

MAXILLOFACIAL ABNORMALITIES AND SURGICAL STABILITY AFTER CHANGING THE ANGLE OF THE PROXIMAL SEGMENT IN PATIENTS WITH FACIAL ASYMMETRY AND PERIODONTAL PROBLEMS

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Abstract

This study investigated jaw and facial abnormalities and surgical stability after changing the angle of the proximal segment in patients with facial asymmetry and periodontal problems. Periodontal disease is caused by bacteria in dental plaque. Plaque is a sticky substance that forms on your teeth after brushing and eating. This disease is closely related to oral hygiene. This disease does not involve the teeth, but penetrates the tissues supporting the teeth. When dental plaques are not removed from the teeth, they attack the supporting tissues of the teeth. It is meant by the supporting tissues of the teeth, gums, bone tissue and supporting fibers in which the teeth are placed. This disease starts from the gum and if it is not treated, it also includes the bone tissue. Infection and inflammation first develop in the gums and involve the surrounding bones. Periodontal disease is initially known as gingivitis, which causes gum swelling and sometimes bleeding in the initial stage. In some cases, the roots of the teeth may be visible. The severity of the disease can also cause tooth loss, which is a sign of severe periodontitis. The progress of periodontal disease in a person depends on the severity of attack or resistance to plaque attack and the efficiency of immune and inflammatory responses of the host body. Current research shows that host responses are influenced by specific environmental and genetic factors that can determine the general susceptibility of the host or the local susceptibility of a tooth within the mouth to the disease. Unfortunately, the severity of the disease is higher in people who have diseases such as diabetes, HIV, and Down syndrome, due to their weak immune system. Smoking and diabetes are among the factors of periodontal disease.

Keywords: Jaw and face abnormalities, Surgery, Patients with facial asymmetry, Periodontal, Mouth.

INTRODUCTION

Also known as imperfect asymmetry, this type, as the name suggests, causes one angle of the face to appear crooked or droopy [1-3].

Causes of facial asymmetry

As you read above, not every person's face is naturally perfectly symmetrical. Asymmetry is sometimes so obvious that the audience can easily see it, but what is the cause of such facial asymmetry? There are various causes, some of which are:

- 1) **Heredity and genetics or congenital factors:** defects and problems of growth and development during the fetal period, injuries, surgery or some congenital diseases are the cause of facial asymmetry [4].
- 2) **Dental and dental works:** tooth extraction, use of artificial teeth or dental veneers can affect the face. In some situations, the facial lines and also the shape of the facial muscles change after the dental procedure.
- 3) **Aging:** Aging is a natural factor. With age, facial asymmetry increases. This is a natural part of every human life. Because with old age, the maturation of bone growth stops. However, as you age, cartilage will continue to grow. For this reason, asymmetry will happen [5].
- 4) **Life habits:** Some bad life habits may have negative effects on facial symmetry in the long run. For example, maybe sleeping on your stomach or having a bad posture can contribute to facial asymmetry in the long run.
- 5) **Injury:** A person may suffer an injury or damage under conditions that affect the symmetry of his face. Injury or damage can affect the symmetry of a person's face at any age.
- 6) **Shape of the nose:** a broken nose or a deep cut will cause asymmetry of the face.
- 7) **Facial nerve palsy or Bell's palsy:** Sudden facial asymmetry indicates a serious illness. Bell's palsy, which is called facial nerve palsy, affects the face suddenly. Stroke is another factor that causes asymmetry and incoordination of muscles on the face [6].
- 8) **Torticollis:** Torticollis, which is also called twisted neck, is an abnormal condition of the neck muscles. Torticollis sometimes occurs in the fetal state.
- 9) **Physical injury:** Any type of injury that changes the muscle activity on one side of the face may cause an asymmetric face (Figure 1) [7].

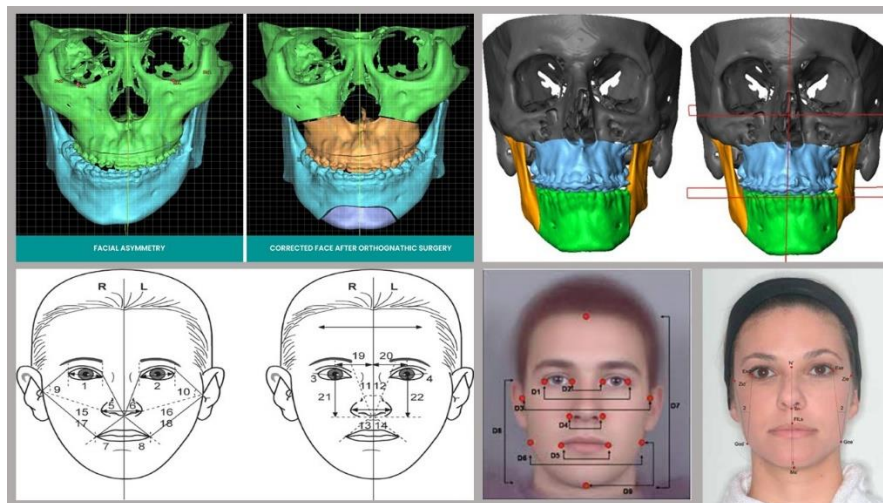


Figure 1: Causes of facial asymmetry

A malocclusion is a type of bad bite. In this situation, when the jaw is closed, the teeth of the upper and lower jaw do not fit together correctly. Types of malocclusions that can usually be treated with orthodontics include:

- 1) **Crowding of teeth:** There is not enough space for teeth to grow regularly, as a result, they grow on top of each other and irregularly.
- 2) **The distance between the teeth:** refers to the distance between the teeth.
- 3) **Overjet:** occurs when the upper teeth of the upper jaw are in front of the teeth of the lower jaw.
- 4) **Open bite:** upper and lower jaw teeth do not meet [8].
- 5) **Overbite:** the upper teeth of the upper jaw are unnaturally ahead of the upper teeth of the lower jaw.
- 6) **Underbite:** In this case, the teeth of the lower jaw are in front of the teeth of the upper jaw.
- 7) **Crossbite:** one or more upper jaw teeth are closer to the cheek or tongue and the upper jaw teeth are behind the lower teeth.
- 8) **Midline deviation:** Midline or midline is a line that passes through the contact area between the two front teeth of the upper jaw. This line should be parallel to the center of the lips and nose. When the midline is far from the center, the midline deviation has actually occurred.
- 9) **Tooth rotation:** when one or more teeth rotate in the mouth, as a result, it causes the teeth to be out of order and creates an ugly appearance [9].
- 10) **Back and front teeth:** two teeth grow in place of each other. For example, fangs grow in place of small molars.

