orthodontic treatment

- **Understanding Common Fee Structures in Orthodontics**
  Understanding Common Fee Structures in Orthodontics Insurance Coverage That Reduces Out of Pocket Costs Exploring Payment Plans and Financing Arrangements Differences Between Flexible Spending and Health Savings Factors Influencing Variations in Treatment Pricing Asking the Right Questions During Cost Consultations Allocation of Funds for Long Term Orthodontic Care Prioritizing Necessary Treatments Within a Budget Navigating Claims and Reimbursements Step by Step How Location Affects Orthodontic Expenses Educating Patients on Financial Planning for Treatment Strategies to Keep Future Costs Predictable
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Here's the article outline for 'Understanding Common Fee Structures in Orthodontics' focusing on orthodontic treatment for kids:

Here's a human-like essay on the topic:

The Impact of Research on Evidence-Based Treatments in Orthodontics

Orthodontic treatment for children has undergone remarkable transformations over the past few decades, largely driven by rigorous scientific research and evidence-based approaches. What once relied heavily on traditional methods and practitioner intuition has now evolved into a sophisticated, data-driven field that prioritizes patient outcomes and scientific understanding.

Research plays a critical role in shaping modern orthodontic treatments. Early orthodontic evaluations are recommended around age seven **Kids' dental alignment services** dentistry. By systematically studying treatment approaches, long-term effects, and patient responses, researchers have developed more precise and effective interventions for children's dental alignment. These studies help orthodontists move beyond anecdotal experience, providing concrete, measurable insights into the most successful strategies.

One significant advancement has been the development of more nuanced understanding of dental growth and development. Longitudinal studies tracking children's dental progression have revealed complex patterns that inform earlier and more targeted interventions. This means orthodontists can now predict and address potential alignment issues with greater accuracy than ever before.

Moreover, evidence-based research has led to less invasive and more comfortable treatment options. Advanced imaging technologies, computer modeling, and comprehensive clinical trials have enabled the creation of more patient-friendly approaches. For instance, newer orthodontic techniques minimize discomfort and reduce treatment times compared to traditional methods.

The continuous integration of research findings into clinical practice ensures that children receive the most current, scientifically validated treatments. This approach not only improves clinical outcomes but also builds patient and parent confidence in orthodontic procedures.

As research continues to evolve, we can expect even more personalized and effective orthodontic treatments that prioritize both functional alignment and aesthetic considerations. The future of pediatric orthodontics looks bright, powered by the relentless pursuit of scientific understanding.

The historical evolution of research methodologies in orthodontic interventions for children represents a fascinating journey of scientific discovery and clinical innovation. Over the past century, orthodontic research has transformed dramatically, moving from subjective observations to rigorous, evidence-based approaches that prioritize patient outcomes and treatment effectiveness.

In the early 20th century, orthodontic research was primarily anecdotal and based on individual practitioners' experiences. Clinicians relied heavily on personal observations and limited case studies, with minimal standardized methodological frameworks. These early investigations, while well-intentioned, lacked the systematic approach needed to generate reliable, generalizable insights.

By the mid-20th century, researchers began implementing more structured research designs. Longitudinal studies emerged, allowing professionals to track dental and skeletal development over extended periods. This shift enabled a more comprehensive understanding of growth patterns, treatment responses, and long-term intervention outcomes in pediatric populations.

The late 20th and early 21st centuries marked a significant turning point with the rise of evidence-based practice. Researchers started incorporating advanced statistical methods, randomized controlled trials, and sophisticated imaging technologies. These methodological advancements allowed for more precise measurements, better understanding of treatment efficacy, and more personalized intervention strategies.

Contemporary orthodontic research now emphasizes interdisciplinary collaboration, integrating insights from genetics, biomechanics, and developmental psychology. Researchers utilize advanced technologies like 3D imaging, digital modeling, and computational analysis to develop more nuanced understanding of pediatric dental interventions.

This evolutionary trajectory demonstrates how research methodologies have progressively become more sophisticated, patient-centered, and scientifically rigorous, ultimately improving treatment outcomes and patient experiences in pediatric orthodontics.

