

Orthodontic Treatment in Patient with Gingival Enlargement: A Case Report

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Abstract

Gingival enlargement can be found in orthodontic patients. Thorough history-taking and clinical examination are important for diagnosis and treatment plan. The key to successful treatment are to obtain a proper diagnosis of the problem and the interdisciplinary team which is needed to treat the patient. This report presented about an adult Thai male, Class II malocclusion with chronic inflammatory gingival enlargement. After five years and eight months under the treatment, the patient's malocclusion was corrected. Gingival enlargement was successfully corrected, before and during orthodontic treatment by gingivectomy. After a year of follow-up, the result was stable and there was no recurrence of gingival enlargement.

Keywords: Gingival hyperplasia/ Orthodontic treatment/ Malocclusion/ Interdisciplinary treatment

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Introduction

Gingival enlargement is one of numerous problems affecting orthodontic treatment which can occur before starting treatment or arising during treatment. Gingival enlargement or gingival overgrowth is characterized by an increase in the size of gingiva which could be caused by gingival hyperplasia (an increase in the number of cells) or gingival hypertrophy (an increase in the size of cells without increasing number of cells). It can have multiple etiology as described in Table 1.¹ It may cause complications such as prolonged retention of primary teeth, difficulty in mastication, speech, esthetic and psychological problems.² Enlargement of gingiva interferes with orthodontic procedures, for example during bracket placement, impeded tooth movement and oral hygiene care. Vice versa, orthodontic treatment could also be the cause of gingival enlargement. To achieve an optimum result, treatment plan between orthodontist and periodontist is important before orthodontic treatment is initiated.³ The objective of this case report was to present a way for the interdisciplinary team to approach a gingival enlargement patient who needed an orthodontic treatment.

Table 1 Gingival enlargement can be classified according to etiologic factors and pathologic changes as follows [Modified from Agrawal (2015)¹].

Inflammatory enlargement	- Chronic - Acute
Drug-induced gingival enlargement	- Anticonvulsants e.g., phenytoin (Dilantin) - Immunosuppressants e.g., cyclosporine - Calcium channel blockers e.g., nifedipine, nitrendipine
Idiopathic gingival enlargement	
Enlargements associated with systemic diseases or conditions	A. Conditioned enlargement - Pregnancy - Puberty - Vitamin C deficiency - Plasma cell gingivitis - Nonspecific conditioned enlargement (pyogenic granuloma) B. Systemic diseases causing gingival enlargement - Leukemia - Granulomatous diseases e.g., Wegener's granulomatosis, sarcoidosis
Genetic disorders associated with gingival enlargement	- Syndromes associated with hereditary gingival fibromatosis e.g., Ramon syndrome - Syndromes associated with lysosomal storage diseases e.g., Hurler syndrome - Gingival enlargement associated with vascular disorders e.g., Sturge-Weber syndrome - Gingival enlargement associated with characteristic dental abnormalities e.g., Wilson syndrome
Neoplastic enlargement (gingival tumors)	- Benign tumors e.g., fibroma, papilloma, peripheral giant cell granuloma - Malignant tumors e.g., carcinoma, malignant melanoma
False enlargement	- Underlying osseous lesions - Underlying dental tissues

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A case report

Case history A Thai male, twenty-two years old, came to receive orthodontic treatment, with a chief complaint of crowded teeth. He had good general health without previous serious illness or medication.

Clinical examination

Extra-oral examination He had asymmetrical ovoid facial type with no chin deviation. His vertical and horizontal facial ratios were normal. He has slightly convex profile (Figure 1).

Intra-oral examination He had a permanent dentition with all teeth present in oral cavity except 36 and all third molars. Canine relationships were Class II on both sides and Molar relationships were Class II on the right side and unclassified on the left side due to a loss of the lower left first molar. Overjet was 7.5 mm (21 as a reference) and overbite was 7 mm (100% complete overbite). The upper dental midline deviated 3 mm to the right while the lower dental midline was on facial midline. He had severe crowding on both arches with gingiva covered on occlusal surface of the upper left second premolar and the lower left second premolar had operculum at distal portion of occlusal table.

His gingiva was pink, firm and thick. He had no pocket formation. There was generalized gingival enlargement especially on the upper and lower anterior teeth and the left posterior segments. The enlargement affected the attached gingival area, extending from the mucogingival junction to the gingival margin and interdental papillae. The enlarged gingival regions had mostly leathery consistency and had a characteristic minutely pebbled surface. He denied all systemic disease, and did not take any medications associated with gingival hyperplasia. The patient noticed gum swelling when he was 15 years old (Figure 2).

