

Incidence Of Complete Denture Fracture: A Survey Among Libyan Dental Laboratories

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معدل حدوث كسور أطقم الأسنان الكاملة: دراسة استقصائية بين معامل الأسنان في ليبيا

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Received: June 27, 2026	Accepted: August 25, 2026	Published: September 30, 2026
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Abstract:

In clinical and laboratory settings, removable prostheses are all kinds of dentures that are designed to replace lost teeth and supporting tissue. The reason they are called removable is that patients or dentists can simply remove and replace them in the mouth, and total denture fractures are a regular issue. The entire denture An edentulous patient's daily life could be ruined by a denture fracture, which can happen during function or when the patient drops it by accident. Repair resins (auto-polymerizing acrylic resins) can be used to fix broken full dentures. The current study's objective was to identify and assess the most frequent rate of total denture fracture.

Material and method: Data were collected from prosthodontic laboratories for produce denture five laboratories in this study (Almajed, Haitham, Rivle ,Bright, ALnoor) among one year, 14235 complete dentures.. Fractured dentures were accurately assessed and repaired in the laboratory. For every damaged denture that was received for repair, a questionnaire was then sent to these labs. the variables were record site of fracture.

Result :Using SPSS statistical version 21 for Windows, all of the gathered data was organized methodically and put through basic statistical analysis. Following repair, a total of 14235 denture fractures (more than 35%) were observed (more than 21% in the midline, 14.731% in other areas, and 28.682% from fractures in artificial teeth).

Conclusion :Stress generated within the denture is another factor contributing to denture fracture, which is typically associated with poor design, fabrication, and material selection. When there is significant damage or when the denture only needs minor adjustments, it may need to be repaired. The degree of dimensional stability maintained both during and after

repair, the working time, and the strength to be achieved with the repair material all influence the choice of material.

Keywords: Complete denture fractures, Acrylic resins, Prosthodontics.

الملخص

مقدمة: تعد أطقم الأسنان المتحركة جميع أنواع أطقم الأسنان التي تُصنع عبر عدة خطوات سريرية ومعملية لتعويض الأسنان المفقودة والأنسجة الداعمة لها. سُميت بالمتحركة لسهولة إزالتها وإدخالها في الفم من قبل طبيب الأسنان أو المريض نفسه. يُعدّ كسر طقم الأسنان الكامل مشكلة شائعة، وقد يُؤثر سلبيًا على الحياة اليومية للمريض فاقد الأسنان. قد يحدث الكسر أثناء الاستخدام أو عند سقوط الطقم عن طريق الخطأ. يُمكن إصلاح أطقم الأسنان الكاملة المكسورة باستخدام مواد ترميمية (راتنجات أكريليك ذاتية التصلب). هدفت هذه الدراسة إلى اقتراح وتقييم أكثر أنواع كسور أطقم الأسنان الكاملة شيوعًا. المواد والطرق: تم جمع البيانات من معامل الأسنان لإنتاج أطقم الأسنان، وشملت هذه الدراسة خمسة معامل (الماجد، هيثم، ريفل، برايت، النور) على مدار عام واحد، بإجمالي 14235 طقم أسنان كامل. أُجري تقييم دقيق لأطقم الأسنان المكسورة التي استقبلتها المعامل لإصلاحها. ثم وُزِع استبيان على هذه المعامل لكل طقم أسنان تالف تم استلامه للإصلاح، وسُجِّل أماكن الكسر للطقم المتحركة.

النتائج: تم ترتيب جميع البيانات التي تم جمعها بشكل منهجي وإخضاعها لتحليل إحصائي أساسي باستخدام حزمة SPSS الإحصائية الإصدار 21 لنظام التشغيل ونذر. بلغ إجمالي حالات كسر أطقم الأسنان 14235 حالة، منها أكثر من 35% بعد الإصلاح، وأكثر من 21% في خط المنتصف، و14.731% بمناطق أخرى، و28.682% من الكسور ناتجة عن الأسنان الاصطناعية. الاستنتاج: يرتبط كسر طقم الأسنان عمومًا بعيوب في التصميم والتصنيع واختيار المواد. ومن الأسباب الأخرى للكسر الإجهاد الناتج داخل الطقم. قد يحتاج طقم الأسنان إلى إصلاح في حال وجود تلف شديد أو حتى عند الحاجة إلى تعديلات طفيفة. يعتمد اختيار المادة على وقت العمل، وقوة مادة الإصلاح المطلوبة، ودرجة ثبات الأبعاد أثناء الإصلاح وبعده.

