

# การรักษาภาวะคอนดัยล์เจริญมากกว่าปกติเพียงด้านเดียว : รายงานผู้ป่วย

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## บทคัดย่อ

บทความนี้เป็นรายงานผู้ป่วยหญิงไทยอายุ 21 ปี 1 เดือน มีภาวะคอนดัยล์ทางด้านขวาเจริญมากกว่าปกติเพียงด้านเดียว ใบหน้าไม่สมมาตร คางเบี่ยงเบนไปทางด้านซ้าย 18 มิลลิเมตร ใบหน้าด้านข้างมีลักษณะเว้า มีโครงสร้างขากรรไกรประเภทที่สามในแนวหน้าหลัง และภาวะสบเปิดในแนวดิ่ง ระบายสบฟันบนและล่างลาดเอียงลงด้านล่างขวา การสบฟันกรามแท้ซี่ที่หนึ่งและฟันเขี้ยวมีความสัมพันธ์ประเภทที่สามทั้งด้านซ้ายและด้านขวา มีฟันหน้าล่างสบคร่อมฟันหน้าบน และฟันหลังล่างสบคร่อมฟันหลังบนตั้งแต่ฟันตัดซี่กลางบนซ้ายถึงฟันกรามบนซ้ายซี่ที่สอง ฟันกรามน้อยบนขวาซึ่งแรกมีลักษณะสบไขว้ทั้งซี่ ร่วมกับแนวกึ่งกลางของฟันตัดกลางบนเบี่ยงเบนไปทางซ้ายจากแนวกึ่งกลางใบหน้า 2 มิลลิเมตร และแนวกึ่งกลางของฟันตัดกลางล่างเบี่ยงเบนไปทางด้านซ้ายจากแนวกึ่งกลางใบหน้า 10.5 มิลลิเมตร ผู้ป่วยได้รับการรักษาทางทันตกรรมจัดฟันร่วมกับการผ่าตัดกระดูกขากรรไกรบนและล่าง และการตัดข้อต่อขากรรไกร ผลการรักษาที่ได้รับพบว่าผู้ป่วยมีการสบฟันที่เป็นปกติและรูปหน้าที่สมมาตร

**คำสำคัญ :** ภาวะคอนดัยล์เจริญมากกว่าปกติ • ใบหน้าไม่สมมาตร

## Treatment of unilateral active condylar hyperplasia : A case report

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## Abstract

*This article presents the case of a Thai woman aged 21 years and 1 month old at her initial consultation who had facial asymmetry secondary to the active unilateral right condylar hyperplasia, with chin deviation to the left 18 mm., concave profile, skeletal Class III and deep-bite pattern in vertical plane. The occlusal plane was slightly canted downward to the right. The right and the left molars and canines were in Class III relationship. There were anterior and posterior crossbite of #21 - #27 and #15 showed scissor-bite. The upper dental midline deviated from mid-sagittal plane to the left 2 mm., and the lower dental midline also deviated from mid-sagittal plane to the left 10.5 mm. The patient was treated with a combination of orthodontic treatment and two-jaw surgery with high right side condylectomy. The results of the treatment produced good esthetics and acceptable occlusal relationships and function.*

**Key words:** condylar hyperactivity • condylar hyperplasia • facial asymmetry

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## Introduction

Condylar hyperplasia of the mandible is a situation of overdevelopment involving the size and morphology of the condyle and the condylar neck<sup>(1)</sup>. The major features of it include an enlargement of the affected condyle, elongation of condylar neck, outward bowing and downward growth of the body, and ramus of the mandible on the affected side<sup>(2)</sup>. According to Obwegeser in 2001<sup>(3)</sup>, there are three clearly definable forms of condylar hyperactivity: type I, type II, and type III. Type I is hemimandibular hyperplasia; mandible on the affected side becomes larger in volume in all its sections (the condyle and its neck, ascending ramus and its body) and extending to the symphysis only, without chin deviation. Type II is hemimandibular elongation, there is elongation of one half of the mandible with displacement of the chin prominence to contralateral side and with typical crossbite but without the increase in the volume of the affected side. This type of malformation also can lead to significant facial asymmetry, mandibular deviation, malocclusion with cant of the occlusal plane, and articular dysfunction<sup>(2,4,5)</sup>. Lastly is type III which this type is the combination of elongation and hyperplasia. The affected side is increased in volume together with chin deviation to the other side and rotation of the occlusion.