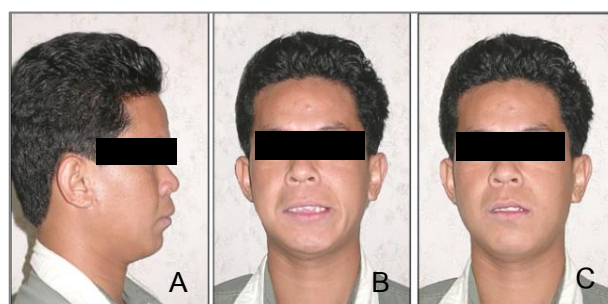


Figure 1 Pre-treatment extra-oral photos A) Lateral view (right), B) Frontal view (smile), C) Frontal view (rest)

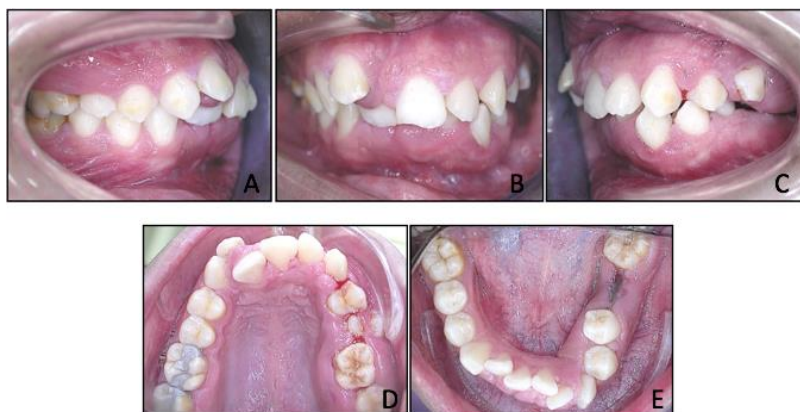


Figure 2 The pictures show generalized gingival enlargement especially on the upper and lower anterior teeth and left posterior segments. Buccal and lingual tissue were involved in both maxilla and mandible. Gingival enlargement caused partial eruption of 25. Pre-treatment intra-oral photos A) Lateral view (right), B) Frontal view, C) Lateral view (left), D) Occlusal view (upper), E) Occlusal view (lower)

Functional evaluation He had no tongue thrusting or mouth breathing. No sign and symptom of temporomandibular joint disorder was detected.

Model analysis From model analysis, both arches presented with asymmetrical ovoid arch form. Upper and lower arches were lacking space, 11.5 and 10 mm, respectively (Figure 3).

Radiographic evaluation

Panoramic radiograph The film revealed normal nasal floor, maxillary sinus and mandibular condyles. There was no pathological lesion. The left mandibular first molar and the right mandibular third molar were missing. The maxillary third molars and the left mandibular third molar were impacted. All teeth were in normal size and shape. Marginal bone level was normal. 17 had defective restoration (Figure 4).

Lateral cephalometric radiograph Patient had mild skeletal class II relationship with orthognathic maxilla and slightly retrognathic mandible and hyperdivergent pattern

(Figure 5). The cephalometric values of pre-treatment are presented in Table 3.

Diagnosis After thorough examination, he was diagnosed with dental Class II division 1 malocclusion with gingival hyperplasia on mild skeletal Class II due to orthognathic maxilla and slightly retrognathic mandible and hyperdivergent pattern with convex profile, incompetent lips and protruded upper lip position.

The patient had no systemic disease, nor had taken any medications associated with gingival hyperplasia. Pronounced gingival overgrowth was recognized by the patient at the age of 15 years and there was no causative agent that could be identified and his oral hygiene was poor; therefore, it was diagnosed as “chronic inflammatory gingival enlargement”

Treatment plan Interdisciplinary treatment plan among periodontist, prosthodontist and orthodontist were discussed and formed in Table 2.

