22q11 deletion

This information sheet explains about 22q11 deletion and what it could mean for your child. It also gives suggestions for how you can ensure the best treatment and support for your child..

What is 22q11 deletion?

It is a type of chromosome disorder that is found in many seemingly unrelated conditions or syndromes (collection of symptoms often seen together). Human beings have about 30 to 40,000 different genes, each of which has a function in making an individual person. The genes are arranged in pairs (one of the pair from each parent) on 23 chromosomes. Each chromosome has a long arm (referred to as q) and a short arm (p). In 22q11 deletion, a tiny part of the long arm of one of the two copies of chromosome 22 is missing at position 11.

The effect of the deletion of this tiny part of chromosome 22 can be seen as a range of problems, ranging from mild to severe. Velo-cardio-facial syndrome (VCFS) is at the mild to moderate end of the range. Children with VCFS have problems with the structure and function of the palate, heart defects and a facial appearance with similar features to other children with the condition. There are various alternative names for VCFS, such as Shprintzen syndrome (named after the speech pathologist who first described it), conotruncal anomaly face syndrome and CATCH 22 (after the initials of the major problems seen in children with the condition). However, VCFS is now the accepted term.

Di George syndrome is at the more severe end of the range. Children with Di George syndrome have problems affecting the heart, calcium levels in the body, immune problems and occasionally palate disorders. However, as with all conditions affecting children, the day-to-day effects of the deletion will vary from child to child and alter over his or her lifetime as well.

How did the deletion happen?

In many affected children, the deletion occurred by chance in the egg or sperm before conception took place. In a very small number (around 10 per cent of children with 22q11 deletion), one parent has the deletion and passes it on to his or her child. If one parent has the deletion, there is a 50 per cent chance of their next baby having 22q11 deletion and this risk is the same for each pregnancy. When neither parent has the deletion, there is still a one or two per cent chance of them having another baby with 22q11 deletion.

How common is 22q11 deletion?

It occurs in around 1 in every 4000 of the population. As the effects of the deletion vary from individual, it may take some time to reach a diagnosis, so it may be more common than we currently think.

How is 22q11 deletion diagnosed?

The deletion is shown by the FISH (fluorescence in-situ hybridisation) test, when instead of both copies of chromosome 22 'lighting up' with a fluorescent DNA tag, only one copy does.

What are the main features?

The problems associated with 22q11 deletion are numerous and affect every body system. However, the extent and severity varies from person to person and two people from the same family will not necessarily show the same features to the same degree. The main features seen in children with 22q11 deletion follow.

Heart problems

These affect around 75 per cent of people with 22q11 deletion. The most common heart problems are: tetralology of Fallot (a combination of four heart defects), interrupted aortic arch (failure of a section of the main artery supplying the body to develop), ventricular septal defect (hole in the ventricle of the heart that alters blood flow) and right aortic arch (the aortic arch is on the right hand side of the heart instead of the left). Further information about all of these heart defects is available from your doctor or one of the organisations listed at the end of this information sheet.

Your child will need surgery to correct some of these, but once corrected (if necessary), his or her heart condition should not cause any further difficulties. Even if your child does not seem to have a heart problem, we will carry out an echocardiogram (ultrasound of the heart) to make sure.

Learning difficulties

These affect around 65 per cent of people with 22q11 deletion. The types of learning difficulty commonly found

include slow development of speech, poor concentration and an inability to reach 'milestones' appropriate to his or her age. He or she may have difficulty at school with arithmetic, comprehension and problem solving, but may be particularly good at learning by rote and reading. The learning difficulties may be associated with a smaller than usual head size or rarely, with craniosynostosis (premature fusing of the skull bones). Attention deficit hyperactivity disorder (ADHD) is more common in children with 22q11 deletion, making learning difficult, and may not respond to the medicines usually recommended.

The earlier any learning difficulties are noticed the better, as early intervention can help reduce their impact. It can also help you organise any special help needed at nursery or school once 22q11 deletion has been confirmed. About one third of people with 22q11 deletion have mild learning difficulties needing help in particular areas of mainstream education. Another one third might need more intensive support but the remaining one third have no significant learning difficulties at all.

