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Remote monitoring in orthodontic treatment has revolutionized the way children receive dental care, offering numerous benefits that make it an ideal approach for families with busy schedules. One of the most significant advantages is the ability to track treatment progress in real-time. This allows orthodontists to monitor the alignment of teeth and make necessary adjustments without the need for frequent in-office visits. By using advanced technology such as smartphones and specialized apps, children can send updates and receive immediate feedback from their orthodontists.

Orthodontic care can improve both dental health and self-confidence **Pediatric orthodontic care** dental braces.

This convenience is particularly beneficial for families who find it challenging to schedule regular appointments. With remote monitoring, parents can manage their children's orthodontic care more effectively, ensuring that treatment stays on track without the inconvenience of frequent office visits. Additionally, remote monitoring empowers children to take a more active role in their treatment by providing them with regular updates and guidance on their progress.

The technology also enhances patient safety and treatment efficacy. AI systems can detect issues such as oral hygiene problems or ill-fitting aligners early on, allowing for timely interventions that might otherwise lead to delays or more serious problems. This not only ensures that children receive high-quality care but also reduces the overall treatment time, making the process more efficient.

In conclusion, remote monitoring in orthodontic treatment for kids offers a flexible, efficient, and personalized approach to dental care. It provides real-time feedback, reduces the need for in-person visits, and allows for early issue Detection, making it a game-changer for families with busy lives.

Invisalign First is designed for children aged 6 to 10, using clear, removable aligners to

address early orthodontic needs, promoting proper jaw development and teeth alignment without traditional braces. —

- **Early Intervention with Invisalign First for Kids**
- **Invisalign First is designed for children aged 6 to 10, using clear, removable aligners to address early orthodontic needs, promoting proper jaw development and teeth alignment without traditional braces.**
- **The HealthyStart System**
- **This non-invasive approach targets the natural development of children's teeth and jaw, using soft dental appliances to align teeth and address breathing issues, reducing the need for more invasive treatments.**
- **Myobrace: A No-Braces Approach**
- **Myobrace offers a brace-free solution that corrects poor oral habits, guiding jaw and teeth alignment development in children, promoting natural growth and oral health.**
- **Comprehensive Orthodontic Solutions**

Remote monitoring in orthodontics has revolutionized the way patients receive care, making it more convenient, efficient, and personalized. This innovative approach utilizes smartphone technology or special devices like the Dental Monitoring Scanbox to capture high-quality images of the teeth. Patients can take these images from anywhere with standard cellular service and send them to their orthodontist for review. This process allows for early issue-dedification and enables healthcare providers to make necessary adjustments to the treatment plan.

The use of remote monitoring platforms, like Dental Monitoring, integrates artificial intelligence (AI) to analyze the images in real-time. This AI-powered technology provides comprehensive reports on treatment progress, which are then used by clinicians to offer personalized feedback and instructions. Patients can monitor their progress through the app, which updates automatically with each new scan, making it possible to track their smile transformation over time.

Remote monitoring not only reduces the need for in-person appointments but also increases patient accountability and communication between patients and healthcare providers. Automated notifications and in-app messaging systems ensure that patients stay on track with their treatment and receive immediate feedback if any issues are found. This approach is particularly useful for patients with busy schedules or those in underserved areas, as it increases access to care and helps manage treatment more effectively.

In conclusion, remote monitoring in orthodontics is a game-changer, enhancing the patient's treatment outcome while making the process more convenient and efficient for all. By harnessing digital technologies, orthodontists can provide high-quality care without the need for regular office visits, making orthodontic treatment more appealing and effective for a diverse patient set.

****The HealthyStart System****

Remote monitoring has revolutionized the field of orthodontics by enhancing patient compliance and tracking treatment progress effectively. This technology is particularly crucial for children, who may need additional support in following treatment instructions correctly. By using remote monitoring tools, such as smartphone-based platforms and AI-driven software, orthodontists can ensure that children are wearing their aligners as required and making the necessary adjustments to their treatment.

The benefits of remote monitoring are numerous. It allows patients to submit images of their teeth from anywhere, which are then evaluated by their orthodontist. This not only reduces the need for in-person appointments but also provides real-time feedback and adjustments to treatment. For children, this means that any issues with aligner wear or oral hygiene can be addressed early, ensuring that their treatment is on track and reducing the need for mid-course corrections.

DentalMonitoring, a leader in AI-powered remote monitoring, has been at the forefront of this innovation. With FDA approval, their technology has set a new standard in orthodontic care, enhancing patient compliance and communication between patients and healthcare providers. By using AI to analyze images and track progress, remote monitoring systems can detect even slight changes in tooth movement, alerting both the patient and the orthodontist to any

potential issues.

This approach is not only convenient for patients but also increases the efficiency of orthodontic care. By reducing the number of in-person visits, remote monitoring saves time for both patients and healthcare providers. It also allows for early detections of any treatment issues, which can be crucial in ensuring successful outcomes. In a field where compliance is key, remote monitoring offers a powerful solution that combines technology with personalized care, making it an important development in modern orthodontics.



This non-invasive approach targets the natural development of children's teeth and jaw, using soft dental appliances to align teeth and address breathing issues, reducing the need for more invasive treatments.

