no single technique is ideal for every patient because edentulous ridges vary greatly in height, width, mucosal resilience, muscle attachment, and degree of atrophy.

The American College of Prosthodontists classification system for complete edentulism emphasizes that diagnostic findings such as residual ridge morphology, mandibular bone height, muscle attachments, and jaw relationships influence treatment complexity. This means that impression taking must be individualized. A patient with a high, broad, firm ridge may be treated with a standard functional impression approach, while a patient with severe mandibular atrophy, movable mucosa, or high muscle attachments requires more careful tray design, relief, border molding, and pressure control.

The aim of this study was to evaluate impression taking in complete edentulism among 58 patients and to identify the main clinical factors that influence the quality of primary and final impressions.

MATERIALS AND METHODS

This clinical observational study included 58 patients with complete edentulism who applied for prosthodontic treatment at the Department of Orthopedic Dentistry and Orthodontics of Andijan State Medical Institute. All patients had complete absence of natural teeth in both jaws and required fabrication or replacement of complete removable dentures. Patients with acute oral inflammatory diseases, extensive maxillofacial defects, untreated oral tumors, or incomplete clinical records were not included.

The patients were aged from 51 to 80 years. The mean age was 65.2 ± 7.6 years. There were 33 women and 25 men. The duration of complete edentulism ranged from less than one year to more than ten years. Twenty patients had used complete dentures previously, while thirty-eight patients either had no previous prosthetic experience or had used dentures irregularly.

Before impression taking, all patients underwent structured prosthodontic examination. The residual alveolar ridges were assessed according to height, width, form, undercuts, mucosal resilience, vestibular depth, and muscle attachment. The oral mucosa was examined for inflammation, traumatic ulceration, flabby tissue, denture stomatitis, hyperplasia, and pressure sensitivity. Salivary condition was assessed clinically by mucosal moisture, patient complaints of dryness, and the ease of manipulation during impression taking. The tongue, lips, cheeks, floor of the mouth, frenula, retromolar pads, maxillary tuberosities, and hard palate were examined because these structures directly affect border formation.

Primary anatomical impressions were obtained using stock trays selected according to jaw size and ridge form. The aim of the primary impression was to record the general anatomy of the prosthetic field without unnecessary compression of movable tissues. After disinfection and evaluation, preliminary casts were poured. Individual trays were fabricated on the casts with

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planned relief in pressure-sensitive areas and proper extension according to anatomical landmarks.

The individual trays were clinically checked in the oral cavity. Border extension was evaluated during passive and active movements of the lips, cheeks, tongue, and floor of the mouth. Overextended areas were shortened, while underextended areas were corrected. Border molding was performed to record functional vestibular limits. During border molding, patients were asked to perform movements such as opening the mouth, moving the lips and cheeks, protruding and moving the tongue, swallowing, and speaking. These movements helped define the functional borders of the maxillary and mandibular dentures.

Final impressions were taken after satisfactory border molding. In patients with firm mucosa and favorable residual ridges, a conventional functional impression approach was used. In patients with uneven tissue resilience, flabby areas, or moderate to severe ridge atrophy, selective pressure principles were applied. Pressure-bearing areas were recorded with functional support, while sensitive or movable tissues were relieved. The final impressions were assessed for full coverage of the denture-bearing area, absence of voids, correct peripheral extension, accurate reproduction of anatomical landmarks, and stability of the impression in the mouth.

The clinical results were analyzed descriptively. The main evaluated indicators were anatomical difficulty of the prosthetic field, need for tray border correction, quality of border molding, presence of mucosal problems, impression retakes, and expected influence on denture retention and stability.

RESULTS

Among the 58 examined patients, favorable anatomical conditions for impression taking were found in 17 patients, which represented 29.3 percent of the study group. These patients had relatively preserved residual ridges, firm mucosa, adequate vestibular depth, and no pronounced muscle interference. Moderate anatomical difficulty was found in 24 patients, or 41.4 percent. These patients had partial ridge resorption, localized mucosal sensitivity, or moderate reduction of vestibular depth. Severe anatomical difficulty was found in 17 patients, or 29.3 percent. In this group, the most common findings were advanced mandibular ridge resorption, shallow vestibule, high muscle attachments, flabby ridge segments, and reduced stability of the mandibular impression.

