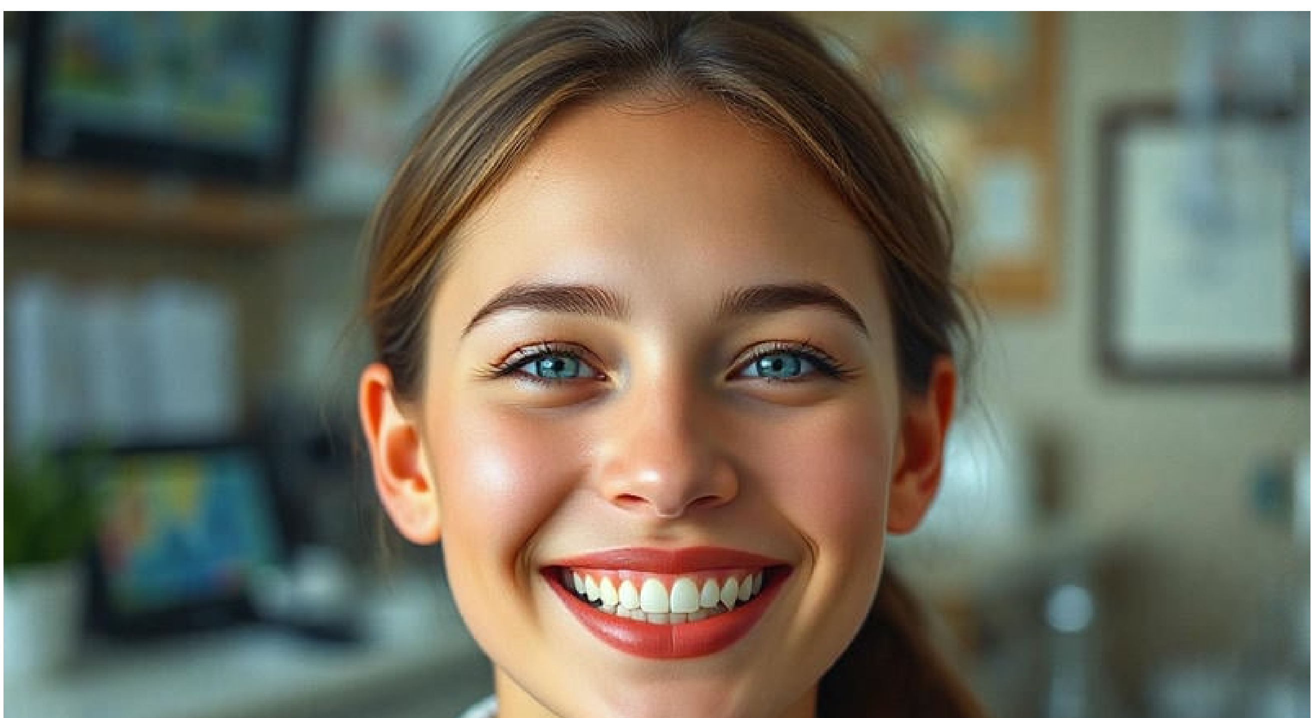
Accelerated Orthodontics

- **Innovative Approaches to Shorten Treatment Time**
  Innovative Approaches to Shorten Treatment Time **The Role of Vibration Devices in Faster Tooth Movement** **Micro Osteoperforation and Its Effects on Treatment** **3D Printing Techniques for Customized Appliances** **Benefits of Digital Impressions in Modern Orthodontics** **AI Assisted Treatment Planning for Precise Outcomes** **Remote Monitoring and Virtual Consultations** **Incorporating New Tools for Patient Compliance** **Practical Considerations of Accelerated Techniques** **Research Trends Shaping Future Orthodontic Practices** **Combining Traditional Methods With Cutting Edge Solutions** **Adapting to Technological Shifts in Orthodontic Care**
- **Indications for Surgical Alignment of the Jaw**
  Indications for Surgical Alignment of the Jaw **Steps in Preparing for Orthognathic Procedures** **Collaboration Between Orthodontists and Surgeons** **Recovery Factors That Affect Surgical Outcomes** **Managing Expectations During Corrective Jaw Treatment** **Potential Complications of Complex Jaw Adjustments** **Importance of Skeletal Analysis Before Surgery** **Combined Orthodontic and Surgical Treatment Timelines** **Role of Virtual Surgical Planning in Jaw Corrections** **Functional Improvements After Orthognathic Intervention** **Support and Care for Post Surgical Recovery** **Evaluating Long Term Benefits of Jaw Realignment**
- **About Us**



