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Original Article

Clinical Efficacy of Soft Tissue Trimmer Versus Conventional Surgical Excision of Gingival Hyperplasia on Postoperative Pain: A Randomized Clinical Trial

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Abstract

Aim: This study aimed to evaluate postoperative pain after gingivectomy procedures using soft tissue trimmer compared to conventional scalpel technique in gingival hyperplasia. Subjects and methods: Twenty-eight patients with inflammatory gingival hyperplasia or uneven gingival margins in anterior teeth region were randomly allocated into two groups; Group A (control group) included 14 patients that were treated with gingivectomy using conventional surgical blade. Group B (test group) included 14 patients that were treated by gingivectomy using soft tissue trimmer. VAS pain score was used to measure postoperative pain at 1, 3, 5 and 7th day. Results: Regarding post-operative pain intensity, the results of the present study revealed that there was a statistically significant difference between the tested groups ($P < 0.001$) after one day. After 3 days ($P = 0.069$), 5 days ($P = 0.63$) and 7 days ($P = 0.32$), there was no statistically significant difference between the tested groups. Conclusion: Gingivectomy and gingivoplasty procedures using soft tissue trimmer could be a promising and fast approach with less significant post-operative pain scores compared to the surgical blade. Intra-operative bleeding is minimized with immediate coagulation and improved wound healing using the soft tissue trimmer resulting in less postoperative pain.

Keywords: Gingivectomy, Gingivoplasty, Soft tissue trimmer, Esthetic crown lengthening

I. INTRODUCTION:

Gingival Hyperplasia is considered one of everyday findings in all ages and for so many reasons. Plaque-induced inflammatory gingival enlargement due to prosthetic or orthodontic reasons is one of the aetiologies as well as drug induced, hereditary gingival fibromatosis and up to a broken tooth or a cavity with excess gingival tissues encroaching the space. In recent years, a range of tools such as scalpels, lasers, and electrocautery devices have been introduced to accomplish haemostasis during surgery with little tissue harm. It has been well known as a gold standard technique the surgical intervention of removing excess gingival tissue using scalpel achieving satisfying results due to its ease of use with the

least harm to periodontal tissue with economic benefits (Gupta et al., 2014).

Recent studies have suggested that the use of scalpel surgery resulted in more postoperative pain and accelerated wound healing. whereas laser application provided delayed wound healing and less discomfort (Ryu et al., 2012)

Soft tissue trimmers are another category of tools that are used for soft tissue removal in cases of operculectomy, crown lengthening procedures, gingival depigmentation and finally for aesthetic gingival contouring of uneven margins or in cases of altered passive eruption. Advantages of soft tissue trimmers over other previously mentioned techniques are the ease of use and time efficiency. Moreover, the expenses and the cost of soft tissue trimmer burs are way less than any of the other tools and could be sterilized and re-used (Guler et al., 2019)

As suggested before by Guler in 2019, using soft tissue trimmers in gingivectomy and gingivoplasty procedures showed superior results regarding pain scores and improved wound healing when compared to the conventional methods. Therefore, this study's aim is to compare the efficacy of these soft tissue trimmers, with the conventional gold standard blades in reducing post-surgical pain and enhancing wound healing of gingival tissues.Continuous evolution of polymeric materials has led to materials with the advantage of improved esthetic appearance, high abrasion resistance and color stability[6], as well as lower abrasive impact on the opposing dentition.[11,12] "Ceramage" one of the polymeric highly ceramic filled restorative materials has been introduced for dental application[13]. The special composition of this micro-hybrid composite system, with a zirconium silicate filler content of more than 70 %, allows the fabrication of different esthetic indirect anterior and posterior restorations including veneers, crowns, occlusal veneers, and long term provisional restorations[14]. Another advantage is the low elastic modulus, which allows the material to absorb functional stresses produced under occlusal load which has a positive effect on the chewing behavior of patients with implant-supported restorations[15].

II. SUBJECTS AND METHODS

A. Study Design

Single blinded, randomized controlled clinical trial.

B. Sample size calculation

Based on previous study by (Kohale et al., 2018) the mean of pain scores in the control group was (4.21±2.72), while in the intervention group was (1.07±0.83). Using power 80% and 5% significance level, sample was calculated to be 22 participants in total, 11 participants for each group. To compensate for losses during follow up, a total of 28 patients were determined and randomized into groups. Sample size calculation was achieved using PS program (Power and Sample) Size Calculation software version 3.1.2.

C. Patient's selection

The present randomized, controlled, parallel-grouped trial included 28 subjects (3 males and 25 females) suffering from esthetic and functional problem. Patients were randomly assigned into two equal groups; one test group; patients were treated using soft tissue trimmer while the control group; patients treated using conventional scalpel.

Participants were selected from the outpatient clinic at the Faculty of Dentistry, Cairo University and recruiting potential participants was carried out through screening of the patients admitted to the Department of Oral Medicine and Periodontology, a personal referral and poster announcements. Screening of patients was carried on until achieving the targeted sample size adjusted for possible dropouts.

The patients met the following eligibility criteria:

Inclusion criteria

- Anterior region (minimum of four teeth at each surgical site).
- Age range (18-45) years old.
- Plaque-induced inflammatory gingival enlargement.
- Orthodontic patients with gingival hyperplasia.
- Uneven gingival margins.
- Passive eruption.
- No clinical attachment loss.
- Systemically healthy individuals.

Exclusion criteria

- Gingival enlargement due to any systemic predisposing factors.
- Pregnancy and/or lactation.
- Conditions requiring antibiotic prophylaxis and anti-inflammatory medications.
- Acute or untreated periodontitis.
- Systemic disease that could influence the outcome of the treatment (i.e., Diabetes)

Then the patients were randomly allocated into two groups:

- Group A (control group) included 14 patients (2 males and 12 females) with ages ranged from 18-45 years that were treated by gingivectomy with conventional scalpel.
- Group B (test group) included 14 patients (1 male and 13 females) with ages ranged from 18-45 years that were treated by gingivectomy with soft tissue trimmer.

The trial protocol was published on www.clinicaltrials.gov protocol registration and results system on the 09/09/2020 with an identifier ID: NCT04542486. The research protocol, informed consents and biological sample collection request were approved by the Ethics Committee of Scientific Research, Faculty of Dentistry, Cairo University.

D. Operative procedures:

Pre-surgical protocol

The procedure was firstly explained to all the patients to be included in the study. A preoperative patient assessment by a thorough medical and dental history was taken, as well as a clinical examination to examine gingival and periodontal state, the subjects' major complaint, and their overall oral health. Participants showing no medical or clinical contraindications then proceeded to periodontal charting assessing the bleeding and plaque scores as well as probing depths.

Participants who met all of the study's inclusion criteria received information about the study and signed an informed consent form that explains the trial's goal, benefits to participants, surgical procedures, risks, and schedule. Once the participant approved to be enrolled in the trial and signed the informed consent, two copies of a written in-Arabic informed consent were signed by the eligible participants; one copy kept by them and one by the operator.

Preoperative intra-oral photos were taken.

Periodontal therapy including full mouth supragingival scaling using ultrasonic scalers and subgingival debridement using curettes were performed if necessary. Oral hygiene instructions including mechanical and chemical plaque control. The mechanical plaque control included brushing the teeth twice daily using the modified bass technique and interdental cleaning using dental floss (Janakiram et al., 2020). Chemical plaque control including chlorhexidine mouth rinse 0.12% twice a day for one week.

Emergency phase was completed in case present before the commence of periodontal phases of therapy. After 4-6 weeks, all subjects were re-evaluated to determine

patient compliance with oral hygiene procedures, as well as to re-evaluate gingival tissue healing (Segelnick & Weinberg, 2006).

Surgical phase

- Bleeding points

After administration of local anesthesia infiltrations through the administration of 2% lidocaine HCL with 1:100000 epinephrine in case of upper teeth and bilateral mental block in case of lower teeth, the golden proportion of the correct dimensions with the proper zenith points were considered. Bleeding points were then made, also using a blue marker the correct scalloping of the gingiva and the bleeding points of all affected teeth were connected and then photographed (Peres et al., 2019).

Furthermore, for the sake of proper visualization of the newly formed gingival margin after the golden proportion is accounted for and the zenith point is adjusted, marking using indelible pen is performed (Dibart, 2017).

- Gingivectomy procedure for the control group

Inverse bevel gingivectomy was performed in all hyperplastic marked tissues in well-controlled clean incisions using 15c blades. The tissue collars were removed using a periodontal surgical curette by proper adaptation of the instrument parallel to the tooth structure with controlled pulling of these tissues.

A micro scissor was used to adjust any irregularities or reshape the thickened interdental papilla. Saline was irrigated after the completion of all needed hyperplastic tissues removal. No periodontal packs were placed.

- Gingivectomy procedure for the intervention group

The stopwatch was started from the beginning of the procedure to measure the surgical time. The sterilized handpiece with non-coolant and following the manufacturer instructions of the utilization of the ceramic soft tissue trimmer a flame-shaped design was applied with controlled motions to remove the already marked areas of excessive gingiva to be eliminated.

The brownish debris of trimmed tissues were gently removed using sterilized gauze. The stopwatch was stopped. Irrigation of saline was again applied on the surgical site.

No periodontal packs were used. Only a damp gauze was placed to cover the surgical sites, and the patient was asked to keep it for half an hour and then to get rid of it following the post-operative care instructions as explained by the operator.

Post-operative phase

Patients were abstained from tooth brushing for 3 days. They were instructed to avoid hot, hard, acidic and/or spicy foods. Patients were instructed not to bite any food but to cut it into small pieces. Chlorhexidine 0.12% mouthwash was prescribed twice a day for 7 days as an antiseptic mouthwash.