In the field of orthodontics, remote monitoring and digital technologies have revolutionized how treatments are conducted, particularly through the use of in-progress assessments. This innovative approach allows orthodontists to track tooth movement and aligner fit remotely, ensuring that the treatment is progressing as planned. By using advanced mobile app technology, patients can submit regular images of their teeth and aligners, which are then used by orthodontists to monitor progress and make necessary adjustments without the need for frequent in-office visits.

One of the key benefits of remote monitoring is the ability to address any issues or side effects early on. By regularly tracking the alignment process, orthodontists can promptly make assessments and provide feedback, ensuring that the treatment stays on track. This not only enhances the treatment's effectiveness but also offers a more convenient and efficient experience for patients. For those using clear aligners, remote monitoring provides peace of mind, as they can receive regular updates on their treatment's progress and any necessary adjustments.

The integration of AI-powered tools, like those provided by DentalMonitoring and Invisalign's Virtual Care AI, has significantly elevated the remote monitoring experience. These technologies use image processing algorithms to analyze patient-submitted images, allowing for precise monitoring of tooth movement and aligner fit. Automated notifications and in-app communication enhance patient accountability and ensure timely clinical support. This seamless integration of technology and orthodontic care empowers patients to be more active participants in their treatment, making the process more personalized and efficient.

In practice, remote monitoring can reduce the number of physical office visits by half, making it ideal for busy individuals who find it challenging to attend frequent in-person appointments. Patients can capture progress photos using specific tools like the Invisalign Lens via the My Invisalign app, which are then automatically integrated into their treatment plan. This not only saves time but also ensures that treatment outcomes are optimized, as any issues are detected and addressed early.

In short, in progress assessments through remote monitoring have become a critical asset in modern orthodontic care, offering a flexible, efficient, and personalized treatment experience for both patients and practitioners.

****Myobrace: A No-Braces Approach****

In the digital health care space, remote monitoring and virtual consultations have significantly advanced the approach to oral hygiene and health monitoring. This technology is particularly valuable for individuals with orthodontic treatments, such as children with braces, where maintaining good oral hygiene is crucial to ensure the treatment's overall health and progress.

Remote monitoring allows patients to track their oral hygiene efforts and provides them with timely reminders or advice as needed. This proactive approach not only helps in reducing plaque buildup and carious lesions but also ensures that the treatment is progressing as planned. For example, remote dental monitoring tools can track whether patients are wearing

their aligners or braces correctly and for the recommended amount of time each day, which is vital for successful orthodontic treatment.

The use of digital devices and smartphone-based tools has been supported by studies, such as one by BMC Oral Health, which concluded that remote dental monitoring significantly improves plaque control and reduces carious lesions. These tools often include features like image capture and AI analysis, enabling patients to monitor their oral health at home and connect with dental providers for virtual consultations.

Invisalign Virtual Care and other remote monitoring technologies have also been designed to reduce the need for frequent in-office visits, allowing patients to continue their daily routine while their treatment is closely monitored. This convenience not only enhances patient compliance but also provides personalized feedback and adjustments based on real-time data.

In summary, remote monitoring and virtual consultations are not just convenient but also crucial for maintaining good oral hygiene, especially for children with braces. By empowering patients to take an active role in their oral health care, these technologies can significantly improve treatment outcomes and overall oral health.



Myobrace offers a brace-free solution that corrects poor oral habits, guiding jaw and teeth

alignment development in children, promoting natural growth and oral health.

The use of remote consultations for treatment assessment has revolutionised the field of orthodontics, particularly when it involves assessing if a child is ready for orthodontic treatment. This innovative approach allows for virtual initial consultations, which can determine the need for orthodontic treatment without the need for an initial in-person visit. This not only makes the process more efficient but also enhances patient convenience and accessibility.

Virtual consultations involve using video conferencing and digital tools to connect patients with orthodontic professionals from the comfort of their homes. This setup allows patients to share images and discuss their concerns remotely, which helps in providing a preliminary evaluation of their orthodontic needs. The orthodontist can visually assess the alignment of teeth and bite through the camera, often with the help of close-up views provided by the patient using a smartphone or handheld mirror.

One of the primary benefits of virtual consultations is the convenience they offer. Patients, especially those with busy schedules or living in remote areas, can access orthodontic advice without the need to travel. This accessibility is particularly beneficial for children, as it allows parents to explore treatment options without the stress of taking them out of school or from their home.

In the virtual consultation, the orthodontist can discuss potential treatment options, including traditional braces or clear aligners, and provide information on the estimated duration and cost of the treatment. They can also address any questions or concerns the patient may have, ensuring that they are well-informed about their treatment plan.

Following the virtual consultation, if the orthodontist and patient determine that in-person treatment is necessary, the next steps typically involve scheduling an in-person appointment

for a comprehensive examination. This visit may include taking impressions or scans of the teeth, which are essential for finalizing the treatment plan.

In today's digital era, remote consultations have not only made orthodontic care more accessible but have also optimized the use of time for both patients and orthodontists. By reducing unnecessary in-person visits for preliminary assessments, these virtual consultations streamline the initial consultation process, making it more efficient and cost-effective. This approach aligns with the growing emphasis on telehealth solutions in healthcare, providing a convenient and effective way to begin the orthodontic treatment journey.