Velopharyngeal insufficiency (VPI) and cleft palate

These affect around 60 per cent of people with 22q11 deletion. Velopharyngeal insufficiency (VPI) is the term used when the palate (roof of the mouth) does not close the nose off from the back of the mouth completely when speaking. Occasionally this can cause regurgitation through the nose when swallowing. VPI results in a 'nasal' voice, makes consonant sounds more difficult and can contribute to a delay in speech and language development, as can other problems affecting the palate. These can include a cleft palate (hole in the palate) or a submucous cleft (where the roof of the mouth might look fine but the muscles are not in the right place). There may also be weakness and lack of coordination of the muscles in the roof of the mouth. Occasionally children with 22q11 deletion are born with a cleft lip. VPI also occur in some children because the adenoids are poorly developed or the base of the skull is shortened.

Speech problems may also result from developmental delay and learning difficulties, or from hearing problems caused by the Eustachian tubes (drainage tubes) in the ear not draining properly. This is common in children with VPI or a cleft, and causes glue ear or middle ear infections that are made worse or more frequent due to the immune problems, developmental delay or learning difficulties.

Feeding difficulties

These are common in infancy and early childhood and are caused by the cleft palate and/or VPI. There may also be gastro-oesophageal reflux, where the stomach contents move back up the food pipe and into the mouth. There may also be problems with chewing and swallowing solids (dysphagia), which may benefit from specialist help.

Appearance

People with 22q11 deletion tend to have similar facial features to one another. Common features include: almond shaped eyes, elongated facial features often with flat cheekbones, a long 'strong' nose with a relatively broad and prominent nasal bridge, small nostrils and a small jaw. The ears may be small, prominent and folded over at the top. The fingers are thin and tapering at the end with small, underdeveloped nails. These features become easier to identify as the child grows older.

Infections due to impaired immunity

The thymus is a gland in the neck, which is part of the immune system and forms T-cells. Some degree of thymus or T-cell malfunction is frequent, but is unusual for it to fail completely, and any immune problems often improve with age. The body' s immune system may not fight infection adequately and so various parts of the immune system are tested during assessment. Advice on vaccinations (especially 'live' vaccinations) and boosters might be needed.

Glands, hormones and growth

The parathyroid glands in the neck may be underactive, which causes low levels of calcium in the blood. This is called hypocalcaemia, and may cause convulsions or seizures (fits), although these are unusual after infancy, even if the hypocalcaemia persists. Hypothyroidism (underactive thyroid) and growth hormone deficiency occur occasionally. Individuals with 22q11 deletion are generally among the smallest 10 per cent of the population anyway, so their growth should be monitored. Any slowing of growth may need to be checked in case of nutritional and hormone deficiencies.

Emotional and mental health concerns

Emotional responses might be immature, so some children have difficulty in making relationships with children of their own age, or sometimes avoid eye contact. Extremes of rapid mood swings or behaviour, varying from quiet inactivity to hyperactivity, and unexpected temper outbursts may cause serious management difficulties. After childhood, depression and other psychiatric conditions, including schizophrenia, have been found to be somewhat commoner than in the general population.

Kidney problems

These are found in 35 per cent of people with 22q11 deletion. It is quite common for a kidney to be absent or for one kidney to be smaller than the other, but kidney problems do not tend to get any worse. Even if your child does not seem to have a kidney problem, we will arrange an ultrasound scan if it has not been done already to make sure.

Bone and muscle problems

These are more common in people with 22q11 deletion than usual. Problems that can occur include scoliosis (curvature of the spine), other vertebral (bony spine) abnormalities, Sprengel's shoulder (where the shoulder blade is in a higher position than usual), talipes (club foot) and

rheumatoid arthritis. Muscle tone is often reduced. A lack of muscle bulk is common and children appear to have a small build. Joints that can be extended more than usual (hypermobility) may result in complaints of leg pain on walking and exercising. Hernias occur due to muscle weakness. Constipation is more common as the gut muscles do not work as well as usual. Testicles may not descend at the normal age.