The anomalies that were introduced are classified in one of the malocclusion classes. These classes determine the relationship between the upper and lower jaw, as well as the position and distance of the teeth.

Search strategy and selection of articles

Search in Scopus, Google scholar, PubMed databases and by searching with keywords such as "Nursing Services", "Medical Services", "Maxillofacial Abnormalities and Surgical Stability", "Facial Asymmetry and Periodontal Problems" and "Changing the Angle of the Proximal Segment in Patients" to obtain articles related to the selected keywords [10-12]. Case report articles, editorials, and articles that were not published or only an introduction of them were available, as well as summaries of congresses and meetings that were in languages other than English, were ignored. Only the original research articles that evaluated the effectiveness of different drugs in the treatment of COVID-19 using standard methods were studied (figure 2) [13].

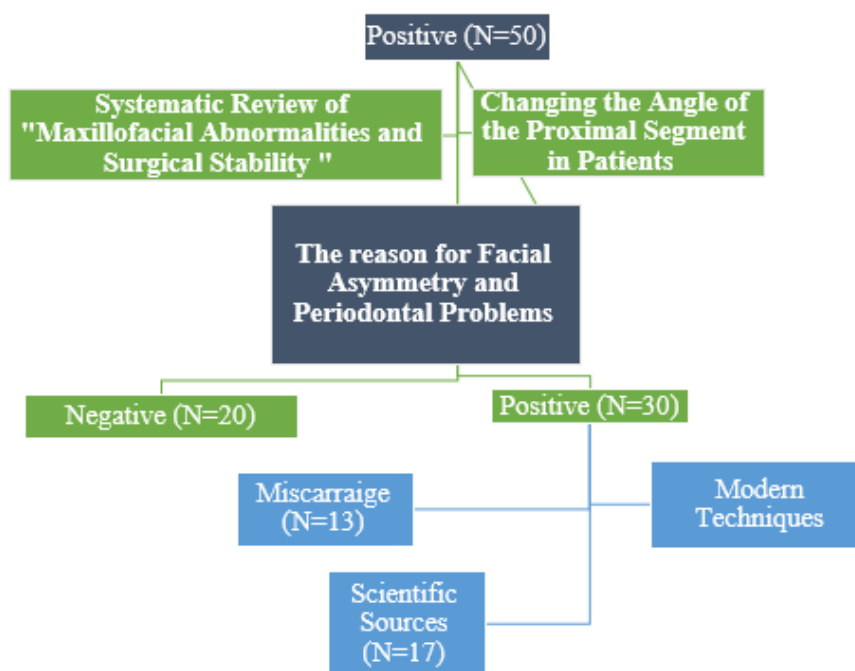


Figure 2: Flow chart of included subjects

Types of jaw disorders

A) First class:

In this type of malocclusion, upper and lower molars as well as canines are in their proper place, but despite this, other problems such as crowding of teeth, distance between them or other dental problems are observed. The acute state of this type of malocclusion may cause other disorders such as open bite and cross bite [14-16].

1- Treatment: Each of the abnormalities has its own treatment, but in general, the treatment of first-class malocclusion includes: expanding the upper arch and correcting the crossbite, creating a lot of space for overlapping teeth and correcting the middle line of the jaw or midline. It goes without saying that closing the open space between the teeth and arranging the rotated teeth are also part of the first-class malocclusion treatments (Figure 3) [17].

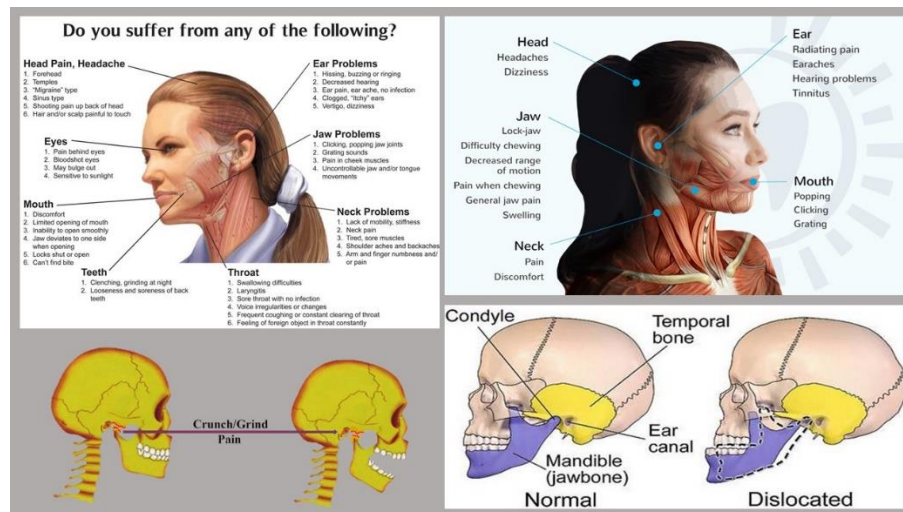


Figure 3: Jaw disorders

B) Second class

In this case, the upper molars are slightly ahead of the lower molars, and the canines are placed together in an inappropriate position. Class II malocclusion is divided into several categories:

B1) The first category: It is a condition in which the lower jaw has not grown enough and the teeth of the lower jaw cause an overjet abnormality. In these cases, the upper arch is usually narrow, and patients with this condition can close their lips with difficulty and pressure.

B2) The second category: They include deep bites. In these patients, the upper arch is wide and the lips close easily and without pressure [18].

