

- **Linking Orthodontics with Periodontal Health**
Linking Orthodontics with Periodontal Health Coordinating with Oral Surgeons for Jaw Corrections Integrating Pediatric Dentistry for Early Intervention Combining Endodontic Care in Complex Cases Collaborative Planning with Prosthodontists Sharing Diagnostic Data Across Multiple Specialists Addressing Aesthetic and Functional Goals Together Communication Strategies Among Dental Teams Balancing Orthodontic Solutions and Restorative Needs Encouraging Holistic Treatment Approaches Managing Patients with Special Medical Conditions Efficient Referrals That Improve Patient Outcomes
- **AI Driven Aligners That Predict Movement**
AI Driven Aligners That Predict Movement Cloud Based Case Tracking for Efficient Management Digital Impressions That Replace Traditional Molds Virtual Consultations for Remote Care 3D Printing Applications in Orthodontic Appliances Teledentistry and Its Impact on Patient Convenience Software Innovations for Treatment Simulations Aligning Treatment Goals with Technological Advances Advantages of Using Digital Models in Planning Modern Approaches to Virtual Monitoring Reducing Errors Through Computerized Analysis The Future of Orthodontics in a Digital Era
- **About Us**



Okay, so you're a pediatric orthodontist, and you're thinking about the trickier cases, the ones where straight teeth are only part of the puzzle. Orthodontic expanders can create more space in the mouth for teeth Youth orthodontic correction pediatrics. That's where understanding the role of a prosthodontist becomes seriously important, especially when you're dealing with kids. Think about it: some kids have missing teeth, congenitally or due to trauma. Others might have enamel defects that compromise the long-term health of their teeth, even *after* the braces come off. You can move teeth into the perfect alignment, but if those teeth are structurally weak or there are significant gaps, you haven't really solved the problem, have you?

Collaborative planning with a prosthodontist allows you to look at the *whole* picture right from the start. Instead of just focusing on aligning teeth, you're thinking about the final restoration, the long-term stability of the bite, and the aesthetics of the smile. Maybe you're planning space closure for a missing tooth, but the prosthodontist can advise on whether that's the best approach for facial balance and jaw development. Perhaps a child has hypodontia (missing teeth); discussing the case allows for planning for future implants, bridges, or even partial dentures, and how your orthodontic treatment can best prepare the mouth for those interventions.

It's not just about fixing problems *after* orthodontics, either. Early collaboration can actually *influence* your treatment plan. The prosthodontist might suggest specific tooth movements to create ideal spaces for future restorations, or recommend a particular type of retainer to maintain stability while the child is still growing.

Ultimately, it's about providing the best possible care for your young patients. By working together, you and the prosthodontist can create comprehensive treatment plans that address both the alignment *and* the long-term health and function of their smiles. And that's what truly makes a difference.

Okay, so you're thinking about collaborative planning with prosthodontists, right? And you're wondering when it's *really* necessary to bring them into the mix. "Identifying Cases Requiring Collaborative Planning" – that's the key. It's not every dental situation, but when you're staring down certain complexities, calling in a prosthodontist can be the difference between a good outcome and a truly exceptional one.

Think about it like this: if you're facing significant tooth loss, especially when it impacts multiple areas of the mouth, or the patient has a history of failed restorations, that's a red flag. We're talking about cases where the bite (occlusion) is seriously compromised, or where there's substantial bone loss in the jaw. These aren't situations where a straightforward filling or even a single crown will cut it. You're potentially looking at implants, complex bridge work, or dentures – all areas where the prosthodontist's

specialized knowledge of function, aesthetics, and biomechanics becomes invaluable.

Another trigger should be the patient's general health. Someone with uncontrolled diabetes, autoimmune diseases, or a history of radiation therapy to the head and neck presents unique challenges. These conditions can affect healing, bone integration, and the overall success of prosthodontic treatment. A prosthodontist can help navigate these complexities, modifying treatment plans and materials to maximize the chances of a positive outcome.