The condylar hyperplasia usually occurs during puberty or early adolescence, and continues the deformity until the growth is complete, which is normally by the end of the second decade. If this deformity has occurred before the completion of growth, the occlusal plane is usually canted because of dental compensation. But if it presents after the growth is completed, posterior openbite is usually

apparent<sup>(1,2,6)</sup>. Traditionally, the surgical methods of bilateral mandibular ramus osteotomy have been used to treat the facial deformity of condylar hyperplasia in nongrowing patients<sup>(1,2,5)</sup>. The combined methods of mandibular ramus osteotomy and condylar surgery may be indicated in the cases which still have active condylar hyperplasia<sup>(1)</sup>.

The following case report presents the pre-treatment, pre-surgical, and post-treatment records of a patient with unilateral right active condylar hyperplasia type II (hemimandibular elongation) treated with a combination of orthodontic treatment and double jaws orthognathic surgery (Le Fort I osteotomy and bilateral sagittal split ramus osteotomy) and unilateral condylectomy.

## Case history

A twenty one years old female had a problem of the asymmetrical face with severe chin deviation to the left side. She had a history of right TMJ trauma when she was two years old. She noticed her chin deviation at the age of 16. She was healthy without any significant medical problems. The patient had good attitude in receiving dental health care and she was well motivated to have orthodontic treatment.

## Clinical evaluation

### Extra-oral assessment

The patient had an asymmetrical mesofacial type, with slightly increased lower anterior facial height. Level of the left eye and ear were lower than those on the right. Lips were incompetent at rest with 3 mm. interlabial gap. The lip line canted downward to

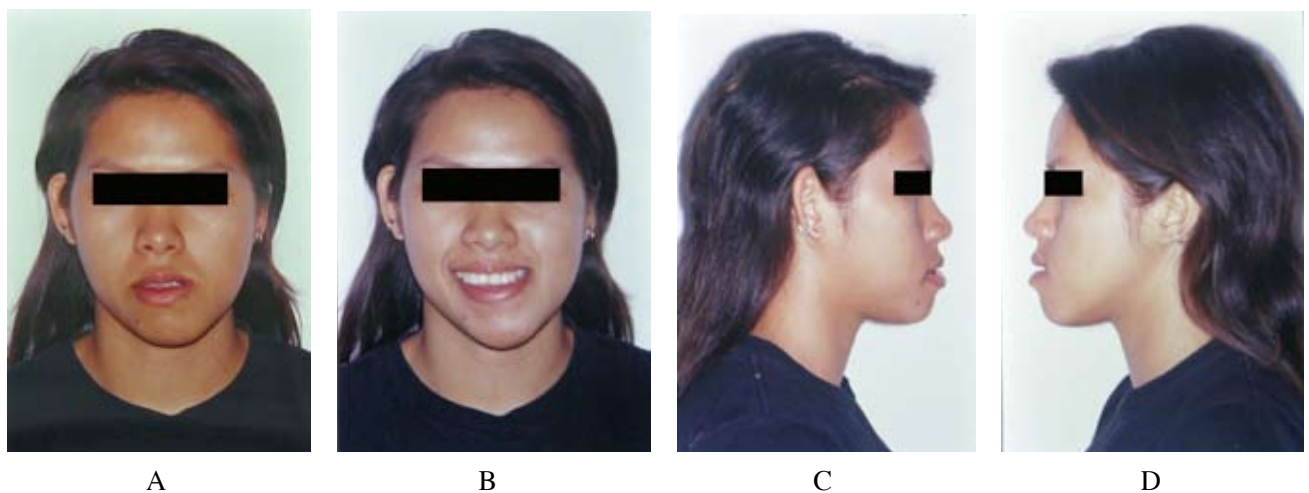


Figure 1 A, B, C, D Pre-treatment extraoral photographs

the right side. Upon smiling, 100% of upper incisor crowns were displayed and the teeth were exposed to the mesial half of the second premolars. The level of the left gonion was lower than the right side. The chin point deviated to the left side 18 mm. She had a concave profile with normal nasolabial angle. She had slightly protrusive upper lip with upper lip strain and severely protrusive lower lip. She had no signs or symptoms of jaw muscle but her mandible deviated to the right while opening. Her speech and swallowing patterns were normal. (Figure 1 A - D)

**Intra-oral assessment**

The patient had fair oral hygiene with generalized moderate plaque and calculus accumulation but with adequate attached gingival. Frenum, tongue, palate and tonsils appeared normal. Upper dental midline deviated from the midsagittal plane to the left 2 mm., as was the lower dental midline also deviated

from midsagittal plane to the left 10.5 mm. When compared to mid-chin point, the lower dental midline deviated to the right 7.5 mm.