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In orthodontic treatment for children, common jaw growth issues often include overbites, underbites, crossbites, and open bites. These conditions can be significantly influenced by genetic factors, the early loss of baby teeth, or habits such as thumb sucking. For example, an overbite occurs when the upper front teeth protrude beyond the lower ones, while an underbite is characterized by the lower teeth extending past the upper ones. A crossbite happens when the upper teeth fit inside the lower ones, and an open bite is defined by a gap between the upper and lower teeth when the mouth is closed.

When complex jaw adjustments are necessary, particularly in cases requiring surgical intervention, potential complications can arise. Braces work by gently applying pressure to move teeth into place **Children's braces treatment** health. Corrective jaw surgery, or orthognathic surgery, is a significant procedure used to address severe jaw misalignments that cannot be corrected solely through orthodontic treatment. This surgery involves a collaboration between orthodontists and oral surgeons to ensure optimal outcomes.

Short-term complications of corrective jaw surgery may include pain, difficulty chewing, and potential issues with jaw movement. In some cases, long-term effects might require secondary surgeries to address unforeseen complications or to achieve optimal results. These secondary procedures might involve adjustments to bone plates, correction of occlusion, or refinements in aesthetics. The likelihood of requiring such interventions varies based on factors such as the complexity of the case, the surgical technique employed, and individual healing responses.

Early orthodontic evaluations are crucial for timely intervention and providing corrective measures before these conditions become more pronounced. Understanding the root causes of jaw alignment issues, such as genetic factors or childhood habits, allows orthodontists to tailor treatments effectively. This approach not only corrects the physical misalignment but also significantly affects a child's oral health, facial aesthetics, and overall quality of life.

Early orthodontic treatment is a vital approach in addressing jaw growth issues, particularly in children. By using techniques such as growth modification devices and functional appliances, orthodontists can effectively guide jaw development. This early intervention not only ensures proper alignment of the teeth and jaw but also helps prevent more severe complications that might arise later in life, such as the need for invasive procedures like jaw surgery.

Jaw surgery, while transformative, comes with its potential complications. These can include short-term issues like swelling, bruising, and numbness due to nerve manipulation during the procedure[3]. In some cases, patients may experience long-term side effects such as the need for secondary surgeries to correct unforeseen complications or achieve optimal outcomes[3]. Persistent jaw pain, difficulty chewing, or problems with bite alignment after surgery can also indicate the need for further intervention[5]. These complications highlight the importance of early orthodontic treatment in minimizing the need for such surgeries.

Untreated jaw issues, particularly temporomandibular joint (TMJ) disorders, can lead to severe and long-term complications. These include chronic jaw pain, permanent joint damage, headaches, and decreased quality of life[1]. Early orthodontic treatment can address these issues before they become severe, ensuring optimal dental health and development for children. By guiding jaw growth and correcting bite issues early, orthodontic care can reduce strain on the jaw muscles and joints, ultimately leading to better overall health and quality of life[4]. This approach underscores the crucial role of early intervention in jaw health management.

The HealthyStart System

When undergoing complex jaw adjustments, patients may experience a variety of potential complications. These can include discomfort, irritation, and temporary changes in bite force, which may lead to symptoms associated with temporomandibular joint disorders (TMJ) or temporomandibular disorders (TMJ). While these symptoms are often mild and temporary, they can still significantly impact a person's quality of life.

Disorders of the temporomandibular joint, such as TMJ, can manifest as pain in the jaw joint or muscles, clicking sounds when opening the mouth, and limited jaw mobility. These conditions are not solely caused by jaw adjustments but can be worsen by them. The temporomandibular joint is unique due to its complex hinge and sliding motions, making it particularly challenging to address when issues arise.

