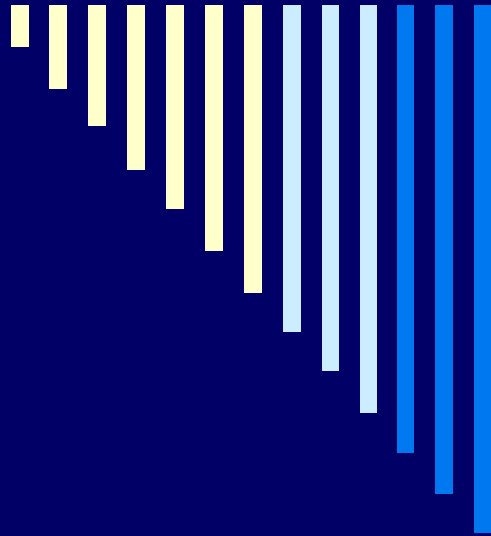




Today's Topic

EVALUATION OF A DEAF CHILD.

Presented by-

Prof.G.H.M.SHAHIDUL HAQUE

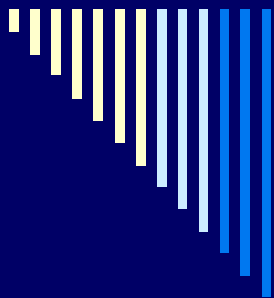
Professor of ENT

Shahabuddin Medical College



THE DEAF CHILD

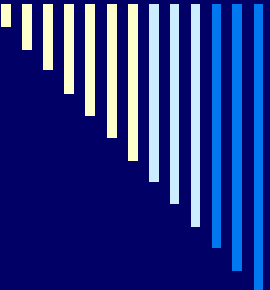
- Children with profound (>90 dB loss) or total deafness fail to develop speech termed as deaf-mute or deaf and dumb.
 - These children have no defect in their speech producing apparatus, the main defect is deafness.
 - The period from birth to 5 years of life is critical for the development of speech and language.
 - There is need for early identification and assessment of hearing loss and early rehabilitation.
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DEAFNESS

□ Conductive hearing loss

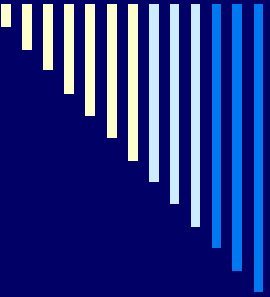
- Affects 4% of all school children.
- Almost all cases are due to glue ear.
- Sounds perceived by the brain are diminished but are generally not distorted.



DEAFNESS

□ Sensorineural Hearing Loss:

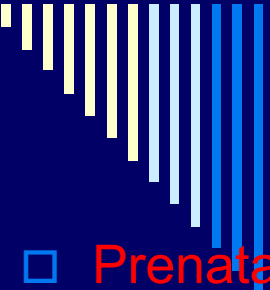
- Affects 0.3% of all school children.
 - Sounds perceived by the brain are both diminished and distorted.
 - Impairment of hearing is permanent.
-



Deafness in Children

□ Aetiology:

- 1. Prenatal cause (before birth).
 - 2. Perinatal cause (during birth).
 - 3. Postnatal cause (after birth).
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Prenatal Causes

- Prenatal causes:

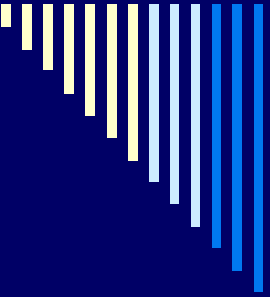
- a) Infant factors:

- i. Inner ear anomalies due to genetic or non-genetic causes.
- ii. Anomalies may affect inner ear alone (non- syndromic) or may form part of a syndrome (syndromic).

- b) Maternal factors:

- i. Infections:

Infections which affect the developing foetus are Toxoplasmosis, Rubella, Cytomegalovirus, Herpes type 1 and 2 and Syphilis. (TORCHES).



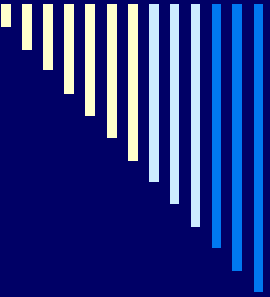
Prenatal Causes (Cont.)

- ii. Drugs during pregnancy:

Streptomycin, gentamycin
tobramycin, amikacin, quinine or
chloroquin when given to the pregnant
mother, cross the placental barrier and
damage the cochlea.

- iii. Radiation to mother: in the first trimester.

- iv. Other factors - nutritional deficiency, diabetes, toxaemia and thyroid deficiency.

