Unilateral Mandibular Hyperplasia Associated with a Lateral Tongue Thrust

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This is a report of a case of unilateral hyperplasia of the mandibular condyle. The patient was not treated, yet it is the purpose of this report to present an example of the doubled effect of the abnormal growth of the mandible and its associated habit of lateral tongue bite to the occlusion of the teeth.

Mandibular morphology results from an integration of growth activities in a number of areas. The condylar growth is responsible for major contributions and maintains its activity longer than most other growth areas in the head. This provides the forward and downward vector for mandibular growth and contributes as well to increased width of the jaw. Asymmetry of the mandible may result from any unilateral developmental, traumatic, or neoplastic disturbances of this area. However, asymmetry is a relative condition because facial features are, strictly speaking, seldom symmetrical. Therefore, only severe degrees of asymmetry are esthetically and/or functionally significant.

Unilateral condylar hyperplasia is known to be a major disturbance to the morphology of the mandible and was first reported by Adams[1] in 1836. Since then a number of cases have been reported.[2-8] Mandibular condylar hyperplasia is taken to mean a progressing, unilateral or bilateral, hyperplasia of the mandibular condyle, of unknown etiology, causing facial deformity and typical malocclusion.[2] This may produce a variety of conditions such as laterognathia, deviation prognathism, unilateral macrognathia and compensatory maxillary growth. Bruce and Hayward[3] defined such variety as follows: laterognathia may be considered to be a true lateral deviation of the mandible with degrees of cross-bite malocclusion; deviation prognathism is a true prognathic jaw with an associated lateral mandibular occlusal position; unilateral macrognathia is a generalized increase in size of half of the mandible. This condition is to be differentiated from hemifacial hypertrophy in which associated soft tissue and teeth are also enlarged. Compensatory maxillary growth occurs with unilateral condylar hyperplasia associated with mandibular macrognathia as a means to a functional dental occlusion. Rushton[4] described the postnatal changes in condylar structure and found excessive thickness of the cartilage layer with extension of islets of cartilage into the bone. Gottlieb[5] reported the deformity with depictions of the various gross morphology of the hyperplastic condyle. The various classifications of the unilateral condylar hyperplasia and types of resulting mandibular asymmetry were also reported.[2,3,4,8,9] After an extensive review of different classifications, Bruce and Hayward proposed that such deformities be classified as 1) deviation prognathism, 2) unilaterally enlarged condyle or condylar neck or both, and 3) unilateral mandibular hyperplasia with or without compensatory maxillary and mandibular dentoalveolar adaptation. The etiology seems to be unknown although numerous factors have been suggested.

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History

A twin girl of 15 years was referred to the Department of Orthodontics, University of Illinois for the possible treatment of her malocclusion. On general physical examination the patient (S.S.) and her sister (S.K.) were found to be well-developed and neurologically within normal limits. They were 5 feet 3 inches in height, the patient weighed 110 pounds and her sister 115 pounds. Their deliveries were normal and occurred at full term. However, both of them were incubated for three weeks because the patient weighed only 4 pounds 5 ounces and her sister 4 pounds 10 ounces at delivery. They were bottle fed and had no weaning difficulties. Disease history revealed that both of them took chicken pox at the age of 6 years and measles at 7. The patient had hepatitis, but the age was not recorded. No operation was done on the patient, but tonsils and adenoid tissue were removed from the sister at the age of 5 years. There were no traumatic accidents. The father and mother were slightly below the average in physical stature and had nine children, four boys and five girls. Neither parent nor the other children was known to have a condition similar to that of the patient. The mother questioned the hearing with the patient's right ear at the age of ten years, but it was found to be normal.

Facial and Oral Examination

Patient S.S.

Frontal view of the face revealed a prominent distortion on the right lower face (Fig. 1, above). The face, therefore, became a modified triangular type. This was due to the excessive vertical height of the right hemimandible which appeared flatter than that of the left. The lip line descended toward the right, excessively at the right corner of the mouth.