In some cases, jaw adjustments might lead to more severe complications, such as nerve damage, which can result in numbness or altered sensation in the jaw, chin, or lip areas. Additionally, misalignment of the jaw can cause a wide variety of symptoms, including difficulty in chewing, speaking, and even breathing. It can also lead to chronic headaches, sleep disorders like sleep apnea, and digestive issues due to improper chewing.

It is crucial for individuals undergoing jaw adjustments to be aware of these potential complications and to discuss them with their medical providers. Open communication about expectations and desired outcomes can help minimize risks and improve the likelihood of a more effective and less complicated procedure. Conservative and reversible treatments are often recommended for TMJ disorders, as they avoid permanent changes to the jaw or bite, which can be more effective in the long term.

This non-invasive approach targets the natural development of children's teeth and jaw, using soft

dental appliances to align teeth and address breathing issues, reducing the need for more invasive treatments.

The use of orthodontic appliances, such as braces and aligners, is a common method for adjusting and aligning teeth and jaws. However, these appliances can sometimes cause irritation and discomfort, which may exacerbate symptoms of temporomandibular joint disorder (TMJ TMD), a condition characterized by pain in the jaw joint and surrounding muscles. TMJ TMD can lead to a complex of symptoms including chronic pain, headaches, and difficulty chewing or speaking.

When orthodontic appliances are used, they can lead to changes in the way the upper and lower teeth fit together, potentially shifting the jaw into an unfavorable position. This can result in jaw muscle tension and TMJ TMD symptoms such as earaches and muscular pain. Moreover, the appliances may cause excessive bite force, which can strain the muscles around the jaws, further exacerbating TMJ symptoms.

In some cases, the discomfort caused by orthodontic appliances can lead to habits like teeth grinding or clenching, which are also common symptoms of TMJ TMD. These habits can cause significant tooth damage and contribute to the worsening of TMJ symptoms.

Managing these complications requires careful planning and adjustments. Orthodontists must carefully evaluate the jaw alignment and overall dental health before recommending treatments. During treatment, it is crucial to regularly adjust and check the appliances to minimize irritation and discomfort. If necessary, appliances may need to be readj justed or even temporarily repositioned to alleviate TMJ symptoms.

In conclusion, while orthodontic appliances are effective for aligning teeth and jaws, they can also contribute to TMJ TMD symptoms if not properly used. By ensuring that appliances are well-ted and regularly check, orthodontists can help minimize the risk of these complications and ensure that the benefits of orthodontic treatment are not outweighed by potential discomfort or long-term health issues.

Myobrace: A No-Braces Approach

Skeletal Irregularities and Complex Cases often require a combination of orthodontic and surgical interventions to achieve proper alignment and functionality. These complex cases can have significant effects on both oral and physical health if not properly aligned.

One of the most common complications associated with complex jaw adjustments is the development of **Temporomandibular Joint (TMJ) Disorders**. TMJ disorders can lead to chronic jaw pain, inflammation, and difficulty in chewing or speaking. If untreated, these conditions can result in permanent joint damage, dislocation, or the need for invasive procedures like surgery[1]. TMJ disorders can also cause headaches, migraines, and ear problems such as tinnitus or earaches due to the close distance between the TMJ and the ears[1]. Sleep disturbances are another potential complication, as TMJ issues can lead to bruxism and sleep apnea[1]. Corrective jaw surgery can help alleviate these issues by realigning the jaw bones to improve TMJ function and overall oral health[4][5]. However, surgical interventions can also lead to complications such as nerve injuries, numbness, and temporary changes in facial sensations[3][5]. Proper preoperative assessment and advanced surgical techniques are crucial in minimizing these complications[3][4]. The recovery process involves a structured approach to postoperative care, including pain management and follow-up treatments to ensure optimal outcomes[3][5]. In some cases, secondary surgeries may be necessary to address unforeseen complications or achieve optimal aesthetic and functional results[3][5]. The importance of thorough consultation and planning cannot be over-ens
In cases where skeletal discrepancies are significant, **Orthognathic Surgery** may be necessary. This surgery involves repositioning the jaw bones to correct severe malocclusion, skeletal discrepancies, and functional impairments[2][4]. While it can significantly improve oral function and aesthetics, it also comes with potential side effects such as swelling, bruising, and temporary numbness[3]. The surgery often requires comprehensive preoperative planning and collaboration between orthodontists and oral surgeons to ensure optimal results[2][4]. Postoperative care includes orthodontic treatments to fine-tune the bite alignment and address any residual issues[2][4]. The long-term commitment to orthodontic treatment before and after