1- Treatment: To correct this anomaly, in addition to wiring, other orthodontic equipment is also used. Different types of effective orthodontic equipment in this case include:

- ✓ **Headgear:** It is a type of movable orthodontic tool that helps align the teeth by creating more space for them to move.
- ✓ **Herbst:** This orthodontic appliance is completely fixed and the patient cannot remove it from the mouth. Herbst is used to correct overjet disorder. This device pulls the patient's lower jaw forward and helps the upper teeth move back [19].
- ✓ **Twin block:** includes upper and lower acrylic blocks and guides the forward and backward movement of the lower jaw [20].

Other treatment techniques include the use of braces, and in more severe cases, tooth extraction or dental surgery [21].

C) The third class

In this case, the molars of the upper jaw are behind the molars of the lower jaw, and the upper teeth of the lower jaw are slightly ahead of the upper teeth of the upper jaw. Class III malformation is the cause of underbite malformation. In fact, the third type of malocclusion is mostly genetic, and excessive growth of the lower jaw and insufficient growth of the upper jaw cause this condition. In some cases, it has been observed that the patient has an underbite disorder, but does not have the third type of malformation. This malocclusion, which is known as false malocclusion, is caused by front teeth or canines and causes the lower jaw to move forward [22-24].

1- Treatment: The treatment of this jaw abnormality is very effective in childhood and in growing age. In fact, the age of the child's development helps the treatment result. Treatment in childhood is usually done without the need for surgery. In addition to dental wires, brackets and archwires, various types of dental equipment are used for treatment. The dental equipment used in the treatment of the third type of jaw deformity are:

- ✓ **Jaw expander:** This device is placed inside the roof of the mouth and with the help of a small key and turning it, it can be slightly widened and opened every day.
- ✓ **Reverse traction headgear:** This tool is used during the night and helps the growth of the upper jaw.
- ✓ **Chin cap:** prevents the lower jaw from growing too much [25-27].

Some deformities and disorders of the jaw cannot be treated with orthodontic equipment and must be corrected through surgery. This applies to adult patients who have passed the age of development [28].

Reasons

Most jaw deformities are hereditary and only some occur under certain conditions. Hereditary malocclusions include: crowding of teeth, spacing between teeth, extra teeth, congenitally fallen teeth, and a wide variety of jaw, tooth, and facial disorders. Impact, thumb or other finger sucking, blockage of airways by tonsils and adenoids, dental diseases and early falling of childhood or adult teeth are conditions that can cause jaw abnormalities and disorders. Most of these problems affect not only the growth and order of the teeth, but also the growth of the face and appearance.

Jaw disorder problems

Some jaw disorders disturb the beauty of the patient's appearance. Some are so severe and acute that they cause abnormalities such as shoulder retraction, lower jaw stretching, inability to close the mouth, and protruding teeth in the patient's face (Figure 4). These problems and disorders can affect the quality of life, self-confidence, mental health and social and professional success of each person.

What is mandibular kyphosis?

Mandibular malocclusion is a disorder that occurs due to the teeth and jaw not being in their correct place in the mouth. The presence of this problem causes the teeth of the upper and lower jaws to not be able to fit on each other properly, and this problem is associated with the occurrence of many disorders, which we will tell you in the following topics (Figure 4) [29].

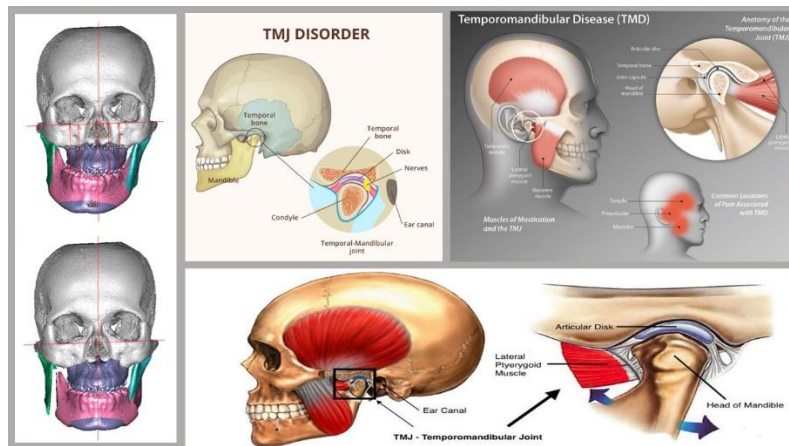


Figure 4: Jaw disorder problems

Methods of diagnosing the absence of lower jaw

When the horizontal growth of one side of the mandible is greater than the opposite side, the person will suffer from a lack of mandible, as a result of which it will not be possible for the upper and lower jaws to be completely on top of each other. By visiting a good orthodontic specialist and performing the following examinations, the presence of this disorder is diagnosed:

- 1) Preparation of radiographic images: It is recommended to prepare radiographic images for accurate diagnosis as well as dental services. These images provide detailed information about the position and condition of the two jaws as well as the teeth, and the orthodontist can use them to diagnose this disorder well.
- 2) Intraoral examination: an orthodontist performs an intraoral examination and evaluation of the fit of the midline of the upper and lower teeth with each other as well as with the face. If there is no proportion between them, it will be diagnosed as mandibular underbite.
- 3) Extraoral examination: The extraoral examination includes examining the exterior of the face and the angle of the lower jaw, which may be clearly visible in the presence of this disorder.

Treatment methods for mandibular underbite

After conducting necessary examinations and investigations and finding the cause of mandibular asymmetry, the orthodontist decides on a treatment plan that fits the patient's needs.

This disorder can be treated using the following methods:

- 1) **Orthodontics:** Orthodontics includes various methods that are used considering the age of the patient. Patients suffering from lack of mandible should treat this disorder before reaching puberty, that is, when the growth of the jaw has not yet been completed or stopped. Using orthodontic treatments without the need for jaw surgery can cure their problems. Of course, it should be noted that the problem of their mandibular lack of teeth is not advanced [30].
- 2) **Jaw surgery in addition to orthodontics:** in cases where the patient has passed the age of puberty, i.e., in a situation where the growth of the jaw has been completed, it is possible that the lack of mandible cannot be treated with orthodontics alone, in which case the orthodontist performs jaw surgery in he suggests orthodontic treatment.