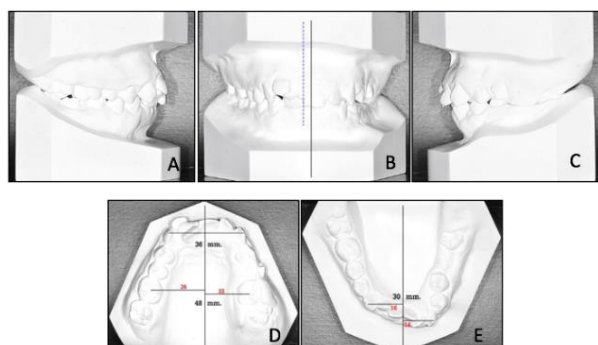


Figure 3 Pre-treatment dental models A) Lateral view (right), B) Frontal view, C) Lateral view (left), D) Occlusal view (upper), E) Occlusal view (lower)



Figure 4 Pre-treatment panoramic radiography

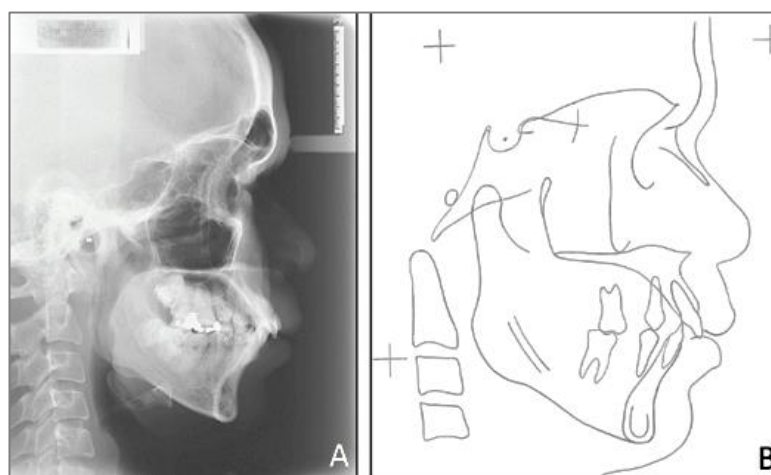


Figure 5 A) Pre-treatment lateral cephalometric radiography, B) Pre-treatment lateral cephalometric tracing

Table 2 Treatment sequences and treatment plan.

Treatment sequences	Treatments	Treatment planning
1. Urgent phase	None.	
2. Control Phase	1. Full mouth scaling and root planing and motivation of home care procedure 2. Surgical gingivectomy in the lower anterior and the left posterior area, the upper anterior area, and the upper left posterior area	
3. Re-evaluation phase	3. Follow-up and recall after gingivectomy for the recurrence of gingival enlargement and oral hygiene control	Periodic check-up every 3-4 months
4. Definite phase	4. Orthodontic treatment 5. Prosthodontic treatment	- Corrective orthodontic treatment with fixed appliance: extraction upper first premolars and all third molars - Recommended wearing removable partial denture for 36 after orthodontic treatment finished until no recurrence of gingival enlargement; then, the patient will make decision either implant or bridge on 36 area.
5. Maintenance phase	6. Follow-up 1 year	

Table 3 Comparison of cephalometric values between pre-treatment, post-treatment and retention.

Area	Measurements	Thai		Pre-treatment (22 years old)	Post-treatment (28 years old)	Retention (29 years old)
		Norm	±S.D.	Value	Value	Value
S K E L E T A L	Cranial base	NS-FH (degree)	7	2.58	4	4
		NS-Ba (degree)	128	5.09	129.5	130
	Maxilla to cranial base	SNA (degree)	84	3.58	87.5	87
		SN-PP (degree)	9	3.03	3.5	4
	Mandible to cranial base	SNB (degree)	81	3.59	82.5	82
		SN-MP (degree)	30	5.61	31.5	30.5
		NSGn (degree)	68	3.29	69	68.5
		Mandibular angle	118	6.13	116	117
	Bony chin contour	SNPg (degree)	82	3.69	82	81.5
		Pg-NB (mm)	1	1.54	-1	-0.5
		ANB (degree)	3	2.50	5	4.5
		Wits (mm)	-2	3.49	9	6
	Maxillo-Mandibular	MP-PP (degree)	21	5.25	28	26.5
		PFH/AFH (%)	65	2.88	68.2	68.3
		Facial index (%)	81	6.54	67.1	68.3
		Co-A (mm)	93	4.95	93	93.5
		Co-Gn (mm)	121	6.69	132	131
D E N T A L	Maxillary Dentition	U1 to NA (degree)	22	5.94	24.5	31
		U1 to NA (mm)	5	2.13	8.5	8.5
		U1 to SN (degree)	108	6.13	112	117.5
	Mandibular Dentition	L1 to NB (degree)	30	5.61	19	40
		L1 to NB (mm)	7	2.22	8	13
		L1 to MP (degree)	97	5.97	86.5	108
	Maxillo-Mandibular	Inter-incisal (degree)	125	8.03	132	104
		Overjet (mm)	3	0.62	7.5	3
		Overbite (mm)	2	1.06	7	2.5
						2
SOFT TISSUE		Nasolabial angle (degree)	91	7.98	90	98
		H-angle (degree)	14	3.83	17.5	16.5
		L lip to E-Plane (mm)	2	2.03	4	4
		Upper lip length (mm)	23	2.01	30.5	31.5
		Lower lip length (mm)	46	2.28	56.5	59.5