****Comprehensive Orthodontic Solutions****

Remote monitoring and virtual consultations have revolutionized the way orthodontic care is delivered, particularly for children in underserved areas or those with access-to-care issues. This innovative approach ensures that more children can receive the necessary treatment, bridging the gap in dental healthcare accessibility.

One of the most significant benefits of remote monitoring is its ability to provide real-time feedback and adjustments to treatment plans. By using advanced technology and mobile app platforms, orthodontists can track a patient's progress without the need for frequent in-person visits. This is especially beneficial for children in rural or underserved communities where access to specialized dental care may be limited. Remote monitoring allows these children to receive timely and effective orthodontic treatment from the comfort of their homes, reducing the need for long-distance travel and associated costs.

Teledentistry, a form of remote dental care, also enhances access to orthodontic services by offering digital consultations. This method allows patients to receive dental advice and guidance via video calls or digital communications, making it easier for children in remote areas to receive regular check-ups and dental care. Teledentistry not only saves time and travel expenses but also ensures that children receive timely treatment, which is crucial for their oral health and overall well-being.

In underserved areas, teledentistry can assist in emergency situations by providing temporary solutions for dental issues, such as broken brackets or loose wires. It also helps in referrals and consultations, ensuring that children can access specialized orthodontic care even when local services are not accessible. By reducing the barriers to dental care, remote monitoring and teledentistry are playing a vital role in ensuring that more children can receive the orthodontic treatment they need, regardless of their location or economic status.

The integration of artificial intelligence (AI) in remote monitoring systems has also significantly advanced the effectiveness of orthodontic treatment. AI can help in accurate assessments and personalized feedback, ensuring that treatment plans are optimized for each patient. This not only improves treatment outcomes but also increases patient compliance and trust in their healthcare providers.

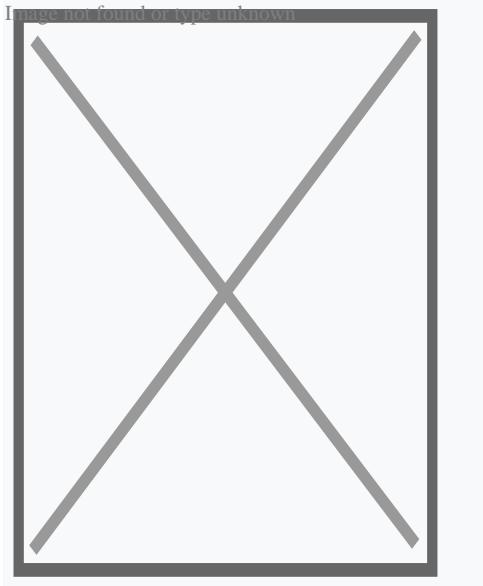
In conclusion, remote monitoring and virtual consultations have become crucial in making orthodontic care more accessible to children in underserved areas. By reducing the need for in-person visits and providing real-time feedback, these technologies are revolutionizing the way dental care is delivered, ensuring that more children can receive the necessary treatment to improve their oral health and quality of life.



About malocclusion

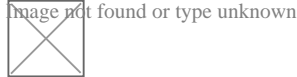
"Deep bite" and "Buck teeth" redirect here. For the village, see Deep Bight, Newfoundland and Labrador.

Malocclusion



Malocclusion in 10-year-old girl

Specialty Dentistry Image not found or type unknown [Edit this on Wikidata](#)



Look up ***bucktooth*** in Wiktionary, the free dictionary.

In orthodontics, a **malocclusion** is a misalignment or incorrect relation between the teeth of the upper and lower dental arches when they approach each other as the jaws close. The English-language term dates from 1864;^[1] Edward Angle (1855–1930), the "father of modern orthodontics",^[2]^[3]^[*need quotation to verify*] popularised it. The word derives from *mal-* 'incorrect' and *occlusion* 'the manner in which opposing teeth meet'.

The malocclusion classification is based on the relationship of the mesiobuccal cusp of the maxillary first molar and the buccal groove of the mandibular first molar. If this molar relationship exists, then the teeth can align into normal occlusion. According to Angle, malocclusion is any deviation of the occlusion from the ideal.^[4] However, assessment for malocclusion should also take into account aesthetics and the impact on functionality. If these aspects are acceptable to the patient despite meeting the formal definition of malocclusion, then treatment may not be necessary. It is estimated that nearly 30% of the population have malocclusions that are categorised as severe and definitely benefit from orthodontic treatment.^[5]

Causes

[edit]

The aetiology of malocclusion is somewhat contentious, however, simply put it is multifactorial, with influences being both genetic^[6]^[*unreliable source?*] and

environmental.^[7] Malocclusion is already present in one of the Skhul and Qafzeh hominin fossils and other prehistoric human skulls.^{[8][9]} There are three generally accepted causative factors of malocclusion:

- Skeletal factors – the size, shape and relative positions of the upper and lower jaws. Variations can be caused by environmental or behavioral factors such as muscles of mastication, nocturnal mouth breathing, and cleft lip and cleft palate.
- Muscle factors – the form and function of the muscles that surround the teeth. This could be impacted by habits such as finger sucking, nail biting, pacifier and tongue thrusting^[10]
- Dental factors – size of the teeth in relation to the jaw, early loss of teeth could result in spacing or mesial migration causing crowding, abnormal eruption path or timings, extra teeth (supernumeraries), or too few teeth (hypodontia)