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Insurance Coverage and Impact on Orthodontic Expenses

Here's the essay:

Key Research Findings that Have Transformed Understanding of Pediatric Orthodontic Treatments

Over the past few decades, pediatric orthodontic treatments have undergone remarkable transformations, driven by groundbreaking research that has fundamentally reshaped our understanding of dental development and intervention strategies. These advances have not just improved treatment outcomes but have also significantly enhanced patient experiences.

One of the most significant research breakthroughs has been the deeper understanding of early intervention techniques. Researchers have discovered that identifying and addressing orthodontic issues during early childhood can prevent more complex dental problems later in life. Studies have shown that strategic interceptive treatments can guide jaw growth, correct misalignments, and reduce the need for more invasive procedures during adolescence.

Technological innovations have also played a crucial role. Advanced imaging techniques like 3D digital scanning and cone-beam computed tomography have allowed orthodontists to create more precise treatment plans. These technologies enable practitioners to visualize dental structures with unprecedented clarity, leading to more personalized and effective interventions.

Genetic research has further expanded our comprehension of orthodontic challenges. Researchers have identified specific genetic markers associated with dental irregularities, helping predict potential issues and develop more targeted treatment approaches. This genetic insight allows for more proactive and individualized care.

Moreover, longitudinal studies have provided critical insights into long-term treatment outcomes. By tracking patients over extended periods, researchers have developed a more nuanced understanding of how different interventions impact dental development and overall oral health.

These research findings have collectively shifted pediatric orthodontic treatments from a reactive to a more preventative and personalized model. The result is more efficient, less invasive, and more patient-friendly approaches that prioritize both functional and aesthetic outcomes.

As research continues to evolve, we can expect even more sophisticated and effective pediatric orthodontic treatments in the future, ultimately improving children's dental health and overall quality of life.

Payment Plan Options for Pediatric Orthodontic Care

Current Scientific Approaches to Evaluating Treatment Effectiveness and Long-Term Outcomes for Children's Orthodontic Care

In recent years, the field of orthodontics has witnessed a significant transformation in how researchers and clinicians evaluate the effectiveness of treatments for children. Gone are the days of relying solely on subjective observations and traditional methods. Today, a more comprehensive and evidence-based approach has emerged, combining advanced technologies, longitudinal studies, and sophisticated analytical techniques.

Modern research in children's orthodontic care focuses on multiple dimensions of treatment assessment. Researchers now employ advanced imaging technologies like 3D digital scanning and cone-beam computed tomography to track precise tooth movement and skeletal changes. These technologies provide unprecedented insights into treatment progression and outcomes that were impossible just a decade ago.

Longitudinal studies have become particularly crucial in understanding the long-term impacts of orthodontic interventions. By following patients over extended periods, scientists can now evaluate not just immediate aesthetic improvements, but also functional and psychological outcomes. This approach helps clinicians understand how early interventions might prevent more complex dental issues later in life.

Interdisciplinary collaboration has also become a hallmark of contemporary orthodontic research. Experts from fields like genetics, biomechanics, and developmental psychology now contribute to a more holistic understanding of treatment effectiveness. This approach recognizes that orthodontic care isn't just about straightening teeth, but about supporting overall developmental health.

Patient-reported outcomes and quality of life measures have gained significant importance in recent research. Researchers now recognize that successful treatment isn't just about technical precision, but also about patient comfort, psychological well-being, and individual satisfaction.

Statistical modeling and big data analysis have revolutionized how treatment effectiveness is evaluated. Machine learning algorithms can now predict treatment outcomes with remarkable accuracy, helping clinicians develop more personalized treatment plans.

As research continues to evolve, the future of children's orthodontic care looks increasingly precise, personalized, and patient-centered. The integration of advanced technologies, comprehensive research methodologies, and a holistic understanding of patient needs promises more effective and compassionate orthodontic treatments.

Factors Influencing Orthodontic Treatment Costs

Critical Analysis of Research Influence on Pediatric Orthodontic Clinical Decisions

In the rapidly evolving field of pediatric orthodontics, the integration of research-driven insights has become paramount in shaping treatment approaches and clinical decision-making. This essay explores the intricate relationship between academic research and practical clinical applications, highlighting how evidence-based practices are transforming orthodontic care for young patients.