The inter-arch relationship showed Class III canine and molar relationships on both sides. She presented a reverse overjet with -2 mm. and 3 mm. incomplete overbite. Both upper and lower occlusal planes slightly canted downward 5° to the right. The right upper first premolar (#14), the right upper second premolar (#15), the right upper first molar (#16), the left upper first premolar (#24), the left upper first molar (#26), the left lower first molar (#36) had amalgam fillings. The left upper second premolar (#25) had previous root canal treatment with severe loss of tooth structure and the right lower first molar (#46) had incomplete root canal treatment with an amalgam filling. CO-CR discrepancy was not present. (Figure 1 E - I)

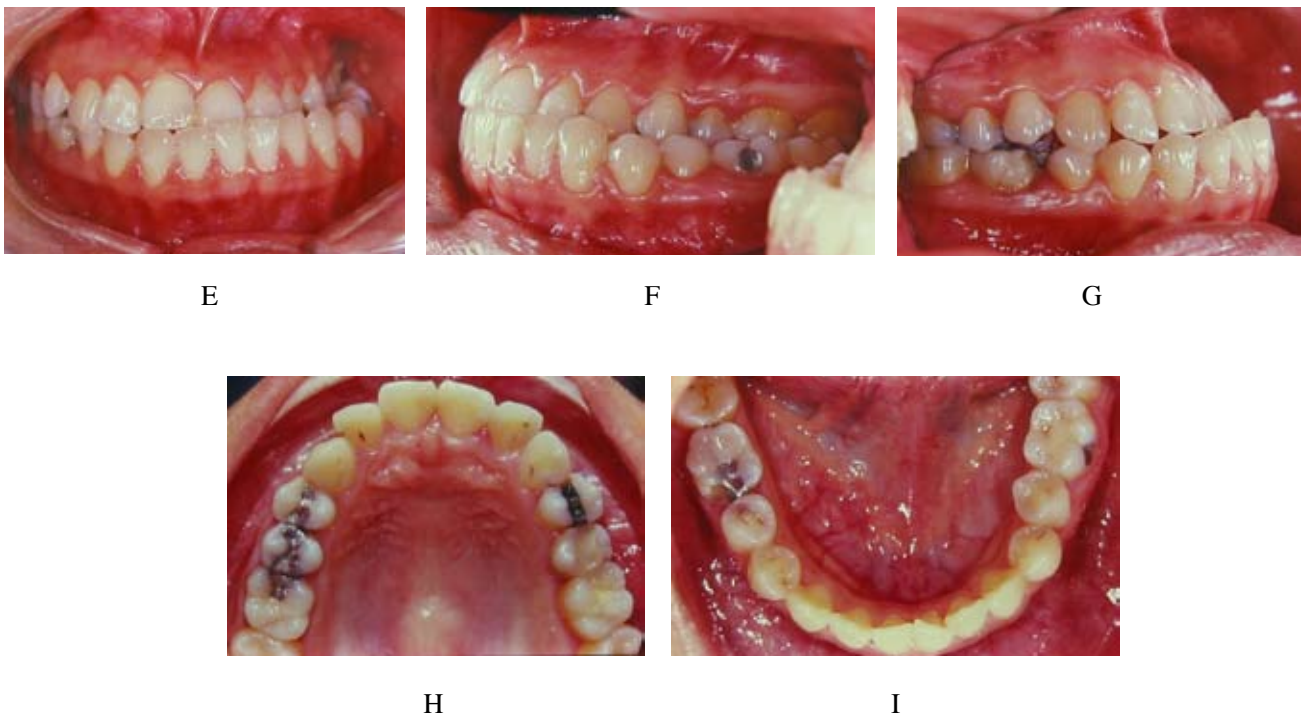


Figure 1 E, F, G, H, I Pre-treatment intraoral photographs

**Model analysis**

She had an asymmetrical ovoid maxillary dental arch form due to buccal tipping of the left posterior teeth, similar to as well as an asymmetrical ovoid mandibular dental arch form due to lingual tipping of the left posterior teeth. Space available and space required in the maxillary arch were 81.5 and 83.5,

respectively, which resulted in 2 mm. of crowding. In the mandibular arch, there was 1 mm. of crowding from 62.5 mm. space available and 63.5 mm. space required. Both maxillary and mandible arches showed mild crowding, 2 mm. and 1 mm. respectively. The patient had crossbite from the left upper central incisor (#21) to the left upper second molar (#27), while the

upper right second premolar (#15) showed scissors bite. The Bolton's tooth size analysis showed no tooth size discrepancy. Anterior and posterior arch width were coincided between upper and lower arches.

