Apert Syndrome

Apert Syndrome (also known as **Acrocephalosyndactyly type I**) is an inherited disorder of the **bones and connective tissues** that leads to a characteristic pattern of deformities in the head, hands, and feet, which consequentially impact many aspects of normal development. The disorder is characterized by the premature fusion of certain skull bones (craniosynostosis). This early fusion prevents the skull from growing normally and affects the shape of the head and face. In addition, a varied number of fingers and toes are fused together (syndactyly).

Signs and Symptoms

The spectrum of abnormalities in Apert syndrome has recently been described along with current recommendations for orthodontic treatment.[1] Many of the characteristic facial features of Apert syndrome result from the premature fusion of the skull bones. The head is unable to grow normally, which leads to a **sunken appearance in the middle of the face, bulging and wide-set eyes, a beaked nose, and an underdeveloped upper jaw leading to crowded teeth and other dental problems**. Shallow eye sockets can cause **vision problems**. Early fusion of the skull bones also affects the development of the brain, which can disrupt **intellectual development**. Cognitive abilities in people with Apert syndrome range from normal to mild or moderate mental retardation. Individuals with Apert syndrome have **webbed or fused fingers and toes**. The severity of the fusion varies; at a minimum, three digits on each hand and foot are fused together. In the most severe cases, all of the fingers and toes are fused. Less commonly, people with this condition may have extra fingers or toes (polydactyly). Additional signs and symptoms of Apert syndrome can include hearing loss, unusually heavy sweating (hyperhidrosis), oily skin with severe acne, patches of missing hair in the eyebrows, fusion of spinal bones in the neck (cervical vertebrae), and recurrent ear infections that may be associated with an opening in the roof of the mouth (a cleft palate). Apert syndrome patients also have characteristic abnormalities in other bones, including the shoulders, elbows, hips, knees, and ribs.[2]

Causes

Mutations in the FGFR2 gene cause Apert syndrome. This gene produces a protein called fibroblast growth factor receptor 2. Among its multiple functions, this protein signals immature cells to become bone cells during embryonic development. A mutation in a specific part of the FGFR2 gene alters the protein and causes prolonged signaling, which can promote the premature fusion of bones in the skull, hands, and feet.

Diagnosis

Apert syndrome (Acrocephalosyndactyly type I) can be distinguished from two related conditions, **acrocephalopolysyndactyly type II (Carpenter syndrome)** and **acrocephalosyndactyly type III (Saethre-Chotzen syndrome)**. In most cases the diagnosis is based on the pattern of observable abnormalities and can be confirmed (or refuted) by sequencing the FGFR2 gene.

Chances of Developing Apert Syndrome

Heredity

Apert syndrome is inherited in an utosomal dominant pattern, which means one copy of the altered gene in each cell is sufficient to cause the disorder. Since the reproductive fitness of affected individuals is low, almost all cases of Apert syndrome result from new mutations in the gene, and occur in people with no history of the disorder in their family. Individuals with Apert syndrome, however, can pass along the condition to the next generation.

Related Problems

During infancy, patients will have problems with upper airway obstruction due to either reduction in the size of the nasopharynx or abnormalities in the tracheal cartilage. Sleep apnea is common in patients with Apert syndrome, as are elevated intracranial pressure resulting from obstructions to normal cerebrospinal fluid circulation. Other related problems include

- Heart defects and structural problems with the major blood vessels
- Ear infections which can cause hearing loss
- Severe acne
- Hyperactive sweat glands

History

A French physician described the syndrome now known as acrocephalosyndactylia in 1906.[3]

Epidemiology

Apert syndrome affects an estimated 1 in 65,000 to 88,000 newborns. It accounts for about 4.5% of all cases of craniostenosis. It is most prevalent in Asians (1 in 45,000) and less prevalent among Hispanics (1 in 130,000). Males and females are equally likely to have the disease. A large study revealed that almost half of fathers of affected infants were older than 35 when the child was born, suggesting that point mutations responsible for the disease are more frequently inherited from the father than from the mother.[4]

References

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