Follow up visits

Recall appointments (T1-T6):

The recall appointments were scheduled for 1&3&5&7&14 days and 6 weeks post operative.

On the 1st day post-operative, the patients were contacted via telephone call and asked to rate their pain and to fill a VAS pain score chart that was given to them. On the 3rd day post-operative, the patients were contacted via telephone call and asked to rate their pain and to fill a VAS pain score chart that was given to them. On the 5th day post-operative, the patients were recalled and asked to rate their pain and to fill a VAS pain score chart that was given to them. On the 7th day post-operative, the patients were recalled and asked to rate their pain and to fill a VAS pain score chart that was given to them (Klimek et al., 2017).

E. Statistical Analysis

All of the data was gathered, filtered, and tabulated, then descriptive and analytical statistics were applied. The mean, standard deviation (SD), median, and lowest and maximum values were used to describe numerical data. The frequency and proportion of nominal data were presented. In the case of regularly distributed numerical variables, an independent t-test was used to compare the two groups, and a paired t-test was used to compare distinct outcome data within each group. When the dependent variable being assessed is ordinal, the Friedman test was employed to see if there were any changes between groups. All tests were two-tailed, and statistical significance was defined as a P-value of less than or equal to 0.05. Statistical Package for the Social Sciences version 20.1 was used to conduct all statistical analyses (Chicago, IL, USA Inc.).

III. RESULTS

The present study included a total of 28 patients (3 males and 25 females) with aesthetic and functional problem due to gingival hyperplasia and altered passive eruption. The patients were randomly allocated into two groups. Group A (control group) included 14 patients (2 males and 12 females) with ages ranged from 18-45 years that were treated by gingivectomy with conventional scalpel. Group B (test group) included 14 patients (1 male and 13 females) with ages ranged from 18-45 years that were treated by gingivectomy with soft tissue trimmer.

A. Demographic data

All the demographic data of the patients including gender and age were showed in table (1 and 2) and figure (4 and 5). Regarding the gender distribution, 2 males (14.3%) and 12 females (85.7 %) participated in group A and 1 male (7.1%) and 13 females (92.9 %) participated in group B. By using Chi 2 test, there was no statistically significant difference between tested groups (P value = 0.5).

The mean age value and standard deviation (SD) for (group A) was 20.64±2.02 years, while, for (group B), it was 23.29±3.07 years. By using independent t test, there was no statistically significant difference regarding age between tested groups (P value =0.12).

B. Clinical Results

Postoperative Pain

- Pain intensity

The mean and median values of post-operative pain status for the tested groups were presented I table (3) and figure (6).

After one day: the intensity of pain was (4.21±2.72) in the group A and (1.07±0.83) in group B with statistically significant difference between the tested groups (P <0.001).

After three days: the intensity of pain was (2.21±2.58) in the group A and (0.71±0.83) in group B with no statistically significant difference between the tested groups (P =0.069).

After five days: the intensity of pain was (0.57±1.09) in the group A and (0.5±0.52) in group B with no statistically significant difference between the tested groups (P =0.63).

After seven days: the intensity of pain was (0.07±0.27) in the group A and (0±0) in group B with no statistically significant difference between the tested groups (P =0.32).

- Change with time in post-operative pain intensity within each group

In group A: The mean value of pain score decreased from (4.21±2.72) after one day to (2.21±2.58) after 3 days. It continued to decrease after 5 days to (0.57±1.09) and finally it reached (0.07±0.27) after 7 days. By using Friedman test, there was a statistically significant decrease in the intensity of post-operative pain at different time intervals (p<0.001). These were represented in table (4).

In group B: The mean value of pain score decreased from (1.07±0.83) after one day to (0.71±0.83) after 3 days. It continued to decrease after 5 days to (0.5±0.52) and finally it reached (0±0) after 7 days. By using Friedman test, there was a statistically significant decrease in the intensity of pain at different time intervals (p=0.001). These were represented in table (4).

- Post-operative pain incidence

By using chi square test, the post-operative pain incidence between tested groups were presented in table (5) and figure (8).

After one day: 0 (0%) patients in group A and 4 patients (28.6%) in group B had no pain. 5 (35.7%) patients in group A and 10 (71.4%) patients in group B had mild pain. While 7 (50%) patients in group A and 0 (0%) patients in group B complained from moderate pain. 2 (14.3%) patients in group A and 0 (0%) patients in group B complained from severe pain. There was a statistically significant difference between both groups (p=0.002).

After three days: 3 (21.4%) patients in group A and 6 patients (42.9%) in group B had no pain. 8(57.1%) patients in group A and 8(57.1%) patients in group B had mild pain. While 1(7.1%) patient in group A and 0 (0%) patients in group B complained from moderate pain. 2 (14.3%) patients in group A and 0 (0%) patients in group B complained from severe pain. There was no statistically significant difference between both groups (p=0.26).

After five days: 9 (64.3%) patients in group A and 7 patients (50%) in group B had no pain. 4(28.6%) patients in group A and 7 patients (50%) in group B had mild pain. While 1(7.1%) patient in group A and 0 (0%) patients in group B complained from moderate pain. 0(0%) patients in group A and B complained from severe pain. There was no statistically significant difference between both groups (p=0.35).

After seven days: 13 (92.9%) patients in group A and 14 patients (100%) in group B had no pain. 1(7.1%) patient in group A and no patients in group B had mild pain. While. 0(0%) patients in group A and B complained from moderate or severe pain. There was no statistically significant difference between both groups (p=0.99).

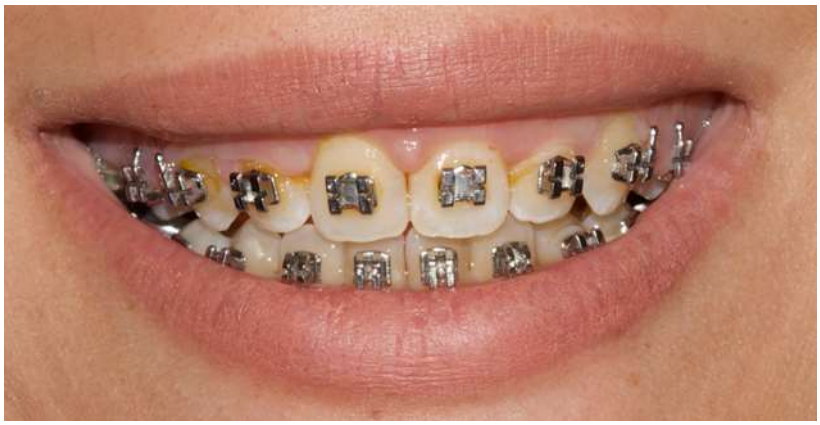

Figure (1A): Pre-operative Photo showing a 23-year-old female with uneven gingival margins and gingival hyperplasia on the anterior teeth

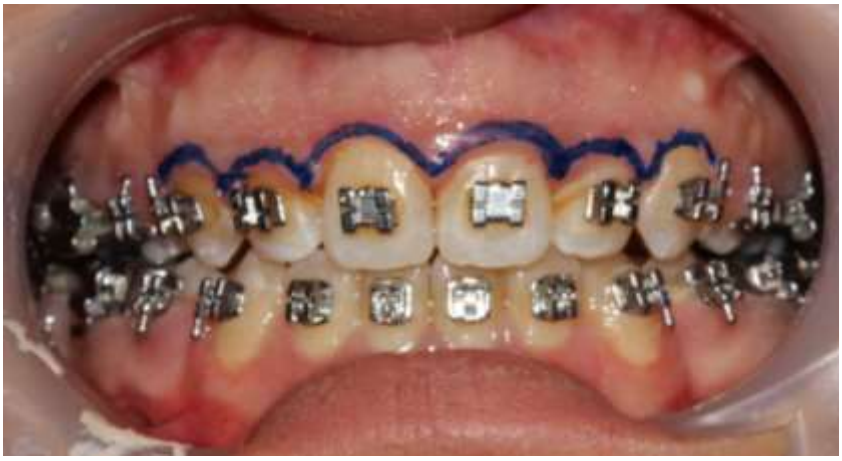

Figure (1B): Photo showing markings of the new gingival margins where reverse bevel gingivectomy with surgical blade had taken place

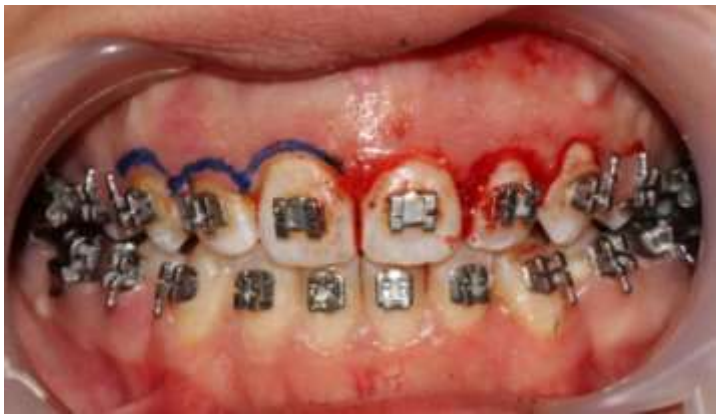

Figure (1C): Intra-operative photo showing removal of excess gingival tissues in one side