## Radiographic evaluation

### Orthopantomogram

All teeth were present. The left lower third molar (#38) was mesioangular impacted against the cervical margin of the left lower second molar (#37). The right upper third molar (#18) and the left upper third molar (#28) were missing. No supernumerary tooth was present. There was good alveolar bone level and no pathology. Nasal floor and sinuses appeared normal. The mandibular asymmetry was clearly noticeable with the higher ramus-condyle section and the longer body section on the right than the left. The right condyle with its neck was clearly longer than the left. Neither the condyle nor its neck seemed enlarged in volume. (Figure 2 A)

### Periapical radiographs

The crown-to-root ratio of upper and lower anterior teeth was normal (1:1.5). There was no sign of root resorption. #25 had improper root canal filling with indistinct lamina dura. #46 had temporary filling and widening of PDL space.

### Lateral cephalogram

The pre-treatment lateral cephalogram (Figure 2B) indicated a mild Class III skeletal pattern ( $ANB = -0.5^\circ$ ) due to orthognathic maxilla ( $SNB 84.5^\circ$ ) and prognathic mandible ( $85^\circ$ ). Vertically, she had an opening rotation of the mandible resulting in a steep mandibular plane ( $FMA = 32^\circ$ ). The maxillary incisors were protruded ( $U1-NA = 8 \text{ mm.}$ ) and proclined ( $U1-SN = 115^\circ$ ) relative to cranial base, whereas the mandibular incisors were retroclined ( $IMPA = 85^\circ$ ). She had a straight facial profile (profile angle =  $176^\circ$ ) with decreased nasolabial angle ( $91^\circ$ ). There was extreme lower lip protrusion relative to esthetic line (4 mm.), with protrusive chin relative to the SN vertical (5.5 mm.). These findings are summarized in Table 1.