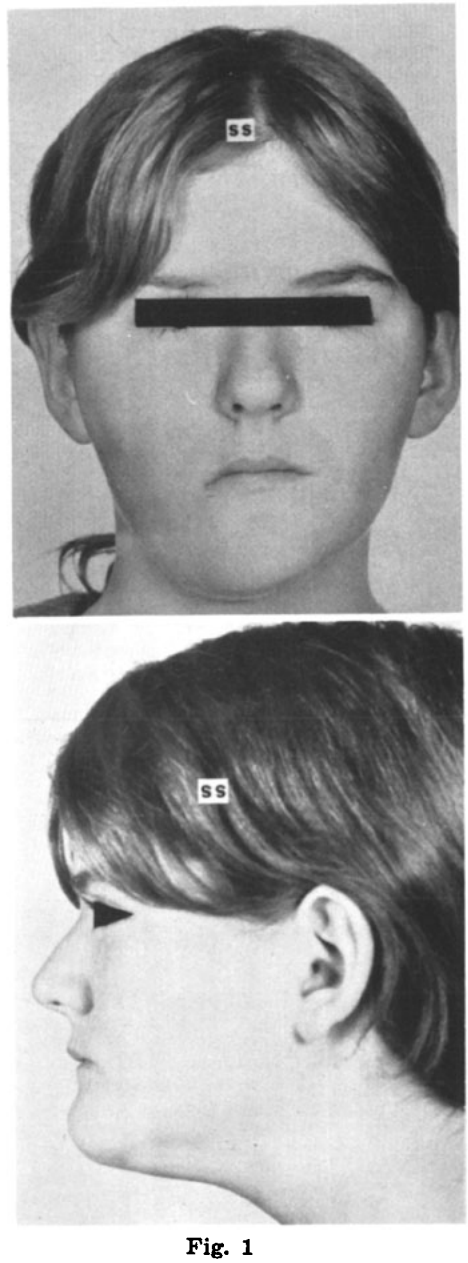

Fig. 1

Lateral view of the face revealed that the profile was a prognathic concave type (Fig. 1, below). The mandible indicated a generalized increase in size, but the lip posture denied a possible anteroposterior discrepancy of the upper and lower anterior teeth.