The order of performing these treatments is that facial orthodontics is performed first so that the teeth are placed in the right positions in the dental arch so that the jaw defects are removed as much as possible. Then the jaw surgery is performed by a maxillofacial specialist. After the jaw surgery, according to the new conditions of the jaw and teeth, it is possible that orthodontic treatment needs to be performed again for a short period of time, for example for 6 months, to complete the treatment. In this way, the best results will be obtained from the treatment of this disorder.

The best time to treat mandibular underbite

It is usually recommended that you take your children to an orthodontist at the age of 7 for dental checkups and to check for dental or jaw problems and disorders so that if there are any problems, they can be treated as soon as possible. It is much easier to treat oral and dental problems as well as jaw problems at a young age when their tissues are still growing. Because as the child ages and at the same time as the face and jaw grow, these problems progress and not only are they more difficult to treat, but the structure of the face and its soft tissues are also affected and may be accompanied by other injuries. that endanger the health of the child's mouth and teeth [31].

Treatment of missing lower jaw after puberty (adulthood)

After puberty and with the completion of jaw growth, the malleability of the jaw bone decreases. For this reason, it becomes difficult to treat its problems only by using orthodontics. When patients visit the orthodontic clinic after puberty to treat their jaw disorders and abnormalities, the orthodontist alone will not be able to provide them with a treatment plan, and doing this will require the cooperation of a maxillofacial specialist. Because in addition to orthodontics, jaw surgery should also be performed to remove severe skeletal abnormalities. Usually, the treatment plan will be such that orthodontics is performed first with the aim of correcting dental disorders and some jaw problems. After that, jaw surgery and finally orthodontics will be done to make final corrections. The length of this treatment period, taking into account the number of abnormalities, the age of the patient and his other conditions, usually lasts about 1 to 2 years.

What are the reasons for the loss of mandibular teeth?

Knowing the cause of this abnormality can help the orthodontist to plan the appropriate treatment plan. Things that contribute to this complication include:

- 1) **Impact:** hitting the face and lower jaw is one of the causes of lower jaw asymmetry.
- 2) **Heredity:** genetics and heredity as well as congenital problems at birth are other effective factors in causing this disorder.
- 3) **Presence of posterior crossbite:** Abnormal growth of the lower jaw, which can be associated with its asymmetry, may be caused by the presence of posterior crossbite.
- 4) **Functional shift of the jaw:** if this disorder is not treated, it will turn into the lack of lower jaw and remains stable.
- 5) **Existence of disorder in the temporomandibular joint:** disorder and abnormality in the temporomandibular joint is another cause of this complication [32].

Complications of not treating mandibular asymmetry

If this disorder is not treated on time and quickly, it can be accompanied by the following complications:

- 1) **Speech problems:** not placing the teeth in the correct position relative to each other causes disturbances in speech and the correct pronunciation of words.
- 2) **Damage to the teeth:** the wear of the teeth and the deterioration of their enamel as well as the development of caries are all complications that cause the teeth to be improperly positioned in relation to each other due to jaw disorders and not only the possibility of cleaning them properly does not exist, but when trying to chew food, disproportionate pressure is placed on them, which leads to damage to the teeth.
- 3) **Damage to the jaw joints:** asymmetric distribution of forces that can cause damage to the jaw joints and pain in them as a result of trying to properly chew food or talk.
- 4) **Pain:** Pain in the jaw, neck and back of patients suffering from this disorder is one of the complications of not treating it.
- 5) **Disturbance in chewing food:** the asymmetry of the lower jaw creates a disturbance in the complete and correct chewing of food, which can lead to digestive problems.
- 6) **Adverse effect on the face:** the presence of any jaw disorder can have an adverse effect on the beauty of the face.

Does mandibular underbite heal by itself with age?

No, it is not possible to treat this disorder by itself and its treatment requires serious orthodontic measures and in some cases jaw surgery.

Is it possible to treat mandibular underbite only by using orthodontics?

The answer to this question depends on the patient's age and the amount of jaw abnormalities and is determined by the orthodontic specialist after the necessary examinations. If the bone growth of the jaw is not yet complete, usually before puberty, it will be possible to treat this disorder without jaw surgery and only with orthodontics (Figure 5).



Figure 5: orthodontics

Why should the problem of missing mandible be treated?

Because the treatment of this complication not only improves the low self-confidence of people due to the existence of this problem, but also has an effect on the treatment of temporomandibular joint pain caused by it, as well as the treatment of speech disorders and difficulty in chewing food.

Non-surgical face contouring methods

- 1) **Injection of gel or filler:** one of the temporary and common methods of angulation and contouring of the face is injection of gel or filler. During the treatment session, specific amounts of gel or filling fillers are injected into different and necessary parts of the jaw. During this process, the shape, angles and curves of the jaw and chin are changed by filling some parts inside. In some situations where the skin is sagging downwards, by injecting skin fillers, they plump up the face and prevent sagging under the jaw. In fact, in this case, the patient's jaw is reconstructed and made younger.
- 2) **Fat injection:** Unlike fillers, no synthetic materials are used in this face contouring method. In this technique, excess fat is removed from a certain place (belly and sides) and injected into different areas of the face. Fat injection does not threaten any serious complications

due to the use of the person's own body fat. In the fat injection method, you will see satisfactory and brilliant results.

- 3) Botox injection:** Botox is a drug that weakens or paralyzes muscles after injection. In low amounts, it can rejuvenate people's faces. Botox is a protein derived from botulinum toxin. Therefore, Botox is a kind of paralyzing poison, but doctors and beauty experts help people a lot by carefully using this substance. Before injecting Botox, the doctor first checks the patient's facial anatomy and then injects a certain amount of Botox. In this method, the doctor paralyzes some normal muscles and causes the face to shrink. This method is safer, safer and without complications than some surgical methods [33].

Deviation of the lower jaw

One of the common types of malocclusions is characterized by the asymmetry of the face and chin and the deviation of the midline of the teeth. Deviations of the lower jaw are one of the main factors affecting the attractiveness of the face, especially in terms of the angle of the jaw and chin. The treatment of this anomaly is usually chosen with orthodontic or orthognathic approaches based on the amount and cause of the deviation. Facial asymmetry is one of the most difficult and challenging dental abnormalities in orthodontic treatment. Skeletal asymmetry is often caused by changes in the temporomandibular joint (TMJ) and is commonly seen in the mandible, which forms the skeletal support for the soft tissues of the lower face. Most asymmetries lead to asymmetric growth of the lower jaw.

