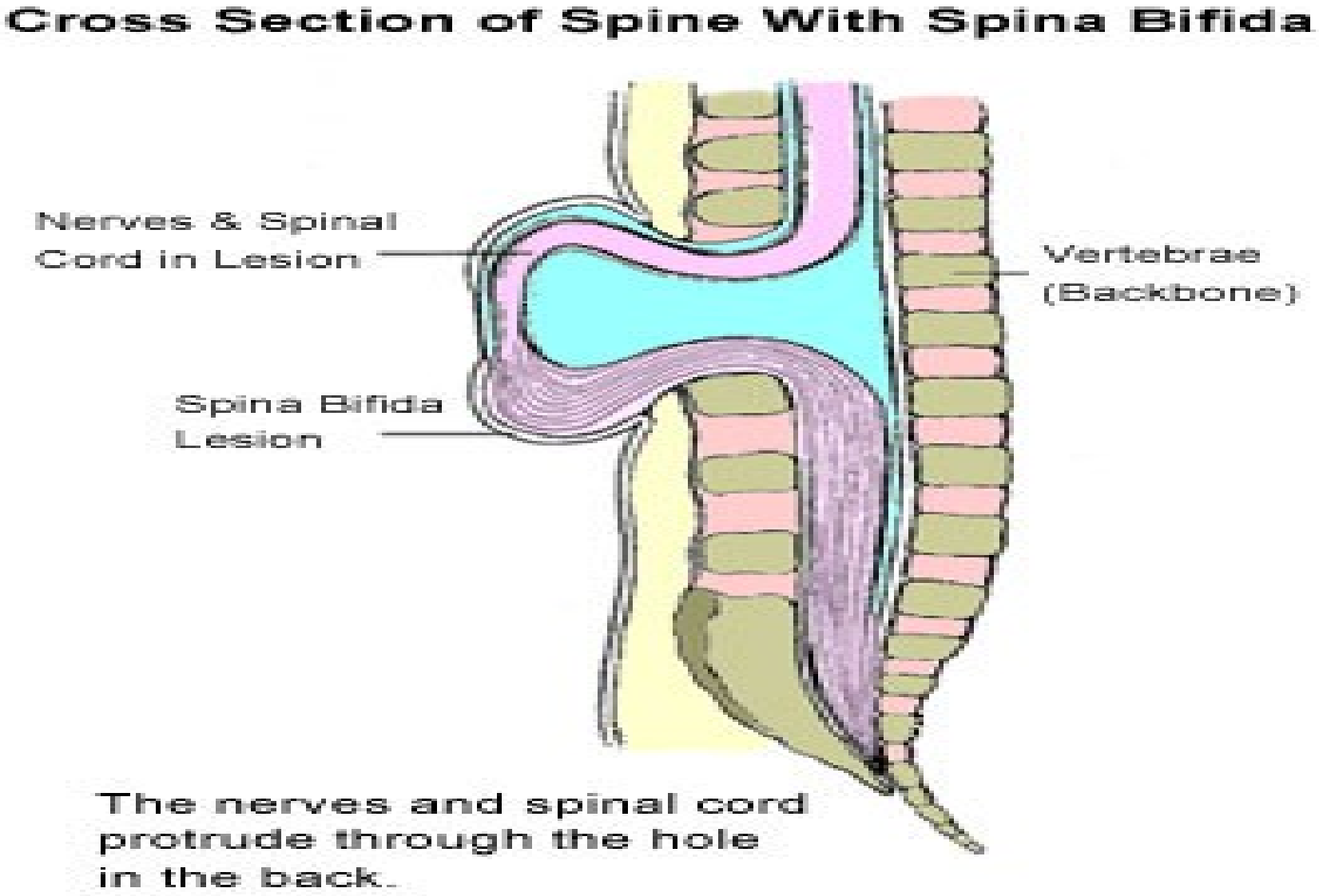
Neurological Infection and Disorders in pediatrics

Mekonen A.

SPINA BIFIDA



What is Spina Bifida?

- A condition that refers to a developmental defect of the spinal column in which the **arches of one or more of the spinal vertebrae fail to fuse.**
- Failure of closure in the **midline or lower end of the neural tube**. (**Cleft Spine)**



Signs and Symptoms

- Swelling
- Dimple in skin
- Tuft of hair
- Muscle weakness
- Paralysis
- Loss of a sensation
- Fluid build up (**hydrocephalus**)
- Brain damage
- Seizures
- Blindness
- Possibly none at all

Secondary Complications

- Low fitness
- Obesity
- Poor functional strength
- Pressure sores
- Respiratory difficulties
- Learning and Perceptual difficulties
- Motor functioning seizures

Types of Spina Bifida

3 in 1,000 births

1. Spina Bifida **Occulta** – an abnormality is confined to the **vertebrae only** and is due to an unclosed posterior vertebral arch.

2. Spina Bifida **Cystica** – A more severe type of spina bifida that has two classifications.

Occulta

- Approximately 40% of all Americans may have spina bifida occulta, but because they experience little or no symptoms, very few of them ever know that they have it.

Cystica

- **Meningocele** – Where **the meninges** protrude through the defect. (4%)

- **Myelomeningocele** – **Elements of the cord** also protrude through the defect, resulting in severe neural deficits. (96%)

- **1 out of 1,000 births**

Causes of Spina Bifida

- **Genetics and environmental factors.**
- **Low folic acid consumption by the mother during pregnancy.**

When to seek medical attention?

- Before Pregnancy
- During Pregnancy
- Right after birth
- When the doctor feels it is necessary

Screening and Diagnosis

- Prenatal Tests

  Ultrasound, Testing of Amniotic fluid

- Evaluation

  Analysis of individual medial history, Physical examination, Evaluation of critical body systems

- Imaging Studies

  X-rays, Ultrasound, CT scan, MRI, Gait Analysis

Prevention

- Recent studies have shown that one factor that increases the risk of having an NTD baby is **low folic acid status before conception** and during the first few weeks of pregnancy.

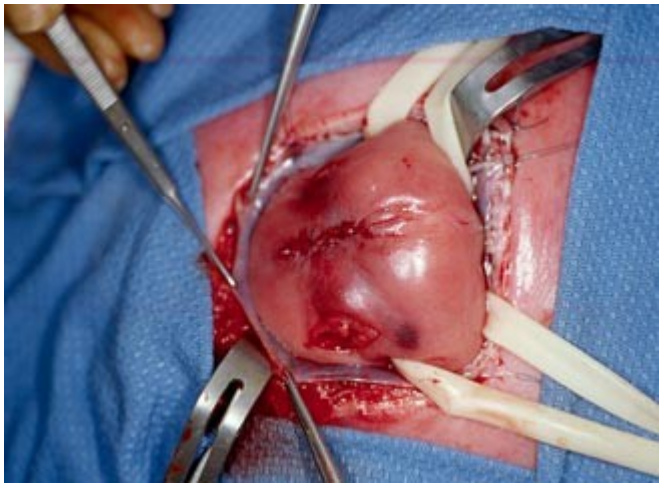
- If all women of childbearing age were to consume **0.4 mg of folic acid prior to becoming pregnant and during the first trimester of pregnancy**, the incidence of folic acid preventable spina **bifida and anencephaly** could be reduced by up to **75%.**

Cont…

- Folic acid, a common water soluble B vitamin, is essential for the functioning of the human body.
- During periods of rapid growth, such as pregnancy and fetal development, the body's requirement for this vitamin increases.
- Folic acid can be found in multivitamins, fortified breakfast cereals, dark green leafy vegetables such as broccoli and spinach, egg yolks, and some fruits and fruit juices. However, the average American diet does not supply the recommended level of folic acid.
- **With proper care, most children with SB live well into adulthood**.

Treatment

- No cure
- Regular check ups with physician
- Surgery (24 hours after birth)
- Medication
- Physiotherapy



Assistive Devices

- Braces
- Crutches
- Wheel chairs



Surgery

- Usually performed with in **24 hours after birth**.
- They remove the infected area and replace it with muscle tissue and skin.
- Helps protect against hydrocephalus.

Educational Assessments

- Children may have difficulty paying attention.
- Early intervention with children who experience learning problems can help considerably to prepare them for school.
- Successful integration of a child with spina bifida into a school sometimes requires changes in school equipment or the curriculum.

Cont…

- The child should be put in the least restrictive environment.
- To promote personal growth, families and teachers should encourage children, within the limits of safety and health, to be independent and to participate in activities with their non-disabled classmates.

Physical/Health Educator Considerations

- Try to include students in all activities.
- Be aware of the students abilities and limitations.
- Plan for their needs.
- Make sure activities are age appropriate.
- Allow opportunities for self directed learning and experimentation.

Special Considerations

- Be aware that there may be some times where the child can cause distractions and you will need an aid to help control the class.
- Be sensitive to bowel and bladder problems, these can cause embarrassing situations.
- Make sure students are involved because it is often that children with this condition become over weight.
- Focus on upper body activities because of the little or no mobility in the legs.
- Development depends largely on environmental factors and setbacks that may disrupt functioning such as lengthy hospital stays, dependence, and poor self esteem.

Exercise

- A comprehensive program of physical activity is needed to maintain a healthy life
- Intervention should occur as early as possible.
- Home based programs are needed to teach parents how to exercise their baby's feet and legs so they can walk with crutches, braces, and exercise is also important for use of a wheel chair.

Activities and Exercise

- Body Awareness
- Group Play
- Parachute activities
- Upper body activities
- Strength training
- Aquatics
- Flexibility
- Relays
- Wheel chair activities

Goals of Intervention

- Teaching gross motor and spatial skills to facilitate coordination.
- Developing and maintaining fitness and flexibility to emphasize self sufficiency.
- Encouraging movement and fitness to overcome susceptibility to obesity.
- Developing physical skills that generalize to activities of daily living and vocational skills.
- Promoting social development in recreational and group play activities, such as aquatics.
- Providing appropriate social outlets for enjoyment and self satisfaction on an individual basis as well as with family or peers within the community.

Research being performed

- The NINDS supports a broad range of research on neural tube defects such as SB aimed at finding way to treat, prevent, and, ultimately, cure these disorders. Recent studies have shown that the addition of folic acid to the diet of women of child bearing age may significantly reduce the incidence of neural tube defects. Therefore it is recommended that all women of child bearing age consume 0.4 mg of folic acid daily.

Neonatal bacterial meningitis

Defn. Neonatal bacterial **meningitis is inflammation of the meninges due to bacterial invasion.**

- Neonatal bacterial meningitis occurs in 2/10,000 full-term and 2/1,000 low-birth-weight (LBW) neonates, with a male predominance.
- It occurs in about 15% of neonates with sepsis and occasionally occurs in isolation.

Etiology

The predominant pathogens are

- ✓ Group B streptococcus (GBS)
- ✓ Escherichia coli
- ✓ Listeria monocytogenes

Symptoms and Signs

- Frequently, only those findings typical of neonatal **sepsis** (eg**, temperature instability, respiratory distress, jaundice, apnea**) are manifest.
- **CNS signs** (eg, **lethargy, seizures [particularly focal], vomiting, irritability**) more specifically suggest neonatal bacterial meningitis.

Cont…

- A bulging or full fontanelle occurs in about 25% and nuchal rigidity in only 15%.
- The younger the patient, the less common are these findings.
- Cranial nerve abnormalities (particularly those involving the 3rd, 6th, and 7th nerves) may also be present.

Diagnosis

- CSF cell counts, **glucose and protein levels**, Gram stain, and culture
- Sometimes ultrasonography or CT or MRI of the brain
- Definitive diagnosis is made by CSF examination via lumbar puncture (LP), which should be done in any neonate suspected of having sepsis or meningitis.
- However, LP can be difficult to do in a neonate, and there is some risk of **hypoxia**.

Cont…

- Poor clinical condition (eg, respiratory distress, shock, thrombocytopenia) makes LP risky.
- If LP is delayed, the neonate should be treated as though meningitis is present.
- Even when the clinical condition improves, the presence of inflammatory cells and abnormal glucose and protein levels in CSF days after illness onset can still suggest the diagnosis.

Treatment

- Empiric ampicillin
  plus
- gentamicin
- cefotaxime

  or both, followed by culture-specific drugs

MENINGOCOCCAL MENINGITIS

A case

Beijing Center for Disease Control and Prevention (CDC)
January 11, 2007

- **The patient was a 14-year-old male student.**
- **The onset of this case started quickly with high fever(39°C) and headache.**
- **Other clinical symptoms included nausea, vomiting, stiff neck and confusion.**
- **There was little petechiate rash emerged on the patient's four limbs.**
- **The Kernig's sign was positive and Brudzinski's sign was negative.**
- **The numbers of white cell in the blood and cerebrospinal fluid (CSF) were 3.6×10^{10}/L and 1.7×10^{9}/L, respectively.**

What was the most likely diagnosis



Definition

Meningococcal meningitis :

- ★ Neisseria meningitides
- ★ Purulent meningitis

✓ an acute inflammation of the membranes that cover the brain and spinal cord

✓ It is an acute bacterial disease which causes inflammation of the **pia and arachnoid space**.



Etiology

- gram-negative coccus
- **aerobic diplococci**
- Neisseria species
- 13 serogroups
- **Five serogroups (A, B, C, Y, and W-135; are responsible for >90% of cases of meningococcal disease worldwide**

What causes Meningococcal meningitis



Epidemiology

Susceptibility

☆ Everybody without specific immunity

★ 6 months to 2 years of age.

▶*Routes of transmission*

⑴ **Respiratory tract :like cough/sneeze**

⑵ **Close contact: like bosoming/kiss/breast-feed**

Pathogenesis

- Meningococcal strains are characterized by the expression of **capsular polysaccharide** and other outer-membrane structures, including **endotoxin.**

✓ Outer-membrane blebbing,

✓ meningococcal autolysis,

✓ molecular mimicry,

✓ genome plasticity,

✓ horizontal DNA exchange, and

✓ phase and/or antigenic variation are all important in meningococcal virulence.

- Meningococci may undergo important phenotypic changes when they adapt to growth
- presumed virulence traits include the

✓ **antiphagocytic capsular polysaccharide**,

✓ an ability to **sialylate LOS** so that it **mimics** host-cell carbohydrate moieties and inhibits complement deposition,

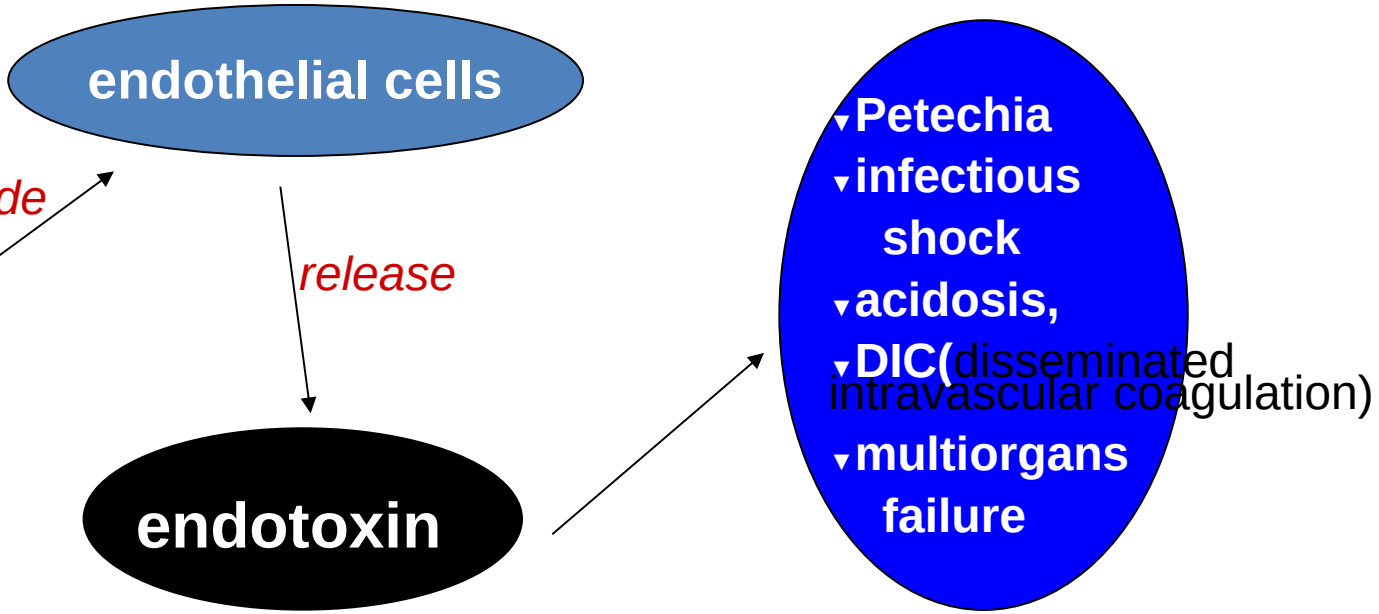
✓ the **secretion of IgA protease**, and mechanisms for **iron acquisition**.

