**Neuromuscular disorders ( Floppy infant syndrome)**

* 50% of cases present with hypotonia and weakness and need to be admitted for further work-up. We need both pathological and anatomical diagnosis.
* Sings of floppy infant syndrome (characteristically seen):
1. Hypotonia
2. Limbs are dangling: when lying down hips are abducting and positioned ventrally.
3. Persistent head lag after 4 months.

***Causes of floppy infant syndrome:***

**1.Supranuclear lesions:** arise centrally above the cranial nerves.

Features:

1. Hypotonia that gradually changes to hypertonia .
2. Increased reflexes: brisk and easily obtainable.
3. Persistent primitive reflex beyond 4 months e.g. grasp reflex.

Causes of Supranuclear lesions:

1. Hypoxia: it is the commonest cause e.g. cerebral palsy.

-When suspecting it ask the mother 4 questions:

1.Method of delivery (c-section or vaginal or assisted vaginal).

2.Did the neonate cry spontaneously after birth?

3.Did he/she breath spontaneously or required ambu-bag?

4.Was he or she able to take the nipple or bottle within 24 hours?

* If the previous history was positive: ask about NICU stay, the requirement for intubation or ventilation and APGAR score.
* If it was negative then we exclude hypoxia as a cause.
* We need to do either CT or MRI that will show peri-ventricular hypoxic ischemic changes that are known as peri-ventricular leukomalacia.

B) Congenital infections:

* Ask about any neonatal febrile illnesses and vaccinations.
* We need to do two investigations:

1.IgM serology and look for

2. imaging studies looking for peri-venticular calcification.

C) Kernicterus:

* Ask about yellow discoloration and if the neonate needed any phototherapy.
* Features:
* Bilirubin is deposited in the basal ganglia, cerebellum, and 8th cranial nerve.
* Cryostasis dyskinetic cerebral palsy.
* Dystonic postural feature.

 D)Metabolic causes :

 *1.Hurler disease:*

* mucopolysacchiride storage disease , neonate is born normally then detorirate and develop hepatosplenomegaly, umbilical hernia, and contractures, coarse features.
* It is a treatable and a preventable disease.
* Treated by enzyme replacement therapy or bone marrow transplant.
* Prevented by routine genetic counseling and pre-implantation genetic studies.

*2.Pompe’s disease:* it is a glycogen storage disease that is treated by enzyme replacement therapy.

*3.*Phenylketonuria: they have a blond hair.

4.Maple syrup urine disease: they have red hair*.*

 5.Niemann-pick disease: needs to be investigated.

Features:

-organomegaly- hepato-splenomegaly.

-bone marrow aspirate will show foam cells.

6.Tay-Sachs disease:

Features:

-no orgnanomegaly

-bone marrow aspirate will show finger-like cells.

*Note*:

-metabolic organic acidemia are 40 times more common is Saudi Arabia than in Europe.

-Red cherry spot is seen on fundoscopy in lipid storage diseases.

E) Chromosomal abnormalities:

1. Down syndrome: Characteristic facial features.
2. Cri du chat: their cry resembles that of a cat.
3. Grey matter formation syndrome.
4. Prader willi syndrome.

**2.Causes outside the CNS:**

1. Congenital hypo-thyrodism: the commonest.
2. Rickets disease: frontal bossing, enlarged skull. They only have muscular problems and is treated with vitamin D.
3. Malnutrition: either due to poor intake or mal-absorption as in Celiac disease or Cystic fibrosis.

**3.spinal cord causes:**

1. congenital infra-medullary lesions : you have to ask if there was any traumatic delivery injuring the spinal cord as in breech delivery or any difficult delivery.

**4.lower motor unit causes:** defect in the nerve, muscle, or neuromuscular junction.

A. *Anterior horn cell disease:* tongue fasciculation is diagnostic for anterior horn cell disease; it can be acute or chronic.

1. Acute anterior horn cell disease:

e.g. Poliomyelitis which causes asymmetrical weakness, facial palsy after a history of sore throat.

1. Chronic anterior horn cell disease:

e.g. Werdnig-Hoffmann disease also known as spinal muscular atrophy type 1, these patients never sit and die within 2 years, they need ventilation. It was previously diagnosed by muscle biopsy. Now it is diagnosed by a blood test to check for DNA mutation and this is 95% positive, and look for maternal carrier mutations. It can be prevented by pre-implantation genetic studies.

B. *Peripheral nerve disease:*

 a. Acute peripheral neuropathy:

 1. GBS: acute peripheral neuropathy occurs 3 weeks after an URTI. They might present with drop foot.

 2. Diphtheria.

 b. Chronic peripheral neuropathy: e.g. inherited peripheral neuropathy.

C. *Neuromuscular disorders:*

1. Myasthenia Gravis: present with ptosis and opthalmoplegia, treated by acetylcholine esterase inhibitors.
2. Botulism: acquired from natural honey that is

contaminated by Cl.botulism toxin.

D. *Muscle disorders:*

 a. Congenital myopathies: structural disease of the muscle.

 b. Acquired myopathies: seen in metabolic disorders as Pompe’s disease

Note: hypertrophic cardiomyopathy + acquired myopathies are seen in Pompe’s disease.

Congenital myopathies:

1. Muscular dystrophy:
* Primary genetically determined progressive degenerative disease.
* Muscle is replaced by fat and connective tissue therefore pseudo-hypertrophy.
* Can be AR or AD or X-linked.
* Can also be classified according to age of onset:

-Younger than 5 years

-Older than 5 years.

* Classified according to rate of progression (loss of ambulation) younger than 13 years or older than 13 years
* Also classified according to death younger than 20 years or older years.
* Might develop HF or respiratory failure.
* Screen the family, might be normal until 10 years the child cant close his eyes.

**Examples of muscular dystrophies:**

1. Duchene muscular dystrophy:
* X-linked recessive disease.
* Age of onset less than 5 years.
* Loss of ambulation by 13 years.
* Death less than 20 years.
* Complete absence of dystrophin.
* Gowers sign: medical sign describing a patient that has difficulty in standing up from squatting position and has to use his hands to be able to stand. It indicates proximal muscle weakness especially in the lower limb.



* They have pseudo-hypertrophy.

2. Duchene like muscular dystrophy: it’s an autosomal recessive disease; girls are more commonly affected than boys. It is milder than Duchene.

3. Becker:

* Milder and more common than Duchene.
* Caused by partial deficiency of the dystrophin protein, which is needed to prevent muscle degeneration.

4.Fascio-scapular humeral muscular dystrophy:

* It is an AD disease.
* It affects the facial and scapular muscles.
* A progressive skeletal muscle weakness usually develops in other areas of the body as well.
* Non-muscular symptoms frequently associated with FSHD include subclinical sensorineural hearing loss and retinal telengectasia.