Mucosal condition had a direct influence on impression technique selection. Healthy and firm mucosa was found in 31 patients, or 53.4 percent. Mild mucosal inflammation was found in 12 patients, or 20.7 percent. Traumatic pressure marks associated with previous dentures were observed in 8 patients, or 13.8 percent. Flabby or excessively movable mucosa was detected in 7 patients, or 12.1 percent. In patients with inflammation or traumatic lesions, final impression taking was postponed until local treatment, denture correction, or tissue rest improved the condition of the prosthetic bed.

Residual ridge atrophy was more pronounced in the mandible than in the maxilla. Mild ridge resorption was found in 18 patients, moderate resorption in 25 patients, and severe resorption in 15 patients. Severe resorption was most frequent among patients with a duration of

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edentulism longer than five years. These patients required more careful tray relief, slower border molding, and more precise pressure control during final impression taking.

During the checking of individual trays, additional border correction was required in 23 patients, or 39.7 percent. Overextension was most often observed in the mandibular lingual border, buccal shelf region, and maxillary labial frenum area. Underextension was more common in the posterior palatal seal area and retromolar pad region. These findings show that laboratory fabrication of an individual tray must always be followed by careful intraoral correction, because cast anatomy alone cannot fully reproduce functional tissue movement.

Border molding was completed without difficulty in 35 patients, or 60.3 percent. In 16 patients, or 27.6 percent, border molding required repeated correction because of unstable muscle movements or patient difficulty in performing functional movements. In 7 patients, or 12.1 percent, mandibular border molding was especially complicated due to shallow floor of the mouth, active tongue movement, or high mylohyoid attachment. In these patients, excessive extension of the lingual border caused displacement of the tray during tongue movement, and gradual correction was necessary.

Final impressions were clinically satisfactory after the first attempt in 46 patients, or 79.3 percent. Repeated final impressions were required in 12 patients, or 20.7 percent. The most common reasons for retaking the impression were voids in the vestibular area, insufficient border thickness, movement of the tray during setting, saliva contamination, and overcompression of movable mucosa. Repeated impressions were more frequent in patients with severe mandibular atrophy and flabby mucosa.

Selective pressure principles were applied in 28 patients, or 48.3 percent. This approach was especially useful in patients with uneven mucosal resilience, localized pressure-sensitive areas, flabby anterior maxillary ridge, and reduced mandibular support. Conventional functional impression technique was sufficient in 30 patients, or 51.7 percent, mainly among those with firm mucosa and moderate or favorable residual ridge anatomy. The results suggest that technique selection should be guided by tissue condition rather than by routine habit.

Clinical evaluation of the final impressions showed that maxillary impressions were generally more stable than mandibular impressions. Complete recording of the posterior palatal seal area improved expected maxillary retention. In the mandible, stability depended mainly on accurate extension over the buccal shelf, correct recording of retromolar pads, and careful formation of the lingual border. In patients with shallow vestibules, even small overextensions caused displacement of the impression tray.

Previous denture experience also influenced the clinical procedure. Among 20 patients who had used old complete dentures, 11 had traumatic mucosal areas, poor border extension, or decreased vertical dimension associated with worn dentures. These patients required more detailed explanation of the impression procedure and more careful tissue preparation before final impression taking. Among patients without previous denture experience, the main difficulty was neuromuscular coordination during functional movements.

The overall analysis showed that the quality of impression taking was determined by four main factors. The first was the anatomical condition of the residual ridges. The second was the

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resilience and health of the mucosa. The third was the accuracy of individual tray border correction. The fourth was the patient's ability to perform functional movements during border molding. When these factors were properly controlled, final impressions were more accurate and clinically predictable.

DISCUSSION

The findings of this study confirm that impression taking in complete edentulism is a clinical process requiring diagnostic thinking, not only technical performance. A complete denture is supported by soft tissues and residual bone, but these tissues are not uniform. Some areas can tolerate functional pressure, while others are easily displaced or traumatized. Therefore, the impression must record the prosthetic field in a condition that is compatible with function.

The primary impression is often underestimated, but it is the foundation of the entire prosthodontic workflow. If the primary impression fails to record the vestibule, retromolar pads, maxillary tuberosities, or posterior palatal area adequately, the individual tray will be inaccurate from the beginning. This may lead to repeated corrections and compromised final impression quality. In the present study, underextension in important anatomical areas was one of the reasons for additional tray correction.

