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Prevalence of alveoplasty in maxillary edentulous patients in south Jordanian people: A cross-sectional study

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Abstract

Aims: This study studies 200 maxillary edentulous patients from southern Jordan to establish alveoplasty rates to guide clinical practice and advance Middle Eastern pre-prosthetic surgical research. With periodical ridge examination or alternative prosthetic options, prosthodontists, oral surgeons, and general dentists may use the data.

Methods: Maxillary edentulous patients who required alveoplasty before obtaining full dentures were studied at Jordan's Prince Ali Bin Al-Hussein Hospital. Two hundred people over forty had all their top teeth pulled for the study. Age was used to categorise individuals. A thorough clinical assessment indicated the patient's necessity for alveoplasty. The study examined the maxillary sinus, pathological lesions, residual bone density, and height using x-rays. X-ray and clinical exam data were merged to decide on surgical ridge adjustment. The appearance of acute bony projections and considerable arch height variability prompted alveoplasty referral. The ridge deformity determined the surgical strategy. A basic alveoplasty surgery that reconstructs localised bone may be recommended for small issues, while ridge removal and smoothing may be needed for severe conditions. Chi-square tests, descriptive statistics, and case report forms organised data collection.

Results: A cross-sectional assessment of 200 upper-bite missing teeth patients at Jordan's Prince Ali Bin Al-Hussein Hospital found significant age disparities in the 12.5% who underwent alveoplasty. Ridge repair surgery was more prevalent in younger persons, even though 15.8% of 51-60-year-olds needed it for structural issues. After six decades, alveoplasty was negatively correlated with age. This suggests that prolonged tooth loss may promote significant ridge atrophy, reducing the need for surgery. The study also found four ways a person's anatomy may indicate the need for an alveoplasty. The findings indicate that a comprehensive clinical examination is essential when choosing ridge irregularity surgery. The study found that alveoplasty patients had increased osteosclerotic regions and root fragments following tooth extraction. How near the maxillary sinus was to the ridge did not significantly affect alveoplasty need. However, knife-edge ridge x-rays were efficient diagnostic tools. Tooth extraction time substantially impacted alveoplasty occurrence. Age, robust bone crests, and time following extraction may indicate alveoplasty. Conclusion: Alveoplasty demands vary by patient type, tooth extraction, and prosthesis reinsertion timing. The principles of bone reshaping remain the same. Jordan's 12.5% incidence rate illustrates the issue healthcare institutions globally confront in combining scant resources with effective replacement therapy. The findings provide a demographic profile of southern Jordanians lacking top teeth who require alveoplasty.

Keywords: Alveoplasty; Maxillary edentulism; Ridge correction; Denture stability; Jordan

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1. Introduction

Millions of people worldwide suffer practical, cosmetic, or mental tooth issues. This makes tooth loss a major oral health issue [1]. Lost teeth, especially maxillary ones, can cause alveolar ridge resorption. This consequence is medically significant. Over time, bone form changes can generate undercuts, uneven ridge morphology, and sharp bony projections [2]. Due to these structural alterations, alveoplasty is often needed to improve denture fit and function. Because these changes make removable prostheses less stable, pleasant, and safe [3].

Alveoplasty is typical before replacement. It levels the alveolar ridge, smooths rough regions, and gives dentures a stable platform [4]. Recurrent ridge malformations such knife-edge ridges, exostoses, or severe mylohyoid ridges make prosthesis recovery difficult, making surgery even more important [5]. Alveoplasty is significant in medicine, but little is known about its prevalence and demographics in Jordanian patients [6].

Edentulism has increased in Jordan [7] because to poor mouth hygiene, untreated cavities, periodontal disease, and in some cases, lack of preventative dental care [8]. Southern Jordan's cultural and socioeconomic characteristics may affect tooth extraction and the necessity for ridge correction treatments such alveoplasty [8]. Clinicians struggle to create research-based treatment regimens since there isn't enough data on how often and why alveoplasty is done in this population [9].

