Great Ormond Street Hospital for Children NHS Foundation Trust: Information for Families

Pfeiffer syndrome

This information sheet from Great Ormond Street Hospital (GOSH) explains the causes, symptoms and treatment of Pfeiffer syndrome and where to get help.

What is Pfeiffer syndrome?

Pfeiffer syndrome is a type of complex craniosynostosis .

The skull is made up of several 'plates' of bone which, when we are born, are not tightly joined together. The seams where the plates join are called 'sutures'.

As we grow older, the sutures gradually fuse (stick) together, usually after all head growth has finished. When a child has craniosynostosis, the sutures fuse before birth. It can affect one suture or several.

When more than one suture is affected, it is called 'complex craniosynostosis'. This may happen as part of a syndrome (collection of symptoms often seen together), and so may be referred to as 'syndromic' as well.

In Pfeiffer syndrome, the coronal, lambdoid and sagittal sutures fuse before birth. Pfeiffer syndrome can be regarded as a spectrum disorder, in that it's signs and symptoms vary from mild to severe. Doctors tend to categorise Pfeiffer syndrome into three groups according to severity:

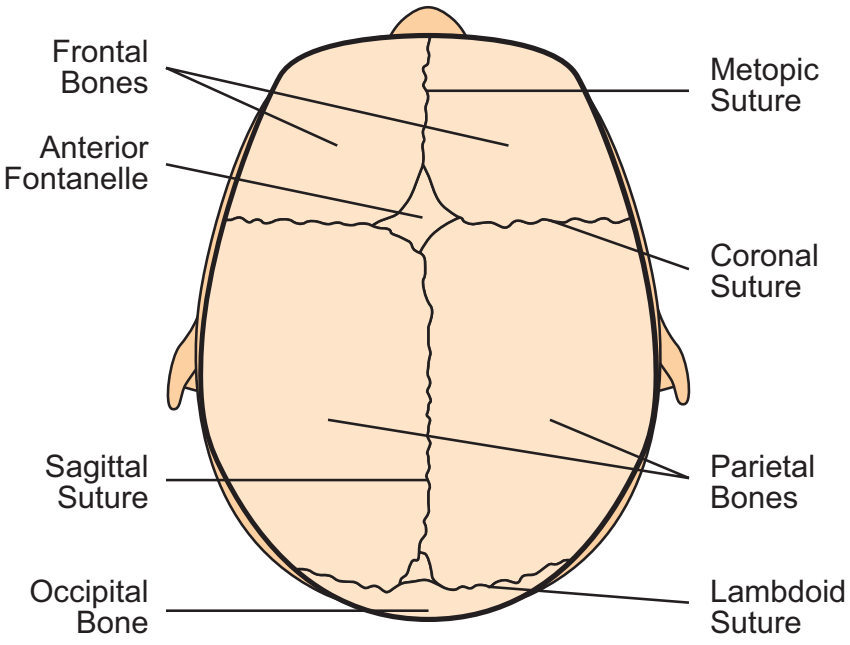
In type I, the effects of the mutation can be mild and the child's appearance little affected, apart from the characteristic broad thumbs and big toes – see below.

Type II and III are much more severe. Many sutures are affected and the headshape and the face are very abnormal. The skull is short from front to back and very tall (turricephalic). The face can be quite set back and the eyes protruding.

The difference between Type II and III is that in Type II there is also hydrocephalus and this pushes the skull into the shape (when seen from in front) of a cloverleaf - the cloverleaf skull.

Raised pressure inside the head is common in both Type II and III Pfeiffer syndrome but fusion of the elbow and knee joints can occur in any type.

Normal Skull of the Newborn



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What causes Pfeiffer syndrome?

Pfeiffer syndrome is a genetic condition, caused by a mutation (change) on a specific gene. Research has identified the gene affected in Type 2 Pfeiffer syndrome as the Fibroblast Growth Factor Receptor 2 (FGFR2) gene. Children born with Type 1 Pfeiffer syndrome have a mutation on either the FGFR2 gene or a similar one called Fibroblast Growth Factor Receptor 1 (FGFR1). Both these genes affect how certain cells in the body – including bone cells – grow, divide and die.

The gene mutation can be passed on from parent to child but in many cases develops sporadically (out of the blue). If it is inherited, it is passed on in an autosomal dominant manner – this means that if one parent is affected then half his or her children will inherit the condition.

What are the signs and symptoms of Pfeiffer syndrome?

Children with Pfeiffer syndrome have a characteristic appearance due to the problems with the skull plates fusing too early. They tend to have bulging widely-spaced eyes due to the eye sockets (orbits) being shallower than usual. Their forehead may be high and their upper jaw underdeveloped with a 'beaked' nose. Their airway may be narrower than usual leading to breathing problems. Hearing loss and dental problems are common. Children with Pfeiffer syndrome may have learning disabilities or developmental delay, most commonly affecting speech development.

The hands and feet are also affected in Pfeiffer syndrome. Thumbs and big toes are wider than normal and bent away from the rest of the hand or foot. Fingers and toes may be shorter than usual and webbing or fusion (syndactyly) can also occur.

How is Pfeiffer syndrome diagnosed?

As children with Pfeiffer syndrome have a characteristic appearance, no specific diagnostic tests are needed. Imaging scans, such as x-ray, CT or MRI may be suggested to monitor bone growth before, during and after treatment and also to detect hydrocephalus. Hearing tests will be needed to diagnose any hearing problems and genetic testing may be useful to identify the particular gene affected.

How is Pfeiffer syndrome treated?

As Pfeiffer syndrome can affect various areas of the body, treatment is best delivered at a specialist centre where a multidisciplinary team approach can be taken. The multidisciplinary team will usually comprise craniofacial (skull and face) surgeons, neurosurgeons, hand surgeons, ophthalmologists (eye specialists), dentists, orthodontists, geneticists, psychologists and speech and language therapists with other specialists brought in as needed.

Depending on the severity of the skull fusion, surgery to the skull and midface region soon after birth may be needed if pressure inside the brain is raised or there is a risk of eye damage. There are several different types of operation - the team will assess which is most suitable for your child.

In many cases, initial skull re-shaping surgery takes place within the first years of life. This will involve cutting through the fused sutures in the skull and re-shaping them to give a more normal skull shape.

Hydrocephalus will need a shunt operation to divert obstructed cerebro-spinal fluid (CSF; a clear, watery fluid that surrounds and cushions the brain)to the abdomen.

As the bone continues to grow during childhood and adolescence, further surgery may be needed to improve the shape of the skull and face. Surgery to improve the midface

problems will usually be carried out in later childhood, most commonly using a rigid external distraction (RED) frame to gradually pull the affected bones forwards over a period of weeks and months.

What happens next?

The outlook for children born with Pfeiffer syndrome is variable depending on the severity of their symptoms and the impact it has on bodily functions such as breathing, vision and hearing. Treatment is required soon after birth in many cases, with repeated operations during early childhood to maintain functioning. Children with Pfeiffer syndrome often have learning disabilities, although the severity of these is variable. Many have long term airway and feeding problems associated with learning disabilities. Most will benefit from support in education and day to day life although a degree of independence may be possible.

Further information and support

Headlines – the Craniofacial Support Group – is the main support organisation in the UK for families of children and young people affected by a craniofacial disorder. Visit their website at www.headlines.org.uk.

Changing Faces is another organisation that will be able to offer help and support to anyone living with a condition that affects their appearance. Visit their website at www.changingfaces.org.uk or telephone their helpline on 0845 4500 275.

Compiled by the Craniofacial team in collaboration with the Child and Family Information Group

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