

Prevalence and characteristics of periodontal surgery procedures in postgraduate periodontic clinics: an epidemiological analysis

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Abstract

Background: Periodontal diseases include gingivitis, periodontitis, and peri-implant disease. There are different ways to treat these diseases, such as surgical and non-surgical periodontal treatments like gingivectomy, open flap debridement, and crown lengthening.

Aim: This study aimed to determine the most common periodontal surgery procedures performed in postgraduate periodontic clinics and to identify the associated periodontal diagnoses and patient demographics.

Materials and methods: This study is a retrospective cross-sectional study carried out at the postgraduate periodontic clinics in the College of Dentistry, University of Baghdad. Various information, such as demographic data, medical and dental history, periodontal diagnoses, and types of periodontal surgery that the subjects underwent, was collected from the periodontal records. The collected data were then analyzed statistically.

Results: A total of 271 patient records were included in this study, with a mean age of 38.7 ± 11.9 years. The most frequently performed periodontal surgery procedures were open flap debridement (29.2%), followed by gingivectomy (19.1%) and guided tissue regeneration (17.5%). Regarding diagnosis, the most prevalent periodontal diagnoses were gingivitis (31%), followed by periodontitis (28.04%) and gingival enlargement (8.86%). Statistically significant associations were observed between periodontal diagnoses and types of periodontal surgeries performed. Sex-specific differences were noted in the selection of surgical treatments.

Conclusion: This study sheds light on periodontal surgery epidemiology in a postgraduate periodontic clinic. The data show that periodontal diseases and patient-specific characteristics require personalized treatment techniques.

Keywords

epidemiology, periodontal surgery, postgraduate, periodontitis

Introduction

Periodontal diseases are disorders of the gingiva and the surrounding tissues.^[1] They range from mild inflammation (gingivitis) to severe inflammatory conditions known as periodontitis, which may lead to tooth loss.^[2] Periodontitis, in its severe form, affects about 11% of adults worldwide.^[3]

Progressive destruction of the periodontal supporting tissues surrounding the teeth may result in tooth loss and reduced quality of life.^[4] Early detection and appropriate treatment of periodontitis offer significant cost savings by preventing severe destruction of the periodontium, tooth loss, and more complex treatment.^[5]

The initial treatment of periodontitis is based on non-sur-

gical periodontal treatment, which involves scaling and root planing. This treatment significantly reduces the subgingival microbial burden by removing dental biofilm, calculus, and bacterial endotoxins.^[6] Oral hygiene instructions and motivation play a central role in the non-surgical and surgical treatment of periodontitis and aim to control biofilm through frequent mechanical removal by the patient.^[7]

The success of non-surgical periodontal therapy is evaluated 6 to 8 weeks after scaling and root planing.^[8] This re-evaluation aims to identify any persistent signs of periodontitis, including ongoing gingival inflammation by the presence of bleeding on probing, deep probing depths (>5 mm), continued attachment loss, gingival recession, or worsening tooth mobility.^[9] Based on the concept of critical probing depth, probing depths equal to 5 mm or less at the re-evaluation examination should be treated non-surgically, while sites with probing pocket depths of 6 mm or more are treated surgically with open flap debridement.^[10]

The international scientific community adopted the term 'periodontal plastic surgery' in 1996. This concept includes surgical interventions designed to address or prevent defects in the gingiva, alveolar mucosa, or bone resulting from anatomical issues, developmental problems, trauma, or disease. The scope of periodontal plastic surgery includes a range of procedures targeting both soft and hard tissues.^[11] These interventions aim to enhance gingival volume, cover exposed roots, rectify mucosal abnormalities around implants, extend crown length, preserve gingiva during ectopic tooth emergence, eliminate irregular frenum (high frenum attachment), mitigate ridge collapse following tooth extraction, and augment the edentulous ridge.^[12]

Despite the well-documented approaches to managing periodontal diseases, there is a scarcity of epidemiological data regarding the actual practices and outcomes of periodontal surgery in postgraduate clinical settings. This study seeks to bridge this gap by providing information about the most common periodontal surgeries and how sex and other factors could affect the choice of the surgery.