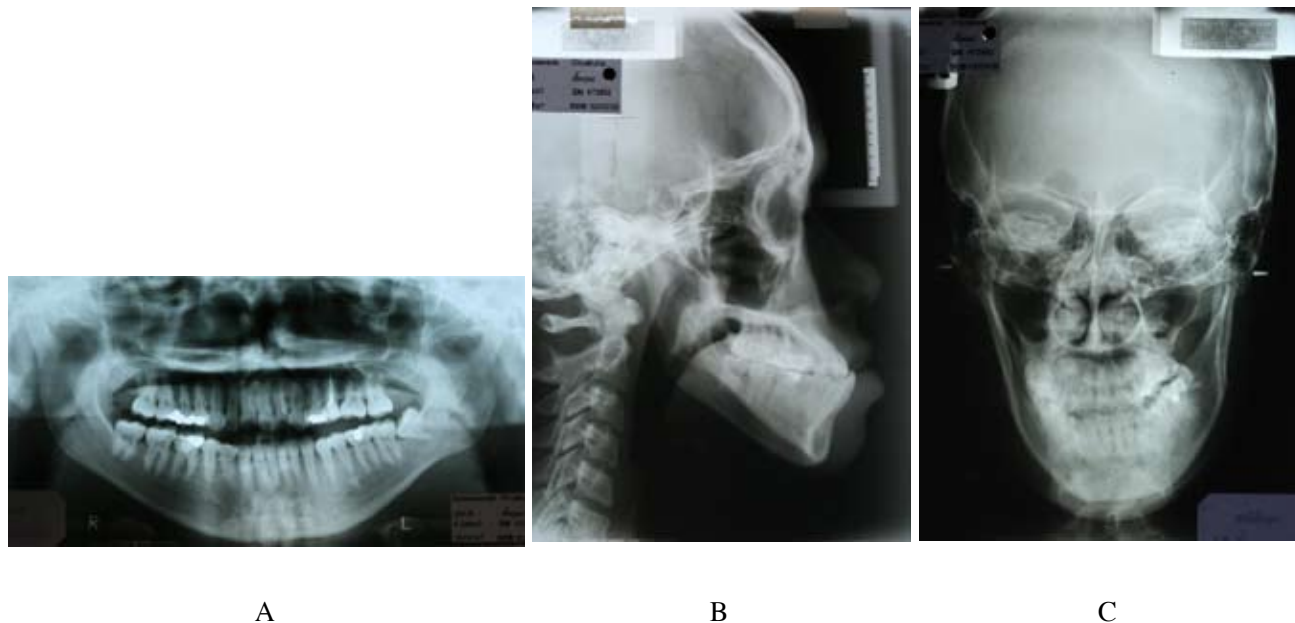


Figure 2 (A) Pre-treatment orthopantomogram, (B) Pre-treatment lateral cephalogram, (C) Pre-treatment postero-anterior cephalogram

### Frontal asymmetry analysis

The frontal analysis presented a significantly asymmetrical face due to the deviation of the mandible to the left and significantly tilted down on the right. The deviation was confirmed by 18 mm. difference of B1 offset and 6 mm. of Me-Ag distance which

indicated that chin was severely deviated to the left side. (Figure 2C)

### Bone Scintigraphy

Anterior and posterior whole body planar images were obtained approximately 3 hours after

intravenous injection of  $^{99m}\text{Tc}$  MDP. The study in November 2005 showed the increased uptake along mandible that extended to the right side. But there was no active growth plate in the whole skeleton. The impression was concluded as bone lesions mentioned above were considered active osteoblastic activity along the mandible with no other bone lesion.

### Treatment objectives

In order to correct the facial asymmetry and malocclusion, the treatment objectives were to correct the mandibular prognathism, correct asymmetric mandibular position and asymmetry of ramal height, correct upper and lower incisors position and inclination, correct anterior and posterior crossbite, obtain normal overjet and overbite, and good intercuspation, coincide upper and lower dental midline, and obtain acceptable facial profile and lips position.

### Treatment options and plan

During the consultation, the patient was informed about the treatment options as follows,

Option 1 : A combination of orthodontic treatment and two-jaw orthognathic surgery and by extraction #15, 25, 38. In this option #46 will be preserved by root canal treatment and re-evaluation, if #46 has a good prognosis and #48 will be referred for extraction later on. For the orthognathic surgery, Le Fort I osteotomy will be done in the maxilla and bilateral sagittal split ramus osteotomy (BSSRO) with high condylectomy at the right TMJ will be done in the mandible.

Option 2 : Orthodontic treatment combined with two-jaw orthognathic surgery together with extraction #15, 25, 38, 46. This option will be chosen if #46 has a poor prognosis and it should be removed. The extraction space of #46 would be closed during presurgical orthodontic stage by moving #47 and #48 mesially. The orthog-nathic surgery would be the same as option 1.

### Treatment

After oral prophylaxis, the patient was referred to an oral surgeon for the extraction of her #15, 25 and surgical removal of #38 and #48. The fixed orthodontic appliances (0.022" slot "MBT prescription" edgewise brackets) were placed in April 2005. Aligning and

leveling started with 0.014" NiTi to 0.019" x 0.025" stainless steel continuous archwires. When approaching 0.019" x 0.025" stainless steel wire, the lingual buttons were placed at #17, 14, 24, and #27. Teeth numbers #14 and #24 were started to retract via powerchain on both buccal and ligual sides following with #13 and #23. Class II elastic (3/16", 3½ ounces) were placed on both sides to help the canine retraction. After the retraction of upper canines and upper first premolars were completed, the four maxillary incisors were retracted via powerchain. The upper and lower arches were coordinated.

After 1 year 8 months of treatment, the patient had a motorcycle accident causing subdural hemorrhage, fractured base of skull and unilateral facial palsy. So the surgery was postponed for at least 6 months until the neurological status was stable.

During the period of treatment, the bone scinti-graphy was performed again in December 2007. It revealed the increased radiotracer uptake at the right mandibular condyle region. So the oral surgeon decided to post-pone the surgery for at least one year, for observation of the rate of condylar growth. In September 2008 (after 3 years 5 months with orthodontic appliances), the bone scintigraphy was done again and revealed increasing of radiotracer uptake at the right mandibular condyle region, but no other significant change from the previous study. Due to the result of the latest bone scintigraphy, the surgeon decided to perform surgery. Double jaws surgery was done by Le Fort I osteotomy for the maxilla and bilateral sagittal split ramus osteotomy (BSSRO) with high condylectomy at the right TMJ for the mandible.