The maxillary arch's link to the sinus cavities, palatal bone forms, and variable chewing and speaking stresses make it special in prosthetic therapy [10]. After a tooth is extracted, maxillary alveolar bone resorbs, narrowing or atrophicing the ridge and making dentures tougher [11]. According to study, incorrect ridge changes can cause pain, sores, and problems swallowing, which can lead to prosthesis failure [12]. Alveoplasty can improve denture fit by making the ridge form more flexible [13].

There are various factors to consider when getting an alveoplasty. The time since tooth extraction, ridge resorption, and bone anomalies are factors [14]. For long-term health, some clinicians recommend alveoplasty immediately after tooth extraction, while others recommend letting the bone repair [15]. Patient-specific characteristics like age, health, and bone density affect the procedure's success [16].

There is consensus that alveoplasty is useful, although clinical opinion is subjective and there is no standard method for those without teeth [17]. Some research [18] suggests that socket grafting may minimise alveoplasty by preserving the ridge's form following extraction. However, without these procedures, ridge irregularities may require surgery before prosthesis rehabilitation [19].

Knowing how common alveoplasty is helps southern Jordanian clinicians plan treatments and allocate resources. Patients may lack oral care or pre-prosthetic education, making this crucial [20]. By considering demographic trends such gender disparities in alveoplasty needs, public health interventions can improve oral rehabilitation outcomes [21].

This study investigated how common alveoplasty is in southern Jordanian maxillary edentulous patients. Gender, age, anatomical, and clinical decision-making characteristics were examined. This study examines 200 Middle Easterners for pre-prosthetic surgery to improve doctors' skills [22].

This study will aid general dentists, prosthodontists, and oral surgeons who treat toothless patients. Finding out that many locals need alveoplasty may inspire dentistry clinics to use regular ridge examination [23]. However, improved imprint methods or implant-supported overdentures may be more essential if demand is limited [24].

This study will contribute to global edentulism discussions by providing local numbers. Compare these numbers to other communities [25]. This knowledge is crucial for creating standardised patient care standards. This is crucial as evidence-based dentistry gains popularity [26].

In many cases of artificial dentistry that involve missing teeth and alveolar ridge modifications, alveoplasty is necessary [27]. There are few statistics on its prevalence in southern Jordan, hence this investigation is needed [28]. This study examined how often and what characteristics predict alveoplasty in toothless patients to help clinicians make better judgements and improve their quality of life [29].

2. Materials and methods

Researchers at southern Jordan's Prince Ali Bin Al-Hussein Hospital interviewed maxillary edentulous patients who needed alveoplasty before dentures. Study ran from April 2025 until March 2026. Study population and prevalence were examined. The Prince Ali Bin Al-Hussein Hospital Institutional Review Board authorised the research protocol (Reference No. 53_7/2025) in accordance with the Declaration of Helsinki for human research. Enrolment required explicit informed consent from all participants [30]. The study included 200 over-40 patients who had all their maxillary teeth removed and came in for prosthetic rehabilitation. Power analysis using G*Power software (version 3.1.9.7) determined the sample size based on regional research [31] that indicated 15% of patients would have an alveoplasty. With a 95% confidence level and 5% error margin, 196 patients were needed. For reliability, the figure was rounded to 200.

To make the study population similar, rigorous criteria were utilised to accept and exclude patients. Participants needed three months without upper jaw teeth to heal the bone [32]. They also couldn't have recent mouth infections or health issues that might prevent modest dental operations. To eliminate confounding influences, rigorous exclusion criteria were applied. People with head and neck radiation [33], severe osteoporosis [34], uncontrolled diabetes [35], bleeding disorders [36], active oral mucosal diseases [37], temporomandibular joint disorders [38], or maxillary arch surgery before getting a prosthetic were excluded. Extreme maxillary atrophy patients who needed bone augmentation beyond alveoplasty were excluded from the research [37].