surgery is crucial for achieving the desired outcomes[4]. In some cases, patients may experience persistent jaw pain or difficulty chewing even after surgery, which could indicate the need for revision surgery[5]. Revision surgery can help address functional issues, aesthetic concerns, or changes in bite alignment that may arise post-surgery[5]. The potential for complications underscores the importance of careful evaluation and personalized treatment planning to ensure that the benefits of surgery outweigh the potential challenges[3][5].

Myobrace offers a brace-free solution that corrects poor oral habits, guiding jaw and teeth alignment development in children, promoting natural growth and oral health.

When it comes to complex jaw adjustments, such as those often necessary in orthodontic treatments, there are several potential complications that can arise. While orthodontic treatment is designed to correct misalignments and improve the overall function and appearance of the jaw, it can also temporarily increase the risk of certain conditions like bruxism and temporomandibular joint disorder (TMJ TMD).

Bruxism, characterized by teeth grinding or clenching, can be both a cause and a consequence of jaw misalignment. Orthodontic appliances, such as braces or aligners, may cause initial discomfort or irritation inside the mouth, leading some individuals to grind or clench their teeth more, which can exacerbate TMJ TMD symptoms. TMJ TMD is a painful condition that affects the joints of the jaw and surrounding muscles, causing discomfort, limitations in mobility, and pain.

The relationship between orthodontic treatment and TMJ TMD is complex. While there is no clear evidence that orthodontic treatment directly causes TMJ issues, certain factors such as changes in occlusion (or the way the upper and lower teeth fit together) and excessive bite force during treatment can contribute to jaw muscle tension and TMJ TMD symptoms. These symptoms are often mild and temporary, resolving within a few months after the completion of treatment.

However, it is crucial for patients undergoing orthodontic treatment to be carefully diagnosed and treated by experienced professionals. Proper treatment planning can reduce the risk of TMJ TMD, and adjustments to orthodontic appliances can alleviate discomfort. Stress, a major risk factor for TMJ TMD, can be further manage through counseling and stress-reduction techniques.

In more severe cases of jaw misalignment, corrective jaw surgery may be necessary. This procedure, while transformative, also comes with potential complications such as short-term pain, discomfort, and long-term effects like the need for secondary surgeries to achieve optimal outcomes.

In conclusion, while orthodontic treatment can help correct jaw misalignments and potentially alleviate TMJ issues by improving bite function, it may also temporarily increase the risk of bruxism and TMJ TMD due to discomfort or changes in bite force. It is important for patients to be well-mentoring and for healthcare professionals to carefully manage these potential complications to ensure the benefits of treatment outweigh the challenges.

Comprehensive Orthodontic Solutions

Minimizing complications in orthodontic treatment, especially for complex jaw issues, is crucial for ensuring the long-term oral health and well-being of children. Early detection plays a significant role in this process. By identifying potential problems early, orthodontists can implement interventions that prevent more severe issues from developing. For example, early orthodontic care can address misaligned teeth and jaw discrepancies before they become more complex, potentially reducing the need for extensive treatments like orthognathic surgery later on.

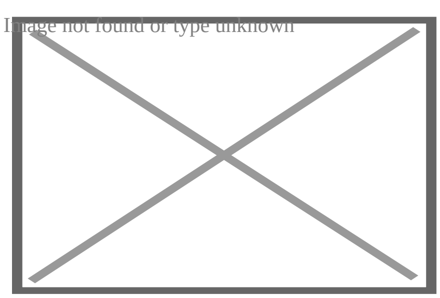
Proper treatment involves a combination of orthodontic appliances and, in severe cases, surgical interventions. Orthodontic appliances such as braces can help align teeth and correct bite issues, but they must be used with care to avoid discomfort or irritation that might exacerbate problems like TMJ (temporomandibular joint) disorder. In cases where skeletal discrepancies are significant, orthognathic surgery may be necessary to correct the jaw's position or size, ensuring a harmonious relationship between the upper and lower jaws.

