

DOWN'S SYNDROME WITH DEAF MUTISM: A CASE STUDY

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ABSTRACT

Downs syndrome (DS or DNS), also known as trisomy 21, is a genetic disorder caused by the presence of all, or part of a third copy of chromosome 21. It is typically associated with physical growth delays, characteristic facial features, and mild to moderate intellectual disability. The average IQ of a young adult with Down syndrome is 50, equivalent to the mental age of an 8- or 9-year-old child, but this can vary widely. In this present case, patient came with the complaint of tempered tantrum (banging head frequently), delayed milestones noticed at 1½ year of age and difficulty in language development and also deaf since birth. On examination patient was observed with simian crease, saddle gap, depressed nasal bridge, mongoloid slant, hypoplasia of middle phalanx and partial

clinodactyly. By observing these conditions patient was diagnosed as suffering with Down's Syndrome with Deaf Mutism. He was prescribed with Syrup Zincovit which is an amino acid supplement and a multivitamin. It is recommended as an important dietary supplement and is especially beneficial for growth, immunity, mental development and behaviour in children. Patient representative was counseled regarding the disease, its complications, drug therapy and also about alternative, occupational, physical, speech and language therapy.

KEYWORDS: Trisomy 21, simian crease, tempered tantrum, mongoloid slant, partial clinodactyly, Deaf Mutism.

DEFINITION

Down syndrome is by far the most common and best known chromosomal disorder in humans and the most common cause of intellectual disability. It is primarily caused by

trisomy of chromosome 21, which gives rise to multiple systemic complications as part of the syndrome. However, not all defects occur in each patient; there is a wide range of phenotypic variation.^[1]

EPIDEMIOLOGY

Down syndrome is the most common autosomal abnormality. The frequency is about 1 case in 800 live births. Each year, approximately 6000 children are born with Down syndrome.^[2] More children are born with Down syndrome in countries where abortion is not allowed and in countries where pregnancy more commonly occurs at a later age.^[3]

About 1.4 per 1000 live births in the United States^[4] and 1.1 per 1000 live births in Norway are affected.^[5]

In the 1950s, in the United States, it occurred in 2 per 1000 live births with the decrease since then due to prenatal screening and abortions.^[6] The number of pregnancies with Down syndrome is more than two times greater with many spontaneously aborting.^[7]

Maternal age affects the chances of having a pregnancy with Down syndrome. At age 20, the chance is one in 1441; at age 30, it is one in 959; at age 40, it is one in 84; and at age 50 it is one in 44. Although the probability increases with maternal age, 70% of children with Down syndrome are born to women 35 years of age and younger, because younger people have more children.^[8]

ETIOLOGY

Down syndrome is caused by a random error in cell division that results in the presence of an extra copy of chromosome 21.

The type of error is called nondisjunction (pronounced non-dis-JUHNGK-shuhn). Usually when one cell divides in two, pairs of chromosomes are split so that one of the pair goes to one cell, and the other from the pair goes to the other cell. In nondisjunction, something goes wrong and both chromosomes from one pair go into one cell and no chromosomes for that pair go into the other cell.

Most of the time, the error occurs at random during the formation of an egg or sperm. To date, no behavioral activity of the parents or environmental factor is known to cause Down syndrome.^[9,10]

After much research on these cell division errors, researchers know that,^[10]

- In more than 90% of cases, the extra copy of chromosome 21 comes from the mother in the egg.
- In about 4% of the cases, the father provides the extra copy of chromosome 21 through the sperm.
- In the remaining cases, the error occurs after fertilization, as the embryo grows.

GENETIC COUNSELING

TRISOMY 21

A previous history of trisomy can increase a woman's risk for a recurrence.^[11] If the couple has a child with trisomy 21, the risk of recurrence is about 1%.^[12]

TRANSLOCATION

The recurrence risk depends on the type of translocation. In most cases, the recurrence risk for de novo translocations is similar to that of the general population but may be slightly higher in some situations; it is estimated to be 2-3%.^[13]

PATHOPHYSIOLOGY

The extra chromosome 21 affects almost every organ system and results in a wide spectrum of phenotypic consequences. These include life-threatening complications, clinically significant alteration of life course (eg, intellectual disability), and dysmorphic physical features. Down syndrome decreases prenatal viability and increases prenatal and postnatal morbidity. Affected children have delays in physical growth, maturation, bone development, and dental eruption.