A single calibrated prosthodontist with over ten years of clinical experience followed a rigorous clinical examination regimen [38] to ensure consistent assessments and decisions across the research. We thoroughly reviewed each patient's medical and dental information before the exam. This required noting down their previous maxillary tooth extraction date, any other dental operations, and any health issues that could affect treatment [39]. The extraoral assessment examined facial symmetry, temporomandibular joint function, and vertical occlusion [40]. These factors influenced prosthetic treatment planning and alveoplasty decisions. Standard dental mirrors and probes were used for a systematic intraoral inspection in a well-lit room. The maxillary residual ridge's soft tissues were carefully examined [41].

After considering several aspects, an intraoral assessment recommended alveoplasty. Ridges with sharp or unequal crests may induce denture base sores [42]. Major undercuts may make denture installation and maintenance difficult [43]. Bony spicules or exostoses can create pressure points [44]. Too many ridge height alterations can weaken dentures [45]. Knife-edge ridges may induce pain or resorption [46]. A soft tissue exam was performed before rehabilitating a prosthetic limb to determine the amount and type of keratinised mucosa, hypermobile tissue, and ulcers [47]. All clinical observations were recorded on a standard form with maxillary arch diagrams [48]. This helped pinpoint anatomical issues that required surgery [48].

The diagnostic process included x-rays of all individuals. All panoramic radiographs were acquired with the same digital imaging technology (Planmeca ProMax 3D, Helsinki, Finland) to minimise technical variance and picture quality [49]. The radiographic evaluation [50] examined the maxillary sinus in relation to the remaining ridge, found pathological lesions, measured residual bone density and height, and found any foreign bodies or root pieces. Radiopaque or radiolucent areas were examined for infection or bone issues that may require alveoplasty [51]. A detailed treatment decision about surgical ridge adjustment was reached by comparing x-ray and clinical exam outcomes [52].

Clinical criteria from prosthodontic principles and research supported alveoplasty [53]. Main explanations were large arch height fluctuations of more than 3mm between areas of the arch, knife-edge ridges, and less than 2mm of flat surface to hold dentures. Ridges with sharp bony projections that could irritate the mucosa and severe undercuts that prevent denture insertion and retention were among these. The prosthodontist's assessment of long-term issues without alveoplasty and the patient's trial denture placement pain were not the key determinants [56]. Another experienced prosthodontist would evaluate a case and agree on treatment [57].

Alveoplasty patients' surgical methods depended on the ridge deformity. For minor issues, doctors do alveoplasty with localised bone recontouring [58]. They used more thorough ridge reduction and smoothing for larger issues [59]. Following conventional surgical protocols, all surgeries were performed with 2% lidocaine and 1:100,000 epinephrine [60]. For discomfort, 400 mg of ibuprofen was given every six hours or as needed, and a 0.12% chlorhexidine mouth rinse was used twice a day for seven days [61]. Two weeks later, patients were called back to remove their stitches and monitor their healing [62]. Then final dentures were manufactured.

Case report forms structured data collection and captured all key information. Demographics included age, gender, and tooth extraction time [63]. Ridge issues, their location (anterior or posterior maxilla), and recommended surgery were noted in clinical parameters [64]. The research supervisor occasionally checked data collection to ensure accuracy [65]. We removed all identifying information from the dataset before analysing it and provided each instance a unique research number to protect patient privacy [66].

We utilised MedCalc Statistical Software (20.218) and IBM SPSS Statistics (25.0) for our statistical analysis [67]. We calculated all variables' means, standard deviations, frequencies, and percentages using descriptive statistics [68]. We divided the number of patients who needed alveoplasty by the sample size to determine its prevalence [69]. Chi-square tests [70] examined connections between age, gender, and alveoplasty requirement. We employed independent t-tests or ANOVA wherever possible for continuous variables [71]. A p-value of 0.05 or less indicated statistical significance for all tests [72]. Multivariate logistic regression analysis [73] was aimed to uncover independent predictors of eye surgery requirement while controlling for confounding factors. The results were checked by a biostatistician to ensure proper statistical procedures and interpretation [74].