Aim

This study aimed to determine the most common periodontal surgery procedures performed in postgraduate periodontic clinics and to identify the associated periodontal diagnoses and patient demographics.

Materials and methods

Study design and setting

This study used a retrospective, cross-sectional design to examine the case records of patients who received periodontal surgery at the postgraduate periodontal clinic of the University of Baghdad, College of Dentistry, from Jan-

uary 2021 to December 2023. The periodontal clinic takes patients referred by undergraduate dental clinics, the diagnostic department, and neighborhood dentists. Initially, 350 patient records were selected for evaluation from the department database, encompassing all patients treated throughout the study period. The College's Ethics Committee approved the study.

Sample selection

Periodontal records were included if they belonged to patients aged 13 years or older who underwent at least one periodontal surgical treatment between 2021 and 2023, and for whom a comprehensive medical and dental history was documented in their periodontal records. Records were excluded if the data was incomplete or illegible or if the patients had previously undergone periodontal surgery at another facility. Following the application of the inclusion and exclusion criteria, a total of 271 periodontal records were included into the final analysis.

Data collection

Demographic data (age and sex), medical history, periodontal diagnoses, extent of periodontal disease (localized or generalized), and types of periodontal surgeries performed were extracted from the patient periodontal records. The data were entered into a standardized data collection form created on an Excel sheet on Microsoft Excel.

Statistical analysis

Descriptive statistics, including frequencies, percentages, and means, were calculated for the demographic variables, medical conditions, periodontal diagnoses, and types of surgery. Data analysis was done using Pivot Tables in Microsoft Excel software.

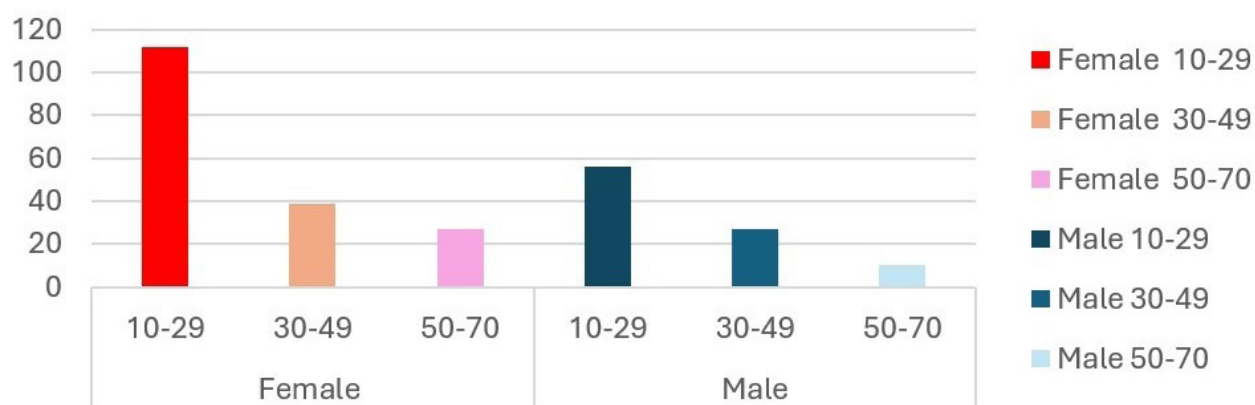
Results

An analysis was conducted on the periodontal records of 271 patients who visited the postgraduate periodontal clinic; **Fig. 1** and **Table 1** present a summary of the patient's sex and age distribution. Female patients were 65.68% of the patient population, with the predominant age group being 10-29 years, accounting for 41.33%. Male patients comprised 34.32%, exhibiting a more equitable distribution across age levels. The 50-70-year-old age group contains a notably reduced percentage of male patients relative to females.