Two different hypotheses have been proposed to explain the mechanism of gene action in Down syndrome: developmental instability (ie, loss of chromosomal balance) and the so-called gene-dosage effect.^[14]

According to the gene-dosage effect hypothesis, the genes located on chromosome 21 have been overexpressed in cells and tissues of Down syndrome patients, and this contributes to the phenotypic abnormalities.^[15]

CLINICAL PRESENTATION

The symptoms of Down syndrome vary from person to person, and people with Down syndrome may have different problems at different times of their lives.

PHYSICAL SYMPTOMS

Common physical signs of Down syndrome include^[16,17]

- Decreased or poor muscle tone
- Short neck, with excess skin at the back of the neck
- Flattened facial profile and nose
- Small head, ears, and mouth
- Upward slanting eyes, often with a skin fold that comes out from the upper eyelid and covers the inner corner of the eye
- White spots on the colored part of the eye (called Brushfield spots)
- Wide, short hands with short fingers
- A single, deep, crease across the palm of the hand
- A deep groove between the first and second toes

In addition, physical development in children with Down syndrome is often slower than development of children without Down syndrome. For example, because of poor muscle tone, a child with Down syndrome may be slow to learn to turn over, sit, stand, and walk. Despite these delays, children with Down syndrome can learn to participate in physical exercise activities like other children.¹⁸ It may take children with Down syndrome longer than other children to reach developmental milestones, but they will eventually meet many of these milestones.^[17]

INTELLECTUAL AND DEVELOPMENTAL SYMPTOMS

Cognitive impairment, problems with thinking and learning, is common in people with Down syndrome and usually ranges from mild to moderate. Only rarely is Down syndrome associated with severe cognitive impairment.^[16]

Other common cognitive and behavioral problems may include.^[16,17,18,19]

- Short attention span
- Poor judgment
- Impulsive behavior
- Slow learning
- Delayed language and speech development

Most children with Down syndrome develop the communication skills they need, although it might take longer for them to do so compared with other children. Early, ongoing speech and

language interventions to encourage expressive language and improve speech are particularly helpful.^[20]

LABORATORY TESTS

Blood test

Several blood markers can be measured to predict the risk of Down syndrome during the first or second trimester.^{21,22} Testing in both trimesters is sometimes recommended and test results are often combined with ultrasound results.^[21] In the second trimester, often two or three tests are used in combination with two or three of: α -fetoprotein, unconjugated estriol, total hCG, and free β hCG detecting about 60–70% of cases.^[22]

DIAGNOSIS

Before birth

When screening tests predict a high risk of Down syndrome, a more invasive diagnostic test (amniocentesis or chorionic villus sampling) is needed to confirm the diagnosis.^[23]

Amniocentesis and chorionic villus sampling are more reliable tests, but they increase the risk of miscarriage between 0.5 and 1%. The risk of limb problems is increased in the offspring due to the procedure. The risk from the procedure is greater the earlier it is performed, thus amniocentesis is not recommended before 15 weeks gestational age and chorionic villus sampling before 10 weeks gestational age.^[24]

Abortion rates

About 92% of pregnancies in Europe with a diagnosis of Down syndrome are terminated.^[25] In the United States, termination rates are around 67%, but this rate varied from 61% to 93% among different populations evaluated.^[26]

After birth

The diagnosis can often be suspected based on the child's physical appearance at birth. An analysis of the child's chromosomes is needed to confirm the diagnosis, and to determine if a translocation is present, as this may help determine the risk of the child's parents having further children with Down syndrome.^[27]

SCREENING

Ultrasound

Increased fetal nuchal translucency (NT) indicates an increased risk of Down syndrome picking up 75–80% of cases and being falsely positive in 6%.^[28]

MANAGEMENT

There is no single, standard treatment for Down syndrome. Treatments are based on each individual's physical and intellectual needs as well as his or her personal strengths and limitations.^[29]

Early Intervention and Educational Therapy

Research indicates that early intervention improves outcomes for children with Down syndrome.^[30,31] This assistance can begin shortly after birth and often continues until a child reaches age 3.^[32]

Treatment Therapies

A variety of therapies can be used in early intervention programs and throughout a person's life to promote the greatest possible development, independence, and productivity. Some of these therapies are listed below.^[33]

Physical therapy includes activities and exercises that help build motor skills, increase muscle strength, and improve posture and balance.