Jaw deviations

Unilateral mandibular overgrowth or mandibular anteroposterior malocclusion or a combination of the two usually results in class III dental malformations. Studies have shown that temporomandibular disorder (TMD) symptoms such as noise, joint pain, and articular disc displacement are more common in patients who exhibit mandibular asymmetry [34].

Complexity of mandibular deviations

The number of orthodontic patients with mandibular deviation and facial asymmetry has increased recently. Deviation of the jaw occurs when the skeletal structure of the jaw is not in its usual place and is noticeably or imperceptibly inclined to the left or right side of the face. In this case, the person's mouth and lips are placed on one side of the face instead of being parallel to the vertical axis of the face. In addition to greatly affecting the beauty of the face, this abnormality also causes problems such as not breathing properly, problems in speaking and swallowing (Figure 6).

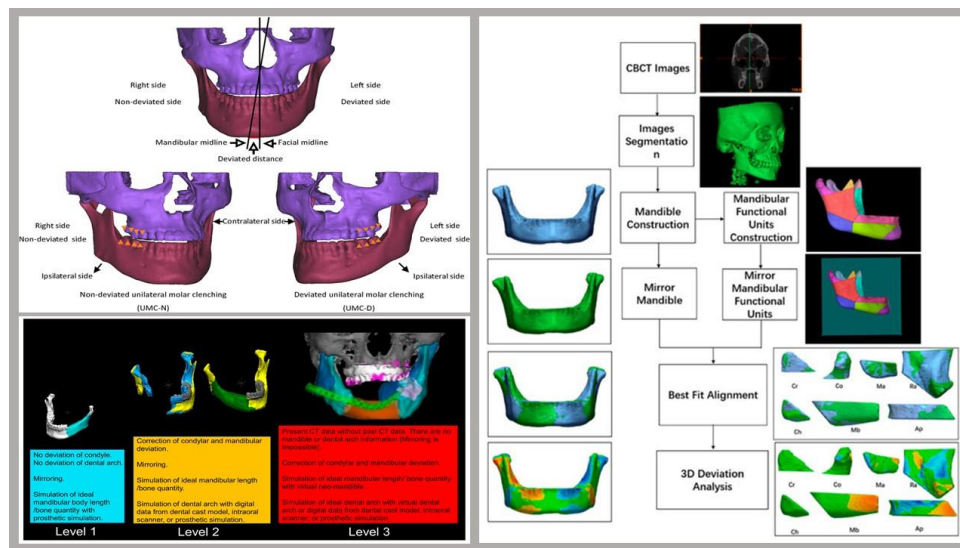


Figure 6: Complexity of mandibular deviations

Radiological picture of deviated jaw

Diagnosis and treatment of class III patients with facial asymmetry or mandibular deviation is more complicated than other jaw abnormalities. Treatment of malocclusion with mandibular deviation is important. Because as the child grows, the degree of deviation and malocclusion worsens. Skeletal Class III patients are often associated with facial asymmetry or midline deviation, and some eventually require surgical orthodontic treatment [35].

Causes of mandibular asymmetry

Facial asymmetry is often located in the lower third of the face. As a result, the correction of facial dental anomalies often includes the elimination of this deviation and asymmetry. Deviation of the lower jaw in the long term leads to a change in the angle and position of the teeth and also causes a change in the soft tissue of the face and jaw. There are several reasons for mandibular deviation, which are mentioned below:

1- Lower jaw growth deficiency: Lower jaw deviation can be caused by lower jaw bone growth deficiency. In this case, the lower jaw deviates due to growth reduction, degenerative changes or trauma and damage. Stunting often occurs as a result of a congenital or developmental abnormality. Hemifacial microsomia and Peri-Romberg syndrome are two such examples that reduce the growth of hard and soft tissue in the lower jaw and cause asymmetry of the jaw. Acquired abnormalities such as osteoarthritis and progressive rheumatoid arthritis may also cause condyle degeneration and lead to a reduction in mandibular length through condyle erosion. This condition reduces the jaw bone and also reduces the prominence of the lower jaw. Impaction of the mandibular condyle is an acquired defect that should be considered when evaluating facial asymmetry. Condyle and neck fractures can reduce the height of the ramus and cause mandibular deviation.

Partial jaw deviation

- 1) Excessive growth: In addition to the lack of growth, excessive growth of the jaw bone can also cause deviation of the lower jaw. Unilateral growth often causes bone and tooth axis deviation. Unilateral prognathism leads to deviation in the horizontal vector of the face. This overgrowth causes Class III malocclusion in canines and molars. Unilateral condylar hyperplasia is classified as jaw elongation or maxillary hyperplasia.
- 2) Elongation of the jaw: Elongation of the jaw is associated with an increase in the length of the condyle and ramus and is considered one of the main reasons for the deviation of the lower jaw. In this case, one side of the jaw has more growth and elongation, while it is not associated with prognathism. Changes caused by overgrowth of the condyle lead to chin deviation [36].
- 3) Hemimaxillary hyperplasia: Hemimaxillary hyperplasia is the enlargement of one side of the lower jaw, including the condyle, neck, ramus, and body. In this case, the vertical disharmony of the lower jaw is clinically evident. Because increasing the growth of the jaw causes downward bending in the face.

Diagnosis of mandibular deviation

In severe cases of mandibular deviation, the physical examination and appearance are very clear, but in mild cases, X-ray imaging is required. The examination should show the details of the facial dental anomaly and the effect of asymmetry on the skeleton, teeth and soft tissue. Imaging plays a valuable role in evaluating facial and jaw skeletal asymmetry. Using the analysis of X-ray films, it is easy to understand the description of anatomical changes related to facial asymmetry. Asymmetries and severe deviation of the jaw may require additional imaging studies including computed tomography (CT) and 3D reconstructions [37].