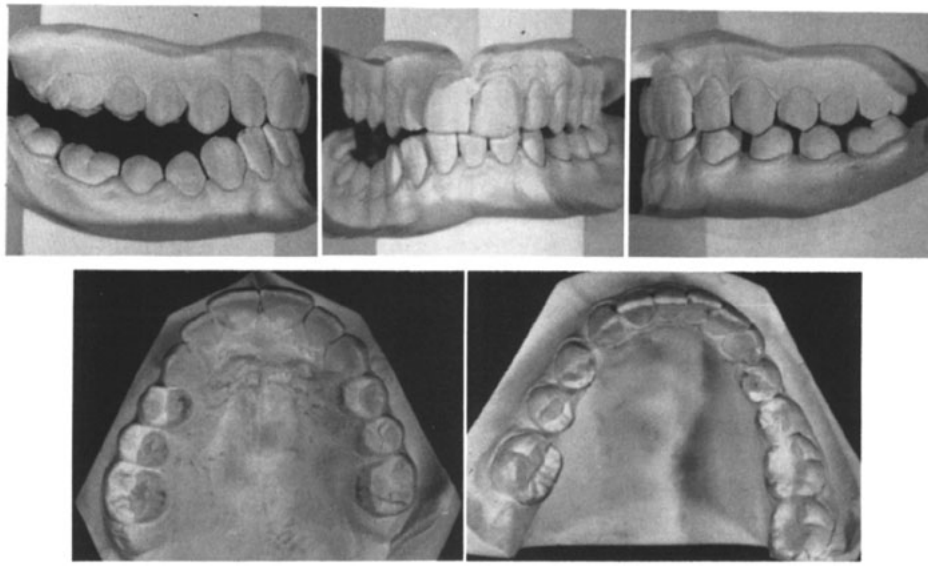

Fig. 2

Oral examination revealed a large open bite at the right buccal segment (Fig. 2). This open bite appeared posterior to the right cuspids and was widest at the second premolar area. The upper occlusal line was flat, the lower severely concave. The patient stated that she started a habit of lateral tongue thrust (bite) at about the age of eight years and retained it until the present time (Fig. 3). The lower denture midline was deviated to the right and the incisors inclined lingually. The lower right incisors, cuspid and the first premolar tipped distally, the second premolar, the first and second molars mesially. The upper dental arch was tapered and relatively symmetrical. The first molars were extracted due to caries. The lower dental arch was also tapered, but appeared asymmetrical. The left first molar was extracted causing some diastemata as well as rotations to the other buccal teeth of that side. In analyzing mandibular movements it was observed that the patient could move the mandible laterally as well as anteroposteriorly without noticeable difficulties.

Fig. 3

Sister S.K.

Frontal view of the face showed an oval type, well-balanced and symmetrical (Fig. 4, left). Lateral view of the face showed that the profile was a mesognathic straight type with no disharmonious features (Fig. 4, right). Oral examination revealed that the denture relationship was a Class I malocclusion. There were minor arch length problems, midline deviation, rotations of teeth, and lack of proper cusp relationships of the buccal segments, but the overbite and overjet of the incisors were acceptable. The maxillary dental