A physical therapist also can help a child with Down syndrome compensate for physical challenges, such as low muscle tone, in ways that avoid long-term problems. For example, a physical therapist might help a child establish an efficient walking pattern, rather than one that might lead to foot pain.^[34]

Speech-language therapy can help children with Down syndrome improve their communication skills and use language more effectively.

In many cases, children with Down syndrome understand language and want to communicate before they can speak. A speech-language therapist can help a child use alternate means of communication, such as sign language and pictures, until he or she learns to speak.^[35]

Education and proper care can improve quality of life.^[36] Raising a child with Down syndrome is more work for parents than raising an unaffected child.^[37] Typical childhood vaccinations are recommended.^[38]

RECENT ADVANCES IN THERAPY AND FUTURE PROSPECTS

Recent interest in therapy for people with DS has focused on pharmacological treatment to enhance cognition. A number of compounds have been shown to improve learning in the Ts65Dn mouse model. Chronic treatment with picrotoxin or pentylentetrazole improved hippocampal-based learning and LTP deficits in Ts65Dn mice, even after treatment had ceased.^[39] These compounds reduce gamma-aminobutyric acid-mediated inhibition in the hippocampus and are proposed to improve cognition by releasing normal learning from excess inhibition. Learning in Ts65Dn mice is also improved by the non-competitive N-methyl-D-aspartic acid receptor (NMDAR) antagonist, memantine.^[40]

CASE STUDY

A patient of age 8year male was admitted in Maharaja Institute of Medical Sciences, Vizianagaram, Andhra Pradesh, India with a complaint of tempered tantrum (banging head frequently), delayed mile stones noticed at 1½ year of age and difficult in language development and also deaf since birth.

On examination patient was observed with simians crease, saddle gap, depressed nasal bridge, mongoloid slant, hypoplasia of middle phalanx and partial clinodactyly. The patient was found to be conscious and alert. There is no history of seizures, irritability, shortness of breath, fainting attacks, excessive cry and joint/limb pain.

Personal history was found to be having normal appetite, urine and passing stools was normal.

Developmental history was found to be gross motor walking at 3years of age, crawling at 1½year of age, running at 4years of age. Fine motor–scribbling at the age of 5years, language–unable to pronounce syllables.

Social history was found to be obey commands only through eye sight.

Immunization history - 1st vaccinated with DPT booster dose at 1½year age.

Anthropometry: Weight–13kgs, Height –102cms, HC–47cms, CC–54cms, US:LS – 50:49.

Family history was found to be mother was mentally retarded and history of language delay.

On the day of admission patient's respiratory rate was 28/min, heart rate was 92/min, temperature was found to be afebrile. Other examinations like CVS was S₁ and S₂ – positive, lungs were clear and BAE – positive. Per Abdomen (P/A) was found to be soft and no organomegaly.

Diagnostic investigation like sonographic evaluation of abdomen in pelvis was found to be no sonological abnormality detected in the patient.

Laboratory Investigations

Hemoglobin – 12.3 gm/dl

Differential leukocyte count:

Neutrophils: 37% (normal value: 30-53%)

Lymphocytes: 34% (normal value: 50-60%)

Eosinophils: 29% (normal value: 0-8%)

Monocytes: 00% (normal value: 4-8%)

Total leukocyte count: 12,600 (normal value: 4000-10,000 cell/cumm)

ESR – 15mm/1st hour

MCV: 76fl

MCH: 24.5pg

PCV: 38%

MCHC: 32gm/dl

Platelets: 1.4lakhs/cumm (adequate)

Based on these investigations blood picture was found to be Normocytic and Normochromic with relative eosinophilia.