الكلمات المفتاحية: كسور أطقم الأسنان الكاملة، راتنجات الأكريليك، طب الأسنان التعويضي

Introduction

The term "removable prosthesis" refers to any form of denture that is created in a number of clinical and laboratory procedures to replace lost teeth and supporting tissue with a prosthesis design. The reason for the word "removable" is that the dentist or the patient can easily remove and insert the prosthesis into the mouth.^[1]

A full denture is the most popular prosthetic available to edentulous individuals globally.[2] Poly methyl methacrylate (PMMA), an acrylic resin, is the substance most frequently used to make dentures. Denture fracture is one of the addressed issues related to it, despite its widespread use, A complete denture patient's daily routine may be severely hampered by a denture fracture. [3]

The denture fracture may occur due to faults in denture fabrication, poor fit and lack of balanced occlusion, and low resistance to fracture of acrylic resin.[4

Denture fractures can be caused by low acrylic resin fracture resistance, poor fit and unbalanced occlusion, and flaws in denture fabrication, The most common causes of denture fractures are mechanical or unintentional. [4] Flexural fatigue and impact are the two types of forces that cause denture fractures.[5] Flexural fatigue is the result of repeatedly flexing a material, whereas catastrophic failure or impact failure indicates the material's mechanical limitations.[6]

Inadequate design, poor manufacture, and/or poor material selection are mechanical factors. The denture is more likely to fracture if the base's deformation is made worse or if its stress distribution is changed [4], [8].

Fracture may be due to a multiplicity of factors rather than the denture base material itself^[7].

The anteroposterior line, which aligns with the labial notch of a maxillary or mandibular complete denture, is a common location for fractures. Flexural fatigue is frequently the

cause of this. The maxilla's alveolar resorption causes the left and right halves of the denture to flex, with a fulcrum along the palate's midline.[8]

Fractures and detachments are examples of artificial tooth failure. Inadequate laboratory procedures, such as contaminated bond surfaces or an incorrect curing cycle, are the primary causes of tooth debonding. [9]

Denture tooth fracture is usually the result of improper handling out of the mouth.[4] Reaching the original strength and contour of the denture at the lowest possible cost and time is the ultimate goal of denture repair. Fractured dentures have been repaired using a variety of methods and materials. Auto polymerizing acrylic resin, heat-curing acrylic resin, and more recently, visible light-cured resin are used to fix broken acrylic resin dentures. Patients benefit from quick and affordable auto polymerizing resin repairs.[10] Regretfully, some of the original transverse strength may be lost in the repaired units. Moreover, rather than through the center of the repair, fracture of repaired dentures frequently happens at the intersection of new and old materials.[11]. The purpose of the study was to assess the most frequent rate of complete denture fractures.

Material and Method

Dentures made with metal denture bases, porcelain teeth, and dentures with prior repairs, relines, wires, or mesh were excluded from the study. Five dental laboratories in Libya agreed to participate in the study, and data was gathered over a one-year period, totaling 14235 complete dentures. The accurate assessment of fractured dentures received in the laboratories for repairs was completed. A questionnaire was then submitted to these laboratories for each damaged dentures received for repair.[12]

Statistical Analysis: Percentage (proportion) statistical test

Using the SPSS statistical package for the Social Sciences version 21 for Windows, all of the gathered data was methodically organized and put through basic statistical analysis

Results

During the 1-year period, questionnaires are Collected from 5 dental laboratories concerning complete denture fracture. In the present study, Table 1 reveals that the most common site of fracture was previous repair (35.356%), followed by artificial teeth that had debonded from the denture bases (28.682%), midline fracture (21.229%), and other area (14.731%). In the current study, 14235 dentures, including complete dentures, were found with previous repair, replacement of the teeth that had debonded from the denture bases, and midline fracture.