Pathogenesis

Immunity<bacterial quantity and virulence

A. **meningococcal septicemia**





Pathogenesis

Immunity < bacterial quantity and virulence

B. **meningococcal meningitis**

Neisseria meningitides

↓

the mucosal barrier

↓

the bloodstream

↓

the central nervous system

↓

increased intracranial pressure

↓

convulsion, coma, herniation

↓

CSF turbid, sometimes circular

obstacle of cerebrospinal fluid and h



Clinical manifestations

- Incubation period: generally 2 to 3 days

  (Range is 1 to 10 days)

- Four types:

  1. Meningococcal meningitis (*Moderate type*)
  2. Fulminate type （*shock type, Meningoencephalitic type*)
  3. Mixed type （*Meningococcemia- meningitis*）
  4. Mild type (*Mild acute meningococcemia*)

What are the signs and symptoms



Clinical manifestations

Prodromal period

Septic period

- an abrupt onset
- chills high fever
- Headache
- Petechias
- purpuras
- Splenomegaly

Meningitic period

- intracranial pressure
- headache
- vomiting
- restlessness
- Stiff neck
- Kernig (+)
- brudziski (+)

Convalescent period

- **gradually disappears**,
- **recovers to normal**.

Meningococcal meningitis



Cont…

- **Kernig's sign** may be positive i.e patient feels back pain when one of the lower limbs is flexed at the knee and joint and extended forward in an elevated position



cont…

Brudinski's sign may be positive i.e when the patient's neck is flexed the two lower extremities get flexed or raised up



Clinical manifestations



图 2-9A　流行性脑脊髓膜炎(皮肤瘀点)







Meningococcal meningitis

Cerebrospinal fluid examination

(an important method to establish diagnosis) :

turbid

- pressure ↑
- WBC ↑ *>1000×10⁶/L*
- protein

- glucose ↓
- sodium ↓
- chloride

Treatment

1

General treatment

①Isolation hospitalization:
②Careful monitor nursing.
③Prevent complication.
④Maintain the balances of fluid and electrolytes

2

Etiological treatment

① Antibacterial activity.
②Concentration in CSF.
③ Resistance to drugs
A. Penicillin G
（200~400u/kg/day)
B.Chloromycetin
C.Cephalosporis

3

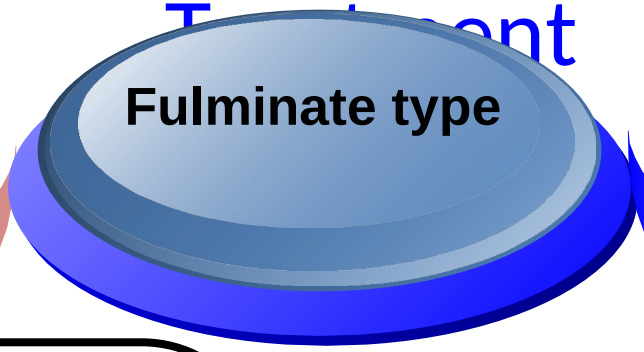
Other treatment

- **High fever: anti-pyretic (physical chemical) measures.**
- **Increased intracranial pressure:**

20 % mannitol (0.5g/kg~2g/kg)



Treatment



A. Shock type

①Etiology treatment:

. Penicillin G

② Shock should be corrected promptly:

a. Volume expanded.

b. Metabolic acidosis corrected.

c. Vasoactive drugs.

d. Adrenal corticosteroids.

e. Important organs protected

B. Meningococcemia-meningitis type

① Effective antibacterial drugs.

Penicillin G.

②Alleviate cerebral edema

Mannitol and 50 per cent Glucose.

③ Adrenal corticosteroids:

Dexamethasone

④ Treatment in respiratory failure:

lobeline, coramine

⑤High fever and seizure:

Sedatives: wintermine phenergan

Microcephaly



Microcephaly is a medical condition in which the **circumference of the head is smaller than normal** (**more than two standard deviations smaller than average for the person's age and sex**)

because the brain has not developed properly or has stopped growing.

- **Microcephaly can be present at birth or it may develop in the first few years of life**.

- Microcephaly" is commonly referred to as "**small head**." It is a form of cephalic condition (disorder of the head). Microcephaly is sometimes discussed in conjunction to **microencephaly**, which is characterized by "**small brain**". This is because the head size is usually determined by the brain size. In general, **genetic factor** has been detected to be the prime cause of microcephaly in some cases. Microcephaly disorder is also indirectly linked to the **chromosomal deletions, and schizophrenia.**

- **<u>Normal head circumference at birth :</u>**

Range from (32 – 37) cm

- **<u>Rate of growth of head circumference :</u>**

2 cm / month > 1st three months of life

1cm / month > 4 – 6 months of age

0.5 cm / month > 6 – 12 months of age

47 cm at 1 year of age

49 cm at 2 years of age

- HC reflects brain volume ,a small skull reflects a small brain .
- **Incidence of moderate to severe mental retardation :**
  - The **severity of mental retardation** has been related to the **severity of the microcephaly** .
  - **HC from 2- 3 SD below the age is 33% risk of developing MR .**
  - **HC > 3 SD , incidence is 62%.**
- However, some children with microcephaly may have other birth defects, such as **: short stature** , **facial abnormalities**, **brain abnormalities**, **seizures** or **developmental delay**

Classification

We can classify microcephaly simply according to :

- Time of onset :

(**congenital or postnatal)**

- It's pathogenesis :

(1ry > genetic) or (2ry > environmental /acquired)

Microcephaly can be isolated, with no other obvious abnormalities, or it may be associated with other anomalies, which is termed **syndromic**.

Pathogenesis

Pathogenesis is very **heterogeneous**, which can present a challenge for the clinician attempting to determine whether environmental or genetic factors are causative .

These factors may act prenatally, perinatally, or postnatally to Inhibit the brain growth.

- **Some possible factors :**

- **Small brain & poorly growing skull .**
- **An abnormal neuronal migration during fetal development .**
- **Cytoarchitectural dearangements** .

❖Second microcephaly (acquired) Causes of microcephaly

1) Prenatal causes :

- Intrauterine *TORCH* infections .
- Fetal alcohol syndrome .
- Maternal phenylketonuria

❑Chromosomal anomalies :

- Down syndrome (21 trisomy)
- Edward syndrome (18 trisomy)
- Patau syndrome (13 trisomy)

2) Postnatal causes :

- **Perinatal asphyxia**
- **Perinatal acquired herpes simplex encephalitis / meningitis**
- **Head injury**
- **Endocrine anomalies**

❑**Hereditary conditions :**

- **Autosomal recessive (familial)**
- **Autosomal dominant**

❑**Congenital CNS anomalies :**

- Agenesis of the cerebellar vermis
- Agenesis of the corpus callosum
- Encephalocele

❑**Others causes :**

- Hyperthermia
- Radiation
- Malnutrition
- Drugs

Isolated Microcephaly

- **"Microcephaly vera" or true microcephaly** has been defined as genetic conditions in which the **brain is abnormally small because of reduce number of neurons** , but is **keeping normal Gyral pattern and being uncomplicated by other anomalies present at birth, with normal pregnancy, delivery, and postnatal periods**.

And it's compatible with normal early gross motor development, and it's not progressive.

Cont…

- The brain weight typically < 500 gm. but has normal architecture.
- The phenotype includes severe hypoplasia of the frontal regions of the brain and skull .
- This condition has considered to be autosomal recessive disorder .
- Note : **HC** alone should never be used to establish a prognosis for intellectual development .

HISTORY

- Family history (for genetic causes)
- Exposure to radiation during pregnancy
- Maternal drug history
- Infection during pregnancy
- Maternal DM or PKU
- Difficult delivery (using forceps)
- Cord around the neck
- Low Apgar scores all rises the possibility of hypoxic ischemic encephalopathy
- Significant fever during neonatal period

symptoms & Signs

- Appearance of the baby's head is very small.
- High-pitched cry.
- Poor feeding.
- Seizures.
- Increased movement of the arms and legs (spasticity).
- Developmental delays.
- Mental retardation.

EXAMINATION

- Note the child alertness
- Look for any dismorphic features
- Child posture & symmetry of the movements
- Inspect the skin for neurocutaneous stigmata
- Note the child overall growth
- Generally small or only head small
- Height & weight & plot in the growth chart

- **Head circumference :**

determined by placing a measuring tape around **the cranial vault to arrive at the largest possible measurement**.

- If abnormal, a second measurement should be performed to confirm the result .



Examine the head for any scar marks :

(Surgical repair or closure of Encephalocele)

- Shape of the head
- Palpate the head for ridging along the suture line & any deformity of skull contour .
- Palpate the anterior fontanelle .
- Examine the Eye & EAR for signs of infection(TORCH)
- Examine the neck for Goiter(Hypothyroidism)

Investigation

- **How is microcephaly diagnosed?**

Microcephaly can sometimes be diagnosed before birth by prenatal ultrasound.

Most of the time, the diagnosis will not be made until birth or later in infancy.

- Diagnostic tests to confirm the diagnosis and identify abnormalities in the brain include:
- **Head circumference** .
- **Chromosomal analysis –** for **autosomal trisomy syndromes**
- **Skull x-ray**
- **CT scan & MRI** – for cerebral malformations
- **Blood tests** &**Urine tests** – for intrauterine TORCH infection .
- **CSF**

How is Microcephaly treated?

Generally there is **no specific treatment** for microcephaly.

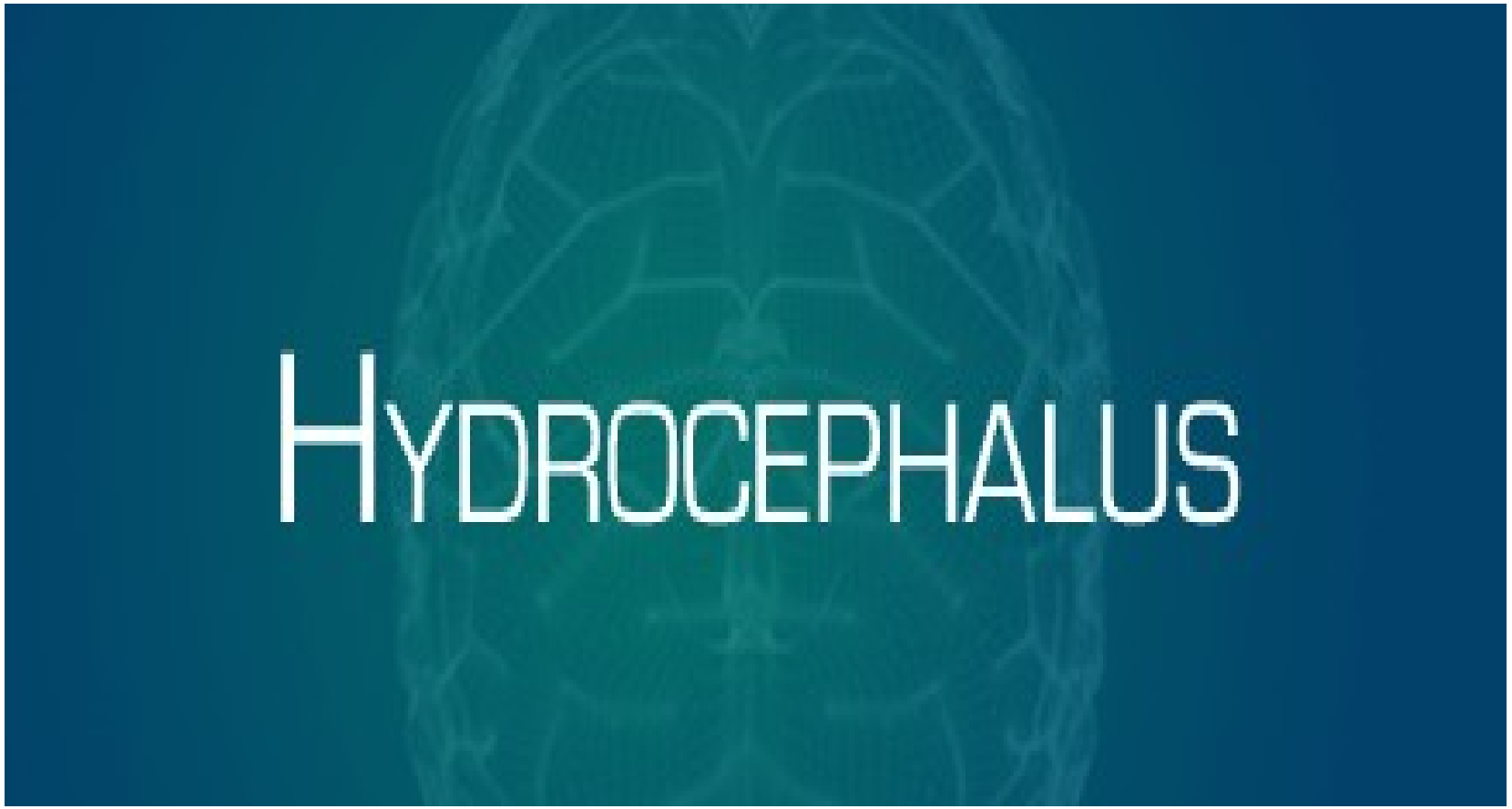
Most treatment options help **decrease the impact of any associated birth defects or developmental delays** that may be present.

Since microcephaly is a life-long condition, management of the condition includes **improving the child's abilities at home and in the community by providing education and support to improve the health and well-being of the child**.

What is the prognosis for microcephaly?

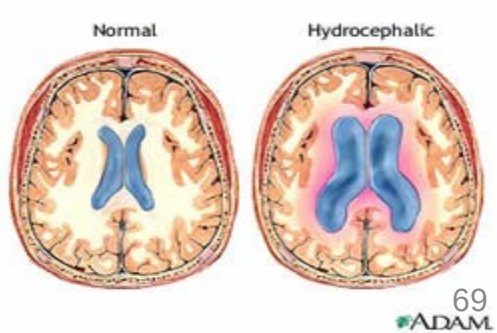
Prognosis for microcephaly varies, and depends on the presence of other existing medical conditions.

In general, life expectancy for children with microcephaly is reduced, and the chances of attaining normal brain function is poor.


HYDROCEPHALUS

Introduction

- The term hydrocephalus is derived from the Greek words "hydro" meaning water and "cephalus" meaning head.
- Although hydrocephalus was once known as "water on the brain," the "water" is actually cerebrospinal fluid (CSF) a clear fluid that surrounds the brain and spinal cord





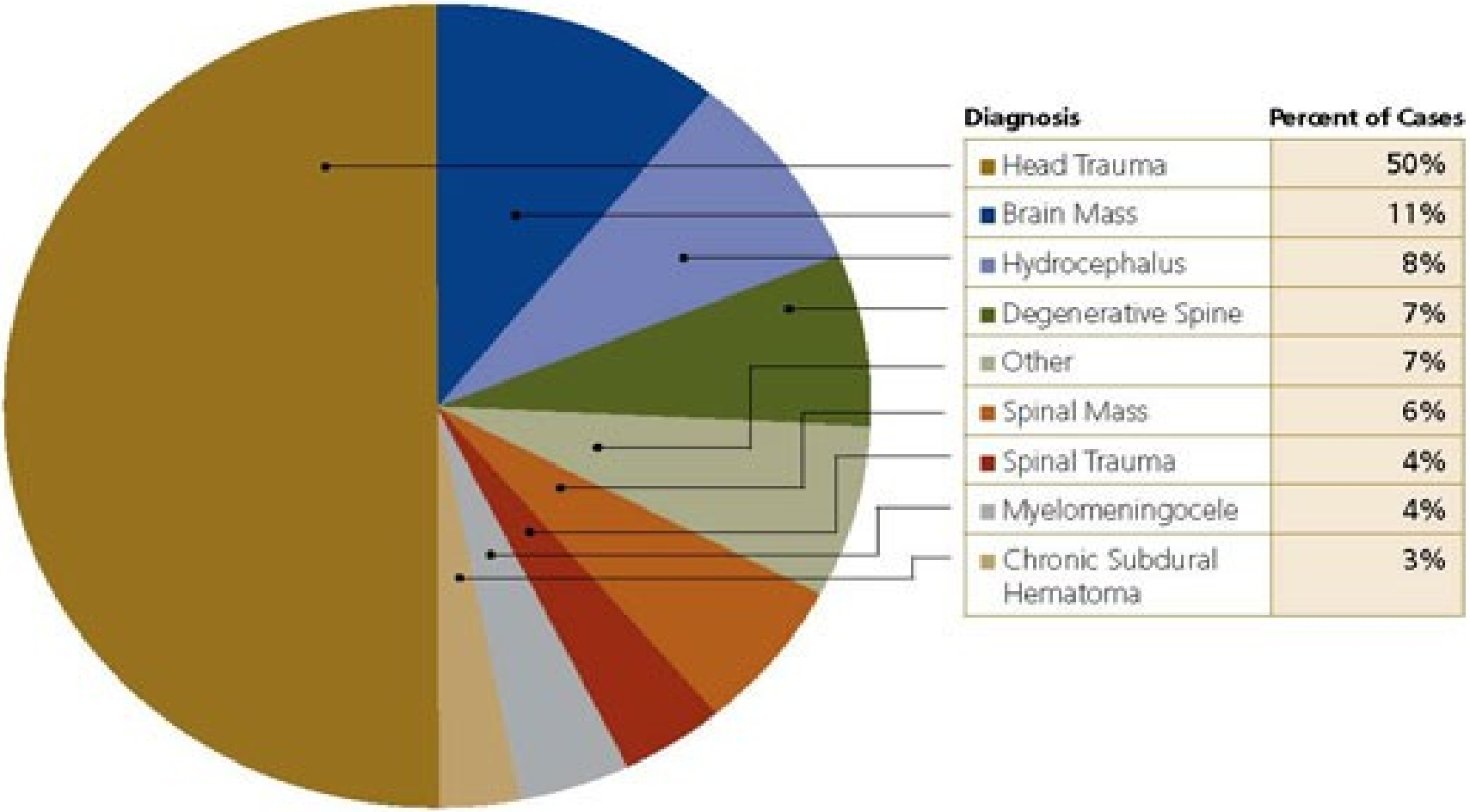
Definition

- It is a condition caused by an imbalance in the production and absorption of CSF in the ventricular system.
- When the production is greater than absorption, CSF accumulates with in the ventricular system, usually under increased pressure, producing passive dilation of the ventricles
- Hydrocephalus may be congenital or acquired.