There is not one single cause of malocclusion, and when planning orthodontic treatment it is often helpful to consider the above factors and the impact they have played on malocclusion. These can also be influenced by oral habits and pressure resulting in malocclusion.^{[11][12]}

Behavioral and dental factors

[edit]

In the active skeletal growth,^[13] mouthbreathing, finger sucking, thumb sucking, pacifier sucking, onychophagia (nail biting), dermatophagia, pen biting, pencil biting, abnormal posture, deglutition disorders and other habits greatly influence the development of the face and dental arches.^{[14][15][16][17][18]} Pacifier sucking habits are also correlated with otitis media.^{[19][20]} Dental caries, periapical inflammation and tooth loss in the deciduous teeth can alter the correct permanent teeth eruptions.

Primary vs. secondary dentition

[edit]

Malocclusion can occur in primary and secondary dentition.

In primary dentition malocclusion is caused by:

- Underdevelopment of the dentoalveolar tissue.

- Over development of bones around the mouth.
- Cleft lip and palate.
- Overcrowding of teeth.
- Abnormal development and growth of teeth.

In secondary dentition malocclusion is caused by:

- Periodontal disease.
- Overeruption of teeth.^[21]
- Premature and congenital loss of missing teeth.

Signs and symptoms

[edit]

Malocclusion is a common finding,^[22]^[23] although it is not usually serious enough to require treatment. Those who have more severe malocclusions, which present as a part of craniofacial anomalies, may require orthodontic and sometimes surgical treatment (orthognathic surgery) to correct the problem.

The ultimate goal of orthodontic treatment is to achieve a stable, functional and aesthetic alignment of teeth which serves to better the patient's dental and total health.^[24] The symptoms which arise as a result of malocclusion derive from a deficiency in one or more of these categories.^[25]

The symptoms are as follows:

- Tooth decay (caries): misaligned teeth will make it more difficult to maintain oral hygiene. Children with poor oral hygiene and diet will be at an increased risk.
- Periodontal disease: irregular teeth would hinder the ability to clean teeth meaning poor plaque control. Additionally, if teeth are crowded, some may be more buccally or lingually placed, there will be reduced bone and periodontal support. Furthermore, in Class III malocclusions, mandibular anterior teeth are pushed labially which contributes to gingival recession and weakens periodontal support.
- Trauma to anterior teeth: Those with an increased overjet are at an increased risk of trauma. A systematic review found that an overjet of greater than 3mm will double the risk of trauma.
- Masticatory function: people with anterior open bites, large increased & reverse overjet and hypodontia will find it more difficult to chew food.
- Speech impairment: a lisp is when the incisors cannot make contact, orthodontics can treat this. However, other forms of misaligned teeth will have little impact on speech and orthodontic treatment has little effect on fixing any problems.

- Tooth impaction: these can cause resorption of adjacent teeth and other pathologies for example a dentigerous cyst formation.
- Psychosocial wellbeing: malocclusions of teeth with poor aesthetics can have a significant effect on self-esteem.

Malocclusions may be coupled with skeletal disharmony of the face, where the relations between the upper and lower jaws are not appropriate. Such skeletal disharmonies often distort sufferer's face shape, severely affect aesthetics of the face, and may be coupled with mastication or speech problems. Most skeletal malocclusions can only be treated by orthognathic surgery. *[citation needed]*

Classification

[edit]

Depending on the sagittal relations of teeth and jaws, malocclusions can be divided mainly into three types according to Angle's classification system published 1899. However, there are also other conditions, e.g. *crowding of teeth*, not directly fitting into this classification.

Many authors have tried to modify or replace Angle's classification. This has resulted in many subtypes and new systems (see section below: *Review of Angle's system of classes*).

A deep bite (also known as a Type II Malocclusion) is a condition in which the upper teeth overlap the lower teeth, which can result in hard and soft tissue trauma, in addition to an effect on appearance.^[26] It has been found to occur in 15–20% of the US population.^[27]

An open bite is a condition characterised by a complete lack of overlap and occlusion between the upper and lower incisors.^[28] In children, open bite can be caused by prolonged thumb sucking.^[29] Patients often present with impaired speech and mastication.^[30]

Overbites

[edit]

This is a vertical measurement of the degree of overlap between the maxillary incisors and the mandibular incisors. There are three features that are analysed in the classification of an overbite:

- Degree of overlap: edge to edge, reduced, average, increased
- Complete or incomplete: whether there is contact between the lower teeth and the opposing teeth/tissue (hard palate or gingivae) or not.
- Whether contact is traumatic or atraumatic

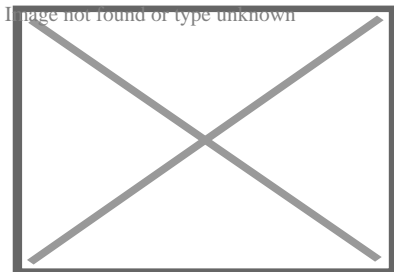
An average overbite is when the upper anterior teeth cover a third of the lower teeth. Covering less than this is described as 'reduced' and more than this is an 'increased' overbite. No overlap or contact is considered an 'anterior open bite'.^{[25][31][32]}

