Down Syndrome

Sharon Witemeyer MD (Pediatrician)

Definition

Down Syndrome is a complex of widely recognized clinical findings due to an extra chromosome 21.

Introduction

Down Syndrome (Trisomy 21) is one of the first symptom complexes associated with mental retardation to be identified as a syndrome. It is the most common pattern of human malformation with an incidence in the general population of 1 in 600-800 live births. A high correlation exists between increasing maternal age and the presence of an extra chromosome in the offspring. Therefore, the expected rate of Down syndrome in a woman 20 years of age is 1 in 1,925 compared to an expected rate of Down syndrome in a woman 49 years of age of 1 in 12. Dr. John Langdon Down described the syndrome in 1866. The chromosome abnormality was discovered in 1959. Usually (96% of the time) Trisomy 21 is caused by duplication from the distal long arm of chromosome 21. Other genetic forms of Down syndrome are Mosaicism (1-2%) and Translocation (3%).

Individuals with Down syndrome have a widely recognized physical appearance. General features include upward slanting eyes, epicanthal folds in which the inner corner of the eyes have a rounded fold of skin, protruding tongue, flattened nose, low tone (hypotonia), very flexible joints, broad short hands, small, abnormally shaped head, mental retardation, and delayed growth and development.

Forty percent of individuals with Down syndrome have some form of congenital heart defect including AV (atrioventricular) communication defects, ventricular septal defect (VSD,) patent ductus arteriosus (PDA,) atrial septal defect (ASD,) aberrant subclavian artery, Tetralogy of Fallot, and pulmonary hypertension. Adolescents and young adults can develop heart valve dysfunction even when they have had no history of congenital heart problems. SBE prophylaxis may be necessary.

Infants with Down syndrome may have esophageal atresia (obstruction of the esophagus) or duodenal atresia (obstruction of the duodenum). Like other individuals with developmental disabilities, adults with Down syndrome frequently develop gastroesophageal reflux disease (GERD). Constipation is a common problem as is obesity. Increased serum triglycerides and other lipid abnormalities may be found. Hirschprung's disease and celiac disease may be associated with Down syndrome.

Ophthalmologic features include Brushfield spots (speckling of the iris), fine lens opacities, cataracts, astigmatism, hyperopia (far sightedness), myopia (near sightedness), strabismus, keratoconus, blepharitis (inflammation) and nystagmus. Ear abnormalities are also common – especially middle ear effusions and recurrent otitis media (infections.) Hearing loss can be a problem.

Immune function may be impaired so sinusitis and pneumonia are more frequent. Individuals who have lived in institutions are at greater than average risk of having contracted Hepatitis B or C. Children with Down syndrome are at greater risk to develop leukemia.

Males are usually infertile, have decreased testosterone levels, small penis and in 25% undescended testicles. Females usually are fertile and half of their children will have Down syndrome. It is heartbreaking to know that 20-40% of women with Down syndrome will have been sexually abused over their lifetime.

Individuals with Down syndrome are at risk for developing thyroid problems throughout the lifespan. However, they may have a slightly lower incidence of diabetes than the general population. Sleep apnea occurs in one third.

Atlanto-axial instability or occipitoatlantal instability is present in 2-5% of individuals with Down syndrome. The risk of spinal cord injury is 1%.

Five to 10% of individuals with Down syndrome have a seizure disorder. ADHD and autism may occur in individuals with Down syndrome. Other mental health problems including depression, alcohol and substance abuse, psychosis, schizophrenia, OCD, anxiety disorders, and dementia of the Alzheimer type may be found among individuals with Down syndrome. It is important to rule out treatable causes of decline in mental functioning (thyroid problems, B vitamin deficiencies, vision and hearing problems, depression, sleep apnea, polypharmacy, etc.) before jumping to the conclusion that an individual has Alzheimer's.

Diagnosis

The diagnosis of Down syndrome is made by chromosome studies (demonstrate an extra chromosome 21.)

Prevention and Treatment

Down syndrome can be detected in a fetus by examination of chromosomes obtained by amniocentesis.

Throughout the individual's lifespan regular clinical evaluations and lab testing are essential.

Treatment is directed toward specific diagnoses. The following recommendations are for Adults with Down Syndrome

- **History:** Specific questions to address possibility of sleep apnea, thyroid abnormality, mental health problems, vision/hearing problems, incontinence, GERD, C1-C2 instability, and obesity. Review medications.
- **Physical Exam**: General physical and neurologic exam, weight, pelvic exam with pap smear every 1-3 years for women, yearly breast exams for women, yearly testicular and prostate exams for men.
- **Prevention**: Yearly flu shot, SBE prophylaxis as appropriate.
- **Lab tests**: TSH and T4 yearly, ECHO to rule out valvular disease once in early adulthood, cervical spine X-rays once in adulthood, mammograms yearly from age 50 years, mammograms yearly from age 40 years for women with first degree relative with breast cancer.
- **Consultation**: auditory testing every 2 years, eye exam every 2 years, dental exams twice yearly, consider sleep study, and consider mental health referral.
- **Other recommendations**: consider augmentive communication evaluation, discussion of vocational issues, discuss healthcare decisions/advanced directives, guardianship issues, alternative long-term living arrangements.

Emergency Situations – What can go wrong?

1. Spinal cord injury due to C1-C2 cervical spine instability is a rare but potentially devastating event that can cause paraplegia or even death. Symptoms include difficulty walking, weakness in extremities, problems with bowel/bladder control, neck pain, torticollis (head tilt) and paresthesias (odd feelings) in the extremities. This problem will only occur in an individual with untreated instability of the cervical spine that will have been diagnosed by X ray. The occurrence of these symptoms in such an individual should prompt immediate call to the PCP or consultant neurologist.
2. All other potential emergency situations are related to specific diagnoses and not to Down syndrome per se.

Conclusion

Down syndrome is caused by the presence of an extra chromosome 21. It is the most common pattern of human malformation. Individuals with Down syndrome need the same health care screening and care that is provided to everyone. Children with Down syndrome are at higher risk of having certain congenital anomalies, and adults with Down syndrome are at higher risk of developing certain health problems. Links to our on-line manual sites for the most common concerns are provided. Recommendations for routine health care for adults are outlined above.

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