Treatment alternative The first option was to extract upper premolars and upper third molars. Extraction of the upper first premolars was to correct the crowding and canine relationship with maximum anchorage. On the lower arch, the space on the left first molar area would be closed by protraction of the second and third molars. The advantage was that the patient did not have to wear any prosthesis; however, the treatment time would be extended. The second option would be to extract upper premolars and all third molars. For this option, patient would have to wear the prosthesis on the edentulous area. After discussion with the patient, the second option was chosen.

Treatment sequences

Pre-orthodontic phase Before starting orthodontic treatment, patient received periodontal therapy which included scaling and root planing before surgical approach. Internal bevel gingivectomy procedure was done at the lower anterior along with the lower left posterior area, as well as the upper anterior and the upper left posterior with one-week gap between procedures. After that, follow-up appointments were made for observing recurrence of gingival enlargement and periodic check-up every 3-4 months was done (Figure 6). Subsequently, the patient was referred to oral surgeon for extraction of the upper first premolars and referred for orthodontic treatment a month after gingivectomy.

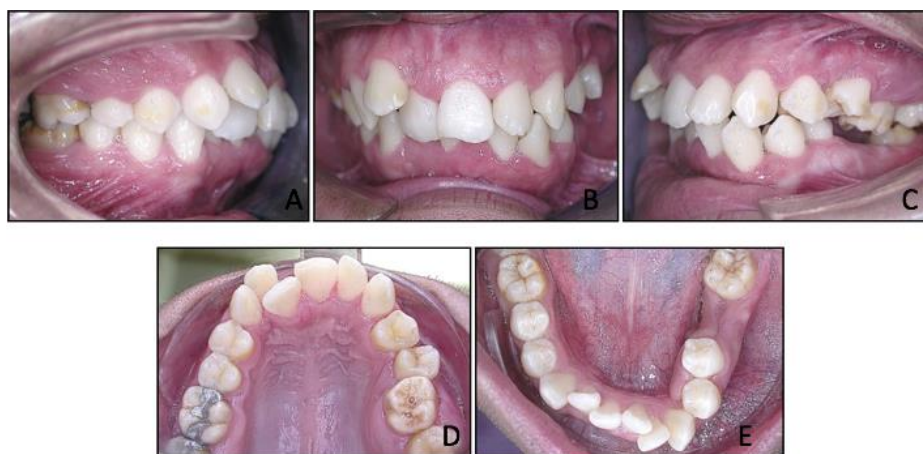


Figure 6 Intra-oral photos after gingivectomy before orthodontic treatment A) Lateral view (right), B) Frontal view, C) Lateral view (left), D) Occlusal view (upper), E) Occlusal view (lower)

Active orthodontic phase and retention Orthodontic treatment was started after a control phase with 0.022 bracket with MBT prescription. An alignment phase took seventeen months then the contraction phase begun. For the period of contraction phase, sliding mechanic on 0.016" x 0.022" SS wire with elastic chain combined with class II elastic were used to close space in the upper arch. The patient had a periodic periodontal check-up every 3-4 months throughout the treatment. We found an enlargement of gingivae at the upper right posterior area followed by the lower left posterior areas, which may resulted from irritation of orthodontic appliances, patient's poor oral hygiene or/and unfavorable tissue reaction during tooth movement.^{2,4-6} The second

gingivectomy was performed on the upper right posterior segment during movement phase one year after wearing orthodontic appliances due to the impediment of tooth movement.^{7,8} Three months later, the third gingivectomy on the lower left posterior segment was performed for the same reason. Thirty-three months later contraction phase was finished and adjustment phase was initiated. Wraparound retainer was used for retention phase. The total treatment time was five years and eight months. There was no recurrence of gingival hyperplasia for the duration of finishing phase also after a year of follow-up. The patient seeks a periodontist for periodontal maintenance after orthodontic treatment for two years.