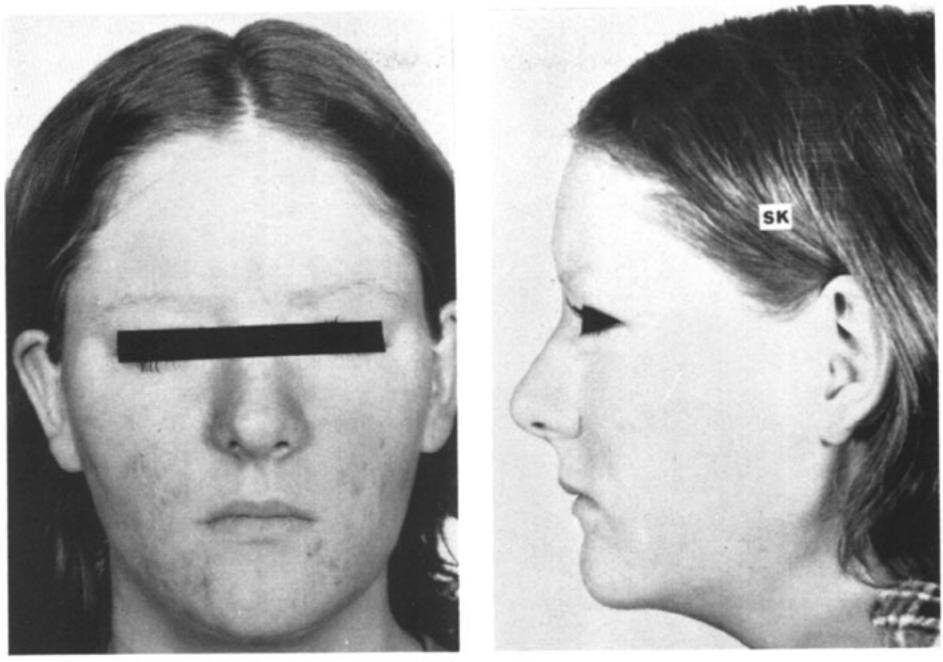

Fig. 4

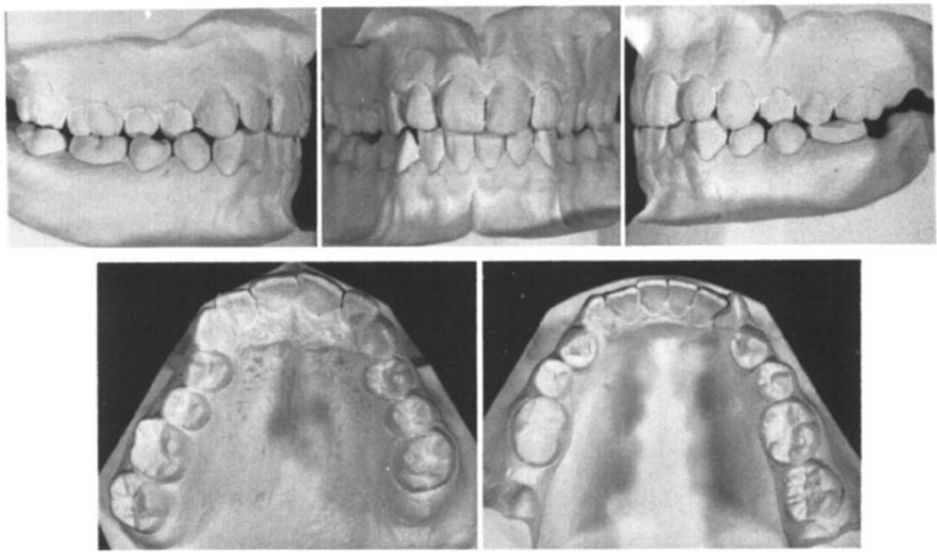

Fig. 5

Fig. 6

Fig. 7

arch was constricted at the premolar regions and the left first molar was lost because of caries. No open-bite tendency was indicated (Fig. 5).

Radiographic Examination

Patient S.S.

The posteroanterior cephalometric film revealed a prominent distortion of the right hemimandible (Fig. 6). The ramus and body of that side were deformed and the buccal open bite noted. In the examination of the upper and middle face, no noticeable asymmetry was observed; the occlusal plane of the maxillary dental arch showed no lateral slant. Thus, the distortion seemed to be localized in the mandible.

The lateral cephalometric film revealed that the mandibular body on the right side was characteristically curved anterior to the angle and increased in height from the crest of the alveolar process to the inferior border of the body (Fig. 7). However, the mandibular body of the left side was quite narrow anterior to the angle; its lower border appeared straight although the ramus and condyle of that side were observed normal in size as well as in shape. On the right side the ramus was increased in height and the condyle and condylar neck were hyperplastic. The coronoid process and anteroposterior width of the ramus were, however, not markedly deformed. The buccal open bite was clearly shown.

The panoramic radiograph revealed the hyperplastic condyle, condylar neck and the body of the mandible of the right and the hypoplastic body of the mandible of the left (Fig. 8). Root apices of the right buccal teeth were slanted toward the mesial; the lower half of the body of that side appeared remarkably radiolucent indicating the low density of the bone and/or the considerable thinness of the body in that region.

Sister S.K.

The posteroanterior cephalometric film showed that the cranium, upper and middle face were not symmetrical, possibly due to a slight deviation of the head positioning in the cephalometer when the film was taken.

The lateral cephalometric film revealed a well-balanced relationship of

Fig. 8 Panoramic radiograph of the patient. Note the hyperplastic condyle, condylar neck and the body of the right; hypoplastic body of the left; radiotranslucency of the body, and mesial slanting of root apices of the right.

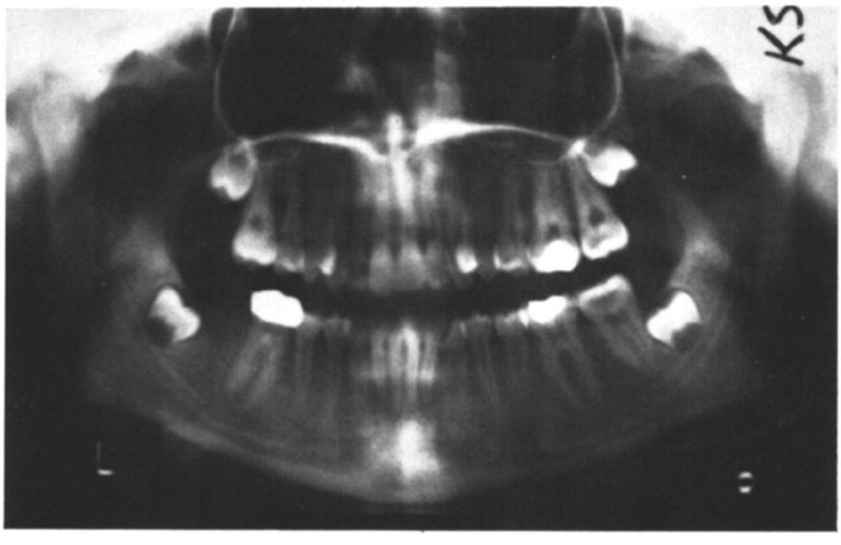

Fig. 9

the craniofacial component parts. The condyle, the neck of the condyle, the body and ramus of the mandible were found to be in normal limits of development and balanced in size as well as in shape in the face.

