Isolated Pierre Robin sequence

Pierre Robin sequence is a set of abnormalities affecting the head and face, consisting of a small lower jaw (micrognathia), a tongue that is placed further back than normal (glossoptosis), and blockage (obstruction) of the airways. Most people with Pierre Robin sequence are also born with an opening in the roof of the mouth (a cleft palate). This feature is not generally considered necessary for diagnosis of the condition, although there is some disagreement among doctors.

Some people have the features of Pierre Robin sequence as part of a syndrome that affects other organs and tissues in the body, such as Stickler syndrome or campomelic dysplasia. These instances are described as syndromic. When Pierre Robin sequence occurs by itself, it is described as nonsyndromic or isolated. Approximately 20 to 40 percent of cases of Pierre Robin sequence are isolated.

This condition is described as a "sequence" because one of its features, underdevelopment of the lower jaw (mandible), sets off a sequence of events before birth that cause the other signs and symptoms. Specifically, having an abnormally small jaw affects placement of the tongue, and the abnormally positioned tongue can block the airways. In addition, micrognathia and glossoptosis affect formation of the palate during development before birth, which often leads to cleft palate.

The combination of features characteristic of Pierre Robin sequence can lead to difficulty breathing and problems eating early in life. As a result, some affected babies have an inability to grow and gain weight at the expected rate (failure to thrive). In some children with Pierre Robin sequence, growth of the mandible catches up, and as adults these individuals have normal-sized chins.

Frequency

Isolated Pierre Robin sequence affects an estimated 1 in 8,500 to 14,000 people.

Causes

Changes in the DNA near the *SOX9* gene are the most common genetic cause of isolated Pierre Robin sequence. It is likely that changes in other genes, some of which have not been identified, are also involved in the condition. Doctors speculate that nongenetic factors, for example conditions during pregnancy that restrict growth of the jaw, may cause some cases of isolated Pierre Robin sequence.

The *SOX9* gene provides instructions for making a protein that plays a critical role in the formation of many different tissues and organs during embryonic development. The SOX9 protein regulates the activity of other genes, especially those that are important for development of the skeleton, including the mandible.

The genetic changes near the *SOX9* gene that are associated with isolated Pierre Robin sequence are thought to disrupt regions of DNA called enhancers, which normally regulate the activity of the *SOX9* gene. These changes reduce *SOX9* gene activity. As a result, the SOX9 protein cannot properly control the genes essential for normal development of the lower jaw, causing micrognathia, and consequently, glossoptosis, airway obstruction, and, often, cleft palate.

Inheritance Pattern

Isolated Pierre Robin sequence is usually not inherited. It typically results from new (de novo) genetic changes and occurs in people with no history of the disorder in their family. When the condition is inherited, it follows an autosomal dominant pattern, which means one copy of the DNA alteration in each cell is sufficient to cause the disorder.

Syndromic Pierre Robin sequence is inherited in the same pattern as the condition it is associated with.

Other Names for This Condition

- glossoptosis, micrognathia, and cleft palate
- Pierre Robin syndrome
- Pierre-Robin syndrome
- Robin sequence
- Robin syndrome

Diagnosis & Management

Genetic Testing Information

- What is genetic testing?
  /primer/testing/genetictesting
- Genetic Testing Registry: Robin sequence
  https://www.ncbi.nlm.nih.gov/gtr/conditions/C0031900/

Research Studies from ClinicalTrials.gov

- ClinicalTrials.gov
  https://clinicaltrials.gov/ct2/results?cond=%22Pierre-Robin+sequence%22

Other Diagnosis and Management Resources

- Boston Children's Hospital: Cleft Lip and Cleft Palate Treatment and Care
  http://www.childrenshospital.org/conditions-and-treatments/conditions/c/cleft-lip-and-cleft-palate
- Seattle Children's Hospital: Robin Sequence Treatments
  https://www.seattlechildrens.org/conditions/chromosomal-genetic-conditions/robin

Additional Information & Resources

Health Information from MedlinePlus

- Encyclopedia: Micrognathia
  https://medlineplus.gov/ency/article/003306.htm
- Encyclopedia: Pierre Robin Syndrome
  https://medlineplus.gov/ency/article/001607.htm
- Health Topic: Craniofacial Abnormalities
  https://medlineplus.gov/craniofacialabnormalities.html

Genetic and Rare Diseases Information Center

- Pierre Robin sequence
  https://rarediseases.info.nih.gov/diseases/4347/pierre-robin-sequence

Educational Resources

- Centers for Disease Control: Facts About Cleft Lip and Cleft Palate
  https://www.cdc.gov/ncbddd/birthdefects/cleftlip.html
- Children's Craniofacial Association: A Guide to Understanding Pierre Robin Sequence
  https://ccakids.org//assets/syndromebk_pierrerobin.pdf
- MalaCards: isolated pierre robin sequence
  https://www.malacards.org/card/isolated_pierre_robin_sequence
- Orphanet: Isolated Pierre Robin syndrome
  https://www.orpha.net/consor/cgi-bin/OC_Exp.php?Lng=EN&Expert=718
- University of California Davis Children's Hospital
  https://health.ucdavis.edu/children/clinical_services/cleft_craniofacial/anomalies/pierre.html

Patient Support and Advocacy Resources

- American Cleft Palate-Craniofacial Association
  https://cleftline.org/
- Children's Craniofacial Association
  https://ccakids.org/
- Foundation for Faces of Children
  https://facesofchildren.org/
- National Organization for Rare Disorders (NORD)
  https://rarediseases.org/rare-diseases/pierre-robin-sequence/

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28Pierre+Robin+Syndrome%5BMAJR%5D%29+AND+%28Pierre-Robin+sequence%5BTIAB%5D%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+1080+days%22%5Bdp%5D

Catalog of Genes and Diseases from OMIM

- PIERRE ROBIN SYNDROME
  http://omim.org/entry/261800

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