Urine analysis

Pus cells: 2-4 HPF

Epithelial cells: 1-2

Albumin, Sugar, RBC: Nil

FINAL DIAGNOSIS

By observing the chief complaints and above diagnostic test patient was diagnosed as suffering with Downs Syndrome with Deaf Mutism.

TREATMENT

On the 1st day of treatment patient was administered with Syrup Zincovit 2.5ml OD (aminoacid supplement), along with these occupational therapy was advised. Regular monitoring vitals has been done.

On 2nd day the patient was conscious and coherent and found to be afebrile. Same treatment was continued that is Syrup. Zincovit 2.5ml OD, along with these occupational therapy was advised Regular monitoring vitals has been done.

On 3rd day the patient was conscious and coherent and found to be afebrile. Same treatment was continued that is Syrup. Zincovit 2.5ml OD, along with these occupational therapy was advised Regular monitoring vitals has been done.

On 4th day the patient was observed with pallor hence the frequency of the amino acid supplement was doubled that is syrup Zincovit 2.5ml BID is administered, along with these occupational therapy was advised. Regular monitoring vitals has been done.

On 5th day the patient was conscious and coherent and found to be afebrile. Syrup Zincovit 2.5ml BID is administered, along with these occupational therapy was advised. Regular monitoring vitals has been done.

On 6th day the patient was conscious and coherent and found to be afebrile. Same treatment was continued that is Syrup Zincovit 2.5ml BID is administered, along with these occupational therapy was advised. Regular monitoring vitals has been done.

On 7th day the patient was conscious and coherent and found to be afebrile. Same treatment was continued that is Syrup Zincovit 2.5ml BID is administered, along with these occupational therapy was advised. Regular monitoring vitals has been done.

On 8th day the patient was conscious and coherent and found to be afebrile and he was generally improved and vitals are stabilized. So he was discharged under stable, general condition and advised to attain BERA (Brainstem evoked response audiometry), karyotyping, 2D echo and review with thyroid profile report in next follow up. Syrup Zincovit 2.5ml OD has been administered for 1month.

DISCUSSION

A 8 year old male patient was admitted to hospital with a complaint of tempered tantrum (banging head frequently), delayed mile stones noticed at 1½ year of age, difficulty in language development and also deaf since birth. By observing the chief complaints and diagnostic test patient was diagnosed as Down's Syndrome with Deaf Mutism. Patient was administered with Syrup Zincovit 2.5ml OD (amino acid supplement) along with these occupational therapy was advised. Regular monitoring vitals has been done. Syrup Zincovit 2.5ml is an amino acid supplement and a multivitamin, mineral supplement containing 9 vitamins, amino acid (lysine) and 3 essential minerals including zinc. It is recommended as an important dietary supplement and is especially beneficial for growth, immunity, mental development and behavior in children. Zinc supplementation ensures quicker growth, better motor development, improves mental and cognitive functioning. Occupational therapy facilitates the development of fine motor skills like feeding, dressing, and grooming. At the time of discharge patient was conscious, coherent and found to be afebrile. He was generally improved and vitals are stabilized. So he was discharged under stable, general condition and advised to attain BERA (Brainstem evoked response audiometry), karyotyping, 2D echo and review with thyroid profile report in next follow up. Syrup Zincovit 2.5ml OD has been administered for 1month.

PATIENT COUNSELLING

As the patient is child, we gave counseling to the patient's representative (parent) regarding disease condition and drug therapy and also about alternative, occupational, physical, speech and language therapy. Patient's condition is thoroughly explained to parents. We discussed about mental and physical condition of the patient. Parent is told that her son is special child so they should give more affection, training and attention. We advised them to teach about social behavior, food habits, toilet training and put them in special schools. The dietary advice was given to the parent to follow the diet chart as the patient is under weight proteinaceous and nutritional food should be given. Syrup Zincovit 2.5ml should be taken once daily as advised.