Figure (1D): Post-operative photo showing anterior teeth after gingivectomy

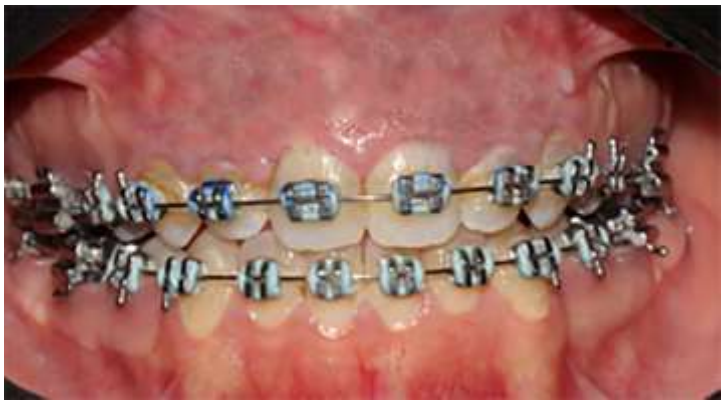

Figure (1E): Postoperative photo showing anterior teeth after 7 days

A B

Figure (2): A) High speed contra **B)** Soft tissue trimmer

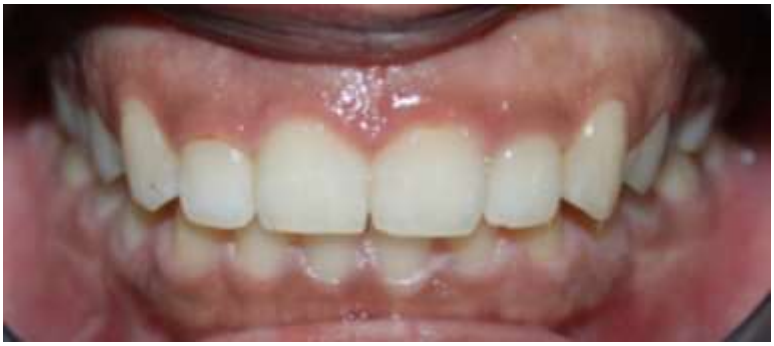

Figure (3A): Pre-operative photo showing a 24 years old female with altered passive eruption in upper anterior teeth

Figure (3B): Intra-operative photo using the soft tissue trimmer at 90 degrees

Figure (3C): Post-operative photo showing the new gingival margins

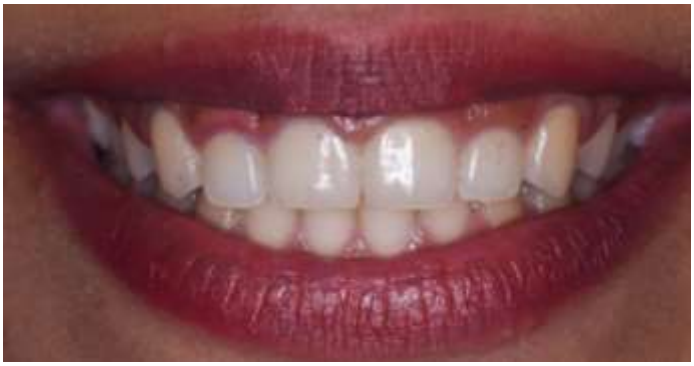

Figure (3D): Post- operative photo showing patient smile

Table 1: Demographic data of the patients showing gender distribution.

Gender		Group A	Group B	P-value
Male	N	2	1	0.5
	%	14.30%	7.10%	
Female	N	12	13	
	%	85.70%	92.90%	

***; significant ($p \leq 0.05$) ns; non-significant ($p>0.05$)**

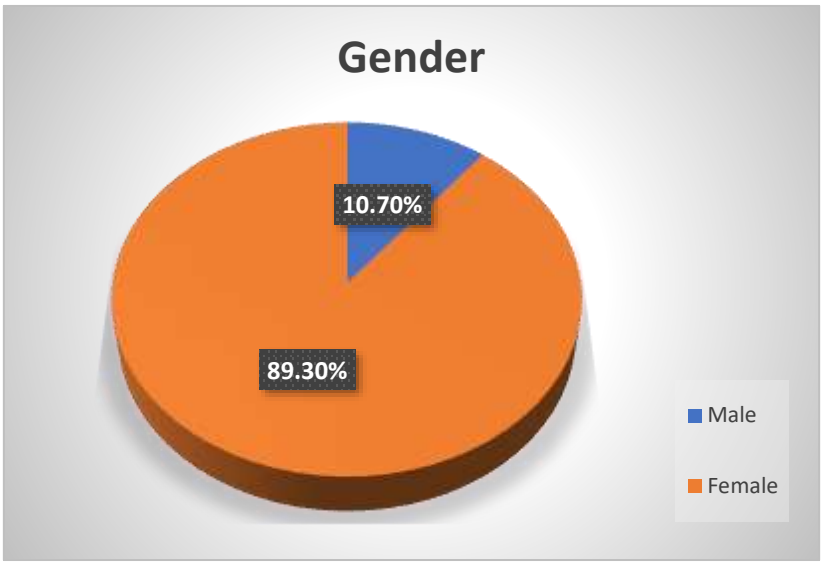

Figure 1): Pie chart showing gender distribution

Table (2): Demographic data of the patients showing age distribution

	Group A	Group B	P-value
Age	20.64±2.02	23.29±3.07	0.12

***; significant (p ≤ 0.05) ns; non-significant (p>0.05)**

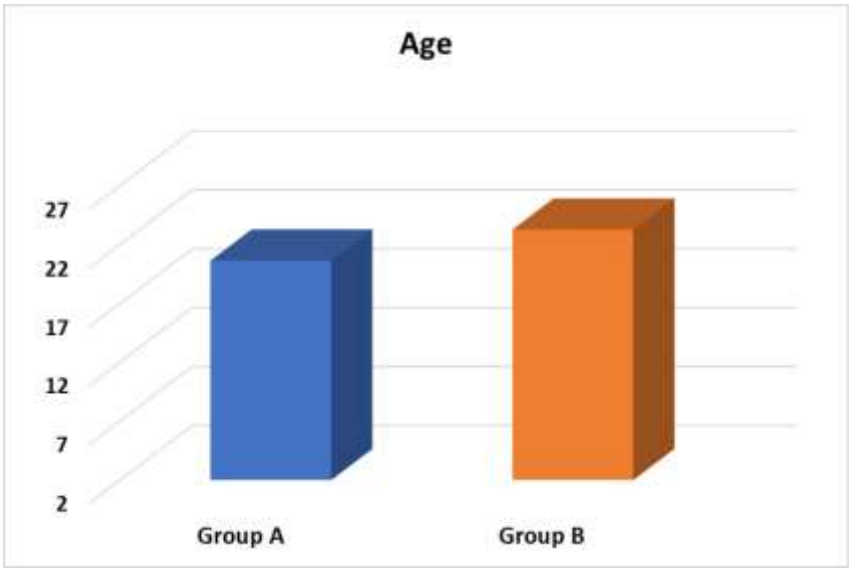

Figure 2): Pie chart showing gender distribution

Table 3: Post-operative pain intensity between the tested groups

	Group A		Group B		P-value
	Mean ±SD	Median (min-max)	Mean ±SD	Median (min-max)	
Day 1	4.21±2.72	4 (1-10)	1.07±0.83	1 (0-2)	<0.001*
Day 3	2.21±2.58	1 (0-8)	0.71±0.83	1 (0-3)	0.069
Day 5	0.57±1.09	0 (0-4)	0.5±0.52	0.5 (0-1)	0.63
Day 7	0.07±0.27	0 (0-1)	0±0	0 (0-0)	0.32

***; significant (p ≤ 0.05) ns; non-significant (p>0.05)**

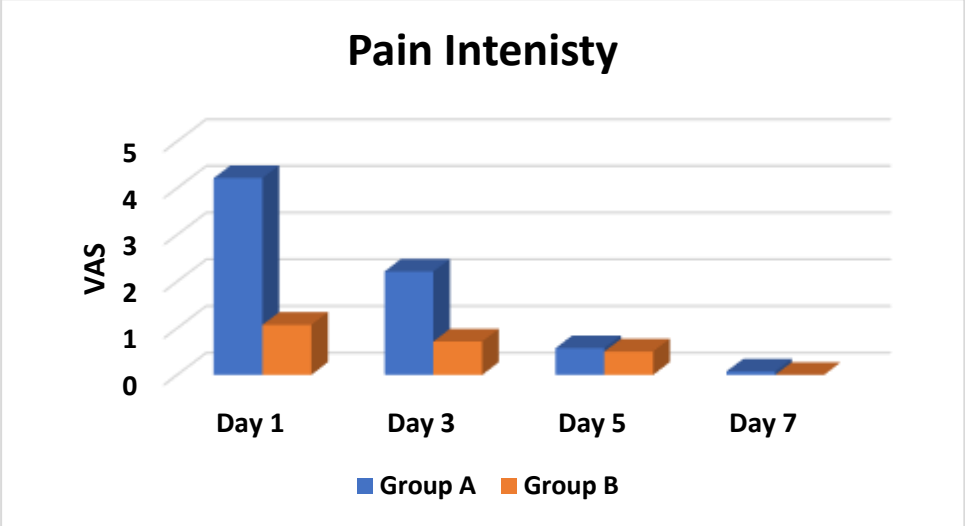

Figure (3): Bar chart showing post-operative pain intensity between the tested groups

Table 4: Change with time in post-operative pain intensity within each group

	Day 1	Day 3	Day 5	Day 7	P-value
Group A	4.21±2.72	2.21±2.58	0.57±1.09	0.07±0.27	<0.001*
Group B	1.07±0.83	0.71±0.83	0.5±0.52	0±0	0.001*