The entire study was quality-controlled, improving reliability and validity [75]. To ensure clinical consistency, the principal researcher calibrated with renowned prosthodontists before collecting data [76]. A research tested the data collection forms and exam protocol on 20 patients to prepare them for the main study [77]. 10% of patients were re-evaluated two weeks after the initial exam to assess second exam reliability. Cohen's kappa coefficient [78] measured agreement. Equipment was calibrated monthly and x-ray interpretation was compared to a reference standard to ensure diagnosis accuracy [79].. These strong methodological processes ensured the study's reliability and reduced bias [80].

3. Results

Two hundred patients with upper-bite missing teeth were included in this cross-sectional research. These patients were treated for artificial treatment at Prince Ali Bin Al-Hussein Hospital, which is located in southern Jordan. The objective was to determine the frequency of alveoplasty as well as the types of patients that need it. With 128 males (64%) and 72 women (36%), the sample represented a decent representative of the people in the region that did not have teeth. This was due to the fact that the sample had a fair age range. At least sixty years of age was present in forty-three percent of the patients. As a third, there were individuals who were between the ages of 41 and 60 (18.5%), and the remaining third were those who were between the ages of 51 and 60 (38.5%). We were able to examine the variations in ridge shape and the need for surgery that occurred as a result of age, which assisted us in gaining a better understanding of significant patterns of alveolar bone loss at various periods of life.

Table 1 Demographic Distribution of Study Participants (N=200)

Characteristic	Category	Number (%)	Male	Female
Total		200 (100)	128 (64)	72 (36)
Age Groups (years)	40–50	37 (18.5)	23 (62.2)	14 (37.8)
	51–60	77 (38.5)	46 (59.7)	31 (40.3)
	>60	86 (43.0)	59 (68.6)	27 (31.4)

Demographic breakdown of the study population by age and gender. Values are presented as *n* (% of subgroup).

Table 2 Prevalence of Alveoplasty Need by Age and Gender

Age Group (years)	Total Patients	Need Alveoplasty, *n* (%)	Male	Female
40–50	37	7 (18.9)	5 (71.4)	2 (28.6)
51–60	77	16 (20.8)	8 (50.0)	8 (50.0)
>60	86	2 (2.3)	2 (100)	0 (0)
Total	200	25 (12.5)	15 (60)	10 (40)

Prevalence of alveoplasty need stratified by age and gender. Percentages in parentheses reflect proportions within each age group (e.g., 18.9% of 40–50-year-olds required alveoplasty).

Table 3 Anatomic Location of Ridge Deformities Requiring Alveoplasty (N=25)

Age Group (years)	Total Alveoplasty Cases	Anterior Maxilla, *n* (%)	Posterior Maxilla, *n* (%)
40–50	7	4 (57.1)	3 (42.9)
51–60	16	7 (43.8)	9 (56.2)
>60	2	0 (0)	2 (100)
Total	25	11 (44.0)	14 (56.0)

Distribution of ridge deformities by anatomic location. Anterior maxilla includes incisor/canine regions; posterior includes premolar/molar areas.

Table 4 Clinical Indications for Alveoplasty (N=25)

Indication	Number (%)	Most Affected Age Group
Sharp bony crests	11 (44.0)	40–50 years
Undercuts interfering with denture	8 (32.0)	51–60 years
Exostoses/bony spicules	4 (16.0)	51–60 years
Severe ridge height discrepancies	2 (8.0)	>60 years

Primary clinical indications for alveoplasty. Percentages reflect proportion of total cases (N=25).

Table 5 Predictors of Alveoplasty Need (Multivariate Logistic Regression)

Predictor	Adjusted Odds Ratio (aOR)	95% CI	p-value
Time since extraction <2 years	3.9	1.7–8.9	0.001
Sharp bony crests on exam	3.2	1.4–7.3	0.006
Age 40–60 years	2.8	1.2–6.5	0.018

Independent predictors of alveoplasty need after adjusting for confounders. CI = confidence interval.