Table 2 revealed that systemically healthy individuals predominate in all age groups and sexes, indicating an overall healthy population. However, age-related patterns arise, with "Systemically healthy" rates decreasing and conditions like hypertension increasing with age, particularly among females aged 50-70. Men display comparable trends, with the healthy majority declining and hypertension and dia-

Table 1. Number and percentage of age and sex

Sex /Age range	Number of Age range	Percentage of Age range
Female	178	65.68%
10-29 years	112	41.33%
30-49 years	39	14.39%
50-70 years	27	9.96%
Male	93	34.32%
10-29 years	56	20.66%
30-49 years	27	9.96%
50-70 years	10	3.69%
Total	271	100.00%

**Figure 1.** Distribution of age groups by sex.

betes emerging as age progresses.

Table 3 reveals the prevalence of periodontal conditions in the treated sample. Gingivitis (31%) and periodontitis (28%) are most common, indicating significant inflammatory gingival diseases. Women are more prone to gingivitis (20.66%) than men (10.33%), while periodontitis is almost equally distributed (women 16.24%, men 11.81%). Gingival enlargement (8.86%) and gummy smile (7.75%) are also notable, with gummy smiles predominantly in women (7.38%). Healthy gingiva appears in 7.01% of patients. Less frequent conditions include gingival recession (2.58%) and peri-implantitis (0.37%), highlighting the range of potential gingival issues.

Table 4 provides a detailed overview of surgical procedures in a postgraduate periodontal clinic. Gingivectomy and frenectomy, addressing excess gingival tissue and frenum issues, respectively, are the most common, comprising nearly 36% of all surgeries. The data also highlights a focus on advanced reconstructive techniques, such as open flap debridement with bone grafting, guided tissue regenera-

tion, and various gingival grafting methods, which together constitute over 17% of surgeries. Aesthetic procedures, including crown lengthening and gingival contouring, account for 10.7% of surgeries.

Table 5 provides an overview of surgical interventions for periodontal conditions. Gingivitis, the mildest form, is sometimes treated with minimally invasive procedures like gingivectomy and frenectomy. Periodontitis requires more extensive interventions, including bone grafting and tissue regeneration. Even healthy gingival tissue may need minor surgeries for specific concerns. The table also includes aesthetic procedures like laser contouring for excessive gingival display and enlargement and addresses less common conditions such as peri-implantitis and pericoronitis treatments.

Table 6 shows how sex may affect postgraduate clinic periodontal surgery operations. The distribution of procedures is comparable for both sexes, although deeper inspection shows certain variances. Gingivectomies, frenectomies, and gingival depigmentation are 12.32% more common in women than men. Laser gingivectomy is per-

Table 2. Prevalence of medical conditions among women and men grouped by age

Medical history	n	%	Medical history	n	%
Women	178	65.68%	Men	93	34.32%
10-29 years	112	41.33%	10-29 years	56	20.66%
Systemically healthy	107	39.48%	Systemically healthy	54	19.93%
Hypertension	3	1.11%	Diabetes mellitus	1	0.37%
Asthma	1	0.37%	Hypertension	1	0.37%
Diabetes mellitus	1	0.37%			
30-49 years	39	14.39%	30-49 years	27	9.96%
Systemically healthy	38	14.02%	Systemically healthy	26	9.59%
Diabetes mellitus	1	0.37%	Diabetes mellitus	1	0.37%
50-70 years	27	9.96%	50-70 years	10	3.69%
Systemically healthy	26	9.59%	No history	9	3.32%
Hypertension	1	0.37%	Blood disease	1	0.37%
Total (men and women)	271	100.00%			