CONCLUSION

Down syndrome (DS or DNS), also known as trisomy 21, is a genetic disorder caused by the presence of all, or part of a third copy of chromosome 21. It is typically associated with physical growth delays, characteristic facial features, and mild to moderate intellectual disability. The average IQ of a young adult with Down syndrome is 50, equivalent to the

mental age of an 8- or 9-year-old child, but this can vary widely. In this present case, patient came with the complaint of tempered tantrum (banging head frequently), delayed mile stones noticed at 1½ year of age and difficult in language development and also deaf since birth. Blood picture was found to be Normocytic and Normochromic with relative eosinophilia. By observing these conditions patient was diagnosed as suffering with Downs Syndrome with Deaf Mutism. Counseling was given to the patient representative about the disease condition, drug therapy and also about alternative, occupational, physical, speech and language therapy. He was discharged under stable, general condition and advised to attain BERA (Brainstem evoked response audiometry), karyotyping, 2D echo and review with thyroid profile report in next follow up. Syrup Zincovit 2.5ml OD has been administered for 1month. There are other medications like fluoxetine can boost intelligence of children with Downs syndrome. As fluoxetine is an antidepressant drug which is used to stimulate neurogenesis (growth and development of nervous tissue).

ACKNOWLEDGEMENT

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PATIENT PHOTOS

MAHARAJAH'S INSTITUTE OF MEDICAL SCIENCES
 DEPARTMENT OF RADIO-DIAGNOSIS & IMAGING
 (Uthirakottai, Kanyakumari District, Tamil Nadu - 626 002)

NAME: M. JASWANTH
 REF BY: P.P.D.
 AGE & SEX: 25 YEARS
 REGD NO: 148761

SONOGRAPHIC EVALUATION OF ABDOMEN AND PELVIS

LIVER is normal in size (S Agnani) shows homogeneous parenchymal echotexture. No mass lesion is seen in liver. No intrahepatic biliary dilatation is seen. CBD appears normal. Portal system appears normal.

GALL BLADDER appears normal. No gallstone or any intraluminal mass lesion is seen in gall bladder.

SPLEEN is normal in size (S Agnani) shows homogeneous echotexture.

PANCREAS appears normal in its shape, size and echotexture. No pancreatic calculus / calcification / mass lesion is seen.

BOTH KIDNEYS appear normal in shape, size and position and show normal sinus and cortical echos. No renal calculus, hydronephrosis / mass lesion is seen.

RIGHT KIDNEY: 6.4x2.6 cm LEFT KIDNEY: 7.3x3.5 cm

URINARY BLADDER is partially distended.

No ascites/pleural effusion seen. No retroperitoneal lymphadenopathy.

IMPRESSION:
 ✓ NO SONOLOGICAL ABNORMALITY DETECTED.

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2. LABORATORY FINDINGS

3. SONOGRAPHIC EVALUATION

4. HOSPITAL CONSENT FORM

AUTHORIZATION FOR PUBLICATION OF CASE STUDY

I, M. Jaswanth, give M. Keerthi, V. Uma Shankar, M. Raji Priscilla, M. Sudeep and Avanthi Institute of Pharmaceutical Sciences permission to publish, reproduce, and distribute, the attached Case Study, regarding DOWNS SYNDROME WITH DEAF MUTISM. I am aware that the Case Study does NOT mention my name or address, but it does reflect my medical care, gender, age and medical history.

I have been told that the authors currently plan to submit the Case Study for publication in a medical journal, for educational purposes.

I will not be paid in any manner for use of the Case Study, as described above. I will not receive any royalties or other compensation in connection with any such publication or use.

I am not required to sign this form, and I may refuse to do so. My medical treatment and payment for healthcare at Maharaja Institute of Medical Sciences (MIMS) will not be affected by whether or not I sign this document.

I may withdraw this authorization for any future sharing at any time by notifying my attending physician in writing, but my withdrawal will not affect information that has already been shared or published. This authorization has no expiration date.

Patient's Name: M. Jaswanth

Patient's Address: KSR Poram, Gajapattinam, Vizhinjam

Patient's / Representative Signature: [Signature] Date: 7/5/16

5. CONSENT FORM

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