Symptoms of mandibular deviation

Mandibular deviation, as mentioned, has different degrees from mild to severe. In extreme cases, the person's appearance and face shows deviation. It is important to check the symptoms to diagnose mild cases. The following can be symptoms of a crooked and deviated jaw:

- ✓ Pain in the jaw joint area.
- ✓ Pain in the shoulder or back.
- ✓ Pain in temple.
- ✓ Jaw tightness.
- ✓ Changing the shape of the face.
- ✓ Jaw making noise while eating or talking.
- ✓ Disruption of teeth.
- ✓ Difficulty in breathing and mouth breathing.
- ✓ Chewing and biting the lips while eating.

Treatment of mandibular deviation

The treatment of mandibular deviation is done using surgical and non-surgical methods. In surgical procedures, the jawbone is cut and placed in the right position. Non-surgical treatment of mandibular deviation is done using orthodontics. In this method, the jaw is placed in its proper position without surgery or invasive operation. This operation, by using braces and applying pressure in the right direction, reduces the deviations of the jaw and puts it in a level position.

Orthognathic orthodontics

In many cases, treatment using both orthodontic and surgical methods is possible. The skills of both orthodontists and jaw surgeons are necessary from the beginning of planning to the completion of the treatment period to completely correct jaw deviations. In this method, the person is first treated by an orthodontist, and then surgery is performed to eliminate the deviation. In some cases, after surgery, orthodontics is used to treat misalignment and misalignment of teeth.

The effect of genetics on facial and body symmetry

Asymmetrical features may appear as you grow up for genetic reasons. If your mother has asymmetrical lips or your father has one ear larger than the other, they can pass these genes on to you. On the other hand, vascular disorders and cleft lip and palate are genetic diseases that can cause asymmetric features on your face.

The effect of sunlight on face and body symmetry

When your skin is exposed to the sun's ultraviolet rays, it can cause spots and moles on your skin. The effects of this injury are not spread evenly throughout your body, especially your face. Sun damage may affect one side of the face or body more than the other.

The effect of aging on facial symmetry

Studies in this field show the relationship between aging and facial asymmetry. This is a natural part of the aging process. While bone growth stops at puberty, cartilage continues to grow, leading to changes in the face, such as what happens to the ears and nose. Likewise, with age, the soft tissues of the face begin to loosen and sag. These changes, as well as wrinkles, cause asymmetry in your face.

The effect of jaw and teeth problems on facial symmetry

If you have your teeth pulled, the appearance of your facial muscles may change. In the same way, placing veneers and artificial teeth can change the contours of your face, which are not always symmetrical.

The effect of habits and lifestyle on facial symmetry

It's possible that some of your lifestyle habits contribute to an asymmetrical face, such as smoking, which exposes the face to toxins and causes vascular disease. Other lifestyle factors that may lead to asymmetry include sleeping on your stomach or sleeping with your face on

the pillow, sitting with your legs crossed, resting your face on your hand, or having poor posture.

The effect of injuries on facial symmetry

If there was an injury to the face, especially in childhood, its effects may cause an asymmetric face in you. Trauma such as a broken nose, deep cuts, or being involved in an accident such as a car accident can cause damage to the face [37].

The effect of stroke on facial symmetry

A stroke may cause numbness on one side of the face and a drooping smile. Other symptoms include weakness or numbness in arms and legs, difficulty speaking, and sudden severe headaches. A stroke occurs when blood flow to the brain is reduced, and people may experience sudden facial asymmetry because of this.

The effect of Bell's palsy on facial symmetry

If you have experienced a sudden loss of facial symmetry, it is possible that Bell's palsy is the cause. Bell's palsy causes paralysis of the muscles on one side of your face. The cause of this disease is currently unknown, but it may be related to trauma, nerve damage, complications of viral infections or pregnancy. Of course, side effects are usually temporary.

Torticollis effect on facial symmetry

Also known as "twisted neck", torticollis causes the neck muscles to be in an abnormal position and tilt the head, which may lead to asymmetric facial features. Sometimes this complication occurs in the womb for the child. As a result, at birth, the baby is born with a little asymmetry in the face, and most of the time the complications are temporary (Figure 7).

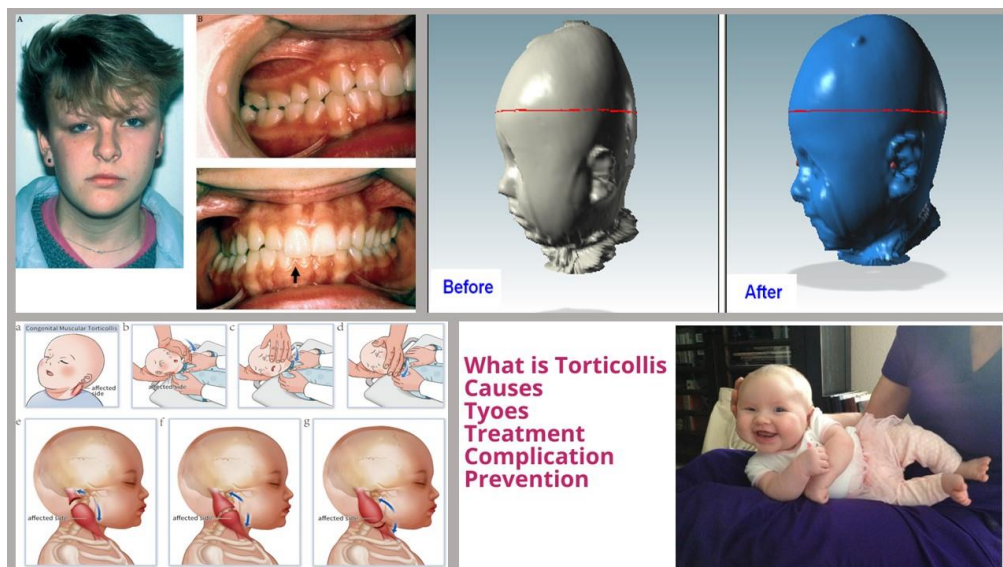


Figure 7: Torticollis effect on facial symmetry

What is the cause of periodontal disease?