***; significant (p ≤ 0.05) ns; non-significant (p>0.05)**

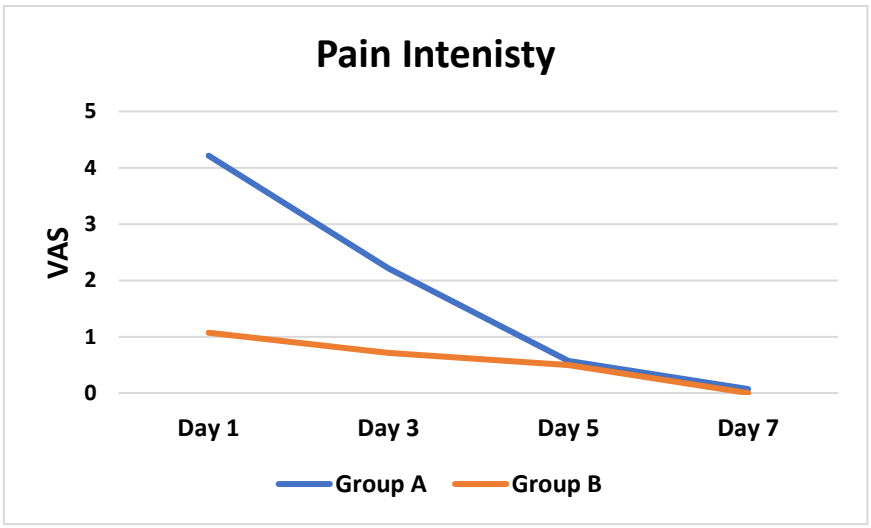

Figure 4): Line graph showing change with time in post-operative pain intensity within each group

Table 5: Post-operative pain incidence between the tested groups

			Group A	Group B	P-value
Day 1	No pain	N	0	4	0.002*
		%	0.00%	28.60%	
	Mild pain	N	5	10	
		%	35.70%	71.40%	
	Moderate pain	N	7	0	
		%	50.00%	0.00%	
	Severe pain	N	2	0	
		%	14.30%	0.00%	
Day 3	No pain	N	3	6	0.26
		%	21.40%	42.90%	
	Mild pain	N	8	8	
		%	57.10%	57.10%	
	Moderate pain	N	1	0	
		%	7.10%	0.00%	
	Severe pain	N	2	0	
		%	14.30%	0.00%	
Day 5	No pain	N	9	7	0.35
		%	64.30%	50.00%	
	Mild pain	N	4	7	
		%	28.60%	50.00%	
	Moderate pain	N	1	0	
		%	7.10%	0.00%	
	Severe pain	N	0	0	
		%	0	0	
Day 7	No pain	N	13	14	0.99
		%	92.90%	100%	
	Mild pain	N	1	0	
		%	7.10%	0	
	Moderate pain	N	0	0	
		%	0	0	
	Severe pain	N	0	0	
		%	0	0	

***; significant (p ≤ 0.05) ns; non-significant (p>0.05)**

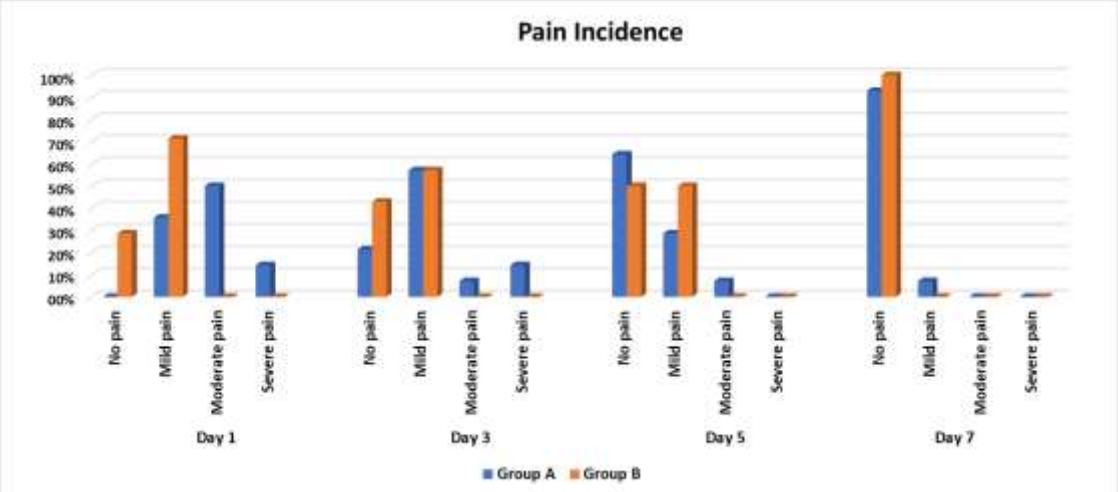

Figure (8): Bar chart showing pain incidence distribution between the tested group

IV. DISCUSSION:

The aesthetics of the gingival tissue around the teeth are influenced by its appearance. The appearance of the teeth is affected by abnormalities in gingival tissue symmetry and shape. Patients frequently complain about a gummy smile or excessive gingival display, as well as a short clinical crown of the tooth. A lot of factors can contribute to a gummy smile and a short clinical crown, one of which is altered passive eruption. (Lastianny & Perwitasari, 2022). Other aetiologies include gingival overgrowth which is considered an inflammatory response to plaque on tooth surfaces caused by poor oral hygiene, as well as trauma to the gingiva caused by imperfect restorations and orthodontic appliances. Other factors include the usage of specific medicines and the presence of systemic diseases. The status of the gingival overgrowth, as well as the extent of the gingival overgrowth, influence the therapeutic strategy chosen. Gingivectomy is performed when the gingiva does not decrease in size despite repeated scaling and root planing (Reddy et al., 2019).

The gingivectomy wound is sore and could heal slowly, therefore gingivectomy or gingivoplasties are performed using a variety of procedures and materials, each of which can have a different effect on the healing process. Clinical healing takes around four weeks, while histological healing takes about six weeks. (Reddy et al., 2019). Recurrent bleeding and pain after gingivectomy may be a problem, in addition to the complex wound healing treatment (Kusakci-Seker & Demirayak-Akdemir, 2020).

Traditional scalpels, electrosurgery, chemosurgery, and laser can all be used to conduct gingivectomy. The therapeutic objective of all of these operations is the removal of the pseudopockets. In traditional surgery due to its ease of use, accuracy, and minimum tissue harm, the small scalpel has been regarded the most common technique. Scalpels, on the other hand, do not produce enough haemostasis, which is critical in highly perfused tissues like inflammatory gingiva (Lione et al., 2020).

Most recently ceramic rotary burs have been used as an alternative to the previously mentioned modalities. Soft tissue trimmers have been used for procedures such as depigmentation showing advantages such as low cost, ease of availability, and patients acceptance (Negi et al., 2019). As well as in gingivectomy procedures in comparison to other techniques proving the least postoperative pain and the highest percentage of epithelization compared to surgical blade group and laser group (Guler et al., 2019).

Few randomised controlled clinical trials comparing traditional surgery versus soft tissue trimmers for reduced post-operative pain and faster wound healing have been conducted. In gingival hyperplasia, the goal of this study was to compare postoperative pain after gingivectomy procedures employing a soft tissue trimmer to a traditional scalpel approach.

Patients were enrolled in this study according to the eligibility criteria set (Guler et al., 2019). Anterior region of systemically healthy individuals was included with no clinical attachment loss in order to be indicated for gingivectomy procedures. Criteria of enrolment included plaque-induced inflammatory gingival enlargement or brackets-based gingival hyperplasia as it is most common (Reddy et al., 2019). Moreover, subjects with uneven gingival margins or altered passive eruption type 1 subgroup A were selected, where the preferred option is the gingivectomy (Pilloni et al., 2021).

Patients with chronic periodontitis, gingival enlargement due to any systemic predisposing factors, pregnant or lactating women, allergies, or a systemic disease that could affect the treatment outcome, such as diabetes, were all excluded from the study.

Antibiotic prophylaxis and anti-inflammatory drugs were also not included in the study. As all these factors are attributed to confounders and could be the reason for the gingival hyperplasia and our main focus were the inflammatory causes (Guler et al., 2019).

Patients were allocated randomly into two groups. Group A (control group) included 14 patients (2 males and 12 females) with ages ranged from 18-45 years that were treated by gingivectomy with conventional scalpel. Group B (test group) included 14 patients (1 male and 13 females) with ages ranged from 18-45 years that were treated by gingivectomy with soft tissue trimmer.

Preoperative intra-oral photos were taken. Periodontal therapy with full mouth supragingival scaling using ultrasonic scalers and subgingival debridement using curettes were performed if necessary. Oral hygiene instructions including mechanical and chemical plaque control. The mechanical plaque control included brushing the teeth twice daily using the modified bass technique and interdental cleaning using dental floss (Janakiram et al., 2020). Chemical plaque control including chlorhexidine mouth rinse 0.12% twice a day for one week. After 4-6 weeks of periodontal therapy, all subjects were re-evaluated to determine patient compliance with oral hygiene procedures as well as to re-evaluate gingival tissue healing (Segelnick & Weinberg, 2006).

Before the beginning of the surgery and for the sake of proper visualization of the newly formed gingival margin after the golden proportion is accounted for and the zenith point is adjusted, marking using indelible pen is performed. This uniform new line would be our guide for removal of the gingival excess or the un-contoured margins (Dibart, 2017). Regarding the surgical technique, bleeding points were made, using a blue marker following the correct scalloping of the gingiva, the bleeding points of all affected teeth were connected and then photographed. This guided us with the excess gingival tissues to be excised /trimmed (Peres et al., 2019).