Angle's classification method

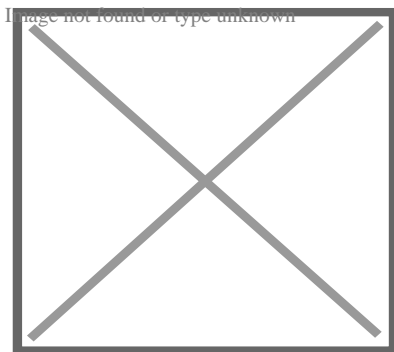
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This section **may be too technical for most readers to understand**. Please help improve it to make it understandable to non-experts, without removing the technical details. (*September 2023*) (*Learn how and when to remove this message*)



Class I with severe crowding and labially erupted canines



Class II molar relationship

Edward Angle, who is considered the father of modern orthodontics, was the first to classify malocclusion. He based his classifications on the relative position of the maxillary first molar.^[33] According to Angle, the mesiobuccal cusp of the upper first molar should align with the buccal groove of the mandibular first molar. The teeth

should all fit on a line of occlusion which, in the upper arch, is a smooth curve through the central fossae of the posterior teeth and cingulum of the canines and incisors, and in the lower arch, is a smooth curve through the buccal cusps of the posterior teeth and incisal edges of the anterior teeth. Any variations from this resulted in malocclusion types. It is also possible to have different classes of malocclusion on left and right sides.

- **Class I** (Neurocclusion): Here the molar relationship of the occlusion is normal but the incorrect line of occlusion or as described for the maxillary first molar, but the other teeth have problems like spacing, crowding, over or under eruption, etc.
- **Class II** (Distocclusion (retrognathism, overjet, overbite)): In this situation, the mesiobuccal cusp of the upper first molar is not aligned with the mesiobuccal groove of the lower first molar. Instead it is anterior to it. Usually the mesiobuccal cusp rests in between the first mandibular molars and second premolars. There are two subtypes:
 - Class II Division 1: The molar relationships are like that of Class II and the anterior teeth are protruded.
 - Class II Division 2: The molar relationships are Class II but the central are retroclined and the lateral teeth are seen overlapping the centrals.
- **Class III**: (Mesiocclusion (prognathism, anterior crossbite, negative overjet, underbite)) In this case the upper molars are placed not in the mesiobuccal groove but posteriorly to it. The mesiobuccal cusp of the maxillary first molar lies posteriorly to the mesiobuccal groove of the mandibular first molar. Usually seen as when the lower front teeth are more prominent than the upper front teeth. In this case the patient very often has a large mandible or a short maxillary bone.

Review of Angle's system of classes and alternative systems

[edit]

A major disadvantage of Angle's system of classifying malocclusions is that it only considers two dimensions along a spatial axis in the sagittal plane in the terminal occlusion, but occlusion problems can be three-dimensional. It does not recognise deviations in other spatial axes, asymmetric deviations, functional faults and other therapy-related features.

Angle's classification system also lacks a theoretical basis; it is purely descriptive. Its much-discussed weaknesses include that it only considers static occlusion, it does not account for the development and causes (aetiology) of occlusion problems, and it disregards the proportions (or relationships in general) of teeth and face.^[34] Thus,

many attempts have been made to modify the Angle system or to replace it completely with a more efficient one,^[35] but Angle's classification continues to be popular mainly because of its simplicity and clarity.^[citation needed]

Well-known modifications to Angle's classification date back to Martin Dewey (1915) and Benno Lischer (1912, 1933). Alternative systems have been suggested by, among others, Simon (1930, the first three-dimensional classification system), Jacob A. Salzmann (1950, with a classification system based on skeletal structures) and James L. Ackerman and William R. Proffit (1969).^[36]

Incisor classification

[edit]

Besides the molar relationship, the British Standards Institute Classification also classifies malocclusion into incisor relationship and canine relationship.

- Class I: The lower incisor edges occlude with or lie immediately below the cingulum plateau of the upper central incisors
- Class II: The lower incisor edges lie posterior to the cingulum plateau of the upper incisors
 - Division 1 – the upper central incisors are proclined or of average inclination and there is an increase in overjet
 - Division 2 – The upper central incisors are retroclined. The overjet is usually minimal or may be increased.
- Class III: The lower incisor edges lie anterior to the cingulum plateau of the upper incisors. The overjet is reduced or reversed.

Canine relationship by Ricketts

[edit]

- Class I: Mesial slope of upper canine coincides with distal slope of lower canine
- Class II: Mesial slope of upper canine is ahead of distal slope of lower canine
- Class III: Mesial slope of upper canine is behind to distal slope of lower canine

Crowding of teeth

[edit]

Dental crowding is defined by the amount of space that would be required for the teeth to be in correct alignment. It is obtained in two ways: 1) by measuring the amount of space required and reducing this from calculating the space available via the width of the teeth, or 2) by measuring the degree of overlap of the teeth.