Modern orthodontic practitioners increasingly rely on comprehensive research to inform their treatment strategies. Unlike past approaches that depended heavily on individual practitioner experience, today's clinical decisions are grounded in systematic studies, longitudinal research, and robust scientific methodologies. This shift ensures more predictable outcomes and personalized treatment plans that consider individual patient characteristics.

The impact of research is particularly significant in understanding developmental orthodontic challenges. Longitudinal studies tracking dental and facial growth patterns provide clinicians with nuanced insights into intervention timing, treatment efficacy, and potential long-term consequences of various orthodontic approaches. These research-driven insights allow for more targeted and less invasive interventions.

Technological advancements have further amplified research's role in clinical decision-making. Advanced imaging techniques, computational modeling, and genetic analysis now offer unprecedented understanding of craniofacial development. Orthodontists can now develop more precise, patient-specific treatment protocols based on comprehensive scientific evidence.

Moreover, evidence-based research has highlighted the importance of interdisciplinary approaches. Studies demonstrating connections between orthodontic treatments and broader health outcomes encourage collaboration among dental specialists, pediatricians, and researchers. This holistic perspective ensures more comprehensive patient care.

However, challenges remain in translating research into practical clinical applications. The gap between academic research and everyday practice continues to be a complex issue. Practitioners must continuously update their knowledge, critically evaluate new research, and be willing to adapt their methodologies.

In conclusion, research plays a transformative role in pediatric orthodontic practices. By providing scientifically validated insights, research enables more precise, personalized, and effective treatment strategies. As technology and scientific understanding continue to advance, the symbiosis between research and clinical practice will undoubtedly become even more sophisticated.

Comparing Different Orthodontic Practices and Their Pricing Strategies

Emerging Technologies and Research Techniques Shaping Modern Orthodontic Treatment Protocols for Children

The field of pediatric orthodontics has undergone a remarkable transformation in recent years, driven by groundbreaking research and innovative technologies that are revolutionizing how we approach dental care for children. Gone are the days of one-size-fits-all treatment approaches; today's orthodontic interventions are becoming increasingly personalized, precise, and patient-friendly.

Digital imaging and 3D scanning technologies have been game-changers in treatment planning. Instead of uncomfortable traditional impressions, children can now undergo quick, comfortable digital scans that create incredibly detailed 3D models of their dental structures. These advanced imaging techniques allow orthodontists to develop more accurate treatment strategies, predicting tooth movement and potential challenges with unprecedented precision.

Artificial intelligence and machine learning are also making significant inroads into pediatric orthodontics. Sophisticated algorithms can now analyze dental images, predict growth patterns, and help clinicians develop more targeted intervention strategies. This means treatments can be more proactive, potentially addressing potential alignment issues before they become more complex problems.

Genetic research has opened up exciting new frontiers in understanding dental development. Researchers are now able to identify genetic markers that might predispose children to specific orthodontic challenges, allowing for earlier and more personalized interventions. This approach represents a shift from reactive to predictive dental care.

Biomaterials and advanced orthodontic appliances have also evolved dramatically. Modern braces are lighter, more comfortable, and more aesthetically pleasing than ever before. Some innovative designs even incorporate self-adjusting mechanisms that reduce the need for frequent manual adjustments, making the treatment process less stressful for young patients.

Importantly, these technological advances are being rigorously validated through evidence-based research. Clinicians are no longer relying solely on traditional methods but are continuously evaluating new techniques through robust scientific studies. This commitment to research ensures that emerging technologies are not just innovative but also genuinely effective and safe for children.

The future of pediatric orthodontics looks incredibly promising. As research continues to push boundaries and technology becomes more sophisticated, we can expect even more personalized, comfortable, and effective treatment protocols that prioritize both dental health and patient experience.