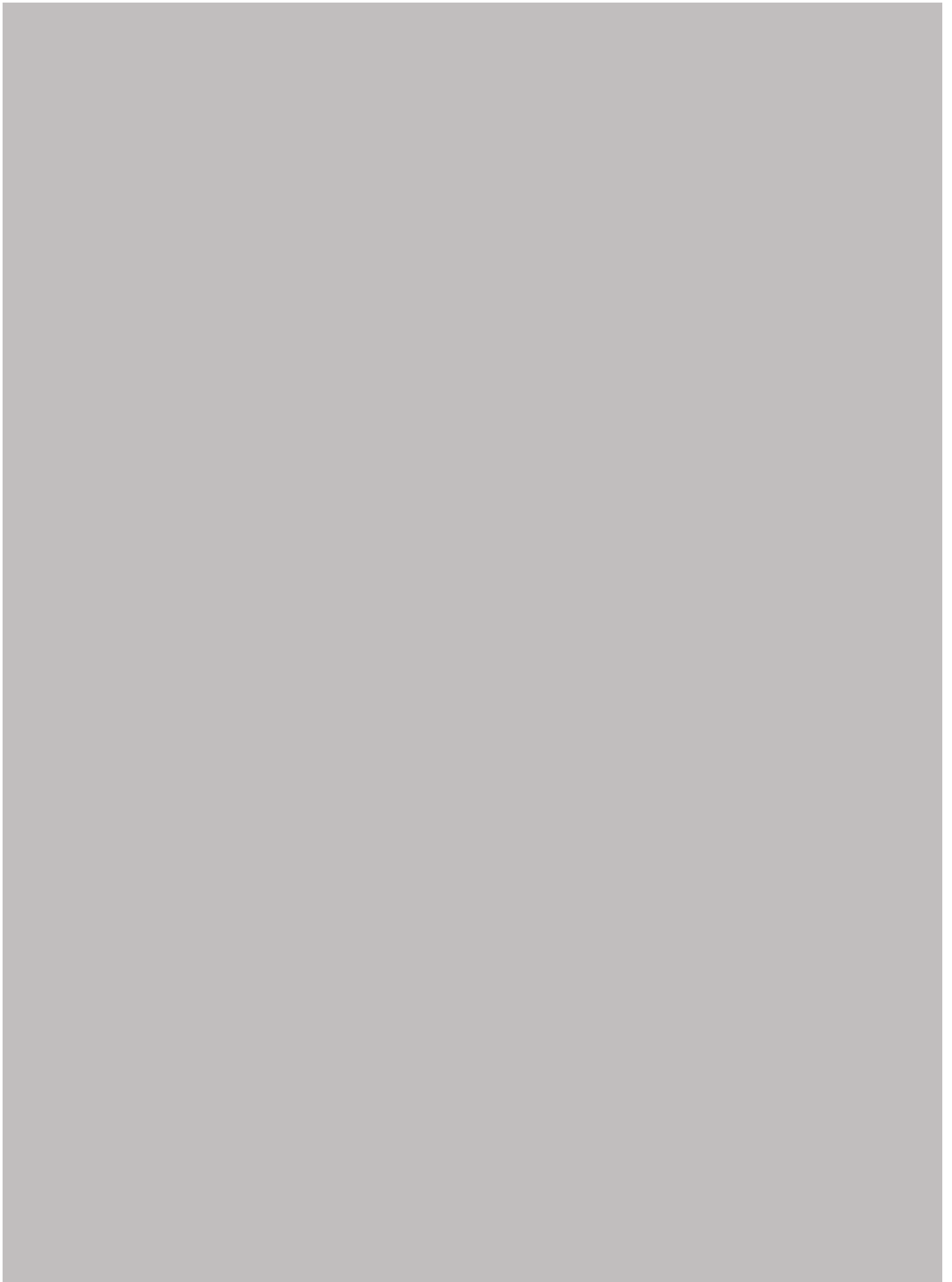
And let's not forget about the aesthetic component. If the patient has very high expectations regarding the final appearance of their smile – maybe they're in the public eye, or just incredibly concerned about aesthetics – a prosthodontist's expertise in smile design and achieving natural-looking results is crucial. They can consider factors like lip support, facial contours, and tooth shade selection with a level of detail that might not be part of your everyday practice.

Ultimately, identifying cases requiring collaborative planning boils down to recognizing when the complexity exceeds your comfort level or when the patient's needs demand a level of specialized knowledge that a prosthodontist can provide. It's about prioritizing the best possible outcome for the patient, even if it means sharing the spotlight and working together. It's not an admission of weakness, but a demonstration of your commitment to providing comprehensive and exceptional care.

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* Preventive measures to maintain periodontal health during orthodontic treatment.

Okay, so imagine a little one, maybe with a cleft palate or a genetic condition that's affecting their jaw and teeth development. It's easy to think, "Oh, prosthodontics? That's for dentures and old folks, right?" But that's missing a huge piece of the puzzle when it comes to these kids. Early intervention strategies involving prosthodontic input are actually incredibly powerful, and that's where collaborative planning with a prosthodontist becomes crucial.

Think about it: a prosthodontist isn't just about replacing missing teeth. They understand craniofacial development, occlusion (how your teeth meet), and the impact of these things on speech, feeding, and even self-esteem. By bringing them into the planning process early – alongside pediatricians, speech therapists, orthodontists, and surgeons – we can create a comprehensive roadmap for the child's oral health and overall well-being.

For example, a prosthodontist might design a palatal obturator for an infant with a cleft palate, helping them to feed properly and develop better speech sounds. Or, they could create a space maintainer to guide the eruption of permanent teeth in a child who's lost a baby tooth prematurely due to trauma or decay. These aren't just cosmetic fixes; they're functional interventions that can prevent bigger problems down the line.

The key is *collaboration*. It's about everyone on the team understanding the prosthodontist's perspective and incorporating their expertise into the overall treatment plan. This means open communication, shared decision-making, and a willingness to think outside the box. It's not simply about waiting until adulthood to address missing teeth; it's about proactively shaping a child's oral environment from the get-go, setting them up for a lifetime of healthy smiles and confident self-expression. It's a team effort, plain and simple, and the child benefits the most when everyone is working together.

*** The role of oral hygiene instructions for children and parental involvement.**

Okay, so you're thinking about how orthodontists and prosthodontists communicate when they're working together, right? It's a really crucial piece of the collaborative planning puzzle. Think about it: you've got the orthodontist moving teeth, and the prosthodontist rebuilding or replacing them. If they're not on the same page, you could end up with a beautiful tooth alignment that still can't support a crown properly, or a perfectly crafted bridge that just doesn't fit in the arch.

The communication has to be clear, consistent, and ideally, proactive. It's not just about sending a referral and hoping for the best. It's about having a real conversation, discussing treatment goals, and understanding each other's limitations and possibilities. What kind of tooth movement are we aiming for? What are the restorative options being considered? What are the patient's aesthetic desires and functional needs?

Think of it like this: the orthodontist might be the architect, creating the framework, and the prosthodontist is the interior designer, making it functional and beautiful. They both need to see the same blueprints and agree on the overall vision.

The best communication often involves a combination of methods. Initial consultations, detailed treatment plans with clear expectations, diagnostic records (like models, photos, and radiographs), and even just a phone call or email to clarify something quickly. It's also incredibly helpful when both specialists can examine the patient together, bouncing ideas off each other and figuring out the best path forward in real-time.

Essentially, good communication between orthodontists and prosthodontists isn't just about professional courtesy; it's about delivering the best possible outcome for the patient. It's about teamwork, shared responsibility, and a commitment to creating a healthy, functional, and beautiful smile.

*** Early detection and management of periodontal problems during orthodontic care.**

Okay, so you've got a patient with missing or malformed teeth. Right off the bat, you know this isn't going to be a solo mission. This is collaborative territory, and the prosthodontist is your MVP. Treatment planning isn't just about filling a gap or fixing a funky shape; it's about restoring function, aesthetics, and, honestly, the patient's confidence.