Incidence

- Hydrocephalus is one of the most common birth defects
- congenital hydrocephalus is believed to be approximately 200 cases per 100,000 live births
- approximately 6,000 children annually develop acquired hydrocephalus during the first 2 years of life

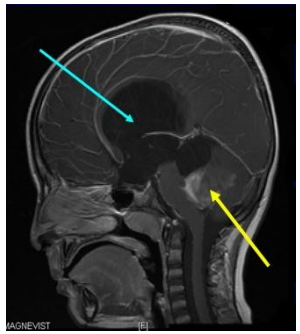
Neurosurgical Cases Performed at BLH



Diagnosis	Percent of Cases
Head Trauma	50%
Brain Mass	11%
Hydrocephalus	8%
Degenerative Spine	7%
Other	7%
Spinal Mass	6%
Spinal Trauma	4%
Myelomeningocele	4%
Chronic Subdural Hematoma	3%

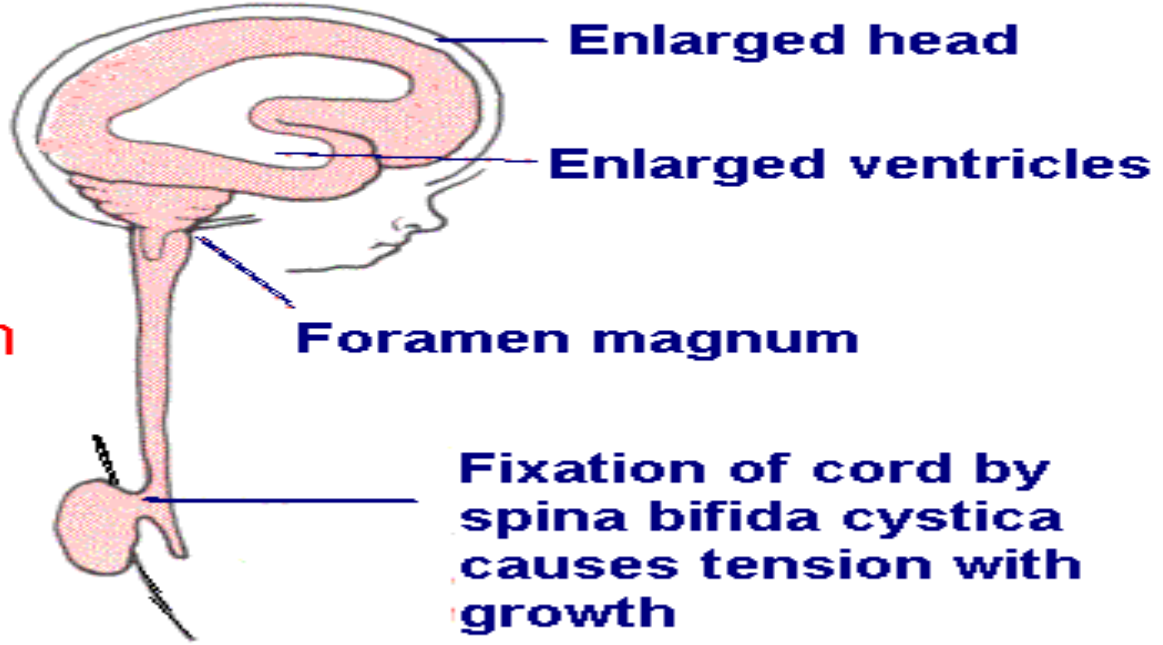
Causes

- The causes of hydrocephalus are still not well understood.
- Congenital causes in infants and children:
  - Aqueductal abnormalities: non communicating hydrocephalus develops because of an abnormality of the aqueduct or a lesion in the fourth ventricle.
  - Chiari malformation (types I and II)
  - Congenital infections (*eg*, cytomegalovirus, toxoplasmosis, rubella)



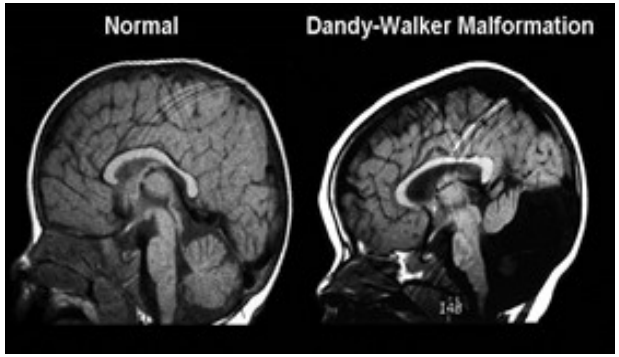
Causes

HYDROCEPHALY
(HYDROCEPHALUS)



Causes

- Dandy-Walker syndrome: enlarged fourth ventricle due to obstruction in pathway
- Spina bifida and neural tube defects (NTDs)
- Hemorrhage or internal bleeding in the brain
- Neurofibromatosis





Causes

- Acquired causes in infants and children
  - Brain tumors (benign or malignant): tumor of choroid plexes causes increased CSF secreation.
  - Cysts, abscesses, or hematoma may cause hydrocephalus
  - **Intraventricular hemorrhage** most frequently affects premature newborn infants.
  - **Subarachnoid hemorrhage**: Communicating hydrocephalus most commonly follows a subarachnoid hemorrhage, which may block the arachnoid villi leading to obstruction of CSF flow.

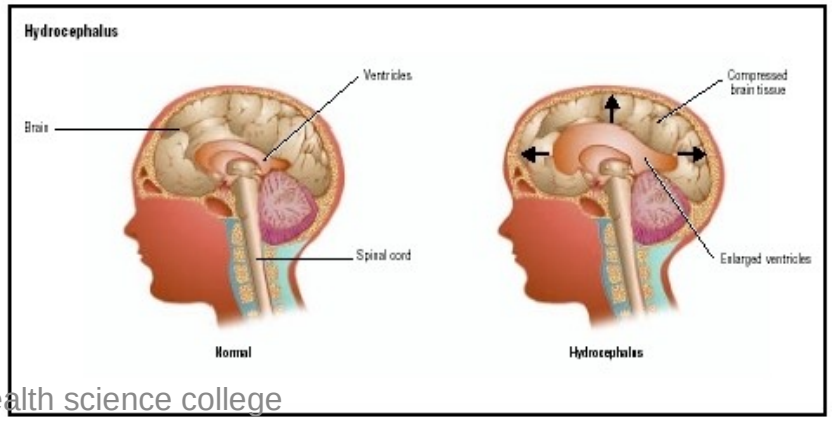
Causes

- Infection, particularly bacterial meningitis and cerebral abscess
- **Increased venous sinus pressure** may be related to some craniostenosis, achondroplasia, or venous thrombosis
- Leukemic infiltrates of CNS may seed the subarachnoid space and cause communicating hydrocephalus



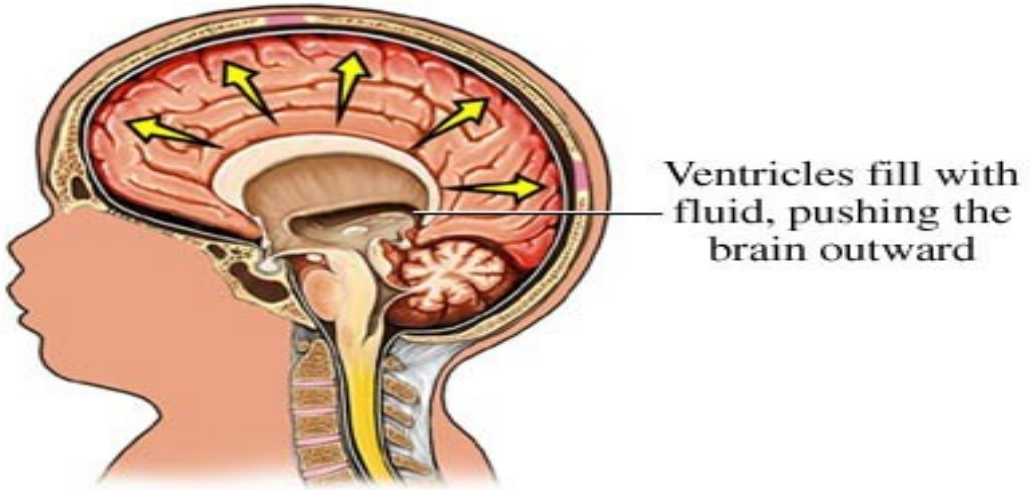
Types

- **Communicating hydrocephalus:**
  - Impaired absorption or increased production of CSF with in the subarachnoid space, obliteration of the subarachnoid cisterns or malfunction of arachnoid villi.
  - Newborn vessels has yet to retract that adds the volume in CSF.



Types

- **Non communicating hydrocephalus:**
  - Obstruction to the flow of CSF through the ventricular system.
  - Most cases of noncommunicating hydrocephalus are a result of developmental malformations.



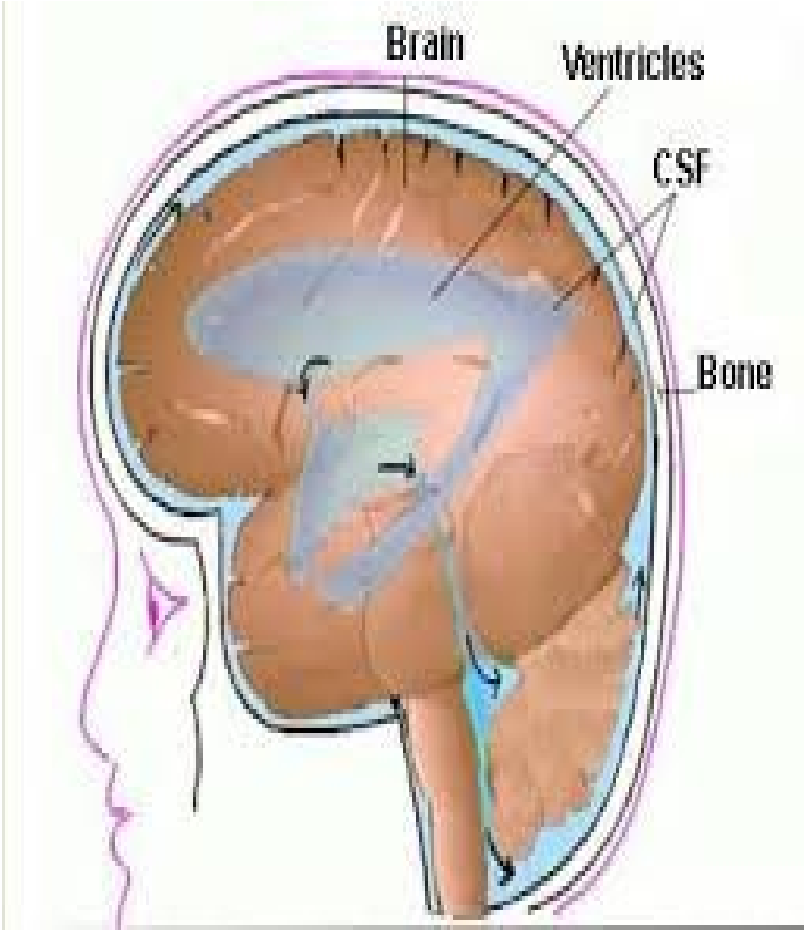
Types

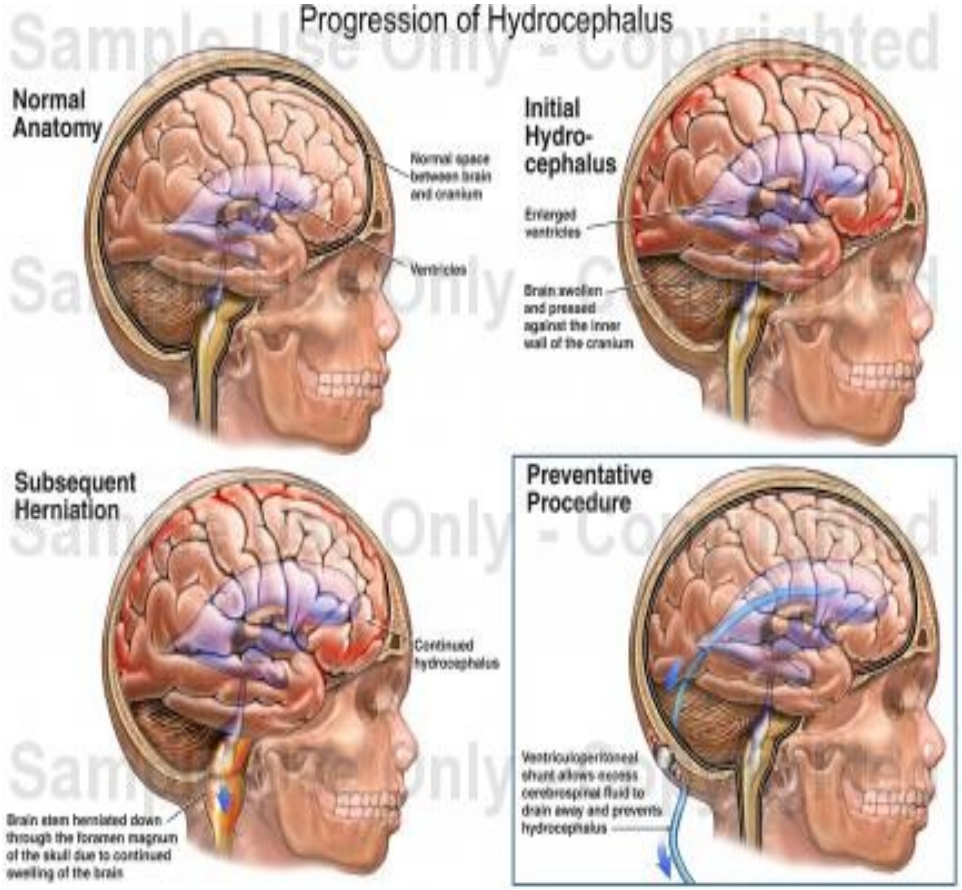
- **Hydrocephalus may be congenital or acquired,**
  - Congenital hydrocephalus is present at birth and may be caused by either events or influences that occur during fetal development, or genetic abnormalities.
  - Acquired hydrocephalus develops at the time of birth or at some point afterward. This type of hydrocephalus can affect individuals of all ages and may be caused by injury or disease.