Table 6 Radiographic Findings Associated with Alveoplasty Need

Radiographic Feature	Alveoplasty Group (N=25), *n* (%)	Non-Alveoplasty Group (N=175), *n* (%)	p-value
Retained root fragments	7 (28.0)	14 (8.0)	0.003
Localized osteosclerosis	9 (36.0)	21 (12.0)	0.001
Knife-edge ridge configuration	13 (52.0)	32 (18.3)	<0.001
Maxillary sinus proximity	10 (40.0)	68 (38.9)	0.214

Comparison of radiographic findings between patients requiring alveoplasty versus those who did not.

12.5% of patients (n=25) required alveoplasty, and there were significant disparities between the age groups in terms of the procedure. There were structural issues that required ridge repair surgery for fifteen of the seventy-seven patients in the age bracket of 51–60 years old, which accounts for 28.8% of everything. It occurred less often in adults aged 40 to 50 (18.9%; 7 out of 37), and it occurred the least frequently in those aged 60 and more (2 out of 86). On the other hand, younger people were more likely to experience it. There is a negative correlation between age and the need for alveoplasty beyond the sixth decade of life. This indicates that although tooth loss that occurs over a short period of

time might result in sharp ridges or undercuts that need repair, tooth loss that occurs over a longer period of time can lead to widespread ridge atrophy, which means that surgery is not required as often.

There was a fairly equal distribution of males and females among the participants in the research, according to the gender-based analysis. Out of the 15 instances of alveoplasty, men made up sixty percent (12 cases), while women made up forty percent (10 cases). On the other hand, when we analysed data according to age group, we discovered some fascinating trends. Within the age range of 40 to 50 years old, there were seven patients who had alveoplasty, and seven of them were male (71.4%). On the other hand, there were eight males and eight females in the age bracket of 51–60 years old. Comparisons between men and women were not informative since there were only two instances in the group of people above the age of sixty. A conclusion that can be drawn from these findings is that the variations in ridge irregularities that exist between men and women seem to be levelling out in later decades. Despite the fact that males may have more visible ridge abnormalities in the early stages of edentulism due to biological causes, this is nonetheless the case.

The acquisition of knowledge about the anatomy of ridge abnormality places resulted in the acquisition of helpful information regarding the operation of particular regions. Younger individuals made up the majority of the 25 patients that required an alveoplasty. On a more specific level, 57.1% (4 out of 7) of individuals who were between the ages of 40 and 50 and 43.8% (7 out of 16) of those who were between the ages of 51 and 60 had modifications done to their front teeth. Alterations to the posterior ridge, on the other hand, occurred more often in persons as they aged. In the age group of 51–60 years old, they occurred 56.2% (9 out of 16) of the time, while in the age group of above 60 years old, they occurred 100% (n=2) of the time. When compared to the front, the back is more likely to need surgical intervention due to the different patterns of bone loss that occur there. Once extractions have been completed, the front ridges will form sharp crests, but they will eventually break down. The bony prominences of those in the back, on the other hand, which are located in close proximity to muscle attachments and sinus pneumatization, are preserved for a longer period of time.

The anatomy of a person may be used to determine whether or not they need an alveoplasty in four primary ways. Forty-four percent of the instances, or eleven in total, had bony crests that were sharp and required to be smoothed off. Those individuals between the ages of 40 and 50, who may not have healed evenly due to the fact that they had unpleasant extractions or their dentures put in immediately thereafter, were most affected by this phenomenon. The undercuts rendered it difficult to place a denture in 32 percent of the instances (n=8) investigated. This occurred more often in individuals between the ages of 51 and 60, who frequently exhibited buccal or palatal concavities as a consequence of the morphology of residual ridges. The removal of bone spicules or regional exostoses was performed in fourteen percent of the cases (n=4), and eight percent (n=2) of the cases had significant changes in ridge height (more than three millimetres inside the arch). There are a number of ridge faults that are included in the phrase "alveoplasty," but these findings demonstrate how essential it is to do a comprehensive clinical examination in order to choose the most effective surgical therapy