Table 3. Distribution of periodontal diagnosis

Periodontal diagnosis / Sex	Number of periodontal diagnosis			Percentage of periodontal diagnosis		
	Total	F	M	Total	F	M
Gingivitis	84	56	28	31.00%	20.66%	10.33%
Periodontitis	76	44	32	28.04%	16.24%	11.81%
Gingival enlargement	24	14	10	8.86%	5.17%	3.69%
Gummy smile	21	20	1	7.75%	7.38%	0.37%
Healthy	19	14	5	7.01%	5.17%	1.85%
Gingival hyperpigmentation	15	11	4	5.54%	4.06%	1.48%
Healthy gingiva on reduced periodontium	13	5	8	4.80%	1.85%	2.95%
High frenal attachment	9	7	2	3.32%	2.58%	0.74%
Gingival recession	7	5	2	2.58%	1.85%	0.74%
Short clinical crown	1	1	0	0.37%	0.37%	0
Peri-implantitis	1	0	1	0.37%	0	0.37%
Pericoronitis	1	1	0	0.37%	0.37%	0
Grand total	271			100.00%		

Table 4. Types of periodontal surgeries

Types of periodontal surgeries	n	Percentage
Gingivectomy	69	25.46%
Frenectomy	29	10.70%
Open flap debridement + bone graft + guided tissue regeneration (GTR)	22	8.12%
Gingivectomy by laser	16	5.90%
Depigmentation	15	5.54%
Crown lengthening	13	4.80%
Gingivoplasty	12	4.43%
Open flap debridement	11	4.06%

Free gingival graft	11	4.06%
Coronal repositioning flap	10	3.69%
Deepening of vestibule	10	3.69%
Frenotomy	9	3.32%
Lip repositioning flap	8	2.95%
MWF + GTR + bone graft	7	2.58%
Modified Widman flap (MWF)	5	1.85%
Pin hole + connective tissue graft	4	1.48%
Coronal repositioning flap + connective tissue graft	4	1.48%
Lateral repositioning flap	4	1.48%
Tunnel + connective tissue graft	2	0.74%
Bone graft + tooth hemisection	2	0.74%
Removal of orthodontic mini-implant	1	0.37%
PRF	1	0.37%
Distal wedge flap	1	0.37%
Coronal repositioning flap + PRF	1	0.37%
Surgical removal of dental implant	1	0.37%
Open flap debridement + bone graft + Guided tissue regeneration + PRF	1	0.37%
Excisional biopsy	1	0.37%
Operculectomy	1	0.37%
Total	271	100.00%

Table 5. Periodontal diagnoses and corresponding surgical treatments

Periodontal diagnoses / Surgical treatments	n	Percentage
Gingivitis	84	31.00%
Gingivectomy	38	14.02%
Frenectomy	13	4.80%
Crown lengthening	9	3.32%
Gingivoplasty	6	2.21%
Gingivectomy by laser	5	1.85%
Pin hole +connective tissue graft	3	1.11%
Free gingival graft	2	0.74%
Deepening of vestibule	2	0.74%
Frenotomy	2	0.74%
Lip repositioning flap	1	0.37%
Removal of orthodontic mini-implant	1	0.37%
Operculectomy	1	0.37%
Excisional biopsy	1	0.37%
Periodontitis	76	28.04%
Open flap debridement + bone graft + guided tissue regeneration (GTR)	22	8.12%
Open flap debridement	11	4.06%
MWF + GTR + bone graft	7	2.58%
Free gingival graft	6	2.21%
Modified Widman flap	5	1.85%
Frenectomy	4	1.48%

Deepening of vestibule	3	1.11%
Coronal repositioning flap	3	1.11%
Tunnel + connective tissue graft	2	0.74%
Lip repositioning flap	2	0.74%
Bone graft + tooth hemisection	2	0.74%
Coronal repositioning flap + connective tissue graft	2	0.74%
Gingivoplasty	2	0.74%
Pin hole + connective tissue graft	1	0.37%
Frenotomy	1	0.37%
Coronal repositioning flap + PRF	1	0.37%
Open flap debridement + bone graft + guided tissue regeneration + PRF	1	0.37%
PRF	1	0.37%
Gingival enlargement	24	8.86%
Gingivectomy	18	6.64%
Gingivoplasty	4	1.48%
Gingivectomy by laser	2	0.74%
Gummy smile	21	7.75%
Gingivectomy by laser	7	2.58%
Gingivectomy	5	1.85%
Lip repositioning flap	4	1.48%
Crown lengthening	4	1.48%
Lateral repositioning flap	1	0.37%
Healthy	19	7.01%
Gingivectomy	7	2.58%
Frenotomy	4	1.48%
Frenectomy	3	1.11%
Free gingival graft	2	0.74%
Gingivectomy by laser	2	0.74%
Lip repositioning flap	1	0.37%
Gingival hyperpigmentation	15	5.54%
Depigmentation	15	5.54%
Healthy gingiva on reduced periodontium	13	4.80%
Coronal repositioning flap	7	2.58%
Deepening of vestibule	5	1.85%
Lateral repositioning flap	1	0.37%
High frenal attachment	9	3.32%
Frenectomy	7	2.58%
Frenotomy	2	0.74%
Gingival recession	7	2.58%
Lateral repositioning flap	2	0.74%
Frenectomy	2	0.74%
Coronal repositioning flap + connective tissue graft	2	0.74%
Free gingival graft	1	0.37%