When you start thinking about treatment, the prosthodontist brings a whole different level of expertise to the table. They're the architects of the smile, considering long-term stability, occlusal harmony, and the biomechanics of whatever restoration you're planning. Think implants, bridges, dentures – all those possibilities need to be weighed carefully.

The first step is a thorough assessment. This is where teamwork really shines. You might be the one spotting the initial problem, but the prosthodontist can delve deeper into the underlying causes. Is it congenital? Trauma? Caries gone wild? Understanding the etiology is crucial for preventing future issues.

Communication is key. Discuss the patient's desires and expectations. What are their priorities? Are they more concerned with function or aesthetics? What's their budget? The prosthodontist can then present realistic treatment options, outlining the pros and cons of each, and helping the patient make an informed decision.

Don't underestimate the importance of preparation. Sometimes, the site needs some serious TLC before any restoration can even be considered. This might involve bone grafting, soft tissue

augmentation, or even orthodontic treatment to create the ideal foundation. The prosthodontist can guide you on the best approach to prepare the site for optimal results.

Finally, remember that treatment planning is a dynamic process. Things can change along the way, and flexibility is essential. Regular communication with the prosthodontist throughout the treatment is vital to ensure that everyone is on the same page and that the patient receives the best possible care. It's a team effort, and a well-coordinated plan leads to happy patients and successful outcomes.

*** Collaboration between orthodontists and periodontists for optimal outcomes.**

Addressing Skeletal Discrepancies and Growth Modification: Collaborative Planning with Prosthodontists

When we talk about creating beautiful smiles and functional bites, sometimes the issues run deeper than just teeth. We're talking about the underlying skeletal structure – the jaw bones themselves. If these bones are misaligned, it can lead to significant problems affecting everything from chewing and speaking to aesthetics and even self-esteem. That's where the concept of addressing skeletal discrepancies and growth modification comes into play, and why collaborative planning with prosthodontists becomes so crucial.

Think of it like building a house. If the foundation is uneven, simply putting up walls and a roof won't solve the problem. You need to address the foundation first. Similarly, if the jaws are significantly out of alignment, restorative work alone might not achieve the desired outcome or long-term stability. Growth modification, especially in younger patients, aims to guide the development of the jaws, ideally preventing or minimizing the need for more invasive interventions later on. In adults, correcting these discrepancies might involve orthognathic surgery, a procedure that physically repositions the jaw

bones.

Now, where does the prosthodontist fit in? They are the architects of the final restoration. They understand the ideal tooth position, occlusion (how the teeth meet), and aesthetics. They bring the vision of the final smile to the table. Therefore, their input is vital from the very beginning. By collaborating with orthodontists and oral surgeons, the prosthodontist can help determine the optimal skeletal position to support the planned restorative treatment. This collaborative approach ensures that the skeletal correction isn't just about achieving a "normal" bite, but about creating a bite that is also functionally sound and aesthetically pleasing in the long run.

Imagine a patient with a severely retruded lower jaw. An orthodontist might align the teeth, but without addressing the skeletal discrepancy, the bite might remain unstable, and the patient might still have an unaesthetic profile. By working with a prosthodontist, the team can determine if orthognathic surgery is necessary to advance the lower jaw, creating a more balanced facial profile and a stable foundation for future restorative work like veneers or implants.

Ultimately, addressing skeletal discrepancies and growth modification in a collaborative setting with a prosthodontist is about providing comprehensive, long-term solutions. It's about looking beyond the teeth and considering the entire craniofacial complex to create a healthy, functional, and beautiful smile that lasts a lifetime. It's a team effort, and the prosthodontist plays a key role in guiding that team towards the best possible outcome for the patient.

Collaborative planning with prosthodontists doesn't just stop once the beautiful new crown is cemented or the meticulously crafted denture is delivered. That's just the beginning of the journey, and it's where long-term maintenance and follow-up care come into play, becoming absolutely crucial for the success of the prosthetic treatment. Think of it like this: we've built a fantastic machine, and now we need to make sure it stays running smoothly for years to come.

This phase involves a shared responsibility. The prosthodontist, armed with their expertise, outlines a specific maintenance protocol, tailored to the patient's individual needs and the type of prosthesis. This might include specific cleaning instructions, dietary recommendations, and a schedule for regular check-ups. But the patient's role is just as vital. They need to be educated on how to properly care for their prosthesis, understand the signs of potential problems (like loosening, inflammation, or discomfort), and be proactive in seeking timely intervention.

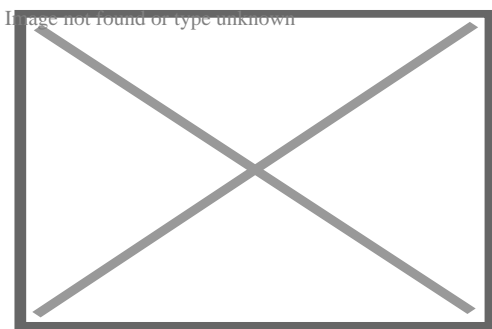
These follow-up appointments aren't just about checking the fit and function. They're an opportunity to assess the health of the supporting tissues, monitor for any signs of complications like peri-implantitis or denture stomatitis, and make any necessary adjustments. The prosthodontist can also reinforce the patient's home care techniques and address any concerns they might have.

Ultimately, long-term maintenance and follow-up ensure the longevity of the prosthetic restoration, protect the health of the surrounding oral tissues, and improve the patient's overall quality of life. It's a continuous partnership built on communication, education, and a shared commitment to maintaining a healthy and functional smile. It's not just about fixing a problem; it's about preventing future ones.

About pediatrics

This article is about the branch of medicine. For the journal, see *Pediatrics* (journal). For the branch of dentistry, see *Pedodontics*.

Pediatrics



A pediatrician examines a neonate.