The panoramic radiograph revealed no pathological condition of the mandible (Fig. 9).

Discussion

Unilateral mandibular hyperplasia involves an entire half of the mandible and results in a unilateral compensa-

Fig. 10 Photograph of the patient (left) and twin sister (right) taken at the age of five years. Slight enlargement of the right hemimandible of the patient seemed to be indicated.

tory maxillary deformity as well. In this type of hyperplasia there is a great variability, but the differences are generally quantitative rather than qualitative. The characteristics generally include unilateral enlarged mandible, including the head and neck of the condyloid process and the mandibular body and ramus. Open bite is usually seen on the side of the hyperplastic process.

The present case exhibited the typical characteristics of the unilateral mandibular hyperplasia (macrognathia) as stated above. It was unique in that the deformity occurred on a twin and was associated with a habit of lateral tongue thrust. However, it was questionable that this twin was monozygotic. Monozygotic twins are of the same genotype, whereas dizygotic twins are no more alike than are any siblings. In this instance, the blood type was the same (AB), but the facial appearance, eye color and hair color were slightly different.

Photographs at ages two and three failed to reveal any noticeable distortion of the mandibular form on the patient. At the age of five years a slight enlargement of the right hemimandible seemed to be indicated (Fig. 10). The facial distortion was more conspicuous at the age of twelve years and became far more aggravated at fifteen years (Fig. 1). Intense chondral activity and subsequent ossification at the condylar area is greatest during the fetal period and the early years, tapering to a standstill between the ages of 16 and 20 years.[10] In the present case the development of the hyperplastic side of the mandible seemed to be accentuated after the age of twelve years. This might indicate that unilateral mandibular hyperplasia occurring through the puberal growth period would have more effect on the mandibular deformity. Furthermore, it would aggravate the buccal open bite, if any, since the maxillary and mandibular alveolar growth could not adequately compensate for such excessive downward growth of the condyle and ramus on the hyperplastic side. However, in this instance the maxilla and maxillary denture seemed to show little compensative growth. This was noticed on the frontal head X-rays and plaster casts showing little degree of asymmetry of the maxilla, its dental arch, and no significant lateral slant of the maxillary occlusal plane.

The shape of the open bite indicated the spontaneous interposition of the tongue between the dental arches so that the lower occlusal line of that area became severely curved, posterior to the canines. The large open bite was undoubtedly maintained by the lateral tongue-thrust habit which was retained for over seven years. The cause of the habit was uncertain with the patient recognizing it about the age of eight years. Therefore, the habit probably started prior to that age. The lateral tongue thrust might be an entirely different pattern from the lateral tongue bite in view of physiopathology. In the present instance the tongue was first pushed into the space of open bite, then the mandible was rested on it. It was not possible to determine the habit a thrusting or biting in this case.

The body of the mandible of the left side was observed to be hypoplastic. This might result from the imbalance of the muscle function, particularly of the mylohyoid induced by such a habit and abnormal growth of the mandible. However, there is considerable range of opinion whether or not muscle function causes deformity of the bone.[8,10]

Variation in mandibular morphology of the unilateral mandibular hyperplasia is primarily dependent on the rate of remodeling of the bone; therefore, the characteristics of the deformity would be associated with the time of occurrence and total period of excessive growth.[3] Puberty would be a critical period in the development of such deformity since remarkable growth generally occurs in the jaws during this period and such growth activity might accelerate the growth of the affected condyle, condylar neck, body and ramus of the mandible as well. In addition, an unfavorable habit would contribute to the development of the deformity occurring on the entire mandible and/or on the occlusion of the teeth if the habit were retained through the period of excessive growth.

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