In addition to the clinical findings, radiographic examinations provided further confirmation of the findings, and a panoramic analysis uncovered other significant relationships. In the event that the ridge does not entirely heal following the extraction, it may create complications. It was shown that patients who required an alveoplasty had a significantly higher incidence of particular osteosclerotic regions (36% vs 12%, p=0.001) and a significantly higher rate of residual root fragments (28% against 8% in the group that did not have an alveoplasty). It was shown that there was no significant correlation between the proximity of the maxillary sinus to the ridge that was still present and the need for alveoplasty (p = 0.214). This finding contradicts the widely held belief that sinus pneumatization has a substantial impact on the requirement for ridge repair. However, x-rays that seemed to have knife-edge ridge patterns were an excellent diagnostic of the need for surgery (odds ratio 4.2, 95% confidence interval 1.8–9.7), demonstrating that these characteristics may be helpful in identifying the patient.

One of the most important aspects that determines how often alveoplasty is performed is the length of time that has passed after the teeth were extracted. The majority of patients, 24.3%, required surgical intervention. In comparison, individuals who had been toothless for one to five years (10.1%) and those who had been toothless for more than five years (4.9%) were shown to have a significantly higher rate of tooth loss (p=0.008). This sequence of events lends credence to the biological theory that the most visible ridge problems are directly attributable to bone contouring that occurs immediately after extraction. In spite of this, surgery is often not required to resolve this issue because of the widespread bone resorption that occurs following the loss of teeth over an extended period of time. During the first two years after tooth loss, 78% of alveoplasty instances occurred in the front of the maxilla, whereas only 52% occurred in the rear (p=0.038), indicating that there is a significant time-dependent relationship between the two processes.

After taking into account any potential confounding variables, a multivariate logistic regression analysis revealed that there are three independent characteristics that determine whether or not an alveoplasty is required. The length of time after the extraction was performed was the most accurate predictor (adjusted odds ratio of 3.9, 95% confidence interval 1.7-8.9). Being between the ages of 40 and 60 years old was the last best predictor, with an adjusted odds ratio of 2.8 and a 95% confidence interval of 1.2-6.5. The next best predictor was having sharp bony crests on clinical examination (adjusted odds ratio 3.2, 95% confidence interval 1.4-7.3). The conclusive model did not demonstrate any significant independent connections between gender, general health, and the amount of time spent smoking. Through the use of these data findings, medical professionals are now able to determine which patients who are missing teeth will benefit the most from undergoing a pre-prosthetic surgery examination.

The twenty-five patients who were a part of the alveoplasty group all had ridge shapes that were suitable for the production of dentures, which indicates that all of them had positive results after the surgical procedure. There were two incidences of tiny wound dehiscence, which accounted for eight percent of the total, and they were treated carefully with local solutions while they were healing. After then, there were no further issues. Following the therapy, the results of the three-month follow-up survey on denture satisfaction revealed that the situation had significantly improved, as shown by a significant increase in the mean visual analogue scale from 3.2±1.1 to 7.8±1.4 ($p<0.001$). This demonstrates that various patients may benefit from alveoplasty. Because patients who had these difficulties addressed reported better chewing than those who had problems with the front ridges (mean functional satisfaction score 8.2 vs. 6.9, $p=0.032$), it is probable that problems with the posterior ridges have a greater impact on denture function. This is because patients who had these problems fixed reported better chewing.

The clinical evaluations revealed a high level of consensus among the examiners, which contributed to the increased reliability of the research. When it came to making judgements on alveoplasty, Cohen's kappa score was 0.87 (95% confidence interval: 0.79–0.94). Because of the high degree of agreement, it was clear that the diagnostic variables that were utilised in the research could be used again and again. Additionally, the combined diagnostic approach offered a comprehensive depiction of the contours of the ridges, as seen by the robust correlation between clinical and radiographic data ($r=0.79$, $p<0.001$), which was observed when radiographic data were examined. Because of these statistical confirmations, the clinical outcomes and frequency estimates that were obtained from the research have a greater chance of being true.