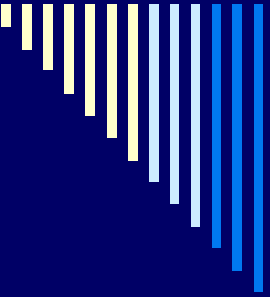


Perinatal Causes

□ During birth or in early neonatal period.

□ **Causes:**

1. Anoxia.
 2. Prematurity and low birth weight (Born before term or with birth weight less than 1500gm).
 3. Birth injury: forceps delivery-intracranial haemorrhage.
 4. Neonatal jaundice- bilirubin level $> 20\text{mg}\%$ damage the cochlear nuclei.
 5. Neonatal meningitis.
 6. Sepsis.
 7. Ototoxic drugs; Used for septicaemia or neonatal meningitis.
-



Postnatal Causes

□ Causes:

i. Genetic.

ii. Non-genetic:

a) Viral infections:

Measles, mumps varicella, influenza, meningitis and encephalitis.

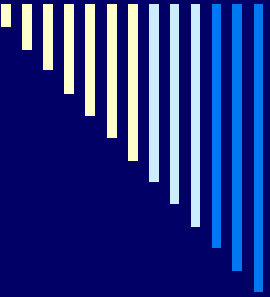
b) Secretory otitis media.

c) Ototoxic drugs.

d) Trauma:

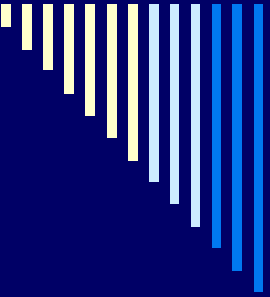
Fracture temporal bone, middle ear surgery.

e) Noise- induced deafness.



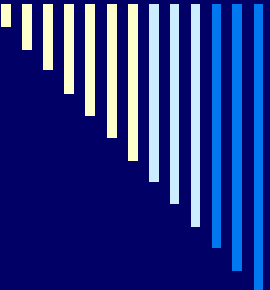
CAUSES(cont.)

- Genetic causes (50%): e.g. Turner's syndrome, Klinefelter's syndrome.
 - Intrauterine (8%): Infection e.g. rubella, CMV, toxoplasmosis.
Maternal drugs, e.g. alcohol, cocaine, streptomycin.
 - Perinatal causes (12%): Include prematurity and/or low birth weight, birth asphyxia, severe hyperbilirubinaemia and sepsis.
 - Postnatal causes (30%): childhood infections, e.g. meningitis, encephalitis, head injury.
 - Unknown causes: 20-30% of deaf children have no definite known aetiology.
-



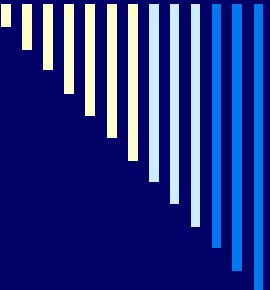
EVALUATION OF A DEAF CHILD

- A. Findings the cause.
 - B. Assessment of hearing in infants and children.
 - C. Management.
-



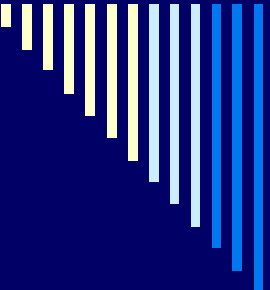
EVALUATION OF A DEAF CHILD (cont.)

- Finding the cause:
 - Required a detailed history of prenatal, perinatal and postnatal causes.
 - Family history.
 - Physical examination.
 - Investigations: depending on the cause suspected.
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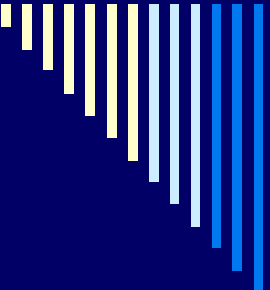
Suspicion of hearing loss.

- Hearing loss is suspected if :
 - The child sleeps through loud noises unperturbed or fails to startle to loud sound.
 - Fails to develop speech at 1-2 years.
 - It is essential that all children at risk for hearing loss should be screened and followed.
-



Risk factors for hearing loss in children.

- ❑ Family history of hearing loss.
 - ❑ Prenatal infections (TORCHES).
 - ❑ Bacterial meningitis.
 - ❑ Ototoxic medications: in utero or postnatal period.
 - ❑ Low birth weight, prematurity.
 - ❑ Low birth apgar scores (0-4 at 1 minute or 0-6 at 5 minutes).
 - ❑ Prolonged mechanical ventilation for 5 days or longer.
 - ❑ Craniofacial anomalies or any syndrome associated with sensorineural hearing loss.
 - ❑ Severe neonatal hyperbilirubinaemia.
 - ❑ Head injury.
 - ❑ Neurodegenerative disorders.
-



Assessment of hearing in infant and children.