The patient was instructed to were used anterior cross elastic for 2 months during orthodontic finishing. The appliances were removed at age 24 years 11 months (total active treatment time was 3 years 10 months). Upper and lower wrap-around retainers were used in the retention phase.

### Treatment results

The combined orthodontic-orthognathic surgical treatment approach allowed this patient to have an acceptable occlusion. All spaces were closed, overjet and overbite were within normal limits. Anterior crossbite was corrected but there was a remaining of 2 mm. posterior crossbite presented at #26 and #27. The maxillary canting was corrected and the mandibular

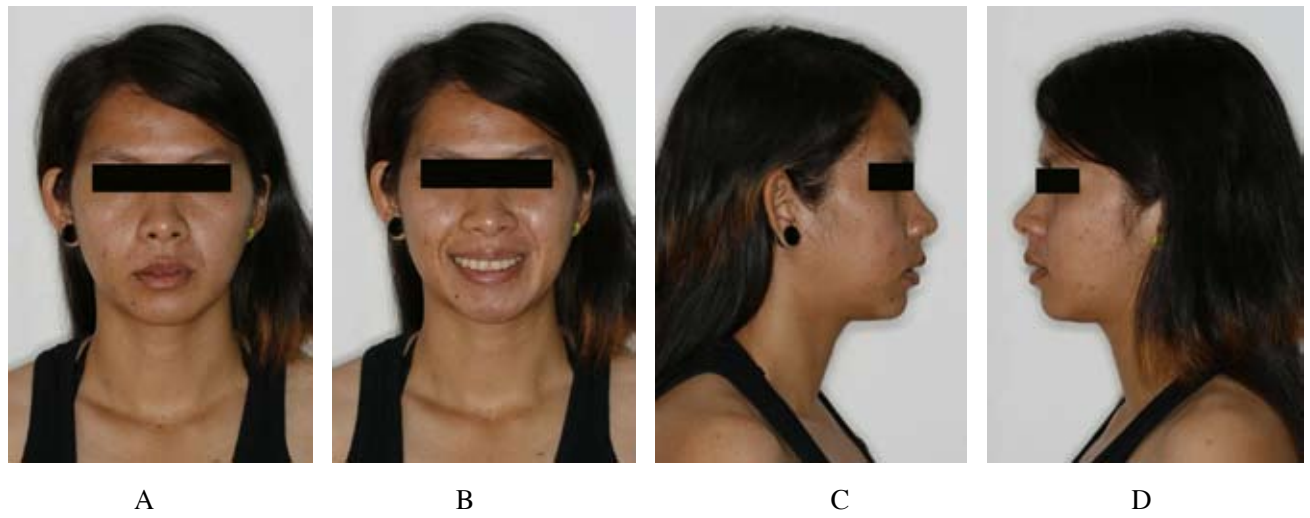


Figure 3 A, B, C, D Post-treatment extraoral photographs

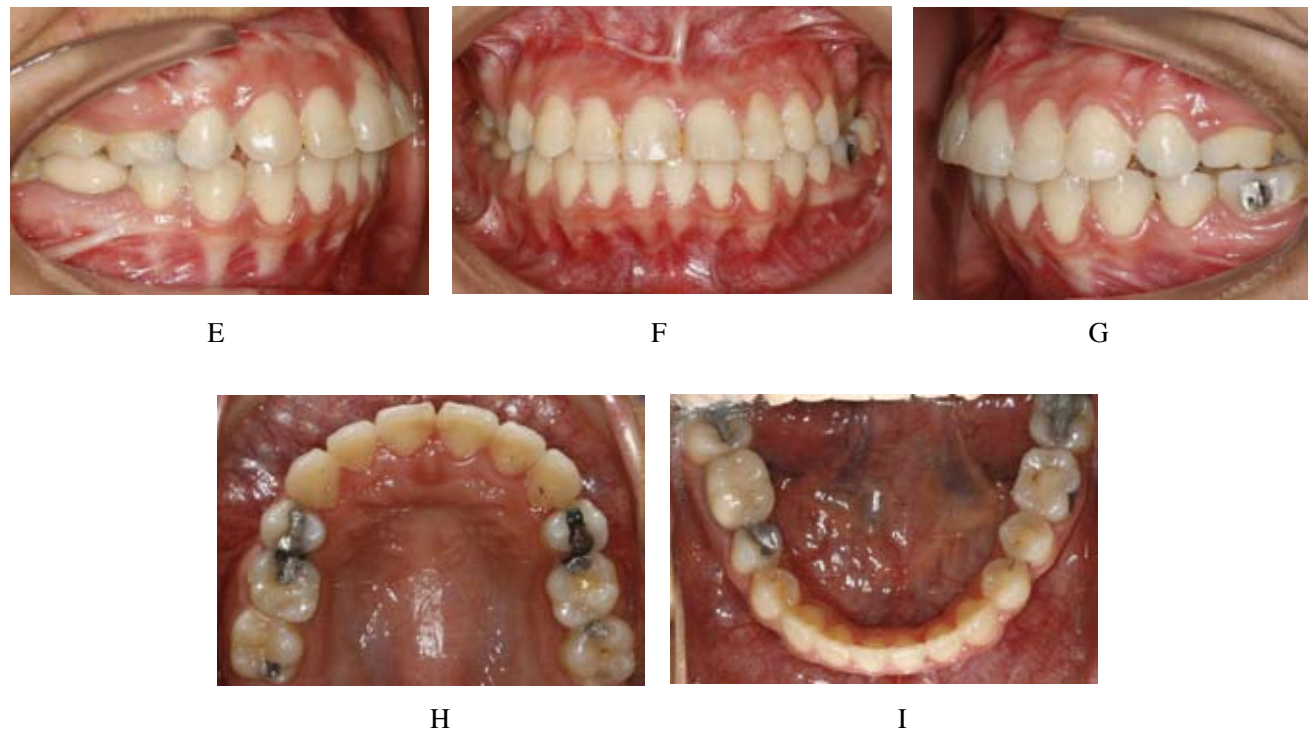


Figure 3 E, F, G, H, I Post-treatment intraoral photographs

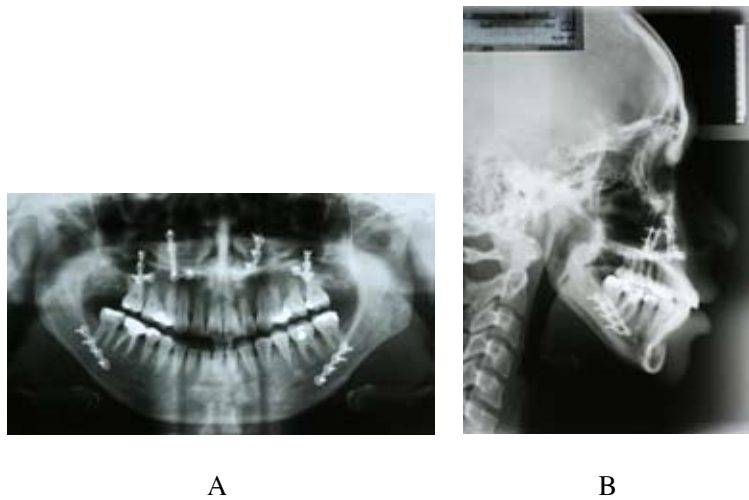


Figure 4 (A) Post-treatment orthopantomogram , (B) Post-treatment lateral cephalogram

asymmetric prognathism was eliminated. The facial profile and lip position were improved to acceptable esthetic level. It was noted that left facial palsy also improved as well. The comparisons of cephalometric measurement values between pre- and post-treatment interpretation are shown in Table 1. Post-treatment orthopantomogram film showed the equal length of both right and left condylar heads as well as both sides of the body of mandible. The patient was very satisfied with the overall treatment results in both esthetics and function. (Figure 3 A – I and Figure 4 A – B)

### Discussion

Nowadays, the etiology of condylar hyperplasia remains controversy. The main causes that have been reported are hormonal disturbances, hypervascularity, hereditary, heredity, previous trauma, abnormal loading, and infection<sup>(2,3,7,8)</sup>. In this case, the history was that the patient had been hit by basketball at her right TMJ when she was two year-old and the presented of chin deviation was noticed when she was 16 year-old. However, although the mandibular trauma may be the cause of condylar hyperplasia, this cannot be substantiated as causative factor by case history alone and may in fact be coincidental<sup>(2)</sup>. The tilting of occlusal plane also had been observed in this case because the deformity had occurred before her completion of growth. Hyperplastic activity of the condyle can be diagnosed using bone scan<sup>(2,9)</sup>. It can be used to monitor the activity of the growing condyle. The short-lived gamma-emitting isotope is concentrated in areas of active bone deposition. Based on histopathological criteria, condylar hyperplasia

has been classified in two types<sup>(10)</sup>: active condylar hyperplasia and inactive hyperplasia (stable situation in which the abnormal growth is completed). The surgical treatment also varies according to the activity of the disease which can be determined by the scintigraphic finding.