Effective stress management techniques are also important, as orthodontic treatment can be a significant life event for children. Reduces stress can help them better maintain oral hygiene habits and reduce the risk of complications such as tooth grinding or clenching, which can strain jaw muscles and exacerbate TMJ symptoms.

In complex cases, collaboration between orthodontists and other dental or surgical clinicians is crucial. This interdisciplinary approach ensures that treatments are well-integrated and effective, minimizing the risk of complications and improving both the functional and esthetic results of orthodontic care. By focusing on early detection, proper treatment, and stress management, parents and orthodontists can work together to ensure that children undergoing orthodontic treatment have the best possible experience and long-term oral health.

About jaw

This article is about the anatomical part. For the mountain, see The Jaw. For other uses, see Jaws (disambiguation) and Jawbone (disambiguation).



Human lower jaw viewed from the left

The **jaws** are a pair of opposable articulated structures at the entrance of the mouth, typically used for grasping and manipulating food. The term *jaws* is also broadly applied to the whole of the structures constituting the vault of the mouth and serving to open and close it and is part of the body plan of humans and most animals.

Arthropods

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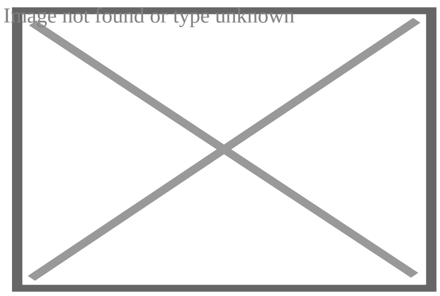
Further information: Mandible (arthropod mouthpart) and Mandible (insect mouthpart)



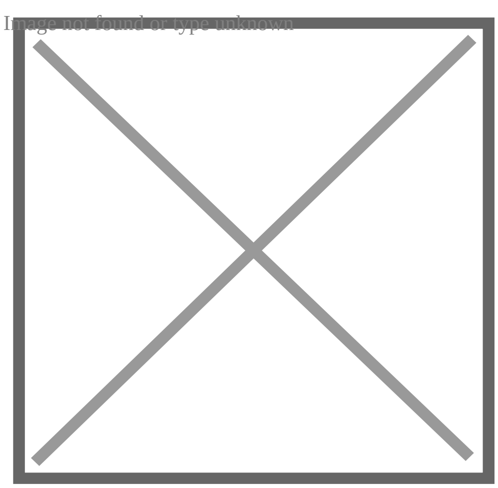
The mandibles of a bull ant

In arthropods, the jaws are chitinous and oppose laterally, and may consist of *mandibles* or *chelicerae*. These jaws are often composed of numerous mouthparts. Their function is fundamentally for food acquisition, conveyance to the mouth, and/or initial processing (*mastication* or *chewing*). Many mouthparts and associate structures (such as pedipalps) are modified legs.

Vertebrates

[edit]

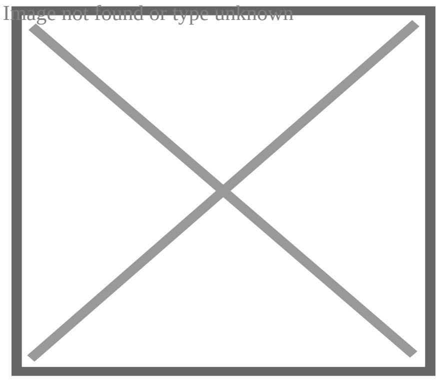
In most vertebrates, the jaws are bony or cartilaginous and oppose vertically, comprising an *upper jaw* and a *lower jaw*. The vertebrate jaw is derived from the most anterior two pharyngeal arches supporting the gills, and usually bears numerous teeth.



Jaws of a great white shark

Fish

[edit]



Moray eels have two sets of jaws: the oral jaws that capture prey and the pharyngeal jaws that advance into the mouth and move prey from the oral jaws to the esophagus for swallowing.