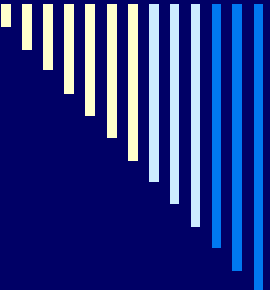
- Methods of hearing assessment:
- A. Neonatal screening procedures-based on infants behavioural response to the sound signal.

Arousal test-

- i. A high frequency narrow band noise is presented for 2 seconds to the infant when he is in light sleep.
- ii. A normal hearing infant can be aroused twice when three such stimuli are presented to him

Auditory response cradle.

ABR / OAE's

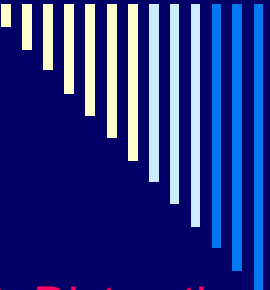


Assessment of hearing in infant and children (cont).

B. Behaviour observation audiometry:-

Auditory signal presented to an infant produces a change in behaviour, e.g. alerting, cessation of an activity, widening of eyes or facial grimacing.

- **Moro's reflex**- Sudden movement of limbs and extension of head in response to sound of 80-90 dB.
 - **Cochleopalpebral reflex**- The child responds by a blink to a loud sound.
 - **Cessation reflex**- An infant stops activity or start crying in response to a sound of 90 dB.
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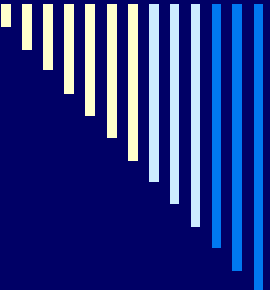
Assessment of hearing in infant and children (cont.)

C. Distraction techniques:

- Are used in children 6-7 months old.
- The child at this age turns his head to locate the source of sound.

D. Conditioning techniques:

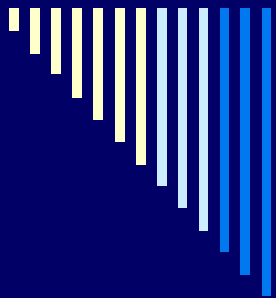
- **Visual reinforcement audiometry**- It is a conditioning techniques in which child is trained to look for an auditory stimulus by turning his head. The test is well suited between the developmental age of 5 months to 2 years.
 -
 - **Play audiometry**- the child is conditioned to perform an act such as placing a marble in a box, putting a ring on a spot or putting a plastic block in a bucket each time he hears a sound signal. This test can be used in children with development age of 2-4 or 5 years.
 - **Speech audiometry**- the child is asked to repeat the names of certain objects or to point them out on the pictures. The voice can be gradually lowered. In this way, hearing level and speech discrimination can be tested.
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Assessment of hearing in infant and children (cont).

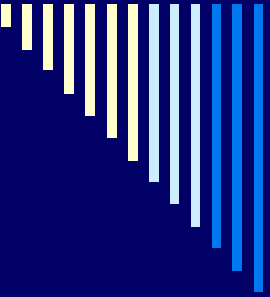
E. Objective tests:

- ABR(Auditory brainstem response).
 - Otoacoustic emissions.
 - Impedance audiometry-
 - i. Normally, stapedius muscle contracts reflexly in response to a sound of 70-100dB HL and this reflex can be recorded.
 - ii. Absence of acoustic reflex indicates middle ear disorder, retrocochlear hearing loss or severe to profound SNHL.
 - iii. Absence of acoustic reflex but a normal tympanometry suggest possibility of SNHL.
 - iv. Absence of acoustic reflex but an abnormal tympanogram indicates conductive loss.
-



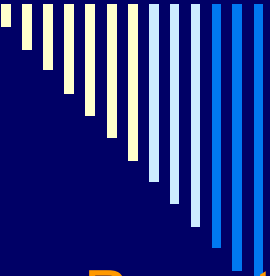
MANAGEMENT

- Essential to know the degree and type of hearing loss.
- Other associated handicaps such as blindness or mental retardation.
- Whether hearing loss is pre-lingual (before development of speech) or post-lingual.
- Aetiology of hearing loss remains obscure in about half the cases.



MANAGEMENT (cont).

- Aims of habilitation of any hearing impaired child are:
 - development of speech and language.
 - adjustment in society.
 - useful employment in a vocation.
-



MANAGEMENT (cont).