Treatment outcomes

After five years and eight months, treatment results showed Class I canine and full-unit Class II molar on the right side, and Class II canine with unclassified molar relationship on the left side. Class I canine on the left side could not be obtained because of the tooth size discrepancies; therefore, interproximal reduction was performed. The upper dental midline slightly deviated 1 mm to the right, but the lower dental midline was at the center related to the facial midline. Proper overjet (2.5 mm) and overbite (2.5 mm/31.25%) were achieved. All extraction spaces in the upper arch were used to relieve crowding. Deep overbite and excessive overjet were corrected by proclination and protrusion of the lower anterior

teeth. Acceptable interdigitation and functional occlusion were gained. On the OPG, acceptable root parallelism was achieved (Figure 7-9).

Superimposition showed that all skeletal components were maintained. Dental component showed proclination of upper incisors and proclination and protrusion of lower incisors. (Figure 10). Gingival enlargement was reduced and under controlled. Edentulous area at the lower left first molar was maintained by retainer and waiting for prosthesis placement. After a year of follow-up, the result was quite stable and there was no recurrence of gingival enlargement (Figure 11-13).



Figure 7 Post-treatment extra-oral photos A) Lateral view (right), B) Frontal view (smile), C) Frontal view (rest)



Figure 8 Post-treatment intra-oral photos A) Lateral view (right), B) Frontal view, C) Lateral view (left), D) Occlusal view (upper), E) Occlusal view (lower)



Figure 9 Post-treatment panoramic radiograph

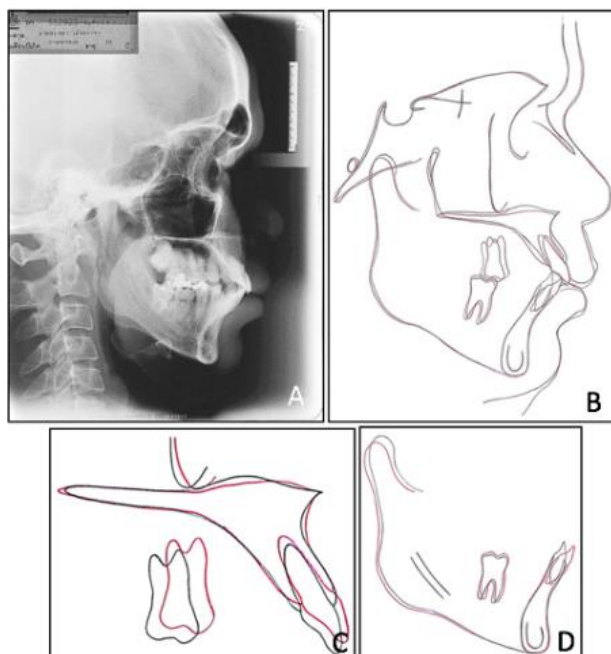


Figure 10 A) Post-treatment lateral cephalometric radiography Superimposition lateral cephalometric tracing (black=pre-treatment, red=post-treatment), B) Overall, C) Maxilla, D) Mandible



Figure 11 Intra-oral photos of one year after treatment A) Lateral view (right), B) Frontal view, C) Lateral view (left), D) Occlusal view (upper), E) Occlusal view (lower)



Figure 12 Panoramic radiography of one year after treatment

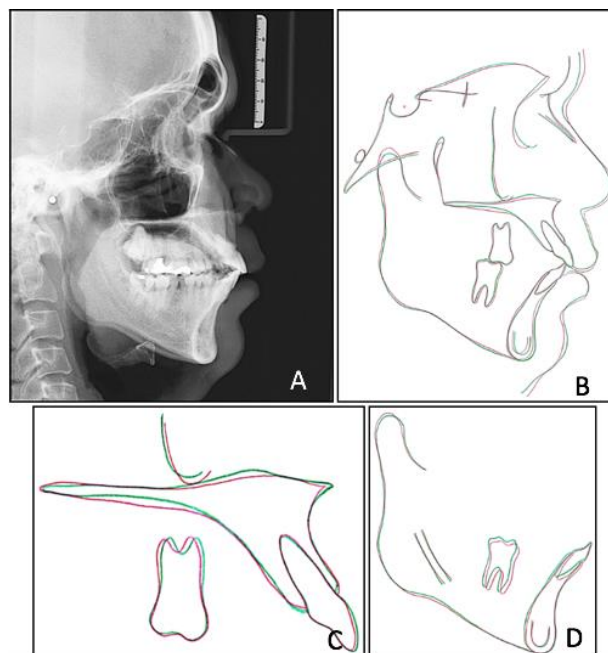


Figure 13 A) Lateral cephalometric radiography at retention phase Superimposition lateral cephalometric tracing (red=post-treatment green=retention), B) Overall, C) Maxilla, D) Mandible