Types

- **Hydrocephalus ex-vacuo and Normal Pressure Hydrocephalus(NPH)**
  - Hydrocephalus ex-vacuo occurs when stroke or traumatic injury cause damage to the brain. In these cases, brain tissue may actually shrink.
  - NPH is an abnormal increase of cerebrospinal fluid in the brain's ventricles that may result from a subarachnoid hemorrhage, head trauma, infection, tumor, or complications of surgery

PATHOPHYSIOLOGY





PATHOPHYSIOLOGY

Any imbalance of secretion and absorption causes an increase accumulation of CSF in the ventricle



ventriculomegaly



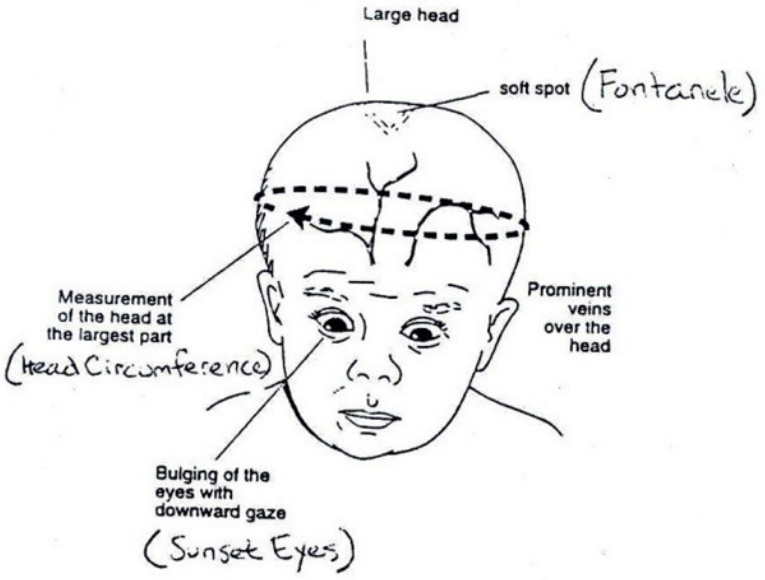
Compress the brain substance against bony prominence



Enlargement of skull and ventricles

Clinical manifestations

- INFANCY:
  - **Abnormally rapid head growth**
  - Bulging frontanels
  - Dilated scalp vein
  - Seperated sutures
  - Macewen sign(cracked spot sound on purcussion)
  - Depressed eyes
  - Setting- sun sign (sclera visible above the iris)





Clinical manifestations

- Irritability and lethargy
- Cries when picked up
- Change in level of consciousness
- Lower extremity spasticity
- Difficulty in sucking and vomiting





Clinical manifestations

- CHILDHOOD
  - Headache on awakening
  - Papilledema
  - Strabismus
  - Irritability and lethargy
  - Confusion ,incoherence and vomiting



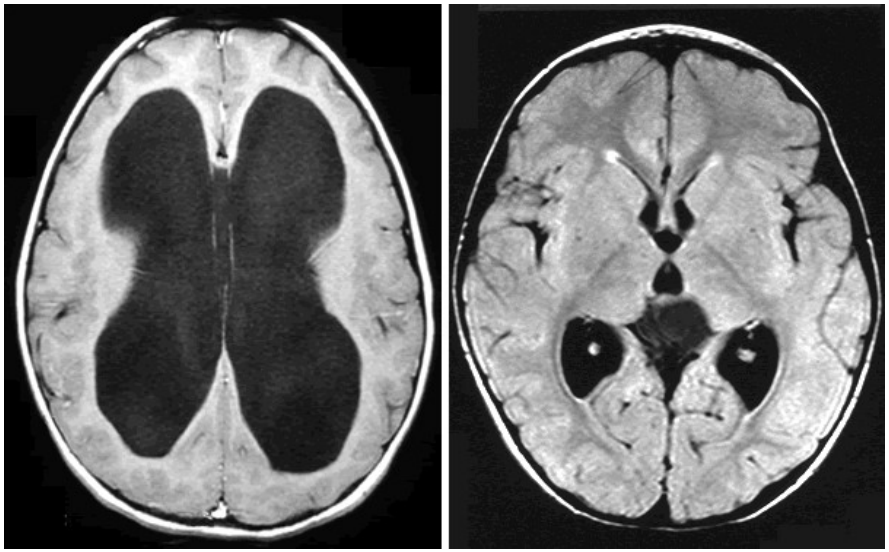


Diagnostic evaluation

- In infancy
  - Increase Head circumfrence that croses the one or more grid line on a measurement chart with in a periode of 2 to 4 weeks and associated neurologic sign that are present and progressive.
- Older children:
  - Sign and symptoms of increased intracranial pressure

Diagnostic evaluation

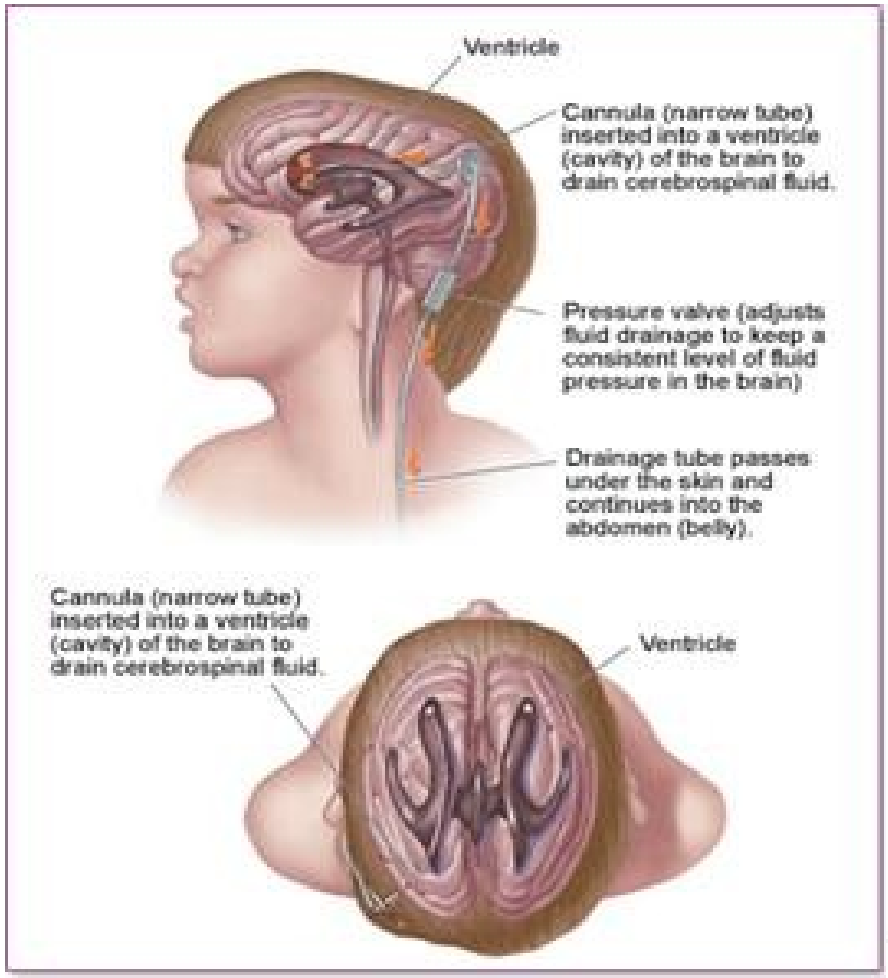
- CT scan and MRI
- In neonate ecoencephalography is useful in comparing the ratio of lateral ventricle to cortex.

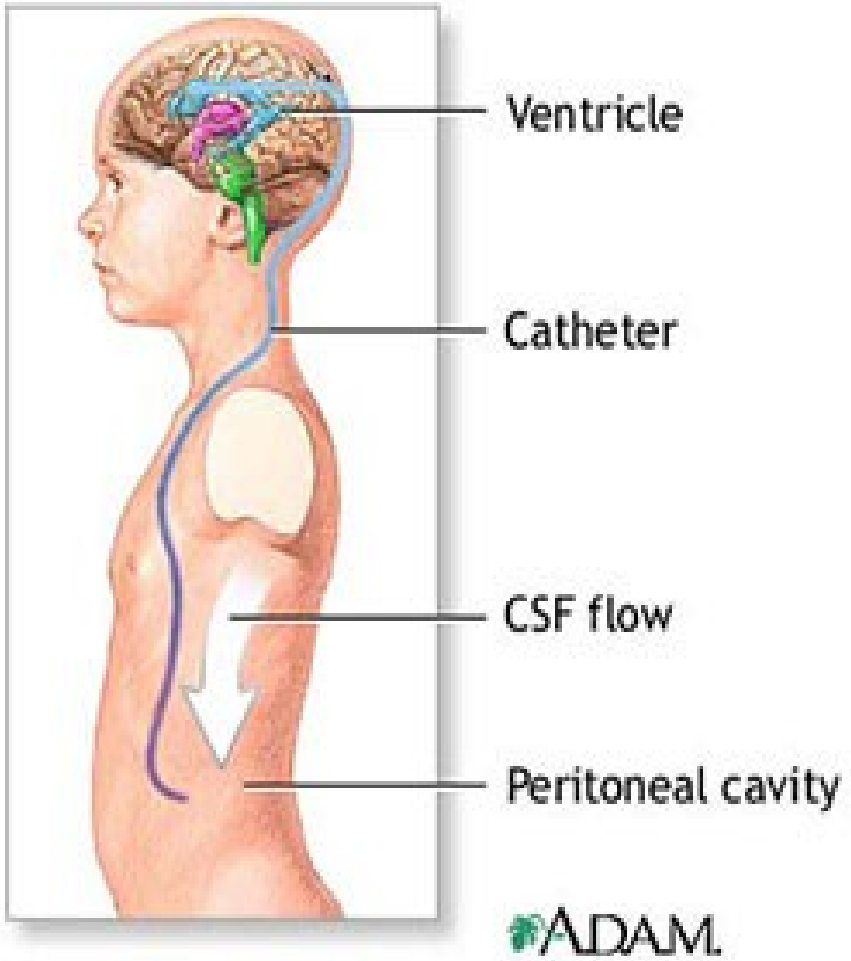


Therapeutic management

- Ventriculoperitoneal shunt(VP shunt)
  - It is shunt that provides primary drainage of the CSF from the ventricle to an extra cranial compartment, usually the peritoneum.
  - It is necessary to relieve CSF obstruction , and revision are needed when signs of malfunction appear.

Therapeutic management



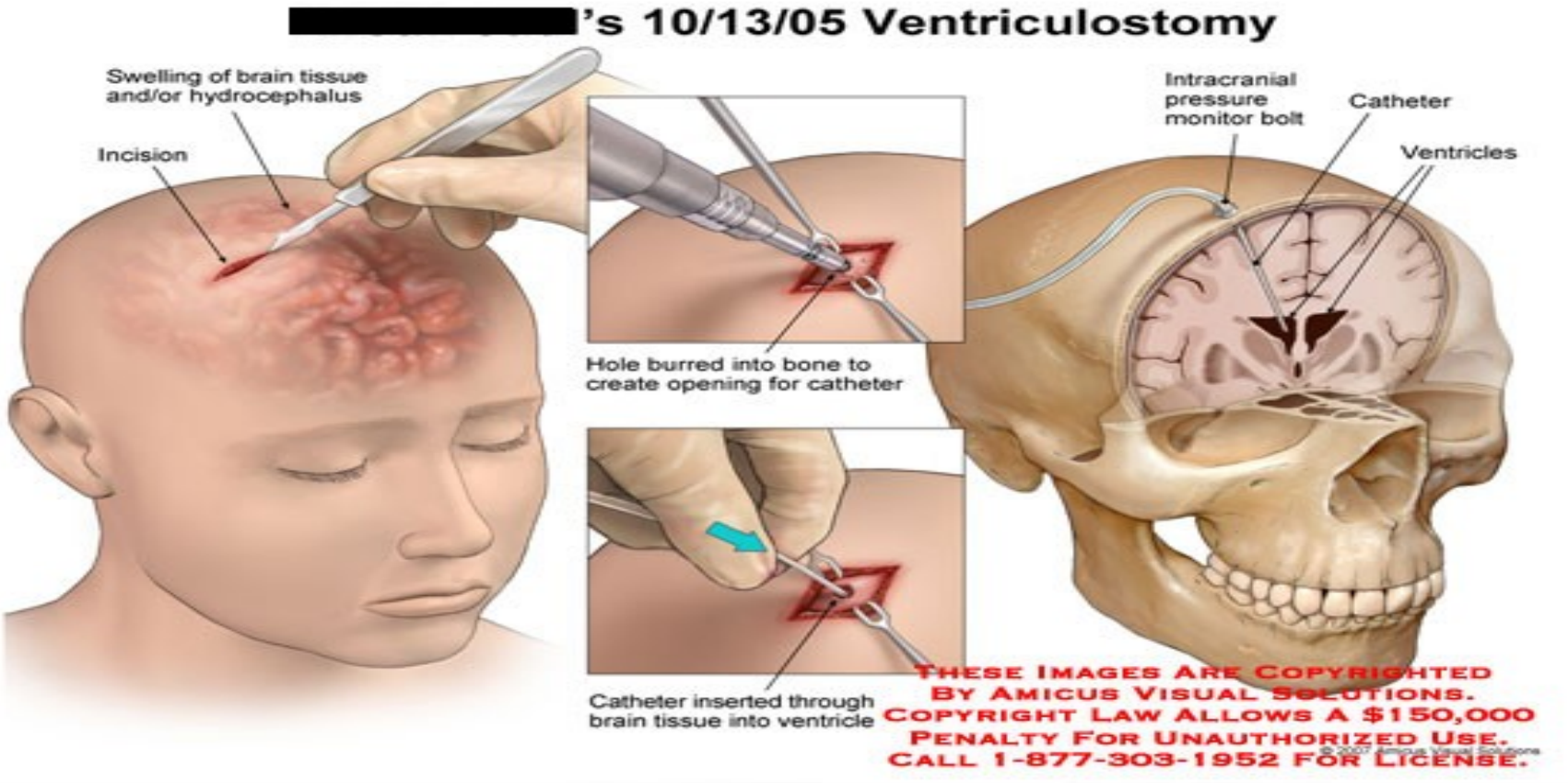


Shunt infection

- It can occur any time but great risk at 1 to 2 months.
- Infection include septicemia, bacterial endocarditis, wound infection, meningitis and ventriculitis.
- Infection should be treated with massive dose of IV antibiotics .
- Persistent infection occurs removal of shunt until the infection is subsided.
- External ventricular drainage done until CSF is sterile

Therapeutic management

- Endoscopic ventriculostomy



Nursing Management

- 1.Teach the family about the management required for the disorder
  - .Treatment is surgical by direct removal of an obstruction and insertion of shunt to provide primary drainage of the CSF to an extracranial compartment, usually peritoneum (ventriculoperitoneal shunt).
  - .A third ventriculostomy is a new nonshunting procedure used to treat children with hydrocephalus.

Nursing Management

- 2.Provide preoperative nursing care
  - .Assess head circumference, fontanelles, cranial sutures, and LOC; check also for irritability, altered feeding habits and a high-pitched cry.
  - .Firmly support the head and neck when holding the child.
  - .Provide skin care for the head to prevent breakdown.
  - .Give small, frequent feedings to decrease the risk of vomiting.
  - .Encourage parental-newborn bonding.

Nursing Management

- 3. Provide Postoperative nursing care
  - .Assess for signs of increased ICP and check the following; head circumference (daily), anterior fontanelle for size and fullness and behavior.
  - .Administer prescribed medications which may include antibiotics to prevent infection and analgesics for pain.
  - Provide shunt care

Nursing Management

- 4.Teach home care
  - .Encourage the child to participate in age-appropriate activities as tolerated. Encourage the parents to provide as normal lifestyle as possible.
  - .Explain how to recognize signs and symptoms of increased ICP. Subtle signs include changes in school performance, intermittent headache, and mild behavior changes.
  - .Arrange for the child to have frequent developmental screenings and routine medical checkups.

Down syndrome

Definition

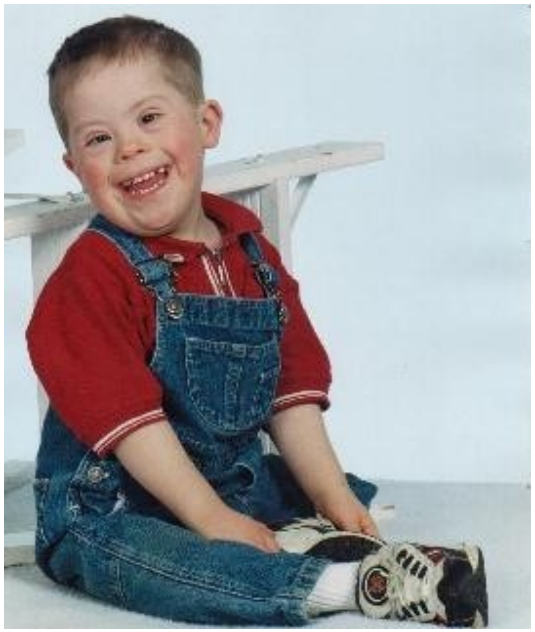
- **Trisomy 21**, extra genetic material causes delays in the way a child develops, mentally, physically
- common chromosomal malformation in newborns.
- Prevalence of is 10 per 10,000 live births,
- Increasing maternal age and termination of pregnancy



Characterized by several

- Dysmorphic features
- Delayed psychomotor development.
- Congenital defects and organic disorders
- CHD and respiratory infections are the most
- The life expectancy dependent on the risk of mortality in the first year of life.