Focus	Infants, Children, Adolescents, and Young Adults
Subdivisions	<i>Paediatric cardiology, neonatology, critical care, pediatric oncology, hospital medicine, primary care, others (see below)</i>
Significant diseases	Congenital diseases, Infectious diseases, Childhood cancer, Mental disorders

Significant tests World Health Organization Child Growth Standards

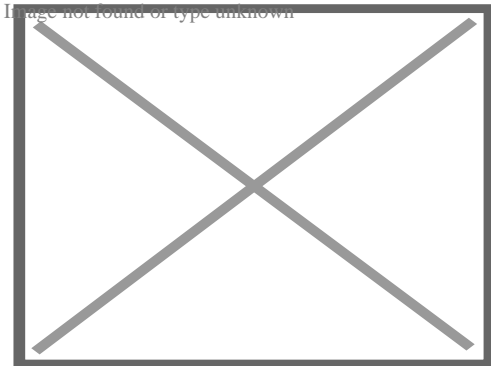
Specialist **Pediatrician**

Glossary Glossary of medicine

Pediatrics (American English) also spelled **paediatrics** (British English), is the branch of medicine that involves the medical care of infants, children, adolescents, and young adults. In the United Kingdom, pediatrics covers many of their youth until the age of 18. ^[1] The American Academy of Pediatrics recommends people seek pediatric care through the age of 21, but some pediatric subspecialists continue to care for adults up to 25. ^[2]^[3] Worldwide age limits of pediatrics have been trending upward year after year. ^[4] A medical doctor who specializes in this area is known as a **pediatrician**, or **paediatrician**. The word *pediatrics* and its cognates mean "healer of children", derived from the two Greek words: *pais* "child") and *iatros* "doctor, healer"). Pediatricians work in clinics, research centers, universities, general hospitals and children's hospitals, including those who practice pediatric subspecialties (e.g. neonatology requires resources available in a NICU).

History

[edit]



Part of Great Ormond Street Hospital in London, United Kingdom, which was the first pediatric hospital in the English-speaking world.

The earliest mentions of child-specific medical problems appear in the *Hippocratic Corpus*, published in the fifth century B.C., and the famous *Sacred Disease*. These publications discussed topics such as childhood epilepsy and premature births. From the first to fourth centuries A.D., Greek philosophers and physicians Celsus, Soranus of Ephesus, Aretaeus, Galen, and Oribasius, also discussed specific illnesses affecting children in their works, such as rashes, epilepsy, and meningitis. ^[5] Already Hippocrates, Aristotle, Celsus, Soranus, and Galen^[6] understood the differences in growing and maturing organisms that necessitated different treatment: *Ex toto non sic pueri ut viri curari debent* ("In general, boys should not be

treated in the same way as men").^[7] Some of the oldest traces of pediatrics can be discovered in Ancient India where children's doctors were called *kumara bhrtya*.^[6]

Even though some pediatric works existed during this time, they were scarce and rarely published due to a lack of knowledge in pediatric medicine. *Sushruta Samhita*, an ayurvedic text composed during the sixth century BCE, contains the text about pediatrics.^[8] Another ayurvedic text from this period is *Kashyapa Samhita*.^{[9][10]} A second century AD manuscript by the Greek physician and gynecologist Soranus of Ephesus dealt with neonatal pediatrics.^[11] Byzantine physicians Oribasius, Aëtius of Amida, Alexander Trallianus, and Paulus Aegineta contributed to the field.^[6] The Byzantines also built *brephotrophia* (crèches).^[6] Islamic Golden Age writers served as a bridge for Greco-Roman and Byzantine medicine and added ideas of their own, especially Haly Abbas, Yahya Serapion, Abulcasis, Avicenna, and Averroes. The Persian philosopher and physician al-Razi (865–925), sometimes called the father of pediatrics, published a monograph on pediatrics titled *Diseases in Children*.^{[12][13]} Also among the first books about pediatrics was *Libellus [Opusculum] de aegritudinibus et remediis infantium* 1472 ("Little Book on Children Diseases and Treatment"), by the Italian pediatrician Paolo Bagellardo.^{[14][5]} In sequence came Bartholomäus Metlinger's *Ein Regiment der Jungerkinder* 1473, Cornelius Roelans (1450–1525) no title Buchlein, or Latin compendium, 1483, and Heinrich von Louffenburg (1391–1460) *Versehung des Leibs* written in 1429 (published 1491), together form the *Pediatric Incunabula*, four great medical treatises on children's physiology and pathology.^[6]

While more information about childhood diseases became available, there was little evidence that children received the same kind of medical care that adults did.^[15] It was during the seventeenth and eighteenth centuries that medical experts started offering specialized care for children.^[5] The Swedish physician Nils Rosén von Rosenstein (1706–1773) is considered to be the founder of modern pediatrics as a medical specialty,^{[16][17]} while his work *The diseases of children, and their remedies* (1764) is considered to be "the first modern textbook on the subject".^[18] However, it was not until the nineteenth century that medical professionals acknowledged pediatrics as a separate field of medicine. The first pediatric-specific publications appeared between the 1790s and the 1920s.^[19]

Etymology

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The term pediatrics was first introduced in English in 1859 by Abraham Jacobi. In 1860, he became "the first dedicated professor of pediatrics in the world."^[20] Jacobi is known as the *father of American pediatrics* because of his many contributions to the field.^{[21][22]} He received his medical training in Germany and later practiced in New York City.^[23]

The first generally accepted pediatric hospital is the *Hôpital des Enfants Malades* (French: *Hospital for Sick Children*), which opened in Paris in June 1802 on the site of a previous orphanage.^[24] From its beginning, this famous hospital accepted patients up to the age of

fifteen years,^[25] and it continues to this day as the pediatric division of the Necker-Enfants Malades Hospital, created in 1920 by merging with the nearby *Necker Hospital*, founded in 1778.^[26]