Taking everything into consideration, the findings provide a comprehensive demographic picture of the necessity for alveoplasty in southern Jordanian individuals who do not possess any maxillary teeth. It is possible that the general frequency of 12.5%, which increases throughout the sixth decade of life and is strongly associated with recent tooth loss, might be of great assistance in the process of arranging prosthetic therapy for groups that are comparable. Last but not least, the statistics on outcomes demonstrate that alveoplasty may be helpful in the treatment process when it is required, and the observed demographic and physical patterns assist medical professionals in determining who will need surgery. There is a significant void in the dental literature of the Middle East that is filled by these data. In addition to this, they make it feasible for future comparative studies to be conducted across a variety of diverse populations and environments in the healthcare industry.

4. Discussion

This study contributes to the tiny body of literature on the pre-prosthetic surgical requirements of Middle Eastern ethnicities in southern Jordan by revealing how and how frequently alveoplasty is done on patients without maxillary teeth. In Turkey and India, delayed replacement treatment and poor extraction procedures may increase ridge anomalies (18–22%) [82]. At 12.5%, or 25 of 200 patients, our rate is poor. Al Quran and Al-Dwairi [81] found 14.3% of Jordanians have this issue. This matches previous research in comparable scenarios. Make fake teeth and extract teeth. This is simply two ways individuals in various locations care after their teeth. These changes greatly impact the morphology of post-extraction ridges and the requirement for further surgery.

Age-specific data provides health information. Alveoplasty demand is highest among adults 51 to 60 (20.8%) and reduces significantly after that (2.3%). Alveolar bone form varies throughout time, resembling these patterns. We found that the initial healing phase following extraction lasts three to twelve months. This leaves sharp crests and undercuts. Generalised atrophy may result from long-term tooth loss [83]. Our findings contradict Cawood and Howell's "critical period" notion that most surgically fixable ridge abnormalities appear within five to 10 years after tooth loss [85]. They reveal that bone density diminishes with age, therefore alveoplasty doesn't increase [84]. Unique factors, such elderly Jordanians wearing complete teeth more regularly, may accelerate ridge erosion beyond alveoplasty's treatment. This may explain our low incidence of 2 out of 86 cases in adults over 60 [86].

Our research had a lower male-to-female ratio than expected. Most alveoplasty patients were males (60%), similar to the overall group incidence of 64%. clients account for 58% of toothless persons, whereas 73% of alveoplasty patients are guys. Many studies have revealed that males require ridge surgery more often [87]. That contradicts such research. Men and women may initially vary due to biological characteristics including bone strength and wound healing. Our 51–60-year-old patients had roughly equal numbers of males and women. These distinctions become less obvious when edentulism worsens. Biomechanics studies show that female ridges shrink quicker while male alveolar bone loses more volume initially. This confirms previous research. Men and women experience the same replacement issues because of this [88].

Prosthodontists and dental specialists now know where ridge issues occur in the body thanks to our research. According to the research, younger patients (57.1% of 40–50-year-olds) are more likely to get front maxillary repairs than posterior repairs (100% of those over 60). The long-standing differential ridge resorption idea is true because of this. Our research was comparable to one in Saudi Arabia, where frontal frequency was greater (57.1% vs. 42%) [89]. This may be because various nations remove teeth differently or because Gulf Cooperation Council countries employed fake surgery a long time ago. Recent comprehensive research indicated that younger patients who received early alveoplasty during extractions required 38% less surgery later. This strategy is supported by the fact that anterior surgery is 78% linked to extractions in the past two years. However, anatomical investigations reveal that muscle loss is slower where muscles combine [91]. This may explain why 52% of persons who have lost teeth for more than two years still have posterior ridge concerns.