Short clinical crown	1	0.37%
Gingivectomy	1	0.37%
Peri-implantitis	1	0.37%
Surgical removal of dental implant	1	0.37%
Pericoronitis	1	0.37%
Distal wedge flap	1	0.37%
Total	271	100.00%

Table 6. Periodontal surgical treatments according to sex

Periodontal Surgery / Sex	n	Percentage	Periodontal Surgery / Sex	n	Percentage
Gingivectomy	69	25.46%	MWF + GTR + bone graft	7	2.58%
Women	45	16.61%	Women	4	1.48%
Men	24	8.86%	Men	3	1.11%
Frenectomy	29	10.70%	Modified Widman flap	5	1.85%
Women	22	8.12%	Women	2	0.74%
Men	7	2.58%	Men	3	1.11%
Open flap debridement + bone graft + guided tissue regeneration (GTR)	22	8.12%	Pin hole +connective tissue graft	4	1.48%
Women	14	5.17%	Women	1	0.37%
Men	8	2.95%	Men	3	1.11%
Gingivectomy by laser	16	5.90%	Coronal repositioning flap + Connective tissue graft	4	1.48%
Women	15	5.54%	Women	2	0.74%
Men	1	0.37%	Men	2	0.74%
Depigmentation	15	5.54%	Lateral repositioning flap	4	1.48%
Women	11	4.06%	Women	2	0.74%
Men	4	1.48%	Men	2	0.74%
Crown lengthening	13	4.80%	Tunnel + connective tissue graft	2	0.74%
Women	11	4.06%	Women	1	0.37%
Men	2	0.74%	Men	1	0.37%
Gingivoplasty	12	4.43%	Bone graft + tooth hemisection	2	0.74%
Women	7	2.58%	Women	1	0.37%
Men	5	1.85%	Men	1	0.37%
Open flap debridement	11	4.06%	Removal of orthodontic mini-implant	1	0.37%
Women	5	1.85%	Men	1	0.37%
Men	6	2.21%	PRF	1	0.37%
Free gingival graft	11	4.06%	Men	1	0.37%
Women	5	1.85%	Distal wedge flap	1	0.37%
Men	6	2.21%	Women	1	0.37%
Coronal repositioning flap	10	3.69%	Coronal repositioning flap + PRF	1	0.37%
Women	4	1.48%	Women	1	0.37%

Men	6	2.21%	Surgical removal of implant	1	0.37%
Deepening of vestibule	10	3.69%	Men	1	0.37%
Women	8	2.95%	Open flap debridement + bone graft + guided tissue regeneration + PRF	1	0.37%
Men	2	0.74%	Women	1	0.37%
Frenotomy	9	3.32%	Excisional biopsy	1	0.37%
Women	6	2.21%	Women	1	0.37%
Men	3	1.11%	Operculectomy	1	0.37%
Lip repositioning flap	8	2.95%	Women	1	0.37%
Women	7	2.58%			
Men	1	0.37%			
Grand Total	271	100.00%			

formed more by women than men, maybe due to pain tolerance or treatment preferences.