In other European countries, the Charité (a hospital founded in 1710) in Berlin established a separate Pediatric Pavilion in 1830, followed by similar institutions at Saint Petersburg in 1834, and at Vienna and Breslau (now

Wrocław) both in 1837. In 1852 Britain's first pediatric hospital, the Hospital for Sick Children, Great Ormond Street was founded by Charles West.^[24] The first Children's hospital in Scotland opened in 1860 in Edinburgh.^[27] In the US, the first similar institutions were the Children's Hospital of Philadelphia, which opened in 1855, and then Boston Children's Hospital (1869).^[28] Subspecialties in pediatrics were created at the Harriet Lane Home at Johns Hopkins by Edwards A. Park.^[29]

Differences between adult and pediatric medicine

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The body size differences are paralleled by maturation changes. The smaller body of an infant or neonate is substantially different physiologically from that of an adult. Congenital defects, genetic variance, and developmental issues are of greater concern to pediatricians than they often are to adult physicians. A common adage is that children are not simply "little adults". The clinician must take into account the immature physiology of the infant or child when considering symptoms, prescribing medications, and diagnosing illnesses.^[30]

Pediatric physiology directly impacts the pharmacokinetic properties of drugs that enter the body. The absorption, distribution, metabolism, and elimination of medications differ between developing children and grown adults.^{[30][31][32]} Despite completed studies and reviews, continual research is needed to better understand how these factors should affect the decisions of healthcare providers when prescribing and administering medications to the pediatric population.^[30]

Absorption

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Many drug absorption differences between pediatric and adult populations revolve around the stomach. Neonates and young infants have increased stomach pH due to decreased acid secretion, thereby creating a more basic environment for drugs that are taken by mouth.^{[31][30][32]} Acid is essential to degrading certain oral drugs before systemic absorption. Therefore, the absorption of these drugs in children is greater than in adults due to decreased breakdown and increased preservation in a less acidic gastric space.^[31]

Children also have an extended rate of gastric emptying, which slows the rate of drug absorption.^{[31][32]}

Drug absorption also depends on specific enzymes that come in contact with the oral drug as it travels through the body. Supply of these enzymes increase as children continue to develop their gastrointestinal tract.^{[31][32]} Pediatric patients have underdeveloped proteins, which leads to decreased metabolism and increased serum concentrations of specific drugs. However, prodrugs experience the opposite effect because enzymes are necessary for allowing their active form to enter systemic circulation.^[31]

Distribution

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Percentage of total body water and extracellular fluid volume both decrease as children grow and develop with time. Pediatric patients thus have a larger volume of distribution than adults, which directly affects the dosing of hydrophilic drugs such as beta-lactam antibiotics like ampicillin.^[31] Thus, these drugs are administered at greater weight-based doses or with adjusted dosing intervals in children to account for this key difference in body composition.^[31]
^[30]

Infants and neonates also have fewer plasma proteins. Thus, highly protein-bound drugs have fewer opportunities for protein binding, leading to increased distribution.^[30]

Metabolism

[edit]

Drug metabolism primarily occurs via enzymes in the liver and can vary according to which specific enzymes are affected in a specific stage of development.^[31] Phase I and Phase II enzymes have different rates of maturation and development, depending on their specific mechanism of action (i.e. oxidation, hydrolysis, acetylation, methylation, etc.). Enzyme capacity, clearance, and half-life are all factors that contribute to metabolism differences between children and adults.^{[31][32]} Drug metabolism can even differ within the pediatric population, separating neonates and infants from young children.^[30]

Elimination

[edit]

Drug elimination is primarily facilitated via the liver and kidneys.^[31] In infants and young children, the larger relative size of their kidneys leads to increased renal clearance of medications that are eliminated through urine.^[32] In preterm neonates and infants, their

kidneys are slower to mature and thus are unable to clear as much drug as fully developed kidneys. This can cause unwanted drug build-up, which is why it is important to consider lower doses and greater dosing intervals for this population.^[30]^[31] Diseases that negatively affect kidney function can also have the same effect and thus warrant similar considerations.^[31]

Pediatric autonomy in healthcare

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A major difference between the practice of pediatric and adult medicine is that children, in most jurisdictions and with certain exceptions, cannot make decisions for themselves. The issues of guardianship, privacy, legal responsibility, and informed consent must always be considered in every pediatric procedure. Pediatricians often have to treat the parents and sometimes, the family, rather than just the child. Adolescents are in their own legal class, having rights to their own health care decisions in certain circumstances. The concept of legal consent combined with the non-legal consent (assent) of the child when considering treatment options, especially in the face of conditions with poor prognosis or complicated and painful procedures/surgeries, means the pediatrician must take into account the desires of many people, in addition to those of the patient.^[citation needed]

History of pediatric autonomy

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The term autonomy is traceable to ethical theory and law, where it states that autonomous individuals can make decisions based on their own logic.^[33] Hippocrates was the first to use the term in a medical setting. He created a code of ethics for doctors called the *Hippocratic Oath* that highlighted the importance of putting patients' interests first, making autonomy for patients a top priority in health care.^[34]

In ancient times, society did not view pediatric medicine as essential or scientific.^[35] Experts considered professional medicine unsuitable for treating children. Children also had no rights. Fathers regarded their children as property, so their children's health decisions were entrusted to them.^[5] As a result, mothers, midwives, "wise women", and general practitioners treated the children instead of doctors.^[35] Since mothers could not rely on professional medicine to take care of their children, they developed their own methods, such as using alkaline soda ash to remove the vernix at birth and treating teething pain with opium or wine. The absence of proper pediatric care, rights, and laws in health care to prioritize children's health led to many of their deaths. Ancient Greeks and Romans sometimes even killed healthy female babies and infants with deformities since they had no adequate medical treatment and no laws prohibiting infanticide.^[5]

In the twentieth century, medical experts began to put more emphasis on children's rights. In 1989, in the United Nations Rights of the Child Convention, medical experts developed the Best Interest Standard of Child to prioritize children's rights and best interests. This event marked the onset of pediatric autonomy. In 1995, the American Academy of Pediatrics (AAP) finally acknowledged the Best Interest Standard of a Child as an ethical principle for pediatric decision-making, and it is still being used today.^[34]