Discussion

The patient's major complaint was crowded teeth; however, another problem found by the orthodontist was severe gingival enlargement. Gingival enlargement could be presented in orthodontic patients, which could affect patients' esthetics. Gingival enlargement can be caused by several factors as shown in Table 1.¹ The patient had no history of relevant medication or health, but his oral hygiene was poor. The final diagnosis for his gingival status was chronic inflammatory gingival enlargement.

The patient had dental Class II division 1 malocclusion on mild skeletal Class II which can be treated by orthodontic treatment alone. Extraction of the upper first premolars and all third molars were chosen to correct the problems. The gingival enlargement made the treatment more complicated. Interdisciplinary treatment between orthodontist and periodontist was necessary throughout the treatment. Before orthodontic treatment started, gingivectomy was performed for two reasons. The first reason was to help the orthodontist place properly bracket position. The second one

was to facilitate tooth movement. At present, no literature reports the effect of gingival enlargement on the duration of orthodontic tooth movement, but the authors think that it may decrease rate of tooth movement, since it may act as physical barrier during tooth movement. In general, the treatment time for regular extraction cases was approximately 2-3 years;⁹ however, the patient took almost 6 years. Thus, the gingival enlargement might have retarded the tooth movement causing longer orthodontic treatment time for the patient. On the other hand, the prolonged treatment time may also influence the occurrence of gingival enlargement due to the presence of appliance which made it difficult to clean and further aggravate the soft tissue reaction.³

Recurrence of the gingival enlargement was not found in retention period due to good oral hygiene control. In order to treat chronic inflammatory gingival enlargement properly, collaboration among periodontist, orthodontist and the patient are needed to achieve an improvement in patient's esthetics, mastication and occlusion.¹

Conclusion

Correcting Angle's class II division 1 with severe crowding and chronic inflammatory gingival enlargement would need a collaboration between interdisciplinary team to obtain a satisfactory result. Careful treatment planning before starting orthodontic treatment is necessary to accomplish good outcome. Orthodontist should be aware of this problem and recall for proper periodontal treatment or gingivectomy before, during and after treatment.

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การรักษาทางทันตกรรมจัดฟันในผู้ป่วยที่มีภาวะเหงือกโต: รายงานผู้ป่วย

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บทคัดย่อ

ภาวะเหงือกโตสามารถพบได้ในผู้ป่วยที่มาทำการรักษาทางทันตกรรมจัดฟัน การซักประวัติผู้ป่วยและการตรวจทางคลินิกอย่างละเอียดถี่ถ้วนนั้นเป็นสิ่งสำคัญในการวินิจฉัยและวางแผนการรักษา หลักสำคัญในการประสบความสำเร็จของการรักษาคือการวินิจฉัยที่ถูกต้องและการทำงานร่วมกันของทีมสหสาขาวิชาชีพในการรักษาผู้ป่วย ในรายงานผู้ป่วยนี้จะกล่าวถึงผู้ป่วยชายไทยที่มีกาสบฟันผิดปกติแบบที่สองร่วมกับภาวะเหงือกโต หลังจากการรักษาเป็นเวลา 5 ปี 8 เดือน การสบฟันที่ผิดปกติของผู้ป่วยได้รับการแก้ไข ภาวะเหงือกโตได้รับการรักษาในช่วงก่อนและระหว่างการรักษาทางทันตกรรมจัดฟันด้วยการตัดเหงือก การติดตามผลหลังจากการรักษา 1 ปีพบการสบฟันที่มีเสถียรภาพและไม่พบการคืนกลับของภาวะเหงือกโต

คำไชรหัส: ภาวะเหงือกโต/ การรักษาทางทันตกรรมจัดฟัน/ การสบฟันผิดปกติ/ การรักษาโดยสหสาขาวิชาชีพ

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