1. Parental guidance:

- It is a great emotional shock for parents to learn that their child is deaf.
 - They should be dealt with sympathetically so as to accept the child.
 - They should be told of child's disability and how to care for it.
 - Habilitation of the deaf child demands a lot from parents: care and periodic replacement of hearing aid, change of ear-moulds, follow up visits for reevaluation, education at home and the selection of vocation.
-



MANAGEMENT (cont).

□ 2. Hearing aids:

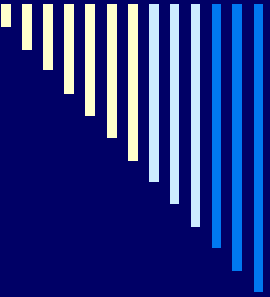
- Hearing aids should be prescribed as early as possible in deaf children.
- If necessary, binaural aids, one for each ear, can be used.
- Hearing aids help to develop lip-reading also.



MANAGEMENT (cont).

3. Development of speech and language:

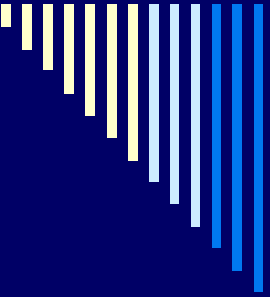
- Communication is a two way process, depending on the receptive and expressive skills.
 - Reception of information is through visual, auditory or tactile faculties while expression is through oral or written speech or the manual sign language.
 - In the hearing impaired, auditory faculty is poor or totally absent.
 - Thus, for proper communication, there is need either to improve hearing through amplification of the residual hearing or cochlear implants:
 - i. Auditory- oral communication.
 - ii. Manual communication.
 - iii. Total communication.
-



MANAGEMENT (cont).

4. Education of the deaf:

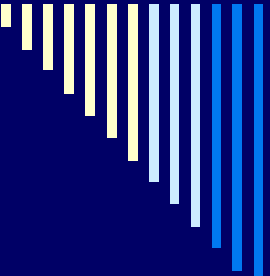
- There is residential and day schools for the deaf.
 - Radio hearing aids have revolutionised education of the deaf. In this device the microphone and transmitter are worn by the teacher and the receiver and amplifier by the child.
-



MANAGEMENT (cont).

5. Vocational guidance.

- The deaf are sincere and good workers.
 - Given the opportunity, commensurate with their ability, they can be usefully employed in several vocations.
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Cochlear Implant

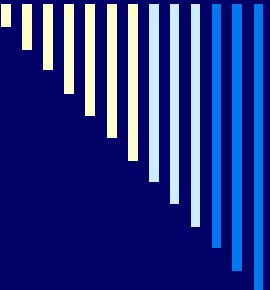


Deaf Children



Deaf children singing





Prognosis

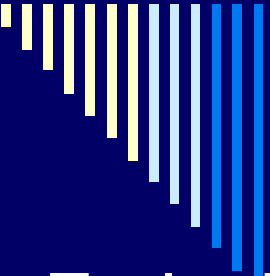
- **Conductive hearing loss:**

- 50% of cases of glue ear resolve within 3 months and 95% within 1 year.

- Early identification of permanent hearing loss is associated with better language, speech, social and emotional development.

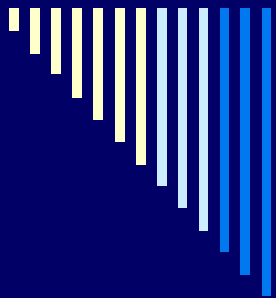
Deaf Child with Hearing Aid





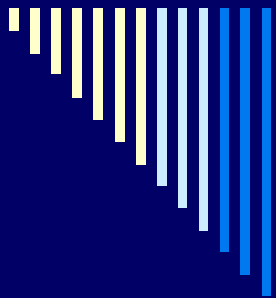
Prevention

- Early diagnosis and treatment of potential causes.
 - Rubella immunisation programmes aiming at eradication.
 - Caution prescribing of medications for pregnant and possibly pregnant women as well as children .
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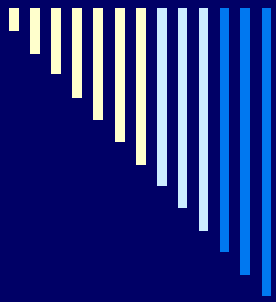
Thank you All

Thank you All



Levels of Hearing Loss

- Mild Deafness: 20-40 dB
- Moderate Deafness: 41-70 dB
- Severe Deafness: 71-95 dB
- Profound Deafness: 95 dB



Investigations

- Specific tests for hearing loss include:
 - Auditory brainstem response (BERA).
 - Otoacoustic emissions.
 - Tympanometry.
 - MRI or CT scan.
 - Chromosomal studies may be of benefit in seeking particular genetic syndromes .
-