Parental authority and current medical issues

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The majority of the time, parents have the authority to decide what happens to their child. Philosopher John Locke argued that it is the responsibility of parents to raise their children and that God gave them this authority. In modern society, Jeffrey Blustein, modern philosopher and author of the book *Parents and Children: The Ethics of Family*, argues that parental authority is granted because the child requires parents to satisfy their needs. He believes that parental autonomy is more about parents providing good care for their children and treating them with respect than parents having rights.^[36] The researcher Kyriakos Martakis, MD, MSc, explains that research shows parental influence negatively affects children's ability to form autonomy. However, involving children in the decision-making process allows children to develop their cognitive skills and create their own opinions and, thus, decisions about their health. Parental authority affects the degree of autonomy the child patient has. As a result, in Argentina, the new National Civil and Commercial Code has enacted various changes to the healthcare system to encourage children and adolescents to develop autonomy. It has become more crucial to let children take accountability for their own health decisions.^[37]

In most cases, the pediatrician, parent, and child work as a team to make the best possible medical decision. The pediatrician has the right to intervene for the child's welfare and seek advice from an ethics committee. However, in recent studies, authors have denied that complete autonomy is present in pediatric healthcare. The same moral standards should apply to children as they do to adults. In support of this idea is the concept of paternalism, which negates autonomy when it is in the patient's interests. This concept aims to keep the child's best interests in mind regarding autonomy. Pediatricians can interact with patients and help them make decisions that will benefit them, thus enhancing their autonomy. However, radical theories that question a child's moral worth continue to be debated today.^[37] Authors often question whether the treatment and equality of a child and an adult should be the same. Author Tamar Schapiro notes that children need nurturing and cannot exercise the same level of authority as adults.^[38] Hence, continuing the discussion on whether children are capable of making important health decisions until this day.

Modern advancements

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According to the Subcommittee of Clinical Ethics of the Argentinean Pediatric Society (SAP), children can understand moral feelings at all ages and can make reasonable decisions based on those feelings. Therefore, children and teens are deemed capable of making their own health decisions when they reach the age of 13. Recently, studies made on the decision-making of children have challenged that age to be 12.^[37]

Technology has made several modern advancements that contribute to the future development of child autonomy, for example, unsolicited findings (U.F.s) of pediatric exome sequencing. They are findings based on pediatric exome sequencing that explain in greater detail the intellectual disability of a child and predict to what extent it will affect the child in the future. Genetic and intellectual disorders in children make them incapable of making moral decisions, so people look down upon this kind of testing because the child's future autonomy is at risk. It is still in question whether parents should request these types of testing for their children. Medical experts argue that it could endanger the autonomous rights the child will possess in the future. However, the parents contend that genetic testing would benefit the welfare of their children since it would allow them to make better health care decisions.^[39] Exome sequencing for children and the decision to grant parents the right to request them is a medically ethical issue that many still debate today.

Education requirements

[edit]

The examples and perspective in this section **deal primarily with United States and Globe** **do not represent a worldwide view of the subject**. You may improve this section, **discuss the issue on the talk page**, or create a new section, as appropriate. (*September 2019*) (*Learn how and when to remove this message*)

Aspiring medical students will need 4 years of undergraduate courses at a college or university, which will get them a BS, BA or other bachelor's degree. After completing college, future pediatricians will need to attend 4 years of medical school (MD/DO/MBBS) and later do 3 more years of residency training, the first year of which is called "internship." After completing the 3 years of residency, physicians are eligible to become certified in pediatrics by passing a rigorous test that deals with medical conditions related to young children. ^[citation needed]

In high school, future pediatricians are required to take basic science classes such as biology, chemistry, physics, algebra, geometry, and calculus. It is also advisable to learn a foreign language (preferably Spanish in the United States) and be involved in high school organizations and extracurricular activities. After high school, college students simply need to fulfill the basic science course requirements that most medical schools recommend and will need to prepare to take the MCAT (Medical College Admission Test) in their junior or early senior year in college. Once attending medical school, student courses will focus on basic medical sciences like human anatomy, physiology, chemistry, etc., for the first three years, the

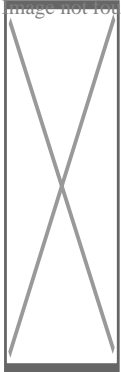
second year of which is when medical students start to get hands-on experience with actual patients.^[40]

Training of pediatricians

[edit]

Pediatrics

image not found or type unknown



Occupation

Names

- Pediatrician
- Paediatrician

Occupation type Specialty

Activity sectors Medicine

Description

Education required

- Doctor of Medicine
- Doctor of Osteopathic Medicine
- Bachelor of Medicine, Bachelor of Surgery (MBBS/MBChB)

Fields of employment

Hospitals, Clinics

The training of pediatricians varies considerably across the world. Depending on jurisdiction and university, a medical degree course may be either undergraduate-entry or graduate-entry. The former commonly takes five or six years and has been usual in the Commonwealth. Entrants to graduate-entry courses (as in the US), usually lasting four or five years, have previously completed a three- or four-year university degree, commonly but by no means always in sciences. Medical graduates hold a degree specific to the country and university in and from which they graduated. This degree qualifies that medical practitioner to become licensed or registered under the laws of that particular country, and sometimes of several countries, subject to requirements for "internship" or "conditional registration".

Pediatricians must undertake further training in their chosen field. This may take from four to eleven or more years depending on jurisdiction and the degree of specialization.