Post-operative care instructions included patients being abstained from tooth brushing for 3-5 days and avoided hot, hard, acidic and/or spicy foods to eliminate any trauma to the surgical site during the inflammatory phase of wound healing. They were also instructed not to bite any food but to cut it into small pieces to avoid irritation to the surgical site. Chlorhexidine 0.12% mouthwash was prescribed twice daily for 7 days to compensate for the lack of tooth brushing during that period. This was according to Cochrane database systematic review which showed that there is high-quality data that chlorhexidine reduces dental plaque and gingival irritation, and there is no indication that one chlorhexidine concentration is more effective than another (James et al., 2017).

Post-operative pain was managed by taking paracetamol 500 mg only when needed while making a record of their consumed number. It was manifested as an unpleasant sensation ranging from a dull aching pain to severe unbearable pain that might interfere with daily activities. Teeth sensitivity was managed by avoiding very cold or hot food/drink. It was manifested as pain/discomfort that was associated with thermal stimulus (ingesting any cold or hot food/drink) which could last from a few seconds to a few minutes (Suchetha et al., 2018).

Concerning the measured outcomes, postoperative pain was measured at 1, 3, 5 and 7 days using VAS pain score which is the most common and simplest scale to be used regarding pain felt by the patients. It was measured from 0-10 with a score of 0 resemble no pain and a score of 10 is a severe pain (Klimek et al., 2017). Patients were recalled to assess and fill the charts based on the pain level they encountered.

Another study used a randomised split-mouth design to examine the efficacy of laser

and soft tissue trimmer for gingival depigmentation in twenty patients with gingival pigmentation. The Dummet Oral Pigmentation Index (DOPI), Gingival Pigmentation Index (GPI) for pigmentation, bleeding factor, wound healing factor, gingival colour, and visual analogue scale (VAS) score for pain were examined in both groups at baseline, 7th day, 1st month, and 6th month. When compared to the scalpel procedure, the bur treated tissue resulted in immediate tissue coagulation and minimal bleeding due to friction caused by heat production. The study also concluded that gaining aesthetic satisfaction with a laser and a soft tissue trimmer is equivalent. As a result, because it is economical, readily available, and patient-acceptable, the soft tissue trimmer could be used for depigmentation (Negi et al., 2019).

Regarding post-operative pain intensity, the results of the present study showed that there was a statistically significant difference between the tested groups ($P < 0.001$) after one day. After 3 days ($P = 0.069$), 5 days ($P = 0.63$) and 7 days ($P = 0.32$), there was no statistically significant difference between the tested groups. This is most probably due to instant tissue coagulation and minimal bleeding which is observed with soft tissue trimmer which resulted in faster wound healing especially in the inflammatory phase which takes place earlier in the first 3-5 days resulting in less post-operative pain (Negi et al., 2019).

Furthermore, the change with time in post-operative pain intensity within each group had revealed that in both groups there was a statistically significant decrease in the intensity of post-operative pain at different time intervals ($p<0.001$). The mean value of pain score in the control group decreased from (4.21±2.72) after one day to (2.21±2.58) after 3 days. It continued to decrease after 5 days to (0.57±1.09) and finally it reached (0.07±0.27) after 7 days. In the test group, the mean value of pain score decreased from (1.07±0.83) after one day to (0.71±0.83) after 3 days. It continued to decrease after 5 days to (0.5±0.52) and finally it reached (0±0) after 7 days. This could be explained by previous data showing that on the seventh day, more patients on bur-treated sites had full wound healing than on laser-treated sites. Negi et al., 2019 found that, both ablation and abrasion were proven to be efficient in attaining aesthetic pleasure as well as good wound healing without infection or pain.. When opposed to diode laser, using a soft tissue trimmer is simple and economical. As a result, patients and operators find it more acceptable. However, further long-term research are needed to evaluate the soft tissue trimmer and diode laser's efficacy.

Concerning post-operative pain incidence after one day: 0 (0%) patients in group A and 4 patients (28.6%) in group B had no pain. 5 (35.7%) patients in group A and 10 (71.4%) patients in group B had mild pain. While 7 (50%) patients in group A and 0 (0%) patients in group B complained from moderate pain. 2 (14.3%) patients in group A and 0 (0%) patients in group B complained from severe pain. There was a statistically significant difference between both tested groups after one day ($p=0.002$). This could be attributed to the coagulation of the ceramic bur that occurs intraoperatively which accelerates wound healing in the first days of the inflammatory phase, reducing post-operative pain. However, previous study on postoperative pain, day 1, VAS pain scores showed no statistically significant difference between the scalpel group and ceramic rotary group. Bur treated patients reported slight to moderate pain and only one patient complained of severe pain (Guler et al., 2019).

Regarding post-operative pain incidence, after three, five and seven days there was no statistically significant difference between both group, in which after three days, 3 (21.4%) patients in group A and 6 patients (42.9%) in group B had no pain. 8(57.1%) patients in group A and 8(57.1%) patients in group B had mild pain. While 1(7.1%) patient in group A and 0 (0%) patients in group B complained from moderate pain. 2 (14.3%)

patients in group A and 0 (0%) patients in group B complained from severe pain. After 5 days, 9 (64.3%) patients in group A and 7 patients (50%) in group B had no pain. 4(28.6%) patients in group A and 7 patients (50%) in group B had mild pain. While 1(7.1%) patient in group A and 0 (0%) patients in group B complained from moderate pain. 0(0%) patients in group A and B complained from severe pain. After seven days, 13 (92.9%) patients in group A and 14 patients (100%) in group B had no pain. 1(7.1%) patient in group A and no patients in group B had mild pain. While, 0(0%) patients in group A and B complained from moderate or severe pain.

On the other hand, a previous study showed significantly higher postoperative pain scores at day 3 and day 5 in the scalpel group compared to those from the ceramic rotary group with no statistically significant differences between both groups. The authors claimed that there was an amount of systemic analgesic consumption within the first postoperative week which did not vary significantly between the groups and those who received painkillers were reported and excluded from the study, because the use of painkillers can affect the VAS values. Whereas, in our current study no systemic analgesics were consumed or recorded for both groups (Guler et al., 2019).

Most of our subjects in this current study had orthodontic appliances which cleared out the reason behind the inflammatory gingival hyperplasia. Metallic orthodontic brackets have been observed to cause specific alterations in the buccal environment, including lower pH, greater accumulation, and increased S. mutans colonization (Eliades et al., 1993). A study resulted in showing that hyperplasia was found to be considerably more common in thick periodontium (61%) than thin periodontium (44.8%) ($p = 0.043$). These findings led to the formulation of a novel hypothesis that the quality of biofilm, rather than the quantity of plaque, could be at the root of gingival overgrowth during orthodontic treatment (Vincent-Bugnas et al., 2021).

To the best of our knowledge patient preferences and satisfaction were more towards the soft tissue trimmer, with the feeling that it was a less scary surgical procedure, and it seemed like “going for a tooth filling rather than going for a periodontal surgery” stated by some subjects. Therefore, for future recommendations; patients’ preferences, rate of recurrence of gingival hyperplasia, there is a need for a larger sample size and longer follow-up periods. In addition, more randomized controlled clinical trials are needed to compare between soft tissue trimmers and the gold standard blade. Only a total of three studies that involved ceramic rotary burs were only conducted in the years 2018 and 2019, none that compared soft tissue trimmer with the conventional surgery alone.

V. CONCLUSIONS

From this study, it can be concluded that:

1. Gingivectomy and gingivoplasty procedures using soft tissue trimmer is a promising and fast approach with less significant post-operative pain.
2. Intra-operative bleeding is minimized with immediate coagulation and improved wound healing using the soft tissue trimmer resulting in less postoperative pain.

VI. CONFLICT OF INTEREST

Absence of any potential conflict of interest.

VII. REFERENCES

1. Blatz M.B., Vonderheide M., Conejo J. The Effect of Resin Bonding on Long-Term Success of High-

Strength Ceramics, J. Dent. Res. 2018; 97:132–139

2. Aboujaoude, S., Aoun, G., & Majzoub, Z. (2021). Local and Systemic Effects of Cyclosporine A on the Severity of Gingival Overgrowth in Post-Transplant Renal Patients. Mater Sociomed, 33(1), 51-55. https://doi.org /10.5455/msm.2021.33.51-55
3. Agrawal, A. A. (2015). Gingival enlargements: Differential diagnosis and review of literature. World J Clin Cases, 3(9), 779-788. https://doi.org/10.12998/wjcc.v3.i9. 779
4. Ainamo, J., & Löe, H. (1966). Anatomical characteristics of gingiva. A clinical and microscopic study of the free and attached gingiva. J Periodontol, 37(1), 5-13. https://doi.org/10.1902/jop.1966.37. 1.5
5. Ainamo, J., & Talari, A. (1976). The increase with age of the width of attached gingiva. J Periodontal Res, 11(4), 182-188. https://doi.org/10.1111/j.1600-0765.1976.tb00069.x
6. Allen, R. R., & Bruce, K. W. (1954). Nevus of the gingiva; report of case. J Oral Surg (Chic), 12(3), 254-256.
7. Alzaidi, A. I., Yahya, A., Rava, M., Swee, T. T., & Idris, N. (2019). A Systematic Review on Current Research Trends In Electrosurgical Systems. Biomedical Engineering: Applications, Basis and Communications, 31(01), 1950004.
8. Amaral Vargas, E. O., de Melo Magalhães, K., Pereira Ferreira, D. M. T., MarañónVásquez, G., Sant'anna, E. F., Maia, L. C., & Pithon, M. M. (2022). Clinical parameters in soft tissue adjunctive periodontal procedures for orthodontic patients: surgical laser vs scalpel. Angle Orthod, 92(2), 265-274. https://doi.org/10.2319/022621-159.1
9. Bailey, O., & O'Connor, C. (2019). Papilla management in sub-gingival, interproximal, direct composite restoration: a key step to success. British dental journal, 226(12), 933-937.
10. Baniţă, I. M., Munteanu, C., Berbecaru-Iovan, A., Stănciulescu, C. E., Andrei, A. M., & Pisoschi, C. G. (2015). Epithelial-Mesenchymal Transition—A Possible Pathogenic Pathway of Fibrotic Gingival Overgrowth. In Emerging Trends in Oral Health Sciences and Dentistry. IntechOpen.
11. Beaumont, J., Chesterman, J., Kellett, M., & Durey, K. (2017). Gingival overgrowth: Part 1: aetiology and clinical diagnosis. Br Dent J, 222(2), 85-91. https://doi.org/10.1038/sj.bdj.2017.7 1
12. Bett, J. V. S., Batistella, E., Melo, G., Munhoz, E. A., Silva, C. A. B., Guerra, E. N. D. S., . .
13. De Luca Canto, G. (2019). Prevalence of oral mucosal disorders during pregnancy: A systematic review and meta-analysis. J Oral Pathol Med, 48(4), 270-277. https://doi.org/10.1111/jop.12831
14. Bhatia, G., Kumar, A., Khatri, M., Bansal, M., & Saxena, S. (2015). Assessment of the width of attached gingiva using different methods in various age groups: A clinical study. J Indian Soc Periodontol, 19(2), 199-202. https://doi.org/10.4103/0972-124X.152106
15. Bhatnagar, S. (2019). Treatment of Gingival Enlargement. In Gingival Disease-A Professional Approach for Treatment and Prevention. IntechOpen.
16. Bhuvaneswaran, M. (2010). Principles of smile design. J Conserv Dent, 13(4), 225-232. https://doi.org/10.4103/0972-0707.73387