Main article: Fish jaw

The vertebrate jaw probably originally evolved in the Silurian period and appeared in the Placoderm fish which further diversified in the Devonian. The two most anterior pharyngeal arches are thought to have become the jaw itself and the hyoid arch, respectively. The hyoid system suspends the jaw from the braincase of the skull, permitting great mobility of the jaws. While there is no fossil evidence directly to support this theory, it makes sense in light of the numbers of pharyngeal arches that are visible in extant jawed vertebrates (the Gnathostomes), which have seven arches, and primitive jawless vertebrates (the Agnatha), which have nine.

The original selective advantage offered by the jaw may not be related to feeding, but rather to increased respiration efficiency.[1] The jaws were used in the buccal pump (observable in modern fish and amphibians) that pumps water across the gills of fish or air into the lungs in the case of amphibians. Over evolutionary time the more familiar use of jaws (to humans), in feeding, was selected for and became a very important function in vertebrates. Many teleost fish have substantially modified jaws for suction feeding and jaw protrusion, resulting in highly complex jaws with dozens of bones involved.[2]

Amphibians, reptiles, and birds

[edit]

The jaw in tetrapods is substantially simplified compared to fish. Most of the upper jaw bones (premaxilla, maxilla, jugal, quadratojugal, and quadrate) have been fused to the braincase, while the lower jaw bones (dentary, splenial, angular, surangular, and articular) have been fused together into a unit called the mandible. The jaw articulates via a hinge joint between the quadrate and articular. The jaws of tetrapods exhibit varying degrees of mobility between jaw bones. Some species have jaw bones completely fused, while others may have joints allowing for mobility of the dentary, quadrate, or maxilla. The snake skull shows the greatest degree of cranial kinesis, which allows the snake to swallow large prey items.

Mammals

[edit]

In mammals, the jaws are made up of the mandible (lower jaw) and the maxilla (upper jaw). In the ape, there is a reinforcement to the lower jaw bone called the simian shelf. In the evolution of the mammalian jaw, two of the bones of the jaw structure (the articular bone of the lower jaw, and quadrate) were reduced in size and incorporated into the ear, while many others have been fused together.[3] As a result, mammals show little or no cranial kinesis, and the mandible is attached to the temporal bone by the temporomandibular joints. Temporomandibular joint dysfunction is a common disorder of these joints, characterized by pain, clicking and limitation of mandibular movement.[4] Especially in the therian mammal, the premaxilla that constituted the anterior tip of the upper jaw in reptiles has reduced in size; and most of the mesenchyme at the ancestral upper jaw tip has become a protruded mammalian nose.[5]

Sea urchins

[edit]

Sea urchins possess unique jaws which display five-part symmetry, termed the *Aristotle's lantern*. Each unit of the jaw holds a single, perpetually growing tooth composed of crystalline calcium carbonate.

See also

[edit]

- Muscles of mastication
- Otofacial syndrome
- Predentary
- Prognathism
- Rostral bone

References

[edit]

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5. **^** *Higashiyama, Hiroki; Koyabu, Daisuke; Hirasawa, Tatsuya; Werneburg, Ingmar; Kuratani, Shigeru; Kurihara, Hiroki (November 2, 2021). "Mammalian face as an evolutionary novelty". PNAS. **118** (44): e2111876118. Bibcode:2021PNAS..11811876H. doi:10.1073/pnas.2111876118. PMC 8673075. PMID 34716275.*

External links

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Human regional anatomy

Body Skin

<table>
<tr><td>Head</td><td>

Hair
Face

Forehead
Cheek
Chin
Eyebrow
Eye
Eyelid
Nose
Mouth
Lip
Tongue
Tooth

Ear
Jaw
Mandible
Occiput
Scalp
Temple

</td></tr>
<tr><td>Neck</td><td>

Adam's apple
Throat
Nape

</td></tr>
<tr><td>Torso (Trunk)</td><td>

Abdomen

Waist
Midriff
Navel

Vertebral column
Back
Thorax

Breast
Nipple

Pelvis
Genitalia

Penis
Scrotum
Vulva

Anus

</td></tr>
</table>

Limbs

- **Arm**
  - Shoulder
  - Axilla
  - Elbow
  - Forearm
  - Wrist
  - Hand
    - Finger
    - Fingernail
    - Thumb
    - Index
    - Middle
    - Ring
    - Little
- **Leg**
  - Buttocks
  - Hip
  - Thigh
  - Knee
  - Calf
  - Foot
    - Ankle
    - Heel
    - Toe
    - Toenail
    - Sole