1- Main causes: Like the main causes of many oral and dental diseases such as dental plaque, decay and tooth root infection, the cause of periodontal disease can be found in the accumulation and deposition of dental plaques. As stated in other articles, microbial plaques are the same sporococcus bacteria that accumulate in the teeth after consuming food, secrete acid and toxins that involve and damage the tissues of the mouth and teeth. In fact, the toxins caused by dental plaques in the deposit with the supporting tissues cause inflammation of the gums, and as a result of this inflammation, the gums bleed during brushing or flossing.

2- Secondary causes: Research shows that aging is one of the causes of oral and dental diseases. Also, diseases that caused a person's inability to take care of oral health increase the incidence of this disease. It has also been seen that there is a close relationship between a healthy oral condition and physical fitness. In addition, diseases such as diabetes increase the spread and occurrence of this disease in the mouth and teeth. Also, risk factors such as smoking and high sugar diet and reducing dental care cause the spread of periodontal disease.

What are the complications of periodontal diseases?

The complications of this oral and dental disease can be divided into two main and secondary complications:

1- Main complications: periodontal diseases begin with the penetration and accumulation of microbial plaques in the tooth tissue. In the first stage, the complication of gingivitis is obtained and this is when the gum tissues are involved and inflammation of the gums occurs. If gingivitis progresses along the root of the tooth and through the periodontal pocket to the apical side, periodontal disease develops and reaches the stage of periodontitis, which is the advanced stage of this disease.

Periodontitis itself is divided into two types: strong and weak. In mild periodontitis, deep grooves between the gums and teeth, which are pockets, are created and filled with infection. The inflammation and bleeding of the gums increases and the tooth bone begins to atrophy, but in the severe type of atrophy of the bone and dental ligaments, it causes loose teeth and even some of the jaw bone undergoes atrophy. It is important to mention that the main factor in tooth loss in middle age and old age is periodontal diseases.

2- Side effects: periodontal disease can cause other diseases in the body such as osteoporosis, cardiovascular diseases and premature birth. Research shows that the presence of this disease is one of the main causes of osteoporosis. It is also one of the reasons for low-birth-weight babies.

Signs of periodontal diseases

During the onset of this disease, it is often accompanied by symptoms that help the doctor to choose the appropriate treatment method according to the clinical symptoms and radiographs.

The clinical signs of this disease are:

- ✓ Gum inflammation and swelling.
- ✓ Redness of the gums.
- ✓ bleeding gums
- ✓ Infection and pus in the gums.
- ✓ Bad Breath.
- ✓ Pain in the mouth and gums.
- ✓ Loose teeth.
- ✓ Messing up the arrangement of the teeth and their distance from each other.

Treatment method of periodontal disease

The treatment of periodontal disease depends on the progress of the disease and the stage of the disease. As we said, in the first stage, this disease has an inflammatory effect and bleeding gums during brushing, which is called gingivitis. At this stage, scaling and occurrence of prophylaxis can be of great help in eliminating the effects of gingivitis. Continuing to increase health care will also greatly help improve the patient's condition, but if the disease has entered the stage of periodontitis, more serious measures are required, and first of all, root planing should be done in every area of the jaw. Root planing is a stage of periodontal treatment in which the microbial mass and plaques below the gum line are removed and the masses in the root are leveled. By using this type of scaling, the gum pocket is emptied of plaques and its depth is reduced. Therefore, the recovery stage of the gums becomes faster, but if the disease has become deeper, the need for periodontal surgery is necessary to remove the gum pocket. Also, in case of loose teeth, the restorative operation should be done on the teeth.

Prevention of periodontal diseases

The best way to avoid contracting this disease is to follow oral and dental hygiene tips and recommendations, which include the following:

- ✓ Brush your teeth at least twice a day.
- ✓ Flossing is essential.
- ✓ The use of mouthwash containing fluoride can play an important role in removing microbial plaques. But another method of prevention is screening. It is worth visiting the dentist every 6 months for a checkup. Also, teeth polishing and examination of teeth and veneers that have been done in the past. It is one of the ways to prevent periodontal diseases.

Risks that exacerbate periodontal disease

In addition to bacteria in plaque, several other factors can increase the risk of developing gum disease, or make it worse when an infection is present. These factors are:

- 1) **Genetics and Inheritance:** Genetics has a great impact on getting periodontal disease, but it can be prevented by following the hygiene measures regularly and correctly.
- 2) **Smoking:** Smoking increases the risk of periodontal disease or, if you have periodontal disease, makes it more severe. In some cases, smoking has even caused resistance to the treatment of this disease. So, quitting this habit will definitely have a positive effect on periodontal.
- 3) **Stress:** Stress weakens the body's immune system, and this causes periodontal disease to occur or worsen.
- 4) **Hormonal changes:** Whenever the hormone level in the body goes up and down, these changes can affect the mouth and teeth as well. Puberty, pregnancy and menopause are among the factors affecting hormones.
- 5) **Medicines:** Several types of medicines can cause dry mouth or Coostomia. For example, there are certain medications for depression and high blood pressure that increase plaque on the teeth. Other drugs include:
 - ✓ Phenytoin: Used to control seizures.
 - ✓ Cyclosporine: Used to suppress the immune system of people who need an organ transplant.
 - ✓ Nifedipine: This drug is a calcium channel blocker used to treat high blood pressure, chest pain, or heart arrhythmia.
 - ✓ Diseases: People with certain diseases are more at risk of periodontal disease. For example, people with diabetes, HIV infection, and inflammation like rheumatoid arthritis are more likely to have periodontal disease. Of course, there is nothing to worry about. Because dentists, with the advice they give to these people, inform them of how to maintain the health of their gums and teeth.
- 6) **Improper nutrition:** Nutrition is very important for the overall health of the body, including the immune system and healthy gums. Severe vitamin C deficiency can cause bleeding gums [38].

Relationship between periodontal disease and other diseases

According to studies conducted in recent years, periodontal disease has been related to other problems and diseases. Some of these diseases include:

- 1) **Atherosclerosis and heart disease:** gum disease may increase the risk of blocked arteries as well as the severity of heart disease.
- 2) **Stroke:** Periodontal disease increases the risk of stroke that causes blocked arteries.