17. Boutiou, E., Ziogas, I. A., Giannis, D., & Doufexi, A. E. (2021). Hereditary gingival fibromatosis in children: a systematic review of the literature. Clin Oral Investig, 25(6), 3599-3607. https://doi.org/10.1007/s00784-020-03682-x
18. Casetta, I., Granieri, E., Desiderá, M., Monetti, V. C., Tola, M. R., Paolino, E., . . . Calura, G. (1997). Phenytoin-induced gingival overgrowth: a community-based cross-sectional study in Ferrara, Italy. Neuroepidemiology, 16(6), 296-303. https://doi.org/10.1159/000109700
19. Caton, J. G., Armitage, G., Berglundh, T., Chapple, I. L., Jepsen, S., Kornman, K. S., . . . Tonetti, M. S. (2018). A new classification scheme for periodontal and peri implant diseases and conditions– Introduction and key changes from the 1999 classification. In (Vol. 89, pp. S1-S8): Wiley Online Library.
20. Cesarman, E., Damania, B., Krown, S. E., Martin, J., Bower, M., & Whitby, D. (2019). Kaposi sarcoma. Nature reviews Disease primers, 5(1), 1-21.
21. Christensen, G. J. (2008). Soft-tissue cutting with laser versus electrosurgery. J Am Dent Assoc, 139(7), 981-984. https://doi.org/10.14219/jada.archive.2008.0286
22. Coachman, C., Calamita, M. A., & Sesma, N. (2017). Dynamic Documentation of the Smile and the 2D/3D Digital Smile Design Process. Int J Periodontics Restorative Dent, 37(2), 183-193. https://doi.org/10.11607/prd.2911
23. Costa, P., Peditto, M., Marcianò, A., Barresi, A., & Oteri, G. (2021). The ―Epulis‖ Dilemma. Considerations from Provisional to Final Diagnosis. A Systematic Review. Oral, 1(3), 224-235.
24. Dahiya, R., Blaggana, A., Panwar, V., Kumar, S., Kathuria, A., & Malik, S. (2019). Clinical and histological comparison of platelet-rich fibrin versus non-eugenol periodontal dressing in the treatment of gingival hyperpigmentation. Journal of Indian Society of Periodontology, 23(4), 345.
25. Dahllöf, G., & Modéer, T. (1986). The effect of a plaque control program on the development of phenytoin-induced gingival overgrowth. A 2-year longitudinal study. J Clin Periodontol, 13(9), 845-849. https://doi.org/10.1111/j.1600-051x.1986.tb02241.x
26. De Rouck, T., Eghbali, R., Collys, K., De Bruyn, H., & Cosyn, J. (2009). The gingival biotype revisited: transparency of the periodontal probe through the gingival margin as a method to discriminate thin from thick gingiva. J Clin Periodontol, 36(5), 428-433. https://doi.org/10.1111/j.1600-051X.2009.01398.x
27. DeAngelo, S., Murphy, J., Claman, L., Kalmar, J., & Leblebicioglu, B. (2007). Hereditary gingival fibromatosis--a review. Compend Contin Educ Dent, 28(3), 138-143; quiz 144, 152.
28. Dibart, S. (2017). Improving patients' smiles: aesthetic crown-lengthening procedure. Practical periodontal plastic surgery [Internet]. Ames, Iowa, USA: Blackwell Publishing Professional, 138-146.
29. El Ayachi, H., Sihame, A., & Cherkaoui, A. (2021). Periodontal management of changes in gingiva during pregnancy: A nonsurgical approach. International Journal of Applied Dental Science, 7(1), 272-276.
30. Eliades, T., Viazis, A. D., & Lekka, M. (1993). Failure mode analysis of ceramic brackets bonded to enamel. Am J Orthod Dentofacial Orthop,

104(1), 21-26. https://doi.org/10.1016/S0889-5406(08)80120-5

31. Elmahal, B. A. (2018). Evaluation of Gingival Healing Following Gingivectomy using Diode Laser Versus Scalpel Sudan University of Science and Technology].
32. Farista, S., Kalakonda, B., Koppolu, P., Baroudi, K., Elkhatat, E., & Dhaifullah, E. (2016). Comparing Laser and Scalpel for Soft Tissue Crown Lengthening: A Clinical Study. Glob J Health Sci, 8(10), 55795. https://doi.org/10.5539/gjhs.v8n10p73
33. Elif, Ö. (2017). Comparison of gingivectomy procedures for patient satisfaction: conventional and diode laser surgery. Selcuk Dental Journal, 4(1), 6-9.
34. Farook, F. F., M Nizam, M. N., & Alshammari, A. (2019). An update on the mechanisms of phenytoin induced gingival overgrowth. The Open Dentistry Journal, 13(1).
35. Fowler, C. B. (1999). Benign and malignant neoplasms of the periodontium. Periodontol 2000, 21, 33-83. https://doi.org/10.1111/j.1600-0757.1999.tb00168.x
36. Gaur, S., & Agnihotri, R. (2018). Is dental plaque the only etiological factor in Amlodipine induced gingival overgrowth? A systematic review of evidence. Journal of clinical and experimental dentistry, 10(6), e610.
37. Gawron, K., Łazarz-Bartyzel, K., Potempa, J., & Chomyszyn-Gajewska, M. (2016). Gingival fibromatosis: clinical, molecular and therapeutic issues. Orphanet journal of rare diseases, 11(1), 1-14.
38. Giunta, J. L. (2002). Gingival cysts in the adult. J Periodontol, 73(7), 827-831. https://doi.org/10.1902/jop.2002.73.7.827
39. Goldblatt, J., & Singer, S. L. (1992). Autosomal recessive gingival fibromatosis with distinctive facies. Clin Genet, 42(6), 306-308. https://doi.org/10.1111/j.13990004.1992.tb03261.x
40. Goldman, H. M. (1951). Gingivectomy. Oral Surgery, Oral Medicine, Oral Pathology, 4(9), 1136-1157.
41. Guler, B., Isler, S. C., Uraz, A., Bozkaya, S., & Cetiner, F. D. (2019). The comparison of postoperative wound healing following different gingivectomy techniques: A randomized prospective clinical trial. Annals of Medical Research, 26(3), 382-388.
42. Gupta, G., Kumar, A., Khatri, M., Puri, K., Jain, D., & Bansal, M. (2014). Comparison of two different depigmentation techniques for treatment of hyperpigmented gingiva. J Indian Soc Periodontol, 18(6), 705-709. https://doi.org/10.4103/0972-124X.147404
43. Hagen, J. O., Soule, E. H., & Gores, R. J. (1961). Granular-cell myoblastoma of the oral cavity. Oral Surg Oral Med Oral Pathol, 14, 454-466. https://doi.org/10.1016/00304220(61)90113-x
44. Hamzani, Y., & Chaushu, G. (2018). Evaluation of early wound healing scales/indexes in oral surgery: A literature review. Clin Implant Dent Relat Res, 20(6), 1030-1035. https://doi.org/10.1111/cid.12680
45. Hooda, S., & Paul, G. (2021). Digital Smile Design. In Digitization in Dentistry (pp. 373399). Springer.
46. Hosadurga, R., Nabeel Althaf, M. S., Hegde, S., Rajesh, K. S., & Arun Kumar, M. S. (2016). Influence of sex hormone levels on gingival enlargement in adolescent patients

undergoing fixed orthodontic therapy: A pilot study. Contemp Clin Dent, 7(4), 506-511. https://doi.org/10.4103/0976-237X.194099