Table 1: Site of Fracture.

Site of Fracture	Prevalence _%
The fracture was repeated	35.356%
Artificial	28.682%
Medline	21.682 %
Other area	14.731%

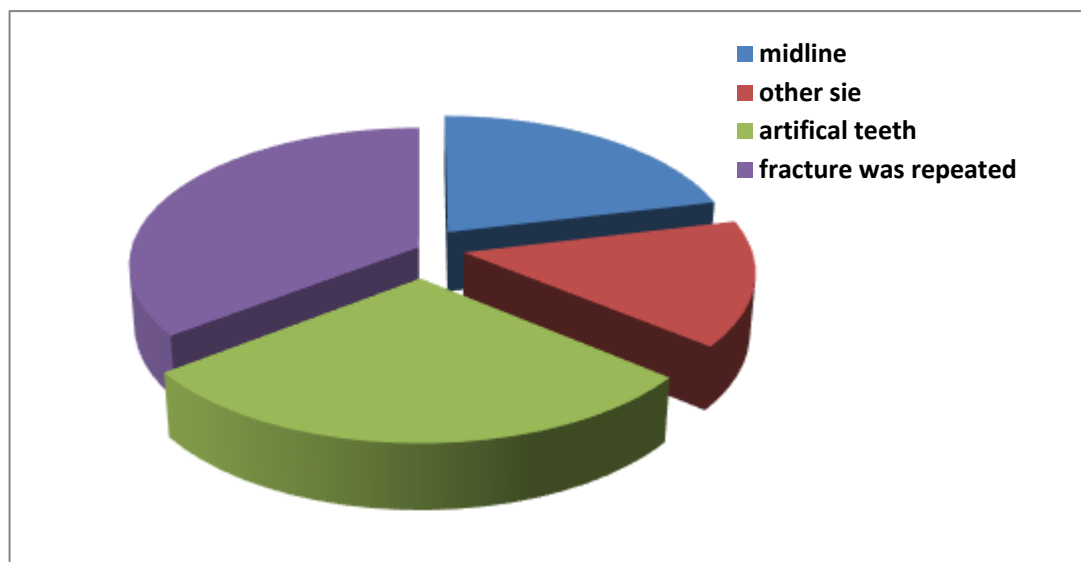


Figure 1: Assessment of site fracture of denture

Discussion

This study determines the prevalence of site of complete denture fracture.

Nagpal et al^[13] stated that: The authors came to the conclusion that, within the constraints of the study, midline fractures were the most frequent mode or location of mandibular denture fracture in the individuals under investigation. The incisor region came next. The most frequent mode or location of maxillary denture fractures in the individuals under study was incisor region fractures. The lateral incisor region and the midline region came next.

Within the confines of the study, **Triveni VVS et al.** [14] discovered that: The majority of repaired dentures had previously been mended; upper dentures were repaired more frequently than lower dentures; and midline fractures were the most prevalent type of crack.

According to Choudhary S. [12], midline fractures were the most prevalent for both types of dentures. In maxillary dentures, fractures of a portion of the artificial tooth were the second most common, and in mandibular dentures, the fracture line is shaped like a moon and passes through the labial or buccal flange.

The most frequent fracture location (more than 35%) in this investigation was repeated; similar findings were reported by Zisis et al. [15], but they were not comparable to those of Javeria et al. [16].

This study's prevalence of midline fractures, which account for 21.229% of all fractures, is not comparable to that of Javeria et al.'s study [26], which found that midline fractures accounted for 45.5% of all fractures, with midline fractures being the most common type (59%); **Hoshang 2011** [17].

33% of 195 repairs in complete dentures were linked to debonding or fracture of artificial teeth, according to **Alina et al.** [18]. In our study, both maxilla and mandibular dentures fractured once in the majority of cases; nearly 15% of patients reported fracture in the same area, while about 10% showed denture fracture more than twice in the same area.

Shanker et al. (2021) reported 196 maxillary and 154 mandibular denture fractures out of 350 total denture fracture cases; midline fractures accounted for 46% of these cases.