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The facial skeleton of the skull

Maxilla

Surfaces

- Anterior: *fossae* (Incisive fossa, Canine fossa)
- Infraorbital foramen
- Orbital bones
- Anterior nasal spine
- Infratemporal: Alveolar canals
- Maxillary tuberosity
- Orbital: Infraorbital groove
- Infraorbital canal
- Nasal: Greater palatine canal

Processes

- Zygomatic process
- Frontal process (Agger nasi, Anterior lacrimal crest)
- Alveolar process
- Palatine process (Incisive foramen, Incisive canals, Foramina of Scarpa, Incisive bone, Anterior nasal spine)

Other

- Body of maxilla
- Maxillary sinus

Zygomatic

- Orbital process (Zygomatico-orbital)
- Temporal process (Zygomaticotemporal)
- Lateral process (Zygomaticofacial)

Palatine

Fossae

- Pterygopalatine fossa
- Pterygoid fossa

Plates

- Horizontal plate (Posterior nasal spine)
- Perpendicular plate (Greater palatine canal, Sphenopalatine foramen)
- Hard palate

Processes

- Pyramidal
- Orbital
- Sphenoidal

Mandible

Body

- *external surface* (Chin, Jaw, Mandibular prominence, Mandibular symphysis, Lingual foramen, Mental protuberance, Mental foramen, Mandibular incisive canal)
- *internal surface* (Mental spine, Mylohyoid line, Sublingual fovea, Submandibular fovea)
- Alveolar part

Ramus

- Mylohyoid groove
  - Mandibular canal
  - Lingula
- Mandibular foramen
- Angle
- Coronoid process
- Mandibular notch
- Condyloid process
- Pterygoid fovea

Nose

- Nasal bone
  - Internasal suture
  - Nasal foramina
- Inferior nasal concha
  - Ethmoidal process
  - Maxillary process
- Vomer
  - Wing

Other

- Lacrimal
  - Posterior lacrimal crest
  - Lacrimal groove
  - Lacrimal hamulus
- Prognathism
- Retromolar space

Portal:

- icon Image not found or type unknown Anatomy

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- Germany
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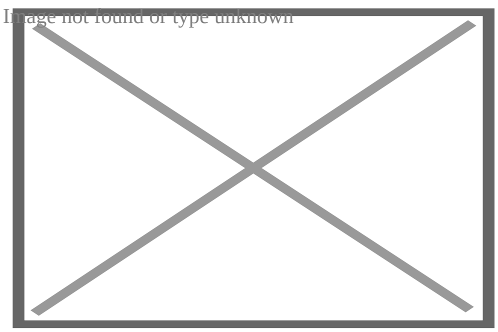
About pediatrics

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	*Paediatric cardiology, neonatology, critical care, pediatric oncology, hospital medicine, primary care, others (see below)*
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: ??Ã¡Â¿â€“? (*pais* "child") and Ã¡Â¼Â°???Ã•Å’?(*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

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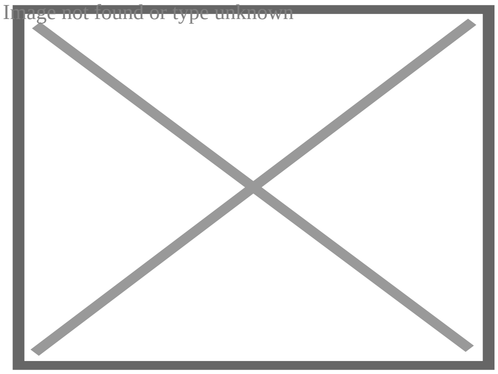

Part of Great Ormond Street Hospital in London, United Kingdom, which was the first pediatric hospital in the English-speaking world.