Surgical methods used for management of facial asymmetry secondary to condylar hyperplasia have consisted primarily with various bilateral ramus osteotomies for correcting the asymmetry, and with the condylar surgery when active growth of the condyle has been observed<sup>(4,5,11)</sup>.

Condylar shaving or high condylectomy has been advocated for correction of growth abnormalities in the mandibular condyle, as it is expected that the removal of the condyle will stop the growth of the mandible in the disease region and can provide a long-term stable results<sup>(7)</sup>. The decision of whether condylectomy is required usually depended on the evidence of active change in the hyperplastic condyle or radiographic or clinical suggestion of pathologic conditions such as chondroma, osteoma, or other neoplasms that may warrant tissue diagnosis<sup>(2,5)</sup>. However, when the hyperplastic activity and neoplasia are not suspected, the condylectomy also can shorten the affected ramus in order to restore the facial symmetry<sup>(2)</sup>. By contrast, if the condyle is mature and stable with normal function and cessation of growth, the condylectomy may not be indicated. The ramus osteotomy to shorten the affected side of ramus is the best treatment of choice<sup>(12)</sup>, the slightly enlarged condyle that has normal function being left intact, and it may later

remodel<sup>(15)</sup>. Recently, Wolford and co-worker<sup>(13)</sup> in 2002 did a retrospective study to evaluate the efficacy of combining high condylectomy and orthognathic surgery for treating condylar hyperplasia. They concluded that the patients who underwent the combined surgery presented better results compared with to those who had orthognathic surgery alone, indicating that the combination of both pro-cedures is beneficial for patients with active condylar hyperplasia<sup>(14)</sup>.

For this patient, the surgeon decided to observe rate of condylar growth after first bone scintigraphy showed the hyperactivity of the condyle. The surgery was performed one year later since the second bone scintigraphy revealed continuing growth. Therefore, combining of double-jaws surgery and condylectomy were carried out.

In this case, it was found that the hemimandibular elongation was present with maxillary occlusal plane cant and skeletal Class III condition together with the active hyperplastic activity of the condyle. So Le Fort I maxillary impaction on the ipsilateral side combined with bilateral sagittal split osteotomy with high condylectomy as described by other authors<sup>(7,8,15)</sup> were the most suitable treatment techniques to treat the dento-skeletal discrepancies.

The presurgical orthodontic is the important part of treatment. In this stage, the first important key is to establish interdental relationship with proper arch coordinations<sup>(2,12)</sup>. During this stage, no attempt must be made to orthodontically shift the teeth to coincide with facial midline, because this will decrease the rage of jaw movement during surgery and thus the degree of change. In fact the decompensation orthodontic tooth movement may be worsen the midline discrepancies presurgically, however, it allow greater jaw movement<sup>(12)</sup>. After the surgery, postsurgical orthodontics is offered to the patients if an ideal occlusion is desired, and when skeletal and dental studies do not mandate orthodontic treatment presurgically. In this case, even though there were attempts to coordinate arch form presurgically as well as treatment in a postsurgical orthodontics phase, there was still has a remaining of posterior crossbite presented at #26 and #27. However, both esthetics and dental function were still acceptable.

It is noteworthy that maximum intercuspation was achieved by spontaneous movement of upper and lower teeth and unilateral movement of the body of the mandible backward to the neutral position. The facial

structures also had a spontaneous remodeling process after elimination of the actively growing hyperplasia condyle resulting in correction of facial asymmetry<sup>(16)</sup>.

## Conclusion

This case report is an example of treatment of active hemimandibular elongation with canting of the occlusal plane by the combination of orthodontics and orthognathic surgery including Le Fort I osteotomy and bilateral sagittal split ramus osteotomy with high condylectomy that produces good esthetic and function functional results.

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