47. Iles, R., Simms, M., & Ledsam, A. (2021). Oral mucosal manifestations of systemic disease. InnovAiT, 14(12), 714-723.
48. Ilgenli, T., Atilla, G., & Baylas, H. (1999). Effectiveness of periodontal therapy in patients with drug-induced gingival overgrowth. Long-term results. J Periodontol, 70(9), 967-972. https://doi.org/10.1902/jop.1999.70.9.967
49. Inglés, E., Rossmann, J. A., & Caffesse, R. G. (1999). New clinical index for drug-induced gingival overgrowth. Quintessence Int, 30(7), 467-473.
50. Jain, S. K., Shenoy, N., Chourasia, M. K., & Ramesh, A. (2021). A Comparative Clinical Study on Surgical Blade and Diode Laser in the Treatment of Gingival Melanin Pigmentation. Journal of Evolution of Medical and Dental Sciences, 10(10), 689-694.
51. James, P., Worthington, H. V., Parnell, C., Harding, M., Lamont, T., Cheung, A., . . . Riley, P. (2017). Chlorhexidine mouthrinse as an adjunctive treatment for gingival health. Cochrane Database Syst Rev, 3, CD008676.https://doi.org/10.1002/14651858.CD008676.pub2
52. Janakiram, C., Varghese, N., Venkitachalam, R., Joseph, J., & Vineetha, K. (2020). Comparison of modified Bass, Fones and normal tooth brushing technique for the efficacy of plaque control in young adults- A randomized clinical trial. J Clin Exp Dent, 12(2), e123e129. https://doi.org/10.4317/jced.55747
53. Kantarci, A., Cebeci, I., Tuncer, O., Carin, M., & Firatli, E. (1999). Clinical effects of periodontal therapy on the severity of cyclosporin A-induced gingival hyperplasia. J Periodontol, 70(6), 587-593. https://doi.org/10.1902/jop.1999.70.6.587
54. Karring, T., Lang, N., & Löe, H. (1975). The role of gingival connective tissue in determining epithelial differentiation. Journal of periodontal research, 10(1), 1-11.
55. Kazakova, R. T., Tomov, G. T., Kissov, C. K., Vlahova, A. P., Zlatev, S. C., & Bachurska, S. Y. (2018). Histological Gingival Assessment after Conventional and Laser Gingivectomy. Folia Med (Plovdiv), 60(4), 610-616. https://doi.org/10.2478/folmed-20180028
56. Kfir, Y., Buchner, A., & Hansen, L. S. (1980). Reactive lesions of the gingiva. A clinicopathological study of 741 cases. J Periodontol, 51(11), 655-661. https://doi.org/10.1902/jop.1980.51.11.655
57. Kibe, T., Koga, T., Nishihara, K., Fuchigami, T., Yoshimura, T., Taguchi, T., & Nakamura, N. (2017). Examination of the early wound healing process under different wound dressing conditions. Oral surgery, oral medicine, oral pathology and oral radiology, 123(3), 310319.
58. Klimek, L., Bergmann, K.-C., Biedermann, T., Bousquet, J., Hellings, P., Jung, K., . . . Stock, P. (2017). Visual analogue scales (VAS): Measuring instruments for the documentation of symptoms and therapy monitoring in cases of allergic rhinitis in everyday health care. Allergo journal international, 26(1), 16-24.
59. Kohale, B. R., Agrawal, A. A., & Raut, C. P. (2018). Effect of low-level laser therapy on wound healing

and patients' response after scalpel gingivectomy: A randomized clinical split-mouth

60. Kolte, A. P., Kolte, R. A., & Bawankar, P. (2018). Proximal contact areas of maxillary anterior teeth and their influence on interdental papilla. The Saudi dental journal, 30(4), 324-329.
61. Kravitz, N. D., & Kusnoto, B. (2008). Soft-tissue lasers in orthodontics: an overview. Am J Orthod Dentofacial Orthop, 133(4 Suppl), S110-114. https://doi.org/10.1016/j.ajodo.2007.01.026
62. KS, P. (2018). Prevalence of Gingival Stippling among 4-8 Years Old Children.
63. Lager, I., Altini, M., Coleman, H., & Ali, H. (2003). Oral Kaposi's sarcoma: a clinicopathologic study from South Africa. Oral Surg Oral Med Oral Pathol Oral Radiol Endod, 96(6),701-710. https://doi.org/10.1016/s1079-2104(03)00370-6
64. Kusakci Seker, B., & Demirayak Akdemir, M. (2020). The effect of non thermal atmospheric pressure plasma application on wound healing after gingivectomy. International Wound Journal, 17(5), 1376-1383.
65. Lang, N. P., Berglundh, T., Giannobile, W. V., & Sanz, M. (2021). Lindhe's Clinical Periodontology and Implant Dentistry, 2 Volume Set. John Wiley & Sons.
66. Lastianny, S. P., & Perwitasari, A. (2022). Treatment of Altered Passive Eruption Type 1B: A Case Report. KnE Medicine, 294-301.
67. Lee, K. W. (1968). The fibrous epulis and related lesions. Granuloma pyogenicum, 'Pregnancy tumour', fibro-epithelial polyp and calcifying fibroblastic granuloma. A clinicopathological study. Periodontics, 6(6), 277-292.
68. Levin, E. I. (1978). Dental esthetics and the golden proportion. J Prosthet Dent, 40(3), 244252. https://doi.org/10.1016/0022-3913(78)90028-8
69. Lione, R., Pavoni, C., Noviello, A., Clementini, M., Danesi, C., & Cozza, P. (2020). Conventional versus laser gingivectomy in the management of gingival enlargement during orthodontic treatment: a randomized controlled trial. European journal of orthodontics, 42(1), 78-85
70. Marshall, R. I., & Bartold, P. M. (1999). A clinical review of drug-induced gingival overgrowths. Aust Dent J, 44(4), 219-232. https://doi.org/10.1111/j.18347819.1999.tb00224.x
71. Mathew, M. R., Nishith, R., AB, S. B., Vanasi, M., & Shashidhar, K. Periodontal Microsurgery-A Review
72. Mawardi, H., Alsubhi, A., Salem, N., Alhadlaq, E., Dakhil, S., Zahran, M., & Elbadawi, L. (2021). Management of medication-induced gingival hyperplasia: a systematic review. Oral Surg Oral Med Oral Pathol Oral Radiol, 131(1), 62-72. https://doi.org/10.1016/j.oooo.2020.10.020
73. Meenawat, A., Verma, S. C., Govila, V., Srivastava, V., & Punn, K. (2013). Histological and clinical evaluation of gingival healing following gingivectomy using different treatment modalities. Journal of the International Clinical Dental Research Organization, 5(1), 31
74. Mele, M., Felice, P., Sharma, P., Mazzotti, C., Bellone, P., & Zucchelli, G. (2018). Esthetic treatment of altered passive eruption. Periodontol 2000, 77(1), 65-83. https://doi.org/10.1111/prd.12206
75. Miller, C. S., & Damm, D. D. (1992). Incidence of verapamil-induced gingival hyperplasia in a dental

population. J Periodontol, 63(5), 453-456. https://doi.org/10.1902/jop.1992.63.5.453

76. Miranda, J., Brunet, L., Roset, P., Berini, L., Farré, M., & Mendieta, C. (2001). Prevalence and risk of gingival enlargement in patients treated with nifedipine. Journal of periodontology, 72(5), 605-611.
77. Murakami, S., Mealey, B. L., Mariotti, A., & Chapple, I. L. C. (2018). Dental plaque-induced gingival conditions. J Periodontol, 89 Suppl 1, S17-S27. https://doi.org/10.1002/JPER.17-0095
78. Nayak, D. G., Uppoor, A., & Abhay, K. (2021). Fundamentals of Periodontology and Oral Implantology-EBook. Elsevier Health Sciences.
79. Negi, R., Gupta, R., Dahiya, P., Kumar, M., Bansal, V., & Kaur Samlok, J. (2019). Ceramic soft tissue trimming bur: A new tool for gingival depigmentation. J Oral Biol Craniofac Res, 9(1), 14-18. https://doi.org/10.1016/j.jobcr.2018.07.002
80. Newman, M., Dragan, I. F., Elangovan, S., & Karan, A. K. (2020). Newman and Carranza's Essentials of Clinical Periodontology E-Book: An Integrated Study Companion. Elsevier Health Sciences.
81. Newman, M. G., Takei, H., Klokkevold, P. R., & Carranza, F. A. (2018). Newman and Carranza's Clinical periodontology E-book. Elsevier Health Sciences.
82. Omori, K., Hanayama, Y., Naruishi, K., Akiyama, K., Maeda, H., Otsuka, F., & Takashiba, S. (2014). Gingival overgrowth caused by vitamin C deficiency associated with metabolic syndrome and severe periodontal infection: a case report. Clin Case Rep, 2(6), 286-295. https://doi.org/10.1002/ccr3.114
83. Peres, M., Lima Filho, T., IJZ, B. I., Gomes, M., & Fernande, P. (2019). Gingivectomy approaches: A Review. Int J Oral Dent Heal, 5, 099.
84. Pilloni, A., Marini, L., Zeza, B., Ferlosio, A., & Aghazada, R. (2021). Histologic Analysis of Clinically Healthy Human Gingiva in Patients with Altered Passive Eruption. Dent J (Basel), 9(3). https://doi.org/10.3390/dj9030029
85. Pinto, A. S., Alves, L. S., do Amaral Zenkner, J. E., Zanatta, F. B., & Maltz, M. (2017). Gingival enlargement in orthodontic patients: effect of treatment duration. American journal of orthodontics and dentofacial orthopedics, 152(4), 477-482.
86. Pollack, R. P. (1990). Neurofibroma of the palatal mucosa. A case report. J Periodontol, 61(7), 456-458. https://doi.org/10.1902/jop.1990.61.7.456
87. Ponnam, S. R., Srivastava, G., Jampani, N., & Kamath, V. V. (2014). A fatal case of rapid gingival enlargement: Case report with brief review. J Oral Maxillofac Pathol, 18(1), 121126. https://doi.org/10.4103/0973-029X.131938
88. Preshaw, P. M., Knutsen, M. A., & Mariotti, A. (2001). Experimental gingivitis in women using oral contraceptives. J Dent Res, 80(11), 2011-2015. https://doi.org/10.1177/00220345010800111201
89. Raizada, S., Varghese, J. M., Bhat, K., & Gupta, K. (2016). Isolated gingival overgrowths: A review of case series. Contemporary clinical dentistry, 7(2), 265.
90. Rao, A. G., Koganti, V. P., Prabhakar, A. K., & Soni, S. (2015). Modified lip repositioning: A surgical approach to treat the gummy

smile. J Indian Soc Periodontol, 19(3), 356-359. https://doi.org/10.4103/0972-124X.152400