Newborn assess



- Hypotonia ,
- Simian fold
- Drinking problems
- Signs of a CHD,
- GIT defect
- Cataract

- karyotyping can confirm the diagnosis

Cont…

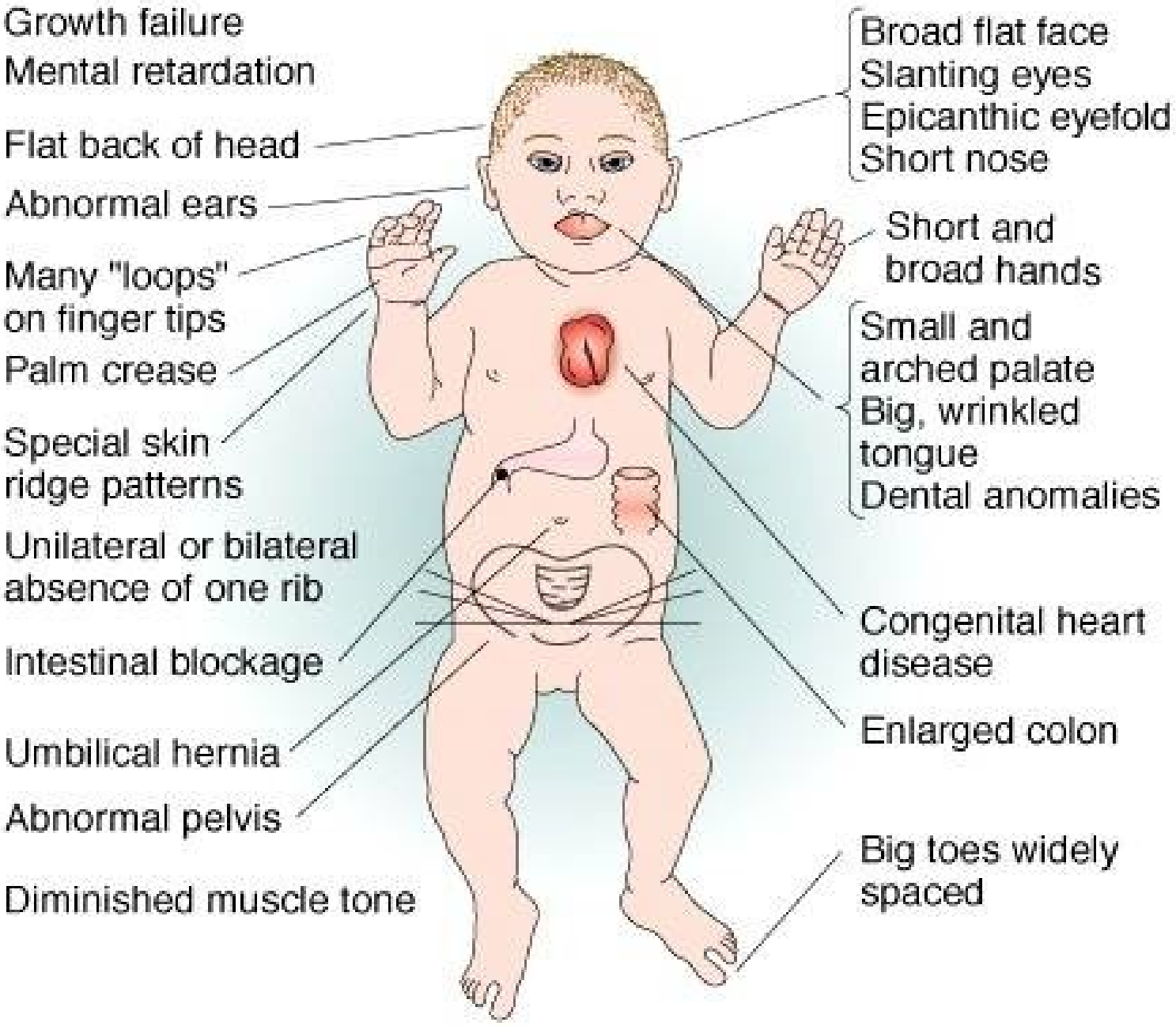
- Small and low set ears
- Small inter nipple distance
- Brush field spots
- Nuchal skin fold
- Brachycephaly (short, broad, and almost spherical head)
- Flat face
- Upward slant of the eye split
- Epicanthic fold
- Low, flat nose bridge Small mouth

Cont…

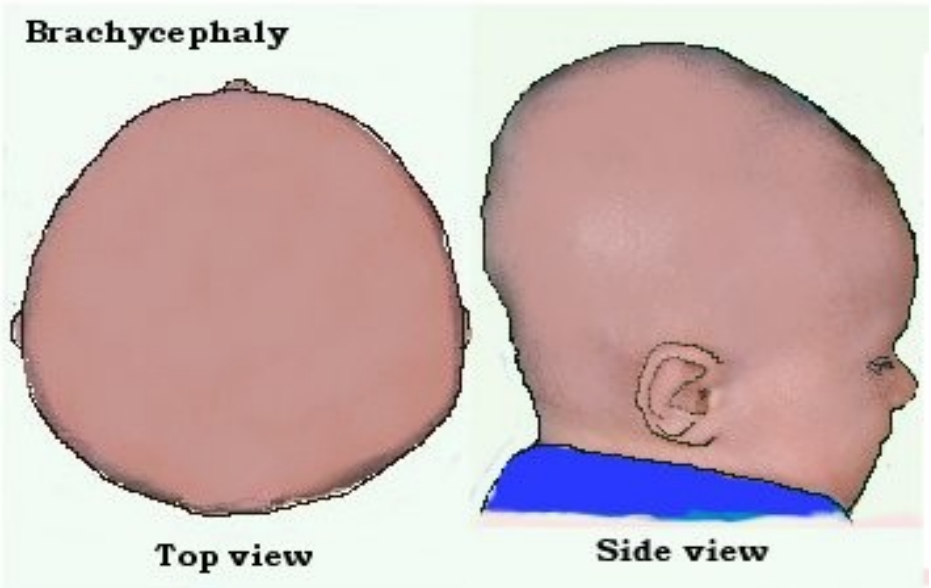
- Congenital heart defects
- Vision disorders
- Hearing disorders
- Obstructive sleep apnoea syndrome
- Wheezing
- Coeliac disease: pain, chronic constipation diarrhoea, failure to thrive anaemia and fatigue

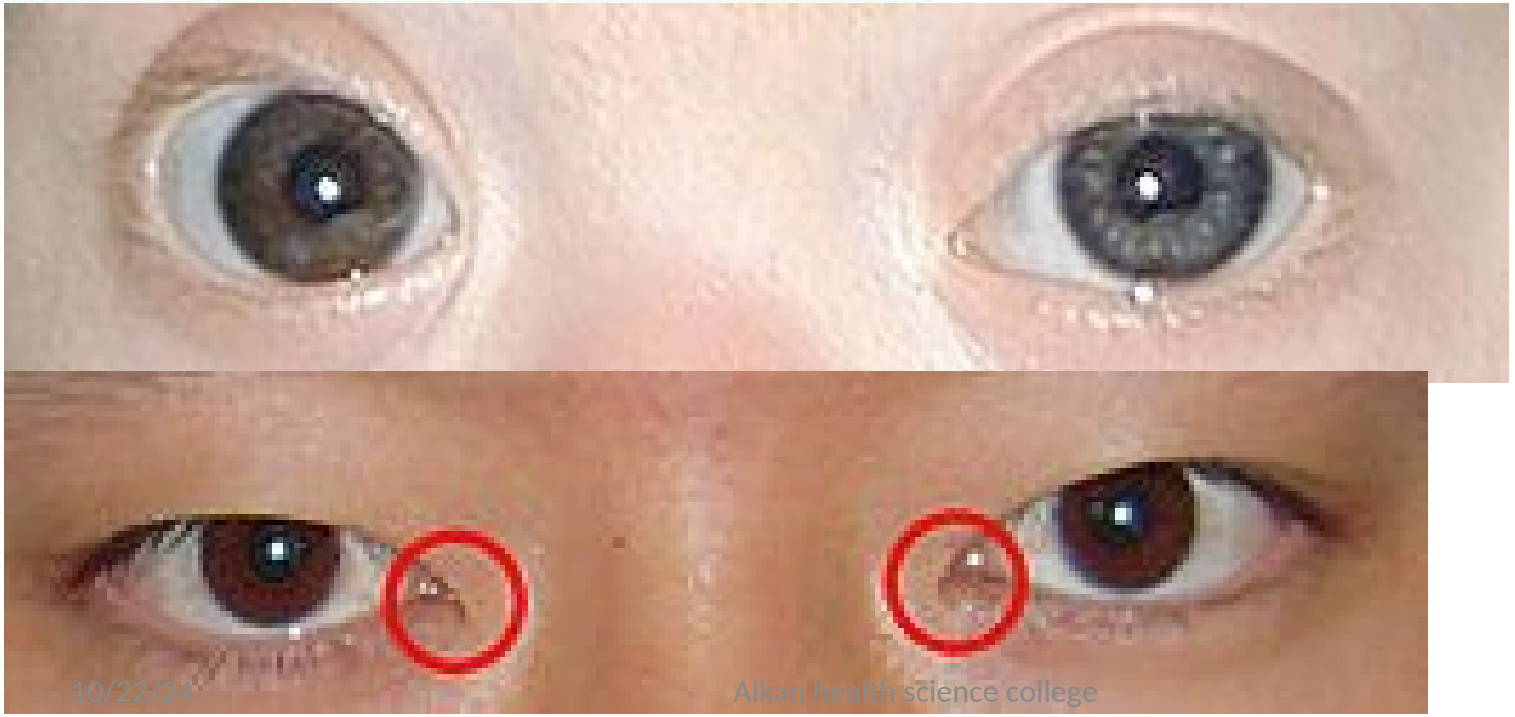
Cont…

- Obesity
- Thyroid disorders
- Atlanto-axial instability
- Urinary tract anomalies
- Skin problems
- Behaviour problems


Growth failure
Mental retardation
Flat back of head
Abnormal ears
Many "loops" on finger tips
Palm crease
Special skin ridge patterns
Unilateral or bilateral absence of one rib
Intestinal blockage
Umbilical hernia
Abnormal pelvis
Diminished muscle tone
Broad flat face
Slanting eyes
Epicanthic eyefold
Short nose
Short and broad hands
Small and arched palate
Big, wrinkled tongue
Dental anomalies
Congenital heart disease
Enlarged colon
Big toes widely spaced

(a)


Brachycephaly
Top view
Side view





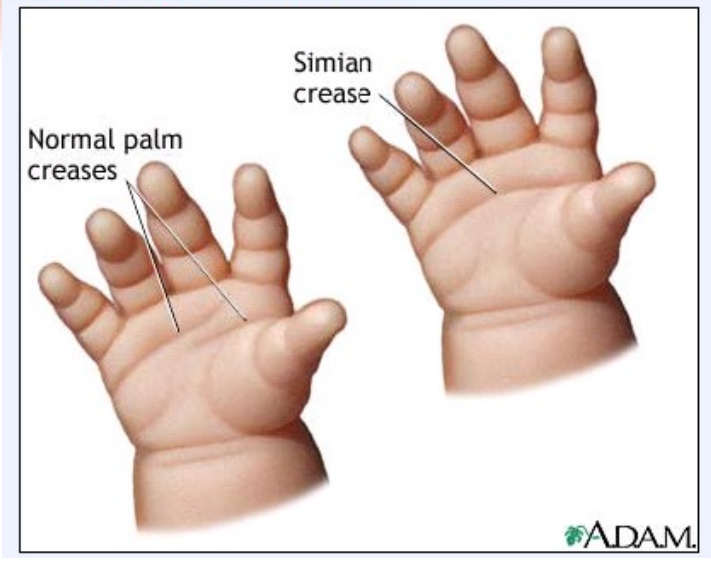











Simian crease
Normal palm creases
A.D.A.M.

Initial postnatal support

- Parents should receive an accurate and correct diagnosis
- Disclosure DS- must be balanced with respect for the opportunity for parents to welcome their child

Cardiovascular disorders

- Neonates 44–58%
- Atrioventricular AND ventricular septal defect
- A normal neonatal examination in children with DS does not exclude a serious CHD.
- Because of the high incidence of significant CHD in children with Down syndrome
- Persistent pulmonary hypertension of the neonate

Vision disorders

- More than half of children with DS
- Visual screening is essential





Cont…

- Brushfield spots
- Strabismus (20–47%),
- nystagmus (11–29%),
- Congenital cataract (4–7%),
- Acquired cataract (3–15%),
- blepharitis (7–41%),
- Refractive errors (43–70%) and
- Glaucoma (0.7%).
- Keratoconus .

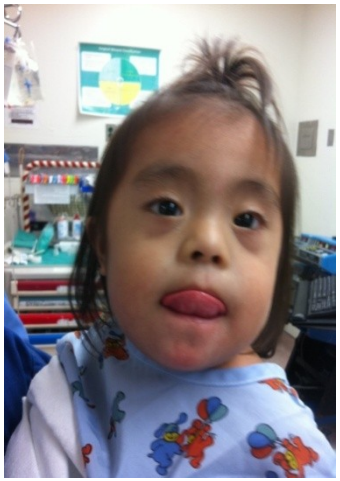




Fig. 1 Large-angle infantile-onset esotropia.

Ear, nose and throat disorders

- Correlate substantially with developmental problems and responsible to chronic middle ear disease and chronic rhinorrhoea.
- Midface hypoplasia
- Abnormalities of the nasopharynx, Eustachian tube, tooth development.
- **hypotonic and macroglossia**



Cont…

- prone to upper airway infections
- hearing loss influence educational, language
- assessment of the hearing function is very important.
- delayed speech development
- Sleep-disordered (breathing ,macroglossia, glossoptosis, adenoid tonsils

Dental Diseases

- ✓ Microdontias
- ✓ Missing Teeth/Fused Teeth
- ✓ Delayed tooth eruption
- ✓ Periodontal disease
- ✓ Dental Caries

Respiratory disorders

- Majority of the morbidity
- Respiratory syncytial virus (RSV)
- Recurrent wheeze
- Exacerbated because of CHD
- Airway anomalies
  - tracheolaryngomalacia(larynx collapses),
  - pulmonary hypoplasia,
  - subpleural cysts.

Gastrointestinal tract disorders

- Oesophageal atresia (0.3–0.8%)
- Pyloric stenosis (0.3%),
- Duodenal stenosis/atresia (1–5%),
- Hirschsprung disease (1–3%)
- Anal stenosis/atresia (<1– 4%).
- Coeliac disease (early detection of CD preventing complications

Cont…

- feeding problems
  - Impaired oral motor function,
  - gastro-oesophageal reflux or
  - congenital disorders
- Constipation (hypotonia
- Breastfeeding should be promoted
  - psycho-emotional or
  - immunity benefits
  - stimulating the development of the oral motor system
- Overweight NEED attention

Haematoloncological &immunological

- Thrombocytopenia (66%) and
- Polycythaemia (up to 33%)
- Lymphoblastic leukaemia.
- Lowered T- and B- lymphocyte counts (infections).

Endocrine disorders

- Thyroid disorders 28– 40%
- congenital hypothyroid ism (1.8 – 3.6%),
- Autoimmune (Hashimoto) thyroiditis
- Hyperthyroidism (Graves ’ disease) (0– 2%)
- Children should be tested more frequently
- Diabetes mellitus

Orthopaedic disorde



- Joint hypermobility and hypotonia
- Craniocervical instabil
- **atlanto-axial instability**
- Having a specific gait, with external rotation of the hips, knees
- **Juvenile rheumatoid arthritis**
- Delays in motor development (hypotonia)
- counselling by a physiotherapist is advised

Urinary tract disorders

- Risk of urinary tract anomalies (3.2%).
- Symptoms may be masked
- **Hydronephrosis , hydroureter,, hypospadias**
- showing them how to do urine and toilet.
- **Micropenis**
- **Cryptoorchidism**
- **Infertility**
- **Urinary Tract Infections**
- **Wilm's Tumor**



Sexual development

- Girls onset of puberty is similar to other
- **Females with DS are able to have children, but males**
- Education to prevent pregnancies is necessary
- Be cautious for sexual abuse in girls with DS.