Conclusion

A complete denture is made using a series of steps in clinical and laboratory settings to replace missing teeth and supporting tissue with a prosthesis design. A complete denture wearer's life is abruptly cut short by a sudden fracture of their denture, which is absolutely necessary for their day-to-day routine. Denture fracture is typically caused by flawed design, fabrication, and material selection. The denture may need to be repaired when there is significant damage or only minor adjustments. The choice of material depends on the working time, the degree of dimensional stability maintained during and after repair.

Reference

- [1] Basker ,R., Devan port ,J .and Tomlin ,H. (2017). prosthetic treatment of edentulous patient", ch 16 5th ed, London : Macmillan Education . pp. 247.
- [2] Roessler DM. (2003). Complete denture success for patients and dentists. *Int Dent J*, 53:340-5.
- [3] Darbar UR, Huggett R, Harrison A. (1994). Denture fracture – A survey. *Br Dent J*, 176:342-5.
- [4] Vallittu PK, Lassila VP, Lappalainen R. (1993). Evaluation of damage to removable dentures in two cities in Finland. *Acta Odontol Scand*, 51:363-9.
- [5] Beyli MS, von Fraunhofer JA. (1981). An analysis of causes of fracture of acrylic resin dentures. *J Prosthet Dent*, 46:238-41.
- [6] Wiskott HWA, Nicholls JI, Belser UC. (1995). Stress fatigue: Basic principles and prosthodontic implications. *Int J Prosthodont*, 8: 105-116.
- [7] Darbar UR, Huggett R, Harrison A. (1994). Denture fracture – A survey. *Br Dent J*, 176: 342-345.
- [8] Stipho HD. (1998). Repair of acrylic resin denture base reinforce with glass fiber. *J Prosthet Dent*, 80: 546-550.
- [9] Jagger DC, Harrison A. (1998). The fractured denture-solving the problem. *J Primary Dent Care*, 5: 159-162.
- [10] Rudd KD, Morrow RM, Eissman HF. (1980). *Dental Laboratory Procedures*. 1st ed. St. Louis: Mosby, p. 371-2.
- [11] Cunningham JL. (1993). Bond strength of denture teeth to acrylic bases. *J Dent*, 21:274-80.
- [12] Choudhary S. (2019). Complete denture fracture – A proposed classification system and its incidence in National Capital Region population: A survey. *J Indian Prosthodont Soc*, 19:307-12.
- [13] Abhishek Nagpal, Omkar Shetty, Sumit Singh Phukela, Bhupender Yadav, Reshu Sanan, Jaiveer Yadav. (2022). Prevalence based evaluation of fracture sites of complete Dentures in Institutionalized Patients: An Original Research Study. *Bull. Env. Pharmacol. Life Sci, Spl , 2* : 247-250.
- [14] Triveni VVS, Sujai GVNS, Bharath S, G M Guruprasad. (2019). An Incidence Based Assessment of Etiology and Position of Fracture of Acrylic Resin Dentures: A Survey Based Original Study. *J Adv Med Dent Scie Res*, 11:95-99.
- [15] -Zissis AJ ,Polyzois G I, Yannikakis SA. (1997). Repair in complete denture :Result of survey , *Quintessence Dent Technol*, 23: 149-55.
- [16] Javeria I , Muhammad N S ,Faiza A, Ayesha N ,Adeel T ,Zain S and Khezran Q. (2022). Frequency and cause of fracture of acrylic resin complete denture in Edentulous patient. *PJMHS*, 16: 160-62.
- [17] Hoshang Khalid Abdel-Rahman. (2011). Causes and types of complete denture fracture. *zjms*, 15: 36-40.
- [18] Aline S, Takamiya, Douglas R, Monteiro, Julie M, Debora B and Barbosa. (2012). Complete denture wearing and fracture among patient treated in university clinics. *Gerodontology*, 29: 728-34.
- [19] Shankar P. Dange, Nikita R. Galgah, Kishor M. Mahale, Smita A. Khalikar. (2021). complete Denture repair : A new classification system Based on a survey. *IOSR-JDMS*, 20: 41-47.
- [20] ASTM International. (2019). *Standard test method for theoretical maximum specific gravity and density of bituminous paving mixtures* (ASTM D2041/D2041M-19). ASTM International.

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