91. Raoofi, S., Asadinejad, S. M., & Khorshidi, H. (2019). Evaluation of Color and Width of Attached Gingiva Gain in Two Surgical Techniques: Free Gingival Graft and Connective Tissue Graft Covered By Thin Mucosal Flap, a Clinical Trial. J Dent (Shiraz), 20(4), 224231. https://doi.org/10.30476/DENTJODS.2019.44916
92. Rashmi, M. S., Alka, K. D., & Seema, C. (2008). Oral hobnail hemangioma--a case report. Quintessence Int, 39(6), 507-510.
93. Reddy, S. P., Koduganti, R. R., Panthula, V. R., Surya Prasanna, J., Gireddy, H., Dasari, R., Chandra G, B. (2019). Efficacy of Low-level Laser Therapy, Hyaluronic Acid Gel, and Herbal Gel as Adjunctive Tools in Gingivectomy Wound Healing: A Randomized Comparative Clinical and Histological Study. Cureus, 11(12), e6438. https://doi.org/10.7759/cureus.6438
94. Rijal, A., Dhami, B., Pandey, N., & Aryal, D. (2021). Non-Surgical Management of Localized Gingival Enlargement in Maxillary Anterior Region. J Kantipur Dent Coll, 2(1), 32-35.
95. Rijal, A. H., Dhami, B., Pandey, N., & Aryal, D. (2021). Prevalence of Gingival Pigmentation and its Association with Gingival Biotype and Skin Colour. Journal of Nepalese Society of Periodontology and Oral Implantology, 5(1), 19-25.
96. Ryu, S.-W., Lee, S.-H., & Yoon, H.-J. (2012). A comparative histological and immunohistochemical study of wound healing following incision with a scalpel, CO2 laser or Er, Cr: YSGG laser in the guinea pig oral mucosa. Acta Odontologica Scandinavica, 70(6), 448-454.
97. Santoro, R., Santoro, C., Loffredo, F., Romano, A., Perrotta, S., Serpico, R., . . . Lucchese, A. (2020). Oral clinical manifestations of neurofibromatosis type 1 in children and adolescents. Applied Sciences, 10(14), 4687.
98. Sarver, D. M., & Yanosky, M. (2005). Principles of cosmetic dentistry in orthodontics: part 2. Soft tissue laser technology and cosmetic gingival contouring. Am J Orthod Dentofacial Orthop, 127(1), 85-90. https://doi.org/10.1016/j.ajodo.2004.07.035
99. Sarwal, P., & Lapumnuaypol, K. (2020). Pyogenic granuloma.
100. Segelnick, S. L., & Weinberg, M. A. (2006). Reevaluation of initial therapy: when is the appropriate time? J Periodontol, 77(9), 1598-1601. https://doi.org/10.1902/jop.2006.050358
101. Seifi, M., & Matini, N.-S. (2017). Laser surgery of soft tissue in orthodontics: Review of the clinical trials. Journal of lasers in medical sciences, 8(Suppl 1), S1.
102. Seymour, R. A., Ellis, J. S., & Thomason, J. M. (2000). Risk factors for druginduced gingival overgrowth. J Clin Periodontol, 27(4), 217-223. https://doi.org/10.1034/j.1600-051x.2000.027004217.x
103. Shankar, B. S., Ramadevi, T., Neetha, M., Reddy, P. S. K., Saritha, G., & Reddy, J. M. (2013). Chronic inflammatory gingival overgrowths: laser gingivectomy & gingivoplasty. Journal of international oral health: JIOH, 5(1), 83.
104. Sharma, A., Singh, S., Kaushik, M., & Khattri, S. (2021). Puberty Induced Gingival Enlargement: A Clinical Case Report. Journal of Advanced Medical and Dental Sciences Research, 9(8), 126-131.

105. Shawky, H. A., & Darwish, M. M. (2017). Clinical Application of Radiesse And Hyaluronic Acid Gel For Treatment Of Papillae Deficiencies In The Esthetic Zone. Egyptian Dental Journal, 63(1-January (Oral Medicine, X-Ray, Oral Biology & Oral Pathology)), 533-545.

106. Silberberg, N., Goldstein, M., & Smidt, A. (2009). Excessive gingival display-etiology, diagnosis, and treatment modalities. Quintessence Int, 40(10), 809-818.

107. Simon, C. P., Bratu, D. C., Motoc, A. G. M., Popa, G., Pop, I. S., & Mederle, O. A. (2020). Immunohistochemical analysis of gingival proliferative processes associated with fixed orthodontic therapy. Rev Chim (Bucharest), 71(2), 302-306.

108. Smith, S., & Almas, K. (2022). Essential Periodontics. John Wiley & Sons.

109. Sobouti, F., Rakhshan, V., Chiniforush, N., & Khatami, M. (2014). Effects of laserassisted cosmetic smile lift gingivectomy on postoperative bleeding and pain in fixed orthodontic patients: a controlled clinical trial. Prog Orthod, 15,66.

110. Soi, S., Bains, V. K., Jhingran, R., Madan, R., & Srivastava, R. (2018). Gingiva Tissue is the Issue: An Overview. Asian Journal of Oral Health & Allied Sciences Volume, 8(1), 15.

111. Solanki, G. (2012). A general overview of gingiva. Inter J Biomed Res, 3(2), 79-82.

112. Srivastava, R., Tandon, P., Gupta, K., & Srivastava, A. (2009). Aesthetics enhancement–crown lengthening procedure with internal bevel gingivectomy–a case report. Inter J Dent Sci, 7.

113. Stevenson, A. R., & Austin, B. W. (1990). A case of ameloblastoma presenting as an exophytic gingival lesion. J Periodontol, 61(6), 378-381.

114. Strzelec, K., Dziedzic, A., Łazarz-Bartyzel, K., Grabiec, A. M., Gutmajster, E., Kaczmarzyk, T., . . . Gawron, K. (2021). Clinics and genetic background of hereditary gingival fibromatosis. Orphanet J Rare Dis, 16(1), 492. https://doi.org/10.1186/s13023-02102104-9

115. Sznajder, N., Dominguez, F. V., Carraro, J. J., & Lis, G. (1973). Hemorrhagic hemangioma of gingiva: report of a case. J Periodontol, 44(9), 579-582. https://doi.org/10.1902/jop.1973.44.9.579

116. Toida, M., Ishimaru, J. I., & Hobo, N. (1993). A simple cryosurgical method for treatment of oral mucous cysts. Int J Oral Maxillofac Surg, 22(6), 353-355. https://doi.org/10.1016/s0901-5027(05)80666-6

117. Torabi, S., & Soni, A. (2021). Histology, Periodontium. In StatPearls [Internet]. StatPearls Publishing.

118. Trackman, P. C., & Kantarci, A. (2015). Molecular and clinical aspects of drug-induced gingival overgrowth. J Dent Res, 4(4), 540-546. https://doi.org/10.1177/0022034515571265

119. Tungare, S., & Paranjpe, A. G. (2019). Drug induced gingival overgrowth.

120. Vandana, K., Shivani, S., Savitha, B., & Vivek, H. (2017). Assessment of gingival sulcus depth, width of attached gingiva, and gingival thickness in primary, mixed, and permanent dentition. Journal of Dental Research and Review, 4(2), 42.

121. Vincent-Bugnas, S., Borsa, L., Gruss, A., & Lupi, L. (2021). Prioritization of predisposing factors of gingival hyperplasia during orthodontic treatment: the role of amount of biofilm. BMC Oral Health, 21(1), 84.

122. Ward, D. H. (2015). Proportional Smile Design: Using the Recurring Esthetic Dental Proportion to Correlate the Widths and Lengths of the Maxillary Anterior Teeth with the Size of the Face. Dent Clin North Am, 59(3),623-638https://doi.org/10.1016/j.cden.2015.03.006

123. Yacob, N., Awang, R. A., & Sinor, M. Z. (2020). Interproximal Contact Area and Width: Relationship to Periodontal Parameters. Int J Dentistry Oral Sci, 7(9), 804-808.

124. Yadav, V. S., Chakraborty, S., Tewari, S., Tewari, N., & Ghosh, T. (2017). Cryotherapy as a conservative treatment modality for gingival enlargement in a patient with Sturge-Weber Syndrome. Intractable & Rare Diseases Research.

125. Yaneva, A. D. B. (2013). Treatment of drug-induced gingival enlargement with Er: YAG laser. Industry report, 3, 34-37.

126. Zachariasen, R. D. (1989). Ovarian hormones and oral health: pregnancy gingivitis. Compendium, 10(9), 508-512.

127. Zweers, J., Thomas, R. Z., Slot, D. E., Weisgold, A. S., & Van der Weijden, F. G. (2014). Characteristics of periodontal biotype, its dimensions, associations and prevalence: a systematic review. Clin Periodontol, 41(10), 958-971. https://doi.org/10.1111/jcpe.12275