The individual tray plays a central role in complete denture impression taking. A stock tray is useful for the preliminary stage, but it cannot provide the same level of adaptation as an individual tray. The individual tray allows the dentist to control space for impression material, provide relief in sensitive areas, and achieve proper border extension. However, the tray must be checked carefully in the mouth before final impression taking. The need for border correction in 39.7 percent of patients in this study shows that intraoral tray adjustment is not optional. It is an obligatory clinical stage.

Border molding was one of the most important procedures affecting the final result. The borders of a complete denture must be long enough to provide retention and stability, but not so long that they interfere with muscle movements. This balance can be achieved only through functional recording of the vestibular tissues. Published clinical research has shown that border molding is closely related to the quality of the working impression and the functional behavior of complete dentures.

The mandibular impression was more difficult than the maxillary impression. This is explained by the smaller supporting area of the mandible, the movement of the tongue, the activity of the floor of the mouth, and the influence of the buccinator, mentalis, and mylohyoid muscles. In severe mandibular ridge atrophy, the denture-bearing area becomes narrow and unstable. For this reason, mandibular impression taking requires special attention to the buccal shelf, retromolar pads, lingual pouch, and neutral zone of muscular balance.

Selective pressure technique was clinically useful in nearly half of the examined patients. This finding is consistent with the general prosthodontic concept that different areas of the edentulous mouth have different pressure tolerance. The selective pressure approach is frequently discussed in the literature as a method designed to combine support and tissue protection, although no single technique can be considered universally superior for every patient.

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In practice, this means that the dentist should adapt the impression method to the patient's anatomy and mucosal condition.

Flabby tissue presented a particular challenge. If movable mucosa is compressed during impression taking, the denture may fit the distorted tissue form and become unstable when tissues return to their resting position. Therefore, flabby areas should be recorded with minimal pressure or relieved in the tray design. In some cases, mucostatic recording of movable tissue combined with selective pressure in stable support areas may provide a better result.

Saliva also influenced the impression procedure. Reduced salivary flow made mucosa more sensitive and increased the risk of discomfort, while excessive saliva sometimes caused voids or material contamination. Although saliva is not always discussed as a main factor, it has practical importance during impression taking. Patients with xerostomia may require mucosal preparation, hydration, and careful material selection.

The study also showed the importance of patient cooperation. During border molding, the patient must perform functional movements correctly. If the patient cannot understand or perform these movements, the recorded borders may be inaccurate. Therefore, the dentist should explain the procedure calmly and demonstrate movements before placing the tray. This is especially important for elderly patients and for those using complete dentures for the first time.

From an educational point of view, the topic of impression taking in complete edentulism should be taught as a sequence of clinical decisions. Students should understand why a tray is shortened in one area and extended in another, why some tissues need relief, why the posterior palatal seal is important, and why the mandibular lingual border must be shaped functionally. Without this understanding, impression taking becomes a routine manipulation and the risk of prosthetic failure increases.

The limitations of this study should be noted. The sample included 58 patients from one clinical setting, and long-term follow-up after denture insertion was not included. The study evaluated clinical impression quality rather than objective retention force or chewing efficiency. Future studies should compare different impression techniques using patient satisfaction, denture retention, pressure distribution, mucosal health, and quality of life indicators.

Despite these limitations, the results demonstrate that high-quality impression taking is one of the key conditions for successful complete denture treatment. The final impression should reflect not only the static anatomy of the edentulous jaw, but also the functional behavior of tissues during daily oral activity.

CONCLUSION

Impression taking in complete edentulism is a decisive stage of prosthodontic rehabilitation. In the present study of 58 patients, the main factors complicating impression procedures were residual ridge atrophy, flabby mucosa, shallow vestibule, high muscle attachments, reduced salivary lubrication, old denture-related trauma, and insufficient neuromuscular coordination during functional movements.

The clinical results showed that primary anatomical impression, accurate individual tray fabrication, careful intraoral tray correction, functional border molding, and final impression based on tissue condition are essential for obtaining a stable and comfortable complete denture.

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Selective pressure principles are especially useful in patients with uneven mucosal resilience and moderate or severe ridge resorption.

The study supports the conclusion that impression taking should be individualized for every completely edentulous patient. A standard approach may be acceptable only in favorable anatomical conditions. In complex cases, the dentist must adapt tray design, border molding, relief areas, and impression material technique to the clinical condition of the prosthetic field. Such an approach improves retention, stability, comfort, and long-term success of complete removable dentures.

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