- 3) **Premature delivery:** Pregnant women who have periodontal disease during pregnancy may be more likely to deliver prematurely. There is also a possibility that the weight of the baby is less than normal.
- 4) **Diabetes:** As mentioned earlier, periodontal disease increases the severity of diabetes.
- 5) **respiratory diseases:** Bacteria involved in this disease may increase lung infections and worsen existing lung conditions [39].

Examining new examples in this regard

A 46-year-old male patient presented to the emergency department of the Hospital Santa Casa de Misericórdia de Araçatuba, SP, complaining of facial pain and swelling. Physical examination revealed left hemispheric asymmetry and trismus, while CT examination of the face revealed a hyperdense mass involving the left metasternal region, pterygium, and temporal surface. Then the patient was referred to the oral and dental cancer center [40]. However, he did not attend the Oral Oncology Center. After 15 days, the patient returned to the same emergency room and the maxillofacial surgery team was present and showed tachycardia, tachypnea, dysphagia, sore throat and difficulty breathing, trismus and edema with a floating point in the temporal region. During the history, the patient had uncontrolled diabetes.

Therefore, a rapid glucose test was performed with reference to the glucose level of 600 mg/dL. In the intraoral examination, a bad oral condition and general periodontitis were observed. The diagnosis was a complex odontogenic infection involving the masticatory, pterygoid, and superficial temporal spaces and was confirmed by computed tomography. Treatment was started immediately with intravenous antibiotic prophylaxis with 2 g cephalothin sodium and 500 mg metronidazole and administration of 10 IU insulin.

It was performed surgically under general anesthesia and started with a floating-point location in the temporal region, where an aspiration puncture was performed for antibiogram culture and surgical drainage of the superficial temporal space using the Gillies technique with a Penrose drain. Two oral incisions were made to access the mastic and posterior jaw spaces.

Then, due to the periodontal condition and social and cultural aspect of the patient, a serial extraction procedure was indicated. On the second postoperative day, the patient had a good general condition and opened his mouth well. Antibiotic treatment was 1 g of ceftriaxone and continued for 48 hours after improvement of symptoms. The patient was referred to a dentist for rehabilitation with total prosthesis (Figure 8).

Raw	Study	Year	Severe COVID-19		non-Severe COVID-19		Forest Plot	Proportion Wight 98%		Weight %
			Yes	No	Yes	No				
1	Wang et al.	2021						0.85	[0.39 – 1.02]	6.02
2	Kragholm et al.	2021						0.83	[0.42 – 1.01]	5.92
3	Papadopoulos et al	2021						0.74	[0.55 – 1.02]	5.65
4	Team	2020						0.91	[0.48 – 1.08]	6.03
Heterogeneity $t^2=0.00$, $I^2= 0.00$, $H^2=1.00$								0.98	[0.20 – 1.08]	
Test of $\Theta= \Theta$, $Q (4) =3.99$, $P= 0.66$										
1	Hafeez et al.	2020						0.68	[0.52 – 1.06]	6.02
2	Wang et al.	2020						0.74	[0.31 – 1.08]	5.92
3	Guan et al	2020						0.89	[0.19 – 1.01]	5.65
4	Zhang et al	2020						0.90	[0.29 – 1.02]	6.03
Heterogeneity $t^2=0.00$, $I^2= 0.00$, $H^2=1.00$								0.98	[0.20 – 1.06]	
Test of $\Theta= \Theta$, $Q (4) =4.44$, $P= 0.71$										
1	Piva et al.	2020						0.92	[0.39 – 1.06]	5.03
2	Zhang et al.	2020						0.87	[0.54 – 1.02]	6.02
3	Haghighi et al.	2020						0.88	[0.63 – 1.01]	5.57
4	Jebril	2019						0.60	[0.25 – 1.08]	6.13
Heterogeneity $t^2=0.02$, $I^2= 0.00$, $H^2=1.00$								0.95	[0.22 – 1.07]	
Test of $\Theta= \Theta$, $Q (4) =5.55$, $P= 0.74$										

Figure 8: Forest plot showed Maxillofacial Abnormalities and Surgical Stability After Changing the Angle of the Proximal Segment in Patients with Facial Asymmetry and Periodontal Problems

CONCLUSION

Facial asymmetry can be a cosmetic, neurological, skin or dental problem. There are many reasons for facial asymmetry. A significant number of people have mild asymmetry in their face, but there are those who suffer from severe asymmetry in their face. With surgery and injection of fillers such as fat and Botox, etc., it is possible to help correct the symmetry of these people's faces. To help improve the patient's condition, the doctor must first determine whether the cause of the asymmetry is in the soft tissue or the hard tissue of the face and then take the necessary measures. Facial asymmetry may be congenital or occur late in development. Chewing habits, sleeping style, poor posture are the most common conditions that may cause facial asymmetry. In addition to them, vision disorders, less hearing in one ear, neurological or orthopedic problems in the vertebrae of the neck also increase the asymmetric appearance of

the face. Also, genetic inheritance, trauma to the head and neck at birth, orthodontic disorders, jaw closing problems can be mentioned as other common causes of facial asymmetry. Jaw and face infections are common in patients of any age and when they reach the deep spaces of the face, they pose a serious threat to life. Signs and symptoms are evident due to the proximity between nerves, muscles and ligaments, which quickly disrupts the function of the affected area and leads to pain and trismus. Although well characterized, the facial anatomy offers specific pathways for the spread of infection that, in the event of an attack, communicate with each other to store large amounts of pus, which may cause upper airway compression or facial asymmetry. and needs quick and accurate treatment. In general, computed tomography (CT) helps to identify the limits of the infection, which is critical for accurate diagnosis and provides the surgeon with the conditions for proper surgical drainage along with removal of the cause. These two steps are the basis of treatment, supported by the prescription of specific antibiotics. Infectious processes within the oral cavity are generally associated with inadequate oral hygiene, periodontal diseases, and caries, and are exponentially exacerbated in patients with immune system deficiencies, especially diabetics. Therefore, when a painful edema is observed in the face or neck, the dentist or doctor should keep the odontogenic infection suspicious. Therefore, expert consultation with a dentist or maxillofacial surgeon can prevent serious complications and save lives.

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