Additional Fees and Potential Hidden Expenses in Orthodontic Treatment

In the evolving landscape of medical and psychological treatments, comparative studies have become increasingly crucial in understanding the effectiveness of evidence-based approaches versus traditional treatment methods. The shift towards evidence-based practices represents a fundamental transformation in how we approach healing and patient care.

Traditional treatment methods have long relied on established practices, clinical experience, and intuitive approaches passed down through generations of practitioners. While these methods certainly hold value, they often lack the rigorous scientific scrutiny that modern research demands. Evidence-based treatments, by contrast, emerge from carefully conducted studies, systematic reviews, and empirical research that provide concrete data about treatment efficacy.

The significance of this approach cannot be overstated. By prioritizing research-driven interventions, healthcare professionals can move beyond anecdotal evidence and implement strategies that have been proven to produce measurable, consistent results. This approach allows for more targeted, efficient, and ultimately more effective patient care across various medical and psychological disciplines.

Comparative studies play a critical role in this transition. They meticulously examine traditional approaches alongside newer, research-backed methods, providing a comprehensive understanding of treatment outcomes. These studies help identify which interventions truly work, which need modification, and which should be reconsidered entirely.

For instance, in mental health treatment, evidence-based therapies like cognitive-behavioral therapy have demonstrated remarkable success rates compared to more traditional, less structured therapeutic approaches. Similar patterns emerge in medical treatments, where research-driven interventions often show improved patient outcomes and more precise treatment protocols.

However, it's important to note that evidence-based approaches don't completely invalidate traditional methods. Instead, they offer a more nuanced, scientifically informed approach to treatment. The goal is to integrate the best available research with clinical expertise and patient preferences.

As research continues to advance, the gap between traditional and evidence-based treatments narrows. Healthcare professionals are increasingly embracing a more holistic, data-driven approach that prioritizes patient outcomes and scientific rigor.

The future of treatment lies in this critical intersection of research, clinical experience, and innovative thinking. By continuing to prioritize evidence-based approaches, we can develop more effective, personalized, and compassionate methods of healing that truly address the complex needs of patients.

Future Research Directions and Potential Innovations in Pediatric Orthodontic Interventions

The field of pediatric orthodontics continues to evolve rapidly, presenting exciting opportunities for groundbreaking research and transformative treatments. As we look ahead, several promising areas of investigation hold the potential to revolutionize how we approach orthodontic care for children.

One of the most promising frontiers is the integration of advanced digital technologies and personalized medicine. Three-dimensional imaging and artificial intelligence are poised to create more precise diagnostic tools and treatment planning strategies. Researchers are exploring how machine learning algorithms can predict tooth movement and treatment outcomes with unprecedented accuracy, potentially reducing treatment times and improving patient experiences.

Biomaterial innovations represent another critical area of potential breakthrough. Scientists are developing smart materials that can actively respond to biological signals, potentially allowing for more gentle and efficient tooth alignment. These next-generation materials could minimize discomfort and reduce the duration of orthodontic interventions, making treatments more tolerable for young patients.

Genetic research is also opening new pathways for understanding individual orthodontic challenges. By mapping genetic markers associated with dental development and misalignment, clinicians might soon be able to create truly personalized treatment protocols that address each child's unique physiological characteristics.

Additionally, minimally invasive techniques are gaining significant attention. Researchers are investigating less traumatic approaches that can achieve optimal results while preserving more of the natural dental structure. This could mean shorter recovery times and reduced psychological stress for pediatric patients.

Interdisciplinary collaboration will be crucial in driving these innovations forward. Orthodontists, geneticists, materials scientists, and digital technology experts must work together to translate theoretical possibilities into practical clinical solutions.

As we move forward, the goal remains clear: developing more effective, efficient, and patient-friendly orthodontic interventions that support children's oral health and overall well-being.