In the United States, a medical school graduate wishing to specialize in pediatrics must undergo a three-year residency composed of outpatient, inpatient, and critical care rotations. Subspecialties within pediatrics require further training in the form of 3-year fellowships. Subspecialties include critical care, gastroenterology, neurology, infectious disease, hematology/oncology, rheumatology, pulmonology, child abuse, emergency medicine, endocrinology, neonatology, and others.^[41]

In most jurisdictions, entry-level degrees are common to all branches of the medical profession, but in some jurisdictions, specialization in pediatrics may begin before completion of this degree. In some jurisdictions, pediatric training is begun immediately following the completion of entry-level training. In other jurisdictions, junior medical doctors must undertake generalist (unstreamed) training for a number of years before commencing pediatric (or any other) specialization. Specialist training is often largely under the control of '*pediatric organizations*' (see below) rather than universities and depends on the jurisdiction.

Subspecialties

[edit]

Subspecialties of pediatrics include:

(not an exhaustive list)

- Addiction medicine (multidisciplinary)
- Adolescent medicine
- Child abuse pediatrics
- Clinical genetics
- Clinical informatics
- Developmental-behavioral pediatrics
- Headache medicine
- Hospital medicine
- Medical toxicology
- Metabolic medicine
- Neonatology/Perinatology
- Pain medicine (multidisciplinary)
- Palliative care (multidisciplinary)
- Pediatric allergy and immunology
- Pediatric cardiology
 - Pediatric cardiac critical care
- Pediatric critical care
 - Neurocritical care

- Pediatric cardiac critical care
- Pediatric emergency medicine
- Pediatric endocrinology
- Pediatric gastroenterology
 - Transplant hepatology
- Pediatric hematology
- Pediatric infectious disease
- Pediatric nephrology
- Pediatric oncology
 - Pediatric neuro-oncology
- Pediatric pulmonology
- Primary care
- Pediatric rheumatology
- Sleep medicine (multidisciplinary)
- Social pediatrics
- Sports medicine

Other specialties that care for children

[edit]

(not an exhaustive list)

- Child neurology
 - Addiction medicine (multidisciplinary)
 - Brain injury medicine
 - Clinical neurophysiology
 - Epilepsy
 - Headache medicine
 - Neurocritical care
 - Neuroimmunology
 - Neuromuscular medicine
 - Pain medicine (multidisciplinary)
 - Palliative care (multidisciplinary)
 - Pediatric neuro-oncology
 - Sleep medicine (multidisciplinary)
- Child and adolescent psychiatry, subspecialty of psychiatry
- Neurodevelopmental disabilities
- Pediatric anesthesiology, subspecialty of anesthesiology
- Pediatric dentistry, subspecialty of dentistry
- Pediatric dermatology, subspecialty of dermatology
- Pediatric gynecology
- Pediatric neurosurgery, subspecialty of neurosurgery

- Pediatric ophthalmology, subspecialty of ophthalmology
- Pediatric orthopedic surgery, subspecialty of orthopedic surgery
- Pediatric otolaryngology, subspecialty of otolaryngology
- Pediatric plastic surgery, subspecialty of plastic surgery
- Pediatric radiology, subspecialty of radiology
- Pediatric rehabilitation medicine, subspecialty of physical medicine and rehabilitation
- Pediatric surgery, subspecialty of general surgery
- Pediatric urology, subspecialty of urology

See also

[edit]

- American Academy of Pediatrics
- American Osteopathic Board of Pediatrics
- Center on Media and Child Health (CMCH)
- Children's hospital
- List of pediatric organizations
- List of pediatrics journals
- Medical specialty
- Pediatric Oncall
- Pain in babies
- Royal College of Paediatrics and Child Health
- Pediatric environmental health

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Further reading

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- *BMC Pediatrics* - open access
- *Clinical Pediatrics*
- *Developmental Review* - partial open access
- *JAMA Pediatrics*
- *The Journal of Pediatrics* - partial open access

External links

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Medicine

Surgery

- Cardiac surgery
- Cardiothoracic surgery
- Endocrine surgery
- Eye surgery
- General surgery
 - Colorectal surgery
 - Digestive system surgery
- Neurosurgery
- Oral and maxillofacial surgery
- Orthopedic surgery
- Hand surgery
- Otolaryngology
 - ENT
- Pediatric surgery
- Plastic surgery
- Reproductive surgery
- Surgical oncology
- Transplant surgery
- Trauma surgery
- Urology
 - Andrology
- Vascular surgery

Internal medicine

- Allergy / Immunology
- Angiology
- Cardiology
- Endocrinology
- Gastroenterology
 - Hepatology
- Geriatrics
- Hematology
- Hospital medicine
- Infectious diseases
- Nephrology
- Oncology
- Pulmonology
- Rheumatology

Obstetrics and gynaecology


- Gynaecology
- Gynecologic oncology
- Maternal–fetal medicine
- Obstetrics
- Reproductive endocrinology and infertility
- Urogynecology

Medical education

- Medical school
- Bachelor of Medicine, Bachelor of Surgery
- Bachelor of Medical Sciences
- Master of Medicine
- Master of Surgery
- Doctor of Medicine
- Doctor of Osteopathic Medicine
- MD–PhD
 - Medical Scientist Training Program

Related topics

- Alternative medicine
- Allied health
- Molecular oncology
- Nanomedicine
- Personalized medicine
- Public health
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- History of medicine

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Infants and their care

Health (Pediatrics)

- Baby food
- Birth weight
- Breast pump
- Breastfeeding
- Breastfeeding and medications
- Breastfeeding and mental health
- Bottle feeding
- Colic
- Cradle cap
- Esotropia
- Failure to thrive
- Immunization
- Infant and toddler safety
- Infant bathing
- Infant feeding
- Infant food safety
- Infant formula
- Infant massage
- Infant respiratory distress syndrome
- Infant sleep training
- Neonatal intensive care unit
- Newborn care and safety
- Oral rehydration therapy
 - Pedialyte
- Preterm birth
- Shaken baby syndrome
- Soy formula
- SIDS