Dermatologic problems

- Alopecia areata (2.9 – 20%),
- Vitiligo (1.9%),
- Seborrhoeic eczema (8– 36%),
- Folliculitis (10.3 – 26%) and
- Lower allergy risk

Neurobehavioral disorders

- Low Mental development
- IQ 35 to 70, indicating mild to moderate mental impairment;
- Can impede learning, and language
- short-term memory
- especial approach to teaching
- impaired oral motor function (articulation.
- behavioral psychiatric problems

Behavior disorders

- ADHD
- conduct /oppositional disorder
- Aggressive behavior
- Obsessive– compulsive disorders

- Depressive disorder
- Autism
- Epilepsy is seen in
- Alzheimer’s disease appears later in life

Education and school

- Early intervention education first months of life and provide tools to stimulate the development
- Especially in the preschool period
- Begin primary school with extra support
- Successful in the area of social skills b/se copy and mirror behavior.



Cont…

- Elementary and Secondary School
  - Reading, writing, math
  - Individual differences
  - Not indicative of the many strengths and talents that each individual acquire
- Adulthood
  - Work
  - Meaningful participation
  - Health

Remember…

- Individuals with Down syndrome attend school, work, participate in family and community activities, make decisions, and contribute to society in many ways.
- Many of medical conditions are treatable, so many individuals with Down syndrome lead healthy, active lives









Physical Development and Intervention

- Hypotonia
- Refine gross motor skills
- Incorporate social aspects (play games, playground equipment)
- Refine fine motor skills
- Handwriting and tool
- Importance of direct teaching
- Caution: orthopedic concerns

Speech and Language Development and Intervention

- Functional communication system
  - Verbal speech
  - Sign language
  - Picture systems
- Comprehension
- Vocabulary building
  - Reading
- Caution: hearing loss

Cognitive Development and Intervention

- Mild to moderate delays
- Importance of direct teaching
- Divide tasks into small steps
- Repetition and practice
- Praise and other forms of reinforcement
- Visual supports and real objects
- Prompts (but aim for independence)

Self-help Development and Intervention

- Divide tasks into small steps
- Repetition and practice
- Toilet training
  - Determine readiness, work with family, work with special educator

Social-Emotional Development

- Awareness and interest in peers - area of strength
- Delays in physical, language, cognitive skills may interfere
- Low strength
- what skill is needed to participate?

Addressing Behavioral Challenges

- Rule out a medical problem that might be related to the behavior (e.g., hearing)
- Use principles of positive behavior support
- Identify the function of the behavior and develop a plan

For long and fulfilling lives.

- Quality educational programs
- Responsive home environments
- Good health care
- Support from family, friends and the community
- Parent perceptions and experiences(Positive)
- Children's educational placements

Autistic Disorder and Pervasive Developmental Disorders

- **Pervasive developmental disorders (PDDs)** begin early in life and involve severe impairments in a number of areas of functioning.
- People with PDD exhibit profound disturbances in relationships, engage in unusual behaviors, and typically have substantial communication difficulties.
- According to field studies conducted for DSM-IV, 54 percent of patients with autism remain mute, as do 35 percent of patients with other PDD.

TABLE 15–7 DSM-IV-TR Diagnostic Criteria for Autistic Disorder

A. A total of six (or more) items from (1), (2), and (3), with at least two from (1) and one each from (2) and (3):

1. Qualitative impairment in social interaction, as manifested by at least two of the following:
   - **a.** marked impairment in the use of multiple nonverbal behaviors such as eye-to-eye gaze, facial expression, body postures, and gestures to regulate social interaction
   - **b.** failure to develop peer relationships appropriate to developmental level
   - **c.** a lack of spontaneous seeking to share enjoyment, interests, or achievements with other people
   - **d.** lack of social or emotional reciprocity
2. Qualitative impairments in communication as manifested by at least one of the following:
   - **a.** delay in, or total lack of, the development of spoken language (not accompanied by an attempt to compensate through alternative modes of communication such as gesture or mime)
   - **b.** in individuals with adequate speech, marked impairment in the ability to initiate or sustain a conversation with others
   - **c.** stereotyped and repetitive use of language or idiosyncratic language
   - **d.** lack of varied, spontaneous make-believe play or social imitative play appropriate to developmental level

3. Restricted repetitive and stereotyped patterns of behavior, interests, and activities, as manifested by at least one of the following:

   a. encompassing preoccupation with one or more stereotyped and restricted patterns of interest that is abnormal either in intensity or focus

   b. apparently inflexible adherence to specific, nonfunctional routines or rituals

   c. stereotyped and repetitive motor mannerisms

   d. persistent preoccupation with parts of objects

B. Delays or abnormal functioning in at least one of the following areas, with onset prior to age 3 years: (1) social interaction, (2) language as used in social communication, or (3) symbolic or imaginative play

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Symptoms of PDD

- **Echolalia:** repeat phrases that are spoken to them, or sometimes repeatedly echo a phrase they heard at an earlier time.
- **Pronoun reversal,** which involves confusing the pronoun “you” with the pronoun “I.”
- Inability to relate to others or lack a **theory of mind** —that is, they fail to appreciate that other people have a point of reference that differs from their own
- ***Self-injurious behavior***

Cont…

- Speech difficulties
- Missing the basic, inborn tendency to form attachments with other people
- Restricted, **repetitive**, and stereotyped patterns of behavior, interests, and activities
- **Rituals** such as flapping a string or spinning a top
- Respond to auditory, tactile, or visual sensations in a **highly unusual and idiosyncratic manner**

Causes of Autism

- Currently, the most promising research focuses on **endorphins and *neuropeptides***, substances that affect the action of **neurotransmitters**, as mediators of symptoms of the disorder.
- Other research has searched for abnormalities in brain structure, not function, among people with autism.

Treatment of PDD

- Intensive behavior modification using operant conditioning techniques called *Applied Behavior Analysis (ABA)* is the most promising approach to treating autism.
- ABA therapists focus on treating the specific symptoms of autism, including communication deficits, lack of self-care skills, and self-stimulatory or self-destructive behavior.

Treatment of PDD (continued)

- Behavior therapists have been fairly successful in teaching self-care skills and less successful in teaching social responsiveness.
- Despite the fact that autism apparently is caused by neurological abnormalities, the most effective treatment for the disorder is highly structured and intensive ABA.

Cerebral palsy

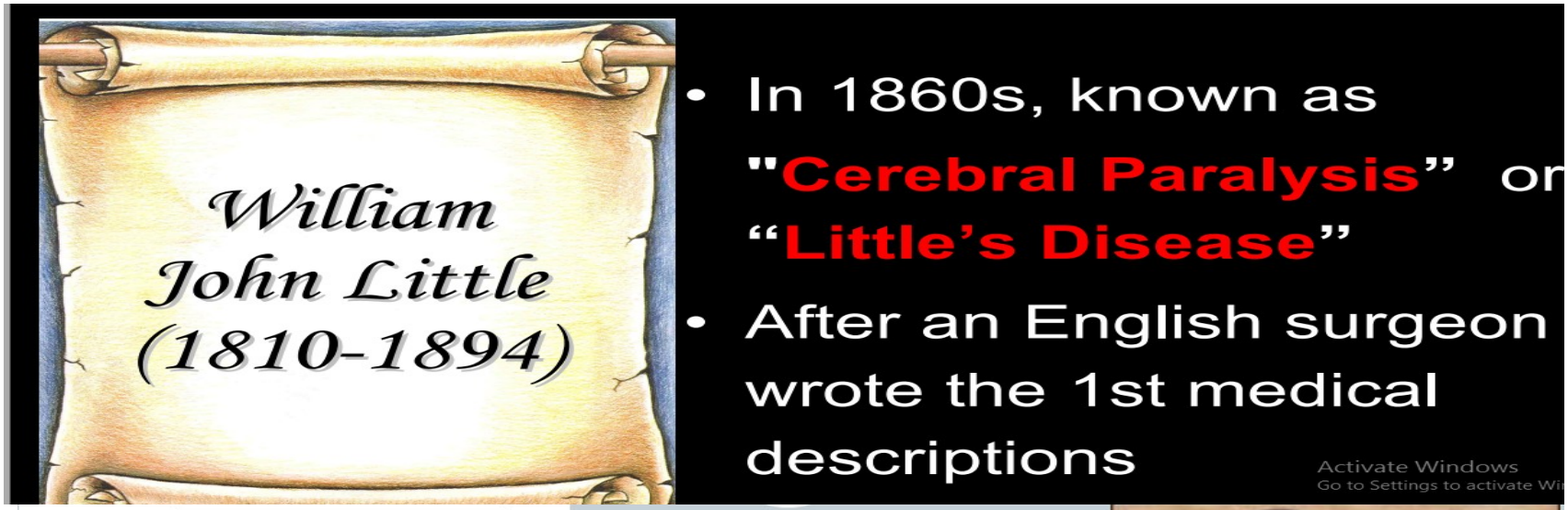
Presentation outline

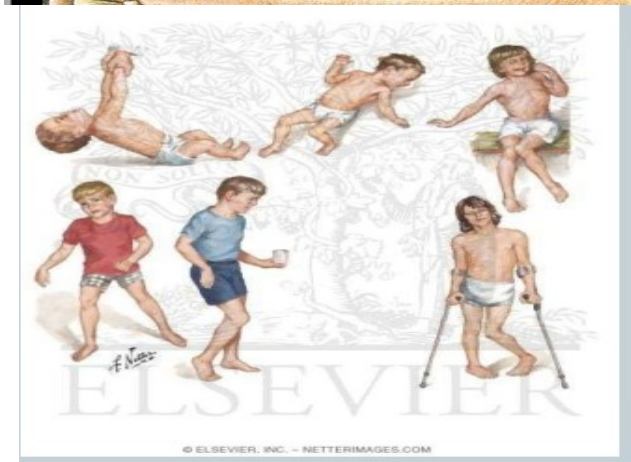
- Dfinition
- Epidemiology
- Etiology and risk factor
- Clinical manifestation
- Complication
- Management
- Summary
- Acknowledgment
- Refernces

Objective

- At the end of this session the learner will able to
  - Define CP
  - Describes its clinical classification
  - Discuss management of CP

Cerebral palsy









Cerebral palsy

Definition

- is a group of permanent disorders of movement and posture causing activity limitation to non progressive disturbances in the developing fetal or infant brain

- The motor disorders are often accompanied by disturbances of sensation, perception, cognition, communication, and behavior

Epidemiology

- Centers for Disease Control and Prevention indicate that the incidence is 3.6 per 1,000 children with a male : female ratio of 1.4 : 1
- The Collaborative Perinatal Project, in which approximately 45,000 children were regularly monitored ,
  - 80% of cases, features were identified pointing to antenatal factors causing abnormal brain development.

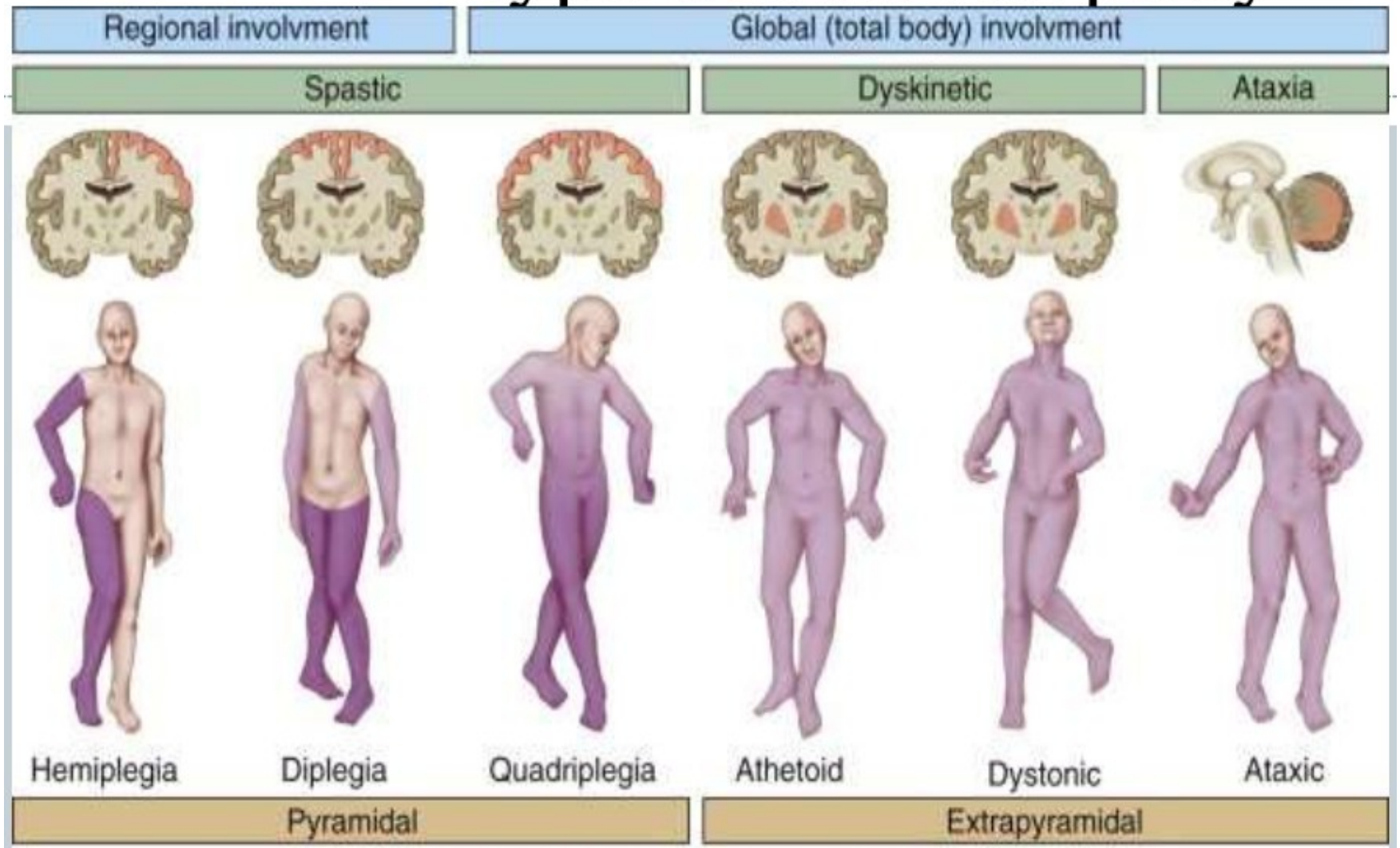
Con't…

- Genetic factors may contribute to the inflammatory cytokine response, and a functional polymorphism in the interleukin-6 gene is associated with a higher rate of CP in term in fants
- The prevalence of CP has increased somewhat as a result of the enhanced survival of very premature infants weighing <1,000 g, who go on to develop CP at a rate of approximately 15 per 100