About malocclusion

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

Malocclusion

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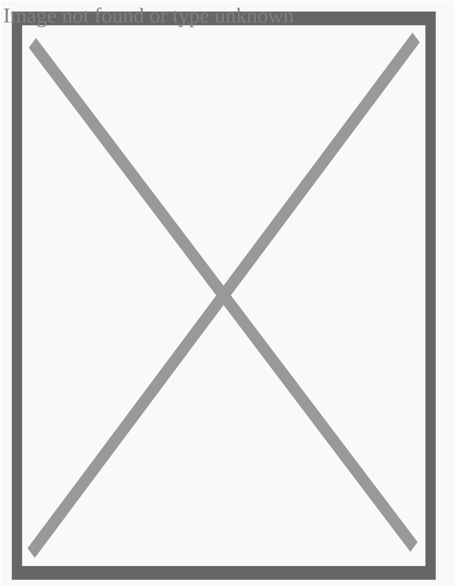

Malocclusion in 10-year-old girl

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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

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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 dentoalvelor 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

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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

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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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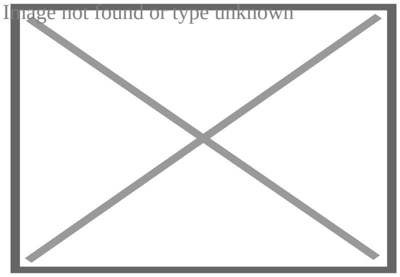
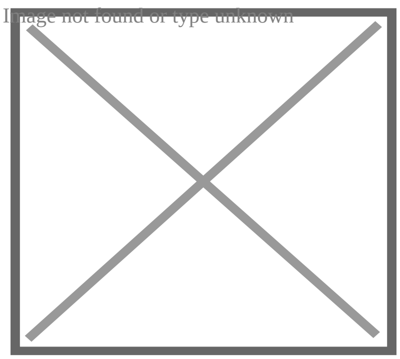


Class I with severe crowding and labially erupted canines



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** (Neutrocclusion): 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

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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 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

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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

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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

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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

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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

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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

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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

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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]

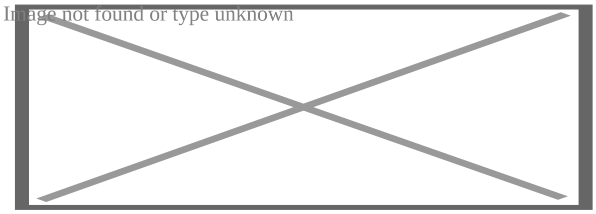
Identifying inter-arch tooth size discrepancy (ITSD) before treatment begins allows the practitioner to develop the treatment plan in a way that will take ITSD into account. ITSD corrective treatment may entail demanding reduction (interproximal wear), increase (crowns and resins), or elimination (extractions)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

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Further reading

[edit]

- 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]

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

Image not found or type unknown

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
Conditions	○ Overbite ○ Overjet ○ Open bite ○ Crossbite ○ Dental crowding ○ Dental spacing ○ Bimaxillary Protrusion ○ Prognathism ○ Retrognathism ○ Maxillary hypoplasia ○ Condylar hyperplasia ○ Overeruption ○ Mouth breathing ○ Temperomandibular 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
Procedures	○ Anchorage (orthodontics) ○ Cantilever mechanics ○ Fiberotomy ○ Interproximal reduction ○ Intrusion (orthodontics) ○ Molar distalization ○ SARPE ○ Serial extraction
Materials	○ Beta-titanium ○ Nickel titanium ○ Stainless steel ○ TiMolium ○ Elgiloy ○ Ceramic ○ Composite ○ Dental elastics

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- Cecil C. Steiner

Organizations	○ American Association of Orthodontists ○ American Board of Orthodontics ○ British Orthodontic Society ○ Canadian Association of Orthodontists ○ Indian Orthodontic Society ○ Italian Academy of Orthodontic Technology ○ 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
Maxilla and Mandible	○ Cherubism ○ Congenital epulis ○ Torus mandibularis ○ Torus palatinus

Other	○ Jaw and base of cranium
	  ○ Prognathism
	  ○ Retrognathism
	○ Dental arch
	  ○ Crossbite
	  ○ Overbite
	○ Temporomandibular joint disorder

Check our other pages :

- **Understanding Common Fee Structures in Orthodontics**
- **Responsibilities of Healthcare Providers in Treatment**
- **Balancing Innovation With Patient Protection**
- **Allocation of Funds for Long Term Orthodontic Care**

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