Open flap debridement with bone grafting and directed tissue regeneration, considered “complex reconstructive,” are more sex-balanced (5.17% for women vs. 2.95% for men). Women get crown lengthening and lip repositioning flaps more often, possibly due to aesthetic concerns about teeth and smiles.

Discussion

The results of this study offer information about the prevalence of periodontal surgery procedures in a postgraduate periodontic clinic. The list of the most frequent periodontal diagnoses and their relationship with definite surgical interventions shows how critical it is to develop an individual approach to the surgical treatment of the periodontal diseases.

Thus, the observed distribution of women needing periodontal treatment is consistent with higher gingivitis rates in women.^[13,14] The increasing prevalence of younger patients (10-29 years) may indicate improved oral health awareness and periodontal or cosmetic demands. Young people are moderately aware of dental hygiene and aesthetics, with most concerned about aesthetic and willing to fix any issues.^[15] The fact that most of the patients are “systemically healthy” suggests that the clinic helps people take charge of their overall health, which may lead to better treatment results.^[16] Notably, the fact that hypertension and diabetes become more common with age shows how important it is to think about overall health when managing periodontal disease.^[17]

The significant occurrence of gingivitis and periodontitis corresponds with findings that identify these as the most prevalent periodontal diseases.^[1] The increased susceptibility of females to gingivitis may be associated with hormonal fluctuations, whereas the even distribution of periodontitis indicates common risk factors across sexes.^[18] The prevalence of gingival enlargement and gummy smile, especially in women, highlights the aesthetic issues commonly addressed

in periodontal consultations.^[19] The clinic’s diverse range of surgical procedures demonstrates its capacity to address various periodontal conditions, encompassing both simple inflammations and complex bone regeneration requirements.

The rising use of gingivectomy, frenectomy, and depigmentation procedures among females may be linked to various factors. A potential factor is the increasing demand for aesthetic enhancements, as indicated by previous researchers.^[20] Patients, especially female patients, are increasingly focused on the aesthetics of their gingiva and smiles, seeking treatments to improve their self-confidence.^[20,21] The prevalence of gingival hyperpigmentation may also influence the aesthetics of the gingiva. Multiple studies, including those by Kafle S, Mai et al. and Kumar et al.^[22-24], examine the management of gingival hyperpigmentation via depigmentation techniques.^[25] The procedures are designed to eliminate or reduce excessive melanin deposition in gingival tissue, thereby enhancing overall appearance.^[26] The interplay of these factors likely enhances the frequency of these procedures among females. Females undergo laser gingivectomy more frequently than males, possibly indicating variations in pain tolerance or treatment preferences.^[27]

The balanced distribution of bone grafting procedures indicates a similar severity of periodontitis across sexes^[28]; however, additional research is required to investigate the underlying causes of these observed differences. The prevalence of crown lengthening and lip repositioning flaps in women corresponds to their link to aesthetic-focused procedures.^[29]

This study recognizes that its single-clinic setting has several limitations and emphasizes the need for larger studies. Besides sex, other things like socioeconomic status and treatment preferences also definitely play a role in surgical decisions. We could learn more about how decisions are made in periodontal surgery if these topics were studied in the future in bigger, more diverse groups of people. Finding out the exact reasons why men and women use procedures differently could help with focused interventions and personalized treatment plans.

Conclusion

This study highlights the most common periodontal surgeries in a postgraduate clinic, with open flap debridement, gingivectomy, and guided tissue regeneration being the most frequently performed. Gingivitis and periodontitis were the predominant diagnoses, with treatment tailored to disease severity. Sex differences were noted, with females undergoing more aesthetic procedures while males receiving more reconstructive surgeries. These findings underscore the need for personalized treatment approaches and further research on long-term clinical outcomes and the impact of systemic health on periodontal surgery.

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Competing Interests

The authors have declared that no competing interests exist.

Ethical Approval

This study has been approved by the Ethical Committee, College of Dentistry / University of Baghdad.

Data Availability

Data of study available from the College of Dentistry/ University of Baghdad.

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