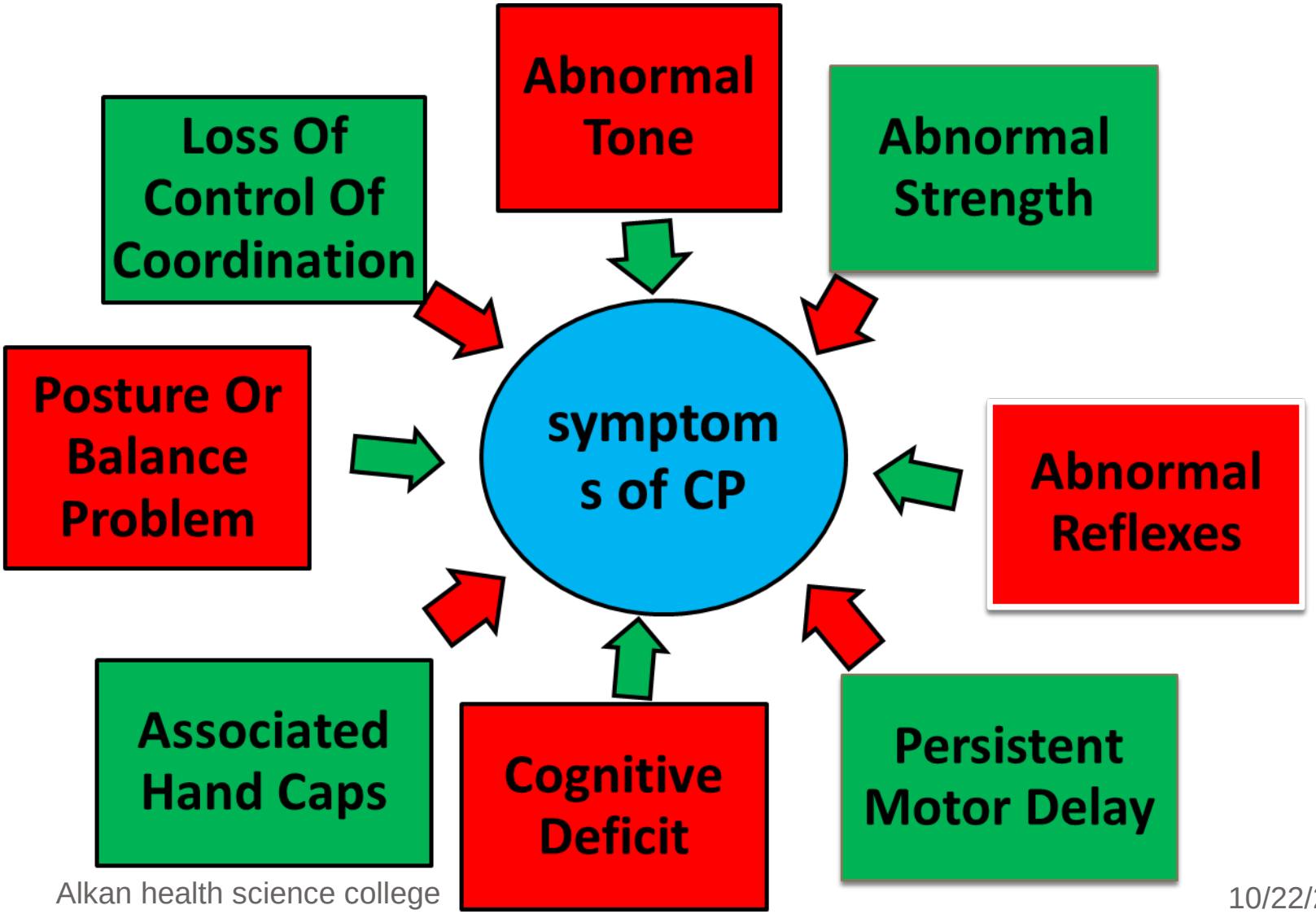
Etiology and risk factors

- **An insult or injury to the brain**
- **Development Malformations**
  – The brain fails to develop correctly.
- **Neurological damage**
  – Can occur before, during or after delivery
  – Rh incompatibility, illness, severe lack of oxygen
  * ***Unknown*** *in many instances*
- prematurity

Type of cerebral palsy



S/S

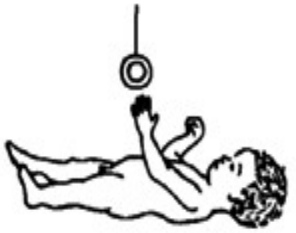

Abnormal Tone
Abnormal Strength
Loss Of Control Of Coordination
Posture Or Balance Problem
symptoms of CP
Abnormal Reflexes
Associated Hand Caps
Cognitive Deficit
Persistent Motor Delay





Child hangs in upside down 'U' with little or no movement.







Body stiffens like a board.

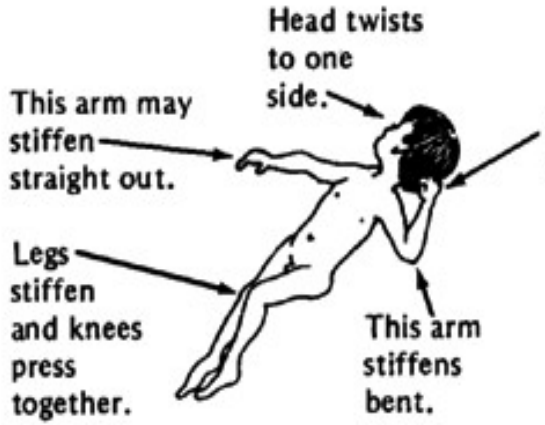




Even if a child can hear loud banging, he may not hear well enough to understand words.

When you try to stand the child the legs often stiffen or cross like scissors.

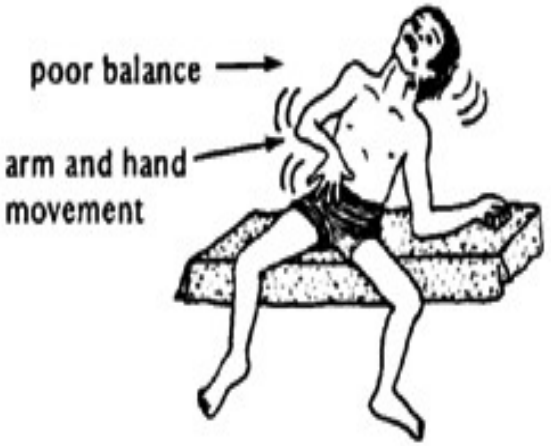






Typical athetoid arm and hand movements may be as a regular shake or as sudden 'spasms'. Uncontrolled movements are often worse when the child is excited or tries to do something.



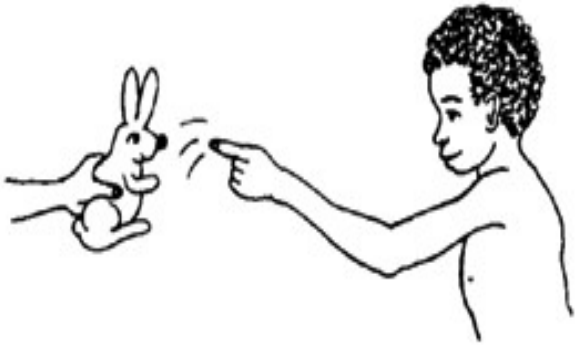


This child has severe athetosis.



To keep her balance the child with ataxia walks bent forward with feet wide apart. She takes irregular steps, like a sailor on a rough sea or someone who is drunk.

TEST FOR ATAXIA:



Hold a finger or a toy in front of the child and ask him to touch it on the first try. The child with ataxia cannot do it.

Diagnosis

- History taking.
- Physical examination.
- Neurologic assessment .
- Imagings

DDx

- Spinal muscular atrophy
- Muscular dystrophy/myopathy
- Myelodysplasia
- Spinal stenosis/tethered cord
- Brain tumor

Complication

- Contracture
- Malnutrition
- Mental health problems
- Lung disease
- Osteoarthritis
- Eye muscle imbalance

Treatment

- Therapy is chiefly symptomatic and preventive.
- **The broad aims of therapy are :**

  - To establish locomotion, communication and self help.
  - To correct associated defects as early and effectively .
  - To provide educational opportunities
  - To promote socialization experiences with other affected

Con't…

- Physical therapy
- Occupational therapy
- Speech and language therapy
- Recreation therapy
- Pharmacological treatment
  - oral diazepam (0.01-0.3 mg/kg/day
  - dantrolene (0.5-10 mg/kg/day, bid
  - Botulinum toxin
- Surgical treatment

Prevention

During pregnancy

- Avoiding exposure to infections, alcohol, cigarettes and drugs
- Controlling blood pressure, blood glucose, etc.
- Avoiding Identifying any potential Rh incompatibility

During labor

- Monitor maternal and fetal heart rate
- Remain as calm as possible during delivery

After birth

- Vaccinating for all common infant infections
- Using a crib with bed rail
- Never leaving your child on high countertops or surfaces unattended

Nursing responsibility

- Assessment of infants for abnormal muscle tones, inability to achieve milestones, and persistence of neonatal reflexes .
- Reinforce the therapeutic plan and assist the family devising and modifying equipment and activities to continue the therapy program the home.
- Encourage parents to define their concerns.
- Ensure as adequate nutritional and caloric intake.
- Immunization administration to prevent childhood illness.

Summary

- The cerebral palsy (CP) syndromes are characterized by abnormalities of motor activity and posture.
- Classification of CP syndromes is based upon the type of motor abnormalities (spastic, dyskinetic, or ataxic
- CP often is accompanied by other disorders of cerebral function, including intellectual disability, behavioral and emotional disorders, seizures and impaired vision and speech.

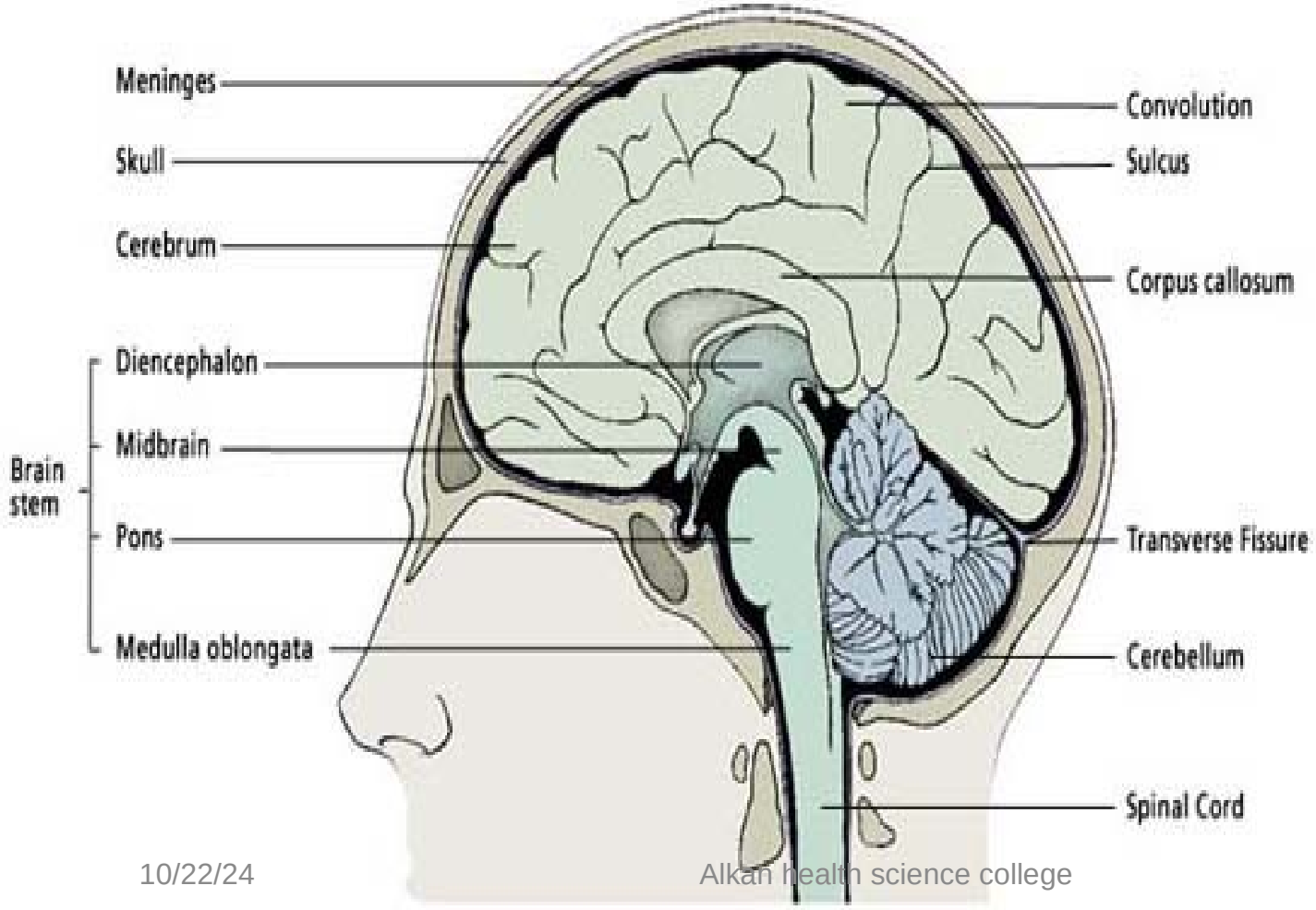
Pediatric Brain Tumor

Outlines

- Introduction
- Definition
- Classification of brain tumors
- Risk factors for brain tumors
- Signs and symptoms of brain tumor
- Diagnosis of brain tumor
- Treatment of brain tumor

Introduction

The Major Portions of the Brain Include the Cerebrum, Cerebellum and Brain Stem



Cont.---

- Brain tumors are a diverse group of neoplasms arising from different cells within the central nervous system (CNS) or from systemic tumors that have metastasized to the CNS.
- The most common of these include the gliomas and meningiomas, as well as metastatic lesions from extracranial tumors.

cont.--

- It is the second most common childhood malignancies, next to hematologic malignancies.
- And are the most common pediatric solid organ tumor.
- It is the leading cause of death from childhood cancer, surpassing the mortality rate of acute lymphoblastic leukemia.

Cont.---

- Brain tumor is a localized intracranial lesion which occupies space with the skull and tends to cause a rise in intracranial pressure.
- Central nervous system (CNS) tumors include both non-malignant and malignant tumors of the brain and spinal cord.

Brain Tumor Characteristics

- Start in the brain and grow steadily there.
- Very rarely spread to other organs through the bloodstream.
- Are named for the anatomic location of tumor and/or the cells from which they arise, each having a certain function essential to normal physiological functioning of the brain.
- For example: Brain Stem Gliomas arise in the lowest part of the brain.

Cont.----

- Meningiomas arise in the meninges.
- Gliomas arise from glial cells that support the CNS.
- Astrocytomas arise from astrocytes.
- Ependymomas arise from ependymal cells which line the ventricles
- Oligodendrogliomas arise from oligodentdrocyte cells which make up the fatty substance called myelin that covers nerves like electrical insulation

Classification of brain tumors

Brain tumors can be benign or malignant

Benign brain tumors:

- Benign brain tumors do not contain cancer cells: usually, benign tumors can be removed, and they seldom grow back.
- The border or edge of a benign brain tumor can be clearly seen.
- Cells from benign tumors do not invade tissues around them or spread to other parts of the body.

Cont.---

- However, benign tumors can press on sensitive areas of the brain and cause serious health problems.
- Unlike benign tumors in most other parts of the body, benign brain tumors are sometimes life threatening.
- Very rarely, a benign brain tumor may become malignant.

Malignant brain tumors

- Malignant brain tumors are generally more serious and often is life threatening.
- It may be primary (the tumor originate from the brain tissue) or
- secondary (metastasis from others tumor elsewhere in the body).
- They are likely to grow rapidly and invade the surrounding healthy brain tissue.

Cont.---

- Very rarely, cancer cells may **break away** from a malignant brain tumor and **spread to;**
  - ✓ Other parts of the brain,
  - ✓ To the spinal cord,
  - ✓ Or even to other parts of the body.

Cont.---

- Two main classification systems are used to categorize childhood CNS tumors:
  - World Health Organization classification is based on tumor histology.
  - International Classification of Childhood Cancer (ICCC) is based on the primary tumor site and morphology.

Cont.---

- The histological types of malignant CNS tumors vary with age in children and differ from those that present in adults.
- In children, primary CNS tumors predominate, and about half are located in the posterior fossa but metastatic lesions to the cerebral cortex in adults.

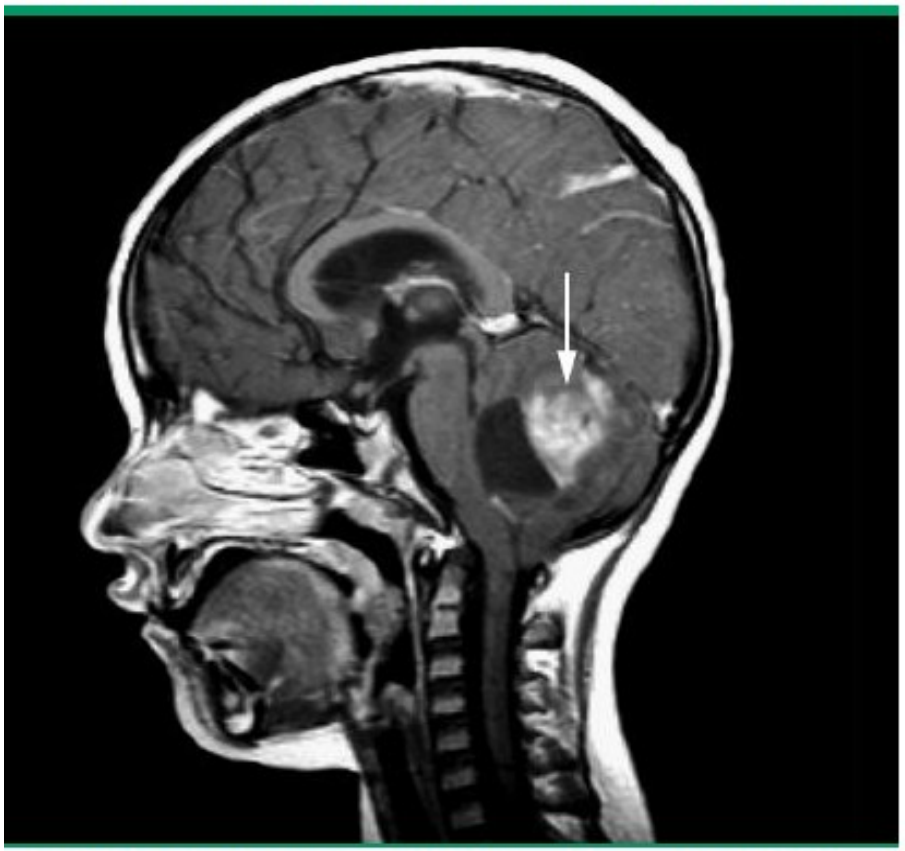
WHO histologic classification

- Tumors of neuroepithelial tissue are also referred to as gliomas,
- which are tumors derived from glial cells (ie, astrocytes, oligodendrocytes, and ependymal cells).
- These tumors account for almost 75 percent of all primary childhood CNS tumors, and include:

Astrocyte tumors

- It can occur throughout the CNS and range from low-grade indolent lesions to highly malignant aggressive tumors.
- Low-grade astrocytomas are the largest group of CNS tumors in children. Pilocytic astrocytoma, formerly referred to as juvenile pilocytic astrocytoma, is the most common brain tumor.
- Other low-grade astrocytomas include diffuse astrocytomas, oligodendroglial tumors, and gangliogliomas.