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* (crêches).[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

[edit]

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 WrocÃ…â€šaw), 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

[edit]

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

[edit]

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

[edit]

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

[edit]

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

[edit]

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

[edit]

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

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The examples and perspective in this section **deal primarily with United States and 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

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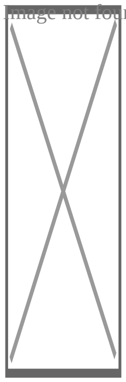

Occupation	
Names	○ Pediatrician ○ Paediatrician
Occupation type	Specialty
Activity sectors	Medicine
Description	
Education required	○ Doctor of Medicine ○ Doctor of Osteopathic Medicine ○ Bachelor of Medicine, Bachelor of Surgery (MBBS/MBChB)
Fields of employment	Hospitals, Clinics

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

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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

Specialties and	**Diagnostic**	○ Radiology
		    ○ Interventional radiology
		    ○ Neuroradiology
		    ○ Nuclear medicine
		○ Pathology
		    ○ Anatomical

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

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- Traditional medicine
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  - Chief physician
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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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National	○ Germany ○ Japan ○ Czech Republic ○ Latvia ○ Israel
Other	○ NARA

Frequently Asked Questions

What are the most common types of jaw misalignments that require orthodontic treatment in children?

Common types of jaw misalignments in children include overbites, underbites, open bites, and crowded teeth. Overbites occur when the upper jaw extends past the lower jaw, while underbites occur when the lower jaw is larger than the upper jaw. Open bites are characterized by the upper and lower front teeth not closing properly, and crowded teeth result from a jaw that is too small for the teeth[1][2][3]. Crowding can lead to poor dental hygiene and discomfort[3]. Overbites and underbites can cause chewing difficulties and affect facial appearance[1][2][3]. Open bites may result from thumb sucking or other oral habits[1]. Early treatment can help correct these issues by modifying jaw growth[4][5]. If left un treated, these issues can lead to more severe problems like jaw pain and breathing difficulties[4][5]. For example, a recessive lower jaw can cause difficulty chewing, poor bite alignment, and even breathing issues like sleep apnea[4]. Early orthodontic treatment can help avoid these more severe problems by aligning the jaws properly during growth[5]. This not only corrects the bite but also prevents future surgical needs[3][5]. In some cases, appliances like palatal expanders can be used to expand the jaw and relieve crowding, which might also help in aligning the upper and lower jaws better[5]. If treatment is put off, more invasive procedures may be necessary later on[5]. For example, if a child has a severe underbite, treatment options might include a reverse-pull face mask or surgery in extreme cases[1][3]. Early diagnosis and treatment can significantly improve the childs quality of life by addressing these issues before they impact speech, eating, and breathing[2][3][4]. By correcting jaw misalignments early, children can avoid long-lasting dental and health problems[5]. For example, correcting an overbite can improve chewing and biting, while treating an underbite can relieve jaw pain and improve speech[2][3]. Early phase orthodontics is crucial in addressing these issues before they lead to more complex problems[5]. It allows for smoother and more effective adjustments during the childs growth phase[5]. In some cases, early treatment can even help avoid the need for tooth removal or surgery later on[5]. By addressing jaw misalignments early, orthodontists can guide the development of oral structures to be as healthy and anatomically correct as possible[5]. This approach not only corrects the bite but also prevents future dental and health issues[5]. For example, correcting a recessive lower jaw can help avoid breathing problems like sleep apnea and improve the childs quality of life[4]. Early treatment can also improve the childs appearance and speech by aligning the jaws properly[2][3]. By correcting jaw misalignments early, children can enjoy better dental health and a more balanced facial appearance[5]. In some cases, early treatment can even help improve the childs breathing and sleep quality by aligning the jaws properly[4]. By addressing these issues early, orthodontists can help children avoid more severe problems later on and improve their quality of life significantly[5]. For example, correcting an open bite can improve chewing and biting, while treating a deep overbite can relieve jaw pain and improve facial appearance[1][3]. Early treatment is crucial in addressing these issues before they lead to more complex problems[5]. It allows for smoother and more effective adjustments during the childs growth phase[5]. In some cases, early treatment can even help avoid the need for surgical correction later

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