The following criterion is used:[²⁵]

- 0-4mm = Mild crowding
- 4-8mm = Moderate crowding
- >8mm = Severe crowding

Causes

[edit]

Genetic (inheritance) factors, extra teeth, lost teeth, impacted teeth, or abnormally shaped teeth have been cited as causes of crowding. Ill-fitting dental fillings, crowns, appliances, retainers, or braces as well as misalignment of jaw fractures after a severe injury are also known to cause crowding.[²⁶] Tumors of the mouth and jaw, thumb sucking, tongue thrusting, pacifier use beyond age three, and prolonged use of a bottle have also been identified.[²⁶]

Lack of masticatory stress during development can cause tooth overcrowding.[³⁷][³⁸] Children who chewed a hard resinous gum for two hours a day showed increased facial growth.[³⁷] Experiments in animals have shown similar results. In an experiment on two groups of rock hyraxes fed hardened or softened versions of the same foods, the animals fed softer food had significantly narrower and shorter faces and thinner and shorter mandibles than animals fed hard food.[³⁷][³⁹][*failed verification*]

A 2016 review found that breastfeeding lowers the incidence of malocclusions developing later on in developing infants.[⁴⁰]

During the transition to agriculture, the shape of the human mandible went through a series of changes. The mandible underwent a complex shape changes not matched by the teeth, leading to incongruity between the dental and mandibular form. These changes in human skulls may have been "driven by the decreasing bite forces required to chew the processed foods eaten once humans switched to growing different types of cereals, milking and herding animals about 10,000 years ago." [³⁸][⁴¹]

Treatment

[edit]

Orthodontic management of the condition includes dental braces, lingual braces, clear aligners or palatal expanders.^[42] Other treatments include the removal of one or more teeth and the repair of injured teeth. In some cases, surgery may be necessary.^[43]

Treatment

[edit]

Malocclusion is often treated with orthodontics,^[42] such as tooth extraction, clear aligners, or dental braces,^[44] followed by growth modification in children or jaw surgery (orthognathic surgery) in adults. Surgical intervention is used only in rare occasions. This may include surgical reshaping to lengthen or shorten the jaw. Wires, plates, or screws may be used to secure the jaw bone, in a manner like the surgical stabilization of jaw fractures. Very few people have "perfect" alignment of their teeth with most problems being minor that do not require treatment.^[37]

Crowding

[edit]

Crowding of the teeth is treated with orthodontics, often with tooth extraction, clear aligners, or dental braces, followed by growth modification in children or jaw surgery (orthognathic surgery) in adults. Surgery may be required on rare occasions. This may include surgical reshaping to lengthen or shorten the jaw (orthognathic surgery). Wires, plates, or screws may be used to secure the jaw bone, in a manner similar to the surgical stabilization of jaw fractures. Very few people have "perfect" alignment of their teeth. However, most problems are very minor and do not require treatment.^[39]

Class I

[edit]

While treatment is not crucial in class I malocclusions, in severe cases of crowding can be an indication for intervention. Studies indicate that tooth extraction can have benefits to correcting malocclusion in individuals.^{[45][46]} Further research is needed as reoccurring crowding has been examined in other clinical trials.^{[45][47]}

Class II

[edit]

A few treatment options for class II malocclusions include:

1. Functional appliance which maintains the mandible in a postured position to influence both the orofacial musculature and dentoalveolar development prior to fixed appliance therapy. This is ideally done through pubertal growth in pre-adolescent children and the fixed appliance during permanent dentition .^[48] Different types of removable appliances include Activator, Bionatar, Medium opening activator, Herbst, Frankel and twin block appliance with the twin block being the most widely used one.^[49]
2. Growth modification through headgear to redirect maxillary growth
3. Orthodontic camouflage so that jaw discrepancy no longer apparent
4. Orthognathic surgery – sagittal split osteotomy mandibular advancement carried out when growth is complete where skeletal discrepancy is severe in anterior-posterior relationship or in vertical direction. Fixed appliance is required before, during and after surgery.
5. Upper Removable Appliance – limited role in contemporary treatment of increased overjets. Mostly used for very mild Class II, overjet due to incisor proclination, favourable overbite.

Class II Division 1

[edit]

Low- to moderate- quality evidence suggests that providing early orthodontic treatment for children with prominent upper front teeth (class II division 1) is more effective for reducing the incidence of incisal trauma than providing one course of orthodontic treatment in adolescence.^[50] There do not appear to be any other advantages of providing early treatment when compared to late treatment.^[50] Low-quality evidence suggests that, compared to no treatment, late treatment in adolescence with functional appliances is effective for reducing the prominence of upper front teeth.^[50]

Class II Division 2

[edit]

Treatment can be undertaken using orthodontic treatments using dental braces.^[51] While treatment is carried out, there is no evidence from clinical trials to recommend or discourage any type of orthodontic treatment in children.^[51] A 2018 Cochrane systematic review anticipated that the evidence base supporting treatment approaches is not likely to improve occlusion due to the low prevalence of the condition and the ethical difficulties in recruiting people to participate in a randomized controlled trials for treating this condition.^[51]

Class III

[edit]

The British Standard Institute (BSI) classify class III incisor relationship as the lower incisor edge lies anterior to the cingulum plateau of the upper incisors, with reduced or reversed over jet.^[52] The skeletal facial deformity is characterized by mandibular prognathism, maxillary retrognathism or a combination of the two. This effects 3-8% of UK population with a higher incidence seen in Asia.^[53]