Cont.---



Sagittal T1 post-contrast MRI of a pilocytic astrocytoma (large cystic mass with a mural nodule, arrow) in the posterior fossa.

CONT---

- High-grade malignant astrocytomas are divided into
  1. **Anaplastic gliomas** (ie, anaplastic astrocytoma, anaplastic oligodendroglioma, and anaplastic oligoastrocytoma),
  2. **Diffuse intrinsic pontine glioma** and
  3. **Glioblastoma.**
- These highly malignant and aggressive tumors carry an extremely poor prognosis.
- Ependymoma/anaplastic ependymoma are derived from primitive glia.

Ependymomas

- ✓ It account for 10 percent of intracranial tumors, and 40 to 60 percent of spinal cord tumors in children and young adults.
- ✓ In children under 3 years of age, ependymomas are typically posterior fossa tumors located about or within the fourth ventricle.

Embryonal CNS tumors

- It includes medulloblastoma (the predominant tumor of this group), CNS primitive neuroectodermal tumors (PNETs), and atypical teratoid/ rhabdoid tumors.
- Medulloblastoma is the most common malignant brain tumor of childhood, accounting for approximately 20 percent of all primary tumors of the central nervous system among patients less than 19 years of age.

Neuronal and mixed neuronal-glial tumors

- This are characterized by a variable degree of neuronal differentiation.
- They include gangliomas and gangliocytomas, dysplastic gangliogliocytoma of the cerebellum, cerebellar liponeurocytomas, central neurocytomas, and glomus tumors (paragangliomas).

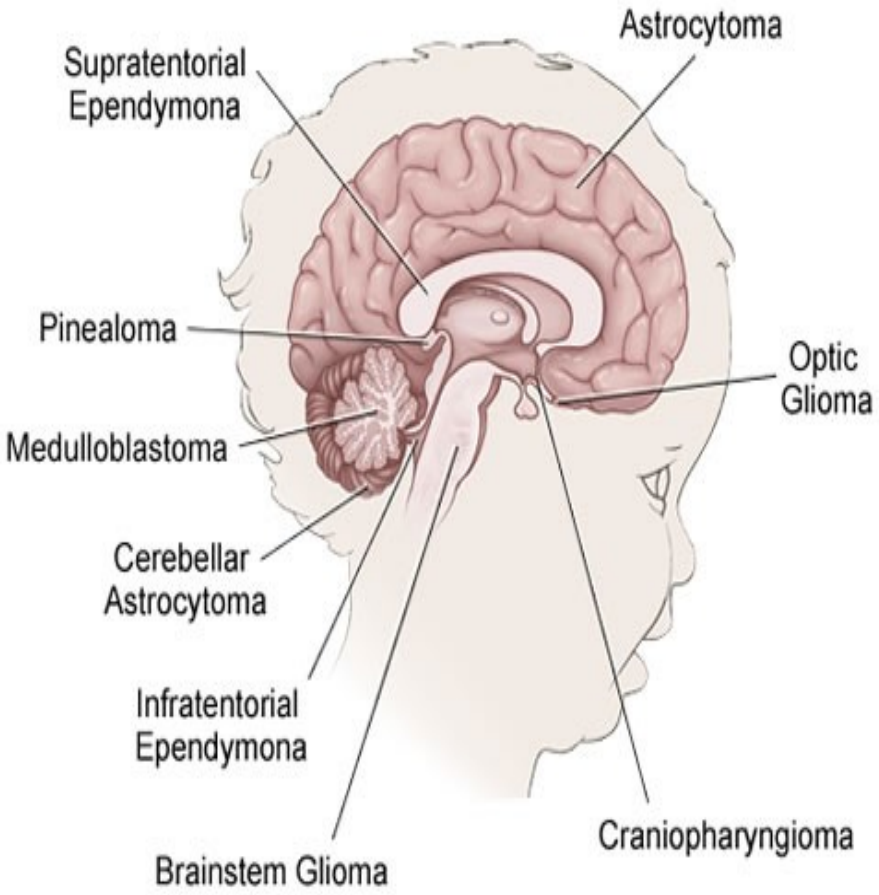
ICCC Classification

- International Classification of Childhood Cancer (ICCC) is based upon primary tumor site.
- The location of the tumor may impact upon the clinical presentation

A. Infratontorial

B. supratontorial

Types of Pediatric Tumors



The most common types of brain tumors in children are gliomas and medulloblastomas

Pediatric Grading

- Grade I and II (low-grade):

✓ The tumor grows slowly

✓ Rarely infiltrates into nearby tissues.

✓ Grade II can infiltrate into nearby tissues

✓ Can be cured by surgery

Pediatric Grading cont.---

- The grade of a tumor refers to the way the cells look under a microscope:

✓ Grade I: The tissue is benign. The cells look nearly like normal brain cells, and they grow slowly.

✓ Grade II: The tissue is malignant. The cells look less like normal cells than do the cells in a Grade I tumor.

✓ Grade III: The malignant tissue has cells that look very different from normal cells. The abnormal cells are actively growing (anaplastic).

✓ Grade IV: The malignant tissue has cells that look most abnormal and tend to grow quickly.

Cont.---

- Grade III and IV (high-grade):
  - The tumor grows quickly
  - Likely to infiltrate into nearby tissue
  - Grade IV tumors usually cannot be cured/removed by surgery

Astrocytoma

- Originate in a particular glia cell, astrocytes
- Most common type of glioma
- There are four primary types:

A. Juvenile pilocytic astrocytoma (Grade I)

- Usually cystic (fluid-filled) and develops in the cerebellum
- Surgical removal is often the only treatment necessary

Cont.---

B. Fibrillary astrocytoma (Grade II)

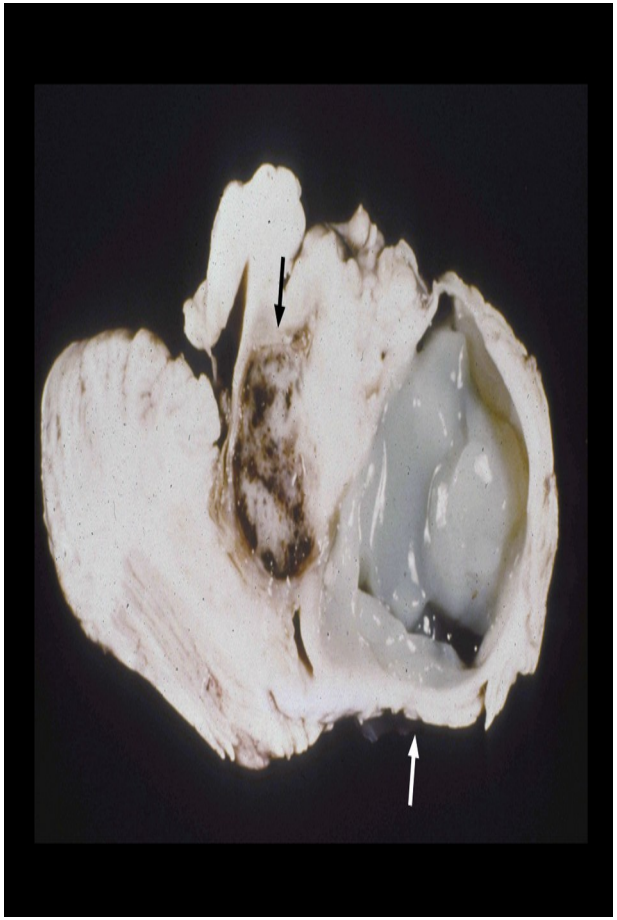
- Infiltrates into the surrounding normal brain tissue
- Difficult to remove by surgery difficult

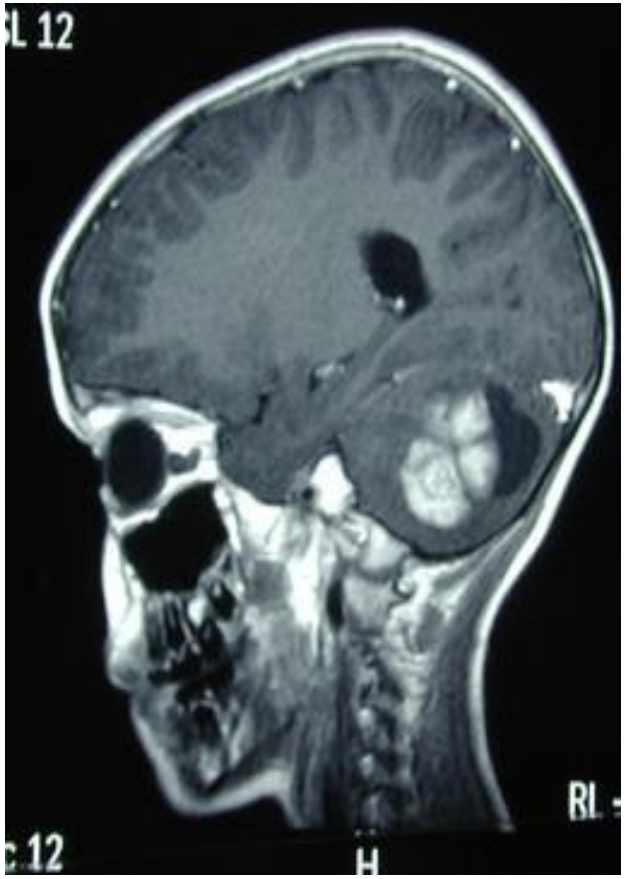
C. Anaplastic astrocytoma (Grade III)

D. Glioblastoma multiforme (Grade IV)

- This is the most malignant type of astrocytoma
- Grows rapidly, increasing pressure in the brain

Juvenile Pilocytic astrocytoma





Glioblastoma Multiforme



Medulloblastoma

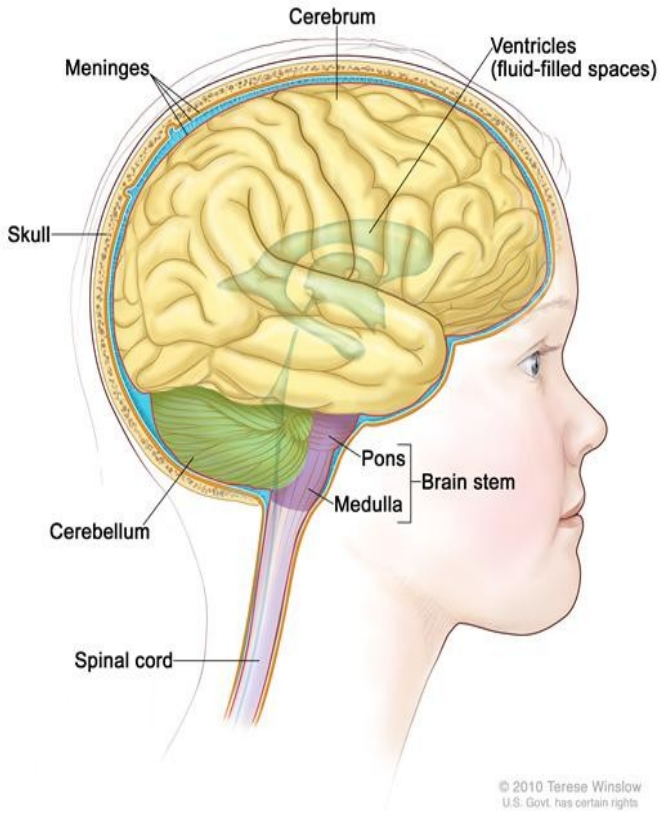
- Accounts for 15% of brain tumors in children
- Form in the cerebellum
- Referred to as a infratentorial primitive neuroectodermal tumor (PNET)
- Can metastasize to the spinal cord
- Highly aggressive





Brainstem Glioma

- Located in the middle of the brainstem
- Majority of the tumors cannot be surgically removed
- Occur in school-aged children
- Symptoms include:
  - Endocrine problems
  - Paralysis of nerves/ muscles of the face
  - Respiratory changes


Cerebrum
Meninges
Ventricles
(fluid-filled spaces)
Skull
Pons
Brain stem
Medulla
Cerebellum
Spinal cord
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Cancers in adults and children: differences

	Adult	Children
Occur	Epithelial or covering tissue	Embryonal origin – mesodermal (nonepithelial) tissues
Classification scheme	topography	morphology
Tumour types predominate	fewer Primitive NeuroectodermalTumours (PNET) (medulloblastoma)	fewer meningiomas(tumours of brain ‘covering’, the meninges)
Astrocytomas/gliomas different histologies	gliomas (44% of all CNS tumours)	juvenile pilocyticastrocytomas(19 %)
Anatomical site commonly below tentorium	more above tentorium	more

Risk factors

- The exact cause of brain tumor is unknown

A. Genetic predisposition

B. Environmental influences

- Occupation studies
  - ✓ electrical workers
  - ✓ White collar professionals
  - ✓ Oil refinery workers
  - ✓ Agriculture workers

Risk factors

- ❖ Radiation
- ✓ Ionizing radiation
- ✓ Electromagnetic radiation
- ✓ radiofrequency radiation
- ❖ Head trauma(meningioma)
- ❖ Diet(alchol, tobacco)
- ❖ Both ionizing radation and genetics are a risk factors but others need further research

Clinical Features (Symptoms and Signs)

- Brain cancers tend to cause two types of clinical features:
  - General features due to generalized pressure on the brain
  - Focal or local features due to pressure or interference by the tumor on parts of the brain or nerves near the tumor.

General Features

- The common general features of cancer in the brain are due to

  pressure and swelling on the brain as a whole
- Headache, the most common
- Nausea,
- Vomiting and
- Papilledema.
- Decrease in level of consciousness
- Hydrocephalus

Focal Features

- Aphasia
- Personality changes
- Sensory defects (smell, hearing)
- Seizures
- Motor abnormalities
- Local twitching or focal fitting

DIAGNOSIS

- History taking
- Physical exam
- Neurological imaging
- ✓ Brain CT scan
- ✓ MRI on brain
- ✓ Angiogram
- ➢ DNA analysis
- ➢ Biopsy
- ➢ CSF

Differential Diagnosis

- Many of the S/Sx of childhood CNS tumors are

  nonspecific and heterogeneous.
- Viral gastroenteritis
- Tension and migraine headaches.
- Brain abscesses,
- Intracranial hemorrhage,
- Non-neoplastic hydrocephalus,
- Aneurysms.
- Tuberculoma

Management

- The choice of treatment depends mainly on the following:

- ✓ The type and grade of brain tumor
- ✓ Its location in the brain
- ✓ Its size
- ✓ Your age and general health

Management

- Treatment of brain tumor is multimodal, including;
  - Chemotherapy
  - Radiotherapy
  - Surgical resection.
  - combination of treatments.

Management cont.--

- ❖ Corticosteroid
  - ✓ Can be used reduce swelling and inflammation
- ❖ Mannitol
  - ✓ May be used to control edema and ICP.
- ❖ Anticonvulsant

Complication of Radiation therapy

- Hair loss
- Brain tissue to swell
- Kills healthy brain tissue
- May harm the pituitary gland
- Skin on the scalp and ears red, dry, and tender.
- Radiation increases the risk of secondary tumors later in life


THANK YOU IN ADVANCE!!