Our imaging connection investigation yielded some crucial diagnostic outcomes. The two outcomes are strongly correlated (28 percent of patients require alveoplasty and 8 percent do not) [92], highlighting the need of adequately cleaning the roots before extractions. Several cephalometric investigations suggest that sinus pneumatization causes posterior ridge issues [93]. There is no correlation between maxillary sinus proximity and operation. This wasn't expected. This may be because our research only looked at teeth and not implant sites, which are more likely to experience oedema. Doctors may now screen panoramic x-rays for knife-edge ridge detection (OR 4.2). Because Atwood discovered how x-rays can detect illness, this discovery was feasible [94].

Our investigation on time patterns indicated that they greatly impact healthcare resource distribution. The frequency of alveoplasty calls dropped significantly after five years of tooth loss. These findings challenge the "wait and see" strategy many healthcare institutions have taken to ridge repair for years. Instead, they recommend surgery to correct ridges quickly [95]. 2023 German health economics research found that early alveoplasty during the first year of tooth loss saved 22% more money than delayed surgery [96]. Our findings resemble that research in many respects. Due to rapid implant placement, numerous Scandinavian nations [97] report that 4–6% of patients require another alveoplasty. The disparity between these data illustrates that healthcare system treatment concepts may greatly impact patient surgery needs.

Since 92% of our alveoplasty patients recovered without complications, the risk of complications is negligible when therapies are done as indicated. Our 8% minor event rate is substantially higher than previous findings of 5–15% [98]. The procedure was meticulous, which may explain this. Recently published prosthodontic outcomes [99] may support the treatment's efficacy. Alveoplasty improved tooth satisfaction (VAS from 3.2 to 7.8). Prosthodontics has long understood that stable back ridges are necessary for oral function. Back area adjustments had superior practical effects (mean happiness of 8.2 vs. 6.9 for front region) [100], supporting this approach.

We successfully finished our investigation using a comprehensive radiographic-clinical connection and stringent uniform scoring by a single calibrated observer (κ=0.87). These increases are substantially greater than in clinical screening-only frequency studies [101]. There are certain crucial aspects to consider when interpreting the data. The hospital-based sample didn't represent rural healthcare; therefore, the true incidence may have been lower than WAS documented [102]. We couldn't compare our findings to previous research on advanced ridge resorption [103] since we didn't look at severe atrophy (Cawood Class V–VI). The cross-sectional design prevents seeing the ridge's evolution [104]. Planning group studies may address this issue in the future.

Abbreviations

- **aOR**: Adjusted odds ratio
- **CI**: Confidence interval
- **N**: Total number of patients/cases
- **N=25**: Subgroup requiring alveoplasty
- **n (%)**: Number (percentage)

5. Conclusion

What took us by surprise was the fact that the requirements for alveoplasty varied greatly from area to region. The manner in which the teeth are removed, the timing of the reinsertion of the prosthesis, and the kind of patient are all factors that influence the result of this situation. Although this is the case, the fundamental concepts that underlie bone reshaping have not changed. A significant number of surgical procedures are performed in developing regions (15-25%) due to the fact that individuals delay treatment. On the other hand, wealthy countries do a significant number of preventive prosthodontic procedures (5-10% alveoplasty), while Jordan falls in the centre with an incidence rate of 12.5% [105]. The findings of our study will be of great assistance to healthcare systems who are attempting to develop a solution that strikes a balance between inadequate financing and high-quality replacement therapy. For this reason, our findings are based on the participants' income levels being somewhere in the centre.

Compliance with ethical standards

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Disclosure of conflict of interest

There is no conflict of interest in this manuscript

Statement of ethical approval

There is no animal subject involvement in this manuscript. The Jordanian Royal Medical Services (JRMS) Institutional Review Board (IRB) initially approved this study at 3 June 2025 with the registration number 53_7/2025. This approved study was formally cleared for publishing after being reviewed by our institution's directorate of professional training and planning at 07 July 2025.

Statement of informed consent

Owing to the retrospective design of this study, the informed consent form was waived.

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