One of the main reasons for correcting Class III malocclusion is aesthetics and function. This can have a psychological impact on the person with malocclusion resulting in speech and mastication problems as well. In mild class III cases, the patient is quite accepting of the aesthetics and the situation is monitored to observe the progression of skeletal growth.^[54]

Maxillary and mandibular skeletal changes during prepubertal, pubertal and post pubertal stages show that class III malocclusion is established before the prepubertal stage.^[55] One treatment option is the use of growth modification appliances such as the Chin Cap which has greatly improved the skeletal framework in the initial stages. However, majority of cases are shown to relapse into inherited class III malocclusion during the pubertal growth stage and when the appliance is removed after treatment. [^{55]}

Another approach is to carry out orthognathic surgery, such as a bilateral sagittal split osteotomy (BSSO) which is indicated by horizontal mandibular excess. This involves surgically cutting through the mandible and moving the fragment forward or backwards for desired function and is supplemented with pre and post surgical orthodontics to

ensure correct tooth relationship. Although the most common surgery of the mandible, it comes with several complications including: bleeding from inferior alveolar artery, unfavorable splits, condylar resorption, avascular necrosis and worsening of temporomandibular joint.[⁵⁶]

Orthodontic camouflage can also be used in patients with mild skeletal discrepancies. This is a less invasive approach that uses orthodontic brackets to correct malocclusion and try to hide the skeletal discrepancy. Due to limitations of orthodontics, this option is more viable for patients who are not as concerned about the aesthetics of their facial appearance and are happy to address the malocclusion only, as well as avoiding the risks which come with orthognathic surgery. Cephalometric data can aid in the differentiation between the cases that benefit from ortho-surgical or orthodontic treatment only (camouflage); for instance, examining a large group of orthognathic patient with Class III malocclusions they had average ANB angle of -3.57° (95% CI, -3.92° to -3.21°). [⁵⁷]

Deep bite

[edit]

The most common corrective treatments available are fixed or removal appliances (such as dental braces), which may or may not require surgical intervention. At this time there is no robust evidence that treatment will be successful.[⁵¹]

Open bite

[edit]

An open bite malocclusion is when the upper teeth don't overlap the lower teeth. When this malocclusion occurs at the front teeth it is known as anterior open bite. An open bite is difficult to treat due to multifactorial causes, with relapse being a major concern. This is particularly so for an anterior open bite.[⁵⁸] Therefore, it is important to carry out a thorough initial assessment in order to obtain a diagnosis to tailor a suitable treatment plan.[⁵⁸] It is important to take into consideration any habitual risk factors, as this is crucial for a successful outcome without relapse. Treatment approach includes behavior changes, appliances and surgery. Treatment for adults include a combination of extractions, fixed appliances, intermaxillary elastics and orthognathic surgery.[³⁰] For children, orthodontics is usually used to compensate for continued growth. With

children with mixed dentition, the malocclusion may resolve on its own as the permanent teeth erupt. Furthermore, should the malocclusion be caused by childhood habits such as digit, thumb or pacifier sucking, it may result in resolution as the habit is stopped. Habit deterrent appliances may be used to help in breaking digit and thumb sucking habits. Other treatment options for patients who are still growing include functional appliances and headgear appliances.

Tooth size discrepancy

[edit]

Identifying the presence of tooth size discrepancies between the maxillary and mandibular arches is an important component of correct orthodontic diagnosis and treatment planning.

To establish appropriate alignment and occlusion, the size of upper and lower front teeth, or upper and lower teeth in general, needs to be proportional. Inter-arch tooth size discrepancy (ITSD) is defined as a disproportion in the mesio-distal dimensions of teeth of opposing dental arches. The prevalence is clinically significant among orthodontic patients and has been reported to range from 17% to 30%.^[59]

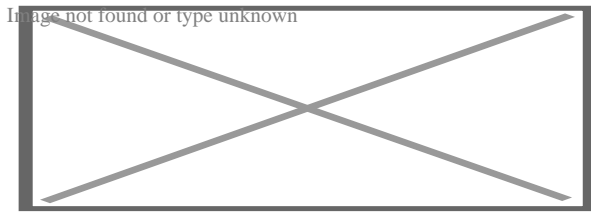
Identifying inter-arch tooth size discrepancy (ITSD) before treatment begins allows the practitioner to develop the treatment plan in a way that will take ITSD into account. ITSD corrective treatment may entail demanding reduction (interproximal wear), increase (crowns and resins), or elimination (extractions) of dental mass prior to treatment finalization.^[60]

Several methods have been used to determine ITSD. Of these methods the one most commonly used is the Bolton analysis. Bolton developed a method to calculate the ratio between the mesiodistal width of maxillary and mandibular teeth and stated that a correct and harmonious occlusion is possible only with adequate proportionality of tooth sizes.^[60] Bolton's formula concludes that if in the anterior portion the ratio is less than 77.2% the lower teeth are too narrow, the upper teeth are too wide or there is a combination of both. If the ratio is higher than 77.2% either the lower teeth are too wide, the upper teeth are too narrow or there is a combination of both.^[59]

Other conditions

[edit]

Further information: Open bite malocclusion



Open bite treatment after eight months of braces.