Development

- Attachment parenting
- Baby-led weaning
- Baby talk
- Babbling
- Birth defect
- Childbirth
- Crawling
- Gestational age
- Infant visual development
- Irritant diaper dermatitis
- Infant cognitive development
- Infant crying
- Kangaroo care
- Mother
- Nursery rhyme
- Object permanence
- Parent
- Parenting
- Peekaboo
- Play
- Prenatal development
- Prenatal development table
- Teething
- Walking
- Weaning

Socialization and Culture

- Attachment
- Babysitting
- Child abuse
- Child care
- Child custody
- Children's rights
 - UN Child rights
- Circumcision
- Foster care
- Grandparent visitation
- Infant swimming
- Milk bank
- Nanny
- Wet nurse

Infant care and equipment

- Baby bouncer
- Baby gate
- Baby monitor/Hidden camera
- Baby powder
- Baby shampoo
- Baby toy
- Baby walker
- Bib
- Baby swing
- Baby transport
- Bassinet
- Car seat safety
- Cloth diaper
- Cradle board
- Diaper
- Diaper bag
- Baby wipes
- Haberman Feeder
- High chair
- Infant bed (*American 'crib' and 'cradle', British 'cot'*)
- Infant carrier
- Infant clothing
- Pacifier
- Playpen
- Stroller
- Supplemental nursing system
- Swaddling
- Swim diaper
- Teether
- Travel cot

Other topics

- Baby shower
- Babywearing
- Child neglect
- Closed adoption
- Cry room
- Infant ear piercing
- Open adoption
- Prenatal cocaine exposure
- Neonatal withdrawal syndrome
- Parental child abduction
- Parental responsibility
- Parenting plan
- Paternity
 - Paternity fraud

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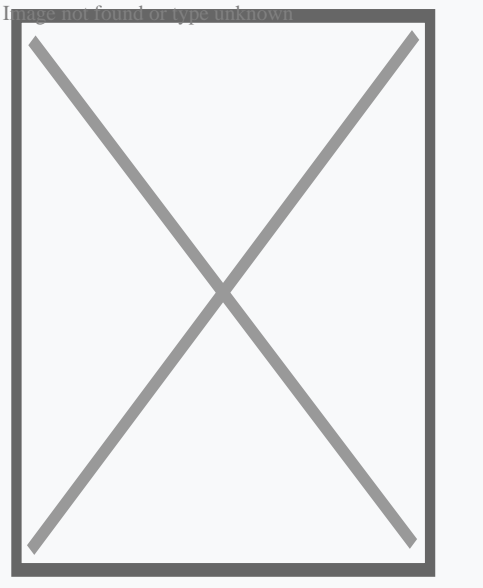
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About malocclusion

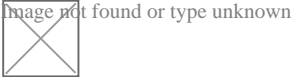
"Deep bite" and "Buck teeth" redirect here. For the village, see Deep Bight, Newfoundland and Labrador.

Malocclusion



Malocclusion in 10-year-old girl

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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

[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

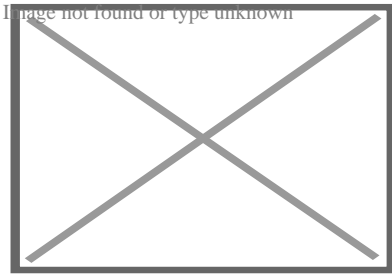
An average overbite is when the upper anterior teeth cover a third of the lower teeth. Covering less than this is described as 'reduced' and more than this is an 'increased' overbite. No overlap or contact is considered an 'anterior open bite'.^{[25][31][32]}

Angle's classification method

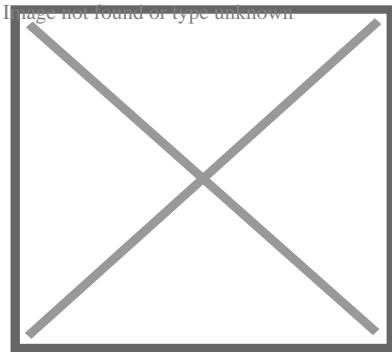
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Class I with severe crowding and labially erupted canines



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** (Neutroclusion): 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:** (Mesioocclusion (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]

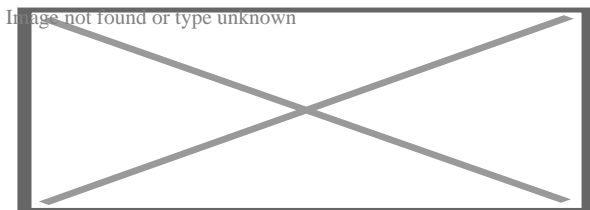
Identifying inter-arch tooth size discrepancy (ITSD) before treatment begins allows the practitioner to develop the treatment plan in a way that will take ITSD into account. ITSD corrective treatment may entail demanding reduction (interproximal wear), increase (crowns and resins), or elimination (extractions)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

[edit]

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External links

[edit]

Classification

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

D



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
- 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

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

- Edward Angle
- Spencer Atkinson
- Clifford Ballard
- Raymond Begg
- Hans Peter Bimler
- Samir Bishara
- Arne Björk
- Charles B. Bolton
- Holly Broadbent Sr.
- Allan G. Brodie
- Charles J. Burstone
- Peter Buschang
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- Rolf Frankel
- Sheldon Friel
- Thomas M. Graber
- Charles A. Hawley
- Reed Holdaway
- John Hooper (Orthodontist)
- Joseph Jarabak
- Harold Kesling
- Albert Ketcham
- Juri Kuroi
- Craven Kurz
- Benno Lischer
- James A. McNamara
- Birte Melsen
- Robert Moyers
- Hayes Nance
- Ravindra Nanda
- George Northcroft
- Dean Harold Noyes
- Frederick Bogue Noyes
- Albin Oppenheim
- Herbert A. Pullen
- Earl W. Renfroe
- Robert M. Ricketts
- Alfred Paul Rogers
- Ronald Roth
- Everett Shapiro
- L. F. Andrews

Notable contributors

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

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- [The Future of Orthodontics in a Digital Era](#)
- [Reducing Errors Through Computerized Analysis](#)

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