Eye problems

These include coloboma (deficiency in a local spot of the eyeball's layers), some developmental differences to usual and small cataracts that are unlikely to need intervention.

Other problems

Rarely, a laryngeal web might cause breathing difficulties from birth.

Although this list can be worrying, please remember that each child is affected in a different way and to a different degree.

How can you ensure the best for your child?

Children with 22q11 deletion are all very different. Some show a wide range of problems, while others hardly any at all. Some of the non-medical problems are subtle and difficult for schools to appreciate.

Coordination of needs

The tremendous variability in skills and problems that can occur with 22q11 deletion can be confusing. You want to ensure that all the appropriate assessments are done and various agencies contacted, including education, health, benefits and social services. These services often need the appropriate information and when necessary, reminders. Visits to various departments at GOSH may be coordinated to happen on the same day. Your family doctor (GP) or paediatrician is likely to be the most useful here.

Genetic advice and what to do about future pregnancies

If your child has a positive FISH test confirming the 22q11 deletion, then both parents can also be tested, although only 10 to 15 per cent of parents will carry the deletion themselves. An affected parent has a 50 per cent chance of passing on the condition and this applies in each pregnancy. For unaffected parents, the chance that they will have a further child with 22q11 deletion is one to two per cent.

The earliest a fetus can be tested in pregnancy is at 11 weeks by chorionic villus sampling (CVS), so booking

antenatal care early is essential. Testing is also available by amniocentesis from 16 weeks onwards. The genetic specialists can help arrange testing for other family members where this is relevant. They can also explain in more detail about the tests that are available in pregnancy and help arrange them for couples that would like them. Fetal assessment centres offer high quality ultrasound to look for heart and other abnormalities. However, the other features of 22q11 deletion, including cleft palate, cannot be reliably detected, so ultrasound does not replace the specific antenatal tests.

Professional assessments

Not all children require comprehensive help, but monitoring their development and attainment is an essential first step to providing for their needs. Hearing is tested regularly from infancy onwards, eyes examined for long-sightedness and medical tests of immunity, biochemistry, kidney and heart structure and function are needed.

In the preschool period, developmental progress should be monitored and speech and language development carefully assessed. If VPI is suspected or confirmed, the specialist speech and language therapist in the cleft palate clinic should be involved. Later, educational progress and social adaptation may need to be reviewed. Therapy for speech, language, coordination and physical disability and special teaching at school may be required. Orthoses (special shoe inserts) may help leg pains. Surgery may be planned on the basis of clinic assessments, for example, in reducing the amount of air escaping through the nose if speech is very nasal in quality. Coordination with schools and health authorities to deliver the right support may be necessary.

Support for parents and family members

People can be strengthened through knowledge of the diagnosis. It helps them understand why their child has problems that may seem unconnected and baffling. Others may also have feelings of guilt for having passed on the condition, even if it was beyond their control. Many parents find it useful to discuss their concerns with professionals. These include social workers, psychologists and counsellors contacted directly or through a doctor. Your health visitor or district nurse may be of help on a week-by-week basis. Self-help groups such as the Max Appeal and 22q11 Group are often a great source of strength and work as a pressure group to improve recognition and resources.

Final words

We at GOSH are working for 22q11 deletion children and families to provide as complete a service as we can. We can provide all the professional assessments, as appropriate, under one roof, reducing the problems of communication that are common when dealing with a variety of doctors and therapists. In addition, we aim to keep in close touch with the local providers of care, the therapists, education department and social work services.

Further information

Max Appeal
Tel: 0800 389 1049 (free 24 hour answer phone service)
Website:

VCFS Educational Foundation (US)
Website:

International 22q11 Deletion Syndrome Foundation (US)
Website:

For further information, please contact our clinic coordinator on 020 7405 9200 ext 7922 Monday to Friday 9am to 5pm

Useful numbers

GOSH switchboard	020 7405 9200
Speech and Language Therapy Department	020 7813 8110
Cleft Lip and Palate secretaries	020 7813 8242
Cleft Service fax	020 7813 8279

Notes

Compiled by the 22q11 Deletion Syndrome team
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www.goshfamilies.nhs.uk www.childrenfirst.nhs.uk