Other kinds of malocclusions can be due to or horizontal, vertical, or transverse skeletal discrepancies, including skeletal asymmetries.

Increased vertical growth causes a long facial profile and commonly leads to an open bite malocclusion, while decreased vertical facial growth causes a short facial profile and is commonly associated with a deep bite malocclusion. However, there are many other more common causes for open bites (such as tongue thrusting and thumb sucking) and likewise for deep bites.^{[61][62][63]}

The upper or lower jaw can be overgrown (macrognathia) or undergrown (micrognathia).^{[62][61][63]} It has been reported that patients with micrognathia are also affected by retrognathia (abnormal posterior positioning of the mandible or maxilla relative to the facial structure).^[62] These patients are majorly predisposed to a class II malocclusion. Mandibular macrognathia results in prognathism and predisposes patients to a class III malocclusion.^[64]

Most malocclusion studies to date have focused on Class III malocclusions. Genetic studies for Class II and Class I malocclusion are more rare. An example of hereditary mandibular prognathism can be seen amongst the Hapsburg Royal family where one third of the affected individuals with severe class III malocclusion had one parent with a similar phenotype ^[65]

The frequent presentation of dental malocclusions in patients with craniofacial birth defects also supports a strong genetic aetiology. About 150 genes are associated with craniofacial conditions presenting with malocclusions.^[66] Micrognathia is a commonly recurring craniofacial birth defect appearing among multiple syndromes.

For patients with severe malocclusions, corrective jaw surgery or orthognathic surgery may be carried out as a part of overall treatment, which can be seen in about 5% of the general population.^{[62][61][63]}

See also

[edit]

- Crossbite
- Elastics
- Facemask (orthodontics)

- Maximum intercuspation
- Mouth breathing
- Occlusion (dentistry)

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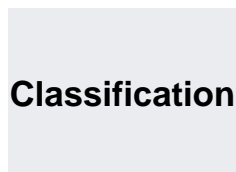
Further reading

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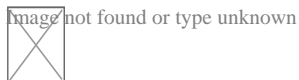
- o Peter S. Ungar, "The Trouble with Teeth: Our teeth are crowded, crooked and riddled with cavities. It hasn't always been this way", *Scientific American*, vol. 322, no. 4 (April 2020), pp. 44–49. "Our teeth [...] evolved over hundreds of millions of years to be incredibly strong and to align precisely for efficient chewing. [...] Our dental disorders largely stem from a shift in the oral environment caused by the introduction of softer, more sugary foods than the ones our ancestors typically ate."

External links

[edit]



- o **ICD-10**: K07.3, K07.4, K07.5, D K07.6
- o **ICD-9-CM**: 524.4
- o **MeSH**: D008310



Wikimedia Commons has media related to **Malocclusion**.

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Orthodontics

Diagnosis

- Bolton analysis
- Cephalometric analysis
- Cephalometry
- Dentition analysis
- Failure of eruption of teeth
- Little's Irregularity Index
- Malocclusion
- Scissor bite
- Standard anatomical position
- Tooth ankylosis
- Tongue thrust
- Overbite
- Overjet
- Open bite
- Crossbite
- Dental crowding
- Dental spacing

Conditions

- Bimaxillary Protrusion
- Prognathism
- Retrognathism
- Maxillary hypoplasia
- Condylar hyperplasia
- Overeruption
- Mouth breathing
- Temporomandibular dysfunction

Appliances

- ACCO appliance
- Archwire
- Activator appliance
- Braces
- Damon system
- Elastics
- Frankel appliance
- Invisalign
- Lingual arch
- Lip bumper
- Herbst Appliance
- List of orthodontic functional appliances
- List of palatal expanders
- Lingual braces
- Headgear
- Orthodontic technology
- Orthodontic spacer
- Palatal lift prosthesis
- Palatal expander
- Quad helix
- Retainer
- SureSmile
- Self-ligating braces
- Splint activator
- Twin Block Appliance
- Anchorage (orthodontics)
- Cantilever mechanics
- Fiberotomy
- Interproximal reduction
- Intrusion (orthodontics)
- Molar distalization
- SARPE
- Serial extraction
- Beta-titanium
- Nickel titanium
- Stainless steel
- TiMolium
- Elgiloy
- Ceramic
- Composite
- Dental elastics

Procedures

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 - Society for Orthodontic Dental Technology (Germany)
- Journals**
 - American Journal of Orthodontics and Dentofacial Orthopedics
 - The Angle Orthodontist
 - Journal of Orthodontics
- Institution**
 - Angle School of Orthodontia

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Dental disease involving the jaw

- General**
 - Jaw abnormality
 - malocclusion
 - Orthodontics
 - Gnathitis
- Size**
 - Micrognathism
 - Maxillary hypoplasia
 - Cherubism
- Maxilla and Mandible**
 - Congenital epulis
 - Torus mandibularis
 - Torus palatinus
 - Jaw and base of cranium
 - Prognathism
 - Retrognathism
- Other**
 - Dental arch
 - Crossbite
 - Overbite
 - Temporomandibular joint disorder

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