NEONATAL JAUNDICE CLUSTER

NEONATAL JAUNDICE

- **physiological:**
  - Jaundice that appears after 48 hours **and usually disappears within 2 weeks if term infant, 3 weeks if the** preterm infant .because of liver immaturity.

Pathological:

Any jaundice within the first 24 hours of birth

Any conjugated hyper bilirubinemia

Anything more than 15 mg/dL (255 mmol/L) total bilirubin

Jaundice is increasing by more than 5mg/dL per day (85 mmol/L)

* **Prolonged**

Any jaundice persisting more than 2 weeks in term infants, and 3 weeks in the preterm infant

A most common cause is breast milk jaundice, followed by the thyroid, followed by conjugated hyper bilirubinemia

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KRAMER SCALE

Where have you noticed the yellowing

Zone1:

Jaundice is just at the head and neck of the baby

Bilirubin approximately 50 mmol

Zone II:

The lower part of the neck and upper part of the chest

100 mmol

Zone III:

Abdomen up to knees

150 mmol

Zone IV:

Arms and below knees excluding palms and soles, 200 mmol

ZoneV

Palms and soles

More than 250 mmol

- **DDX:**
- **1)BREAST MILK JAUNDICE:**
- Suspend breast milk for 24-48 hourse, to break down level of bilirubin.
- Cause: not feeding enough of breast milk, their body is being dehydrated, leading to haemolysis of the RBCs

2)Galactosemia= the problem is in the lactose of the milk.It should break down to glucose and galactose by the body. If the Body does not do it we call it Galactosemia. That mean the body does not have the Enzyme to breakdown galactose

- **3) ABO Incompatibility . (**in first 24 hours after delivery)The blood group and RH between mother and baby are different and the special **test COOMB TEST IS POSITIVE**
- **4) Conjugated hyper bilirubinemia: the** color of the stools is a bit pale, yellowing in palms and soles total bilirubin was 250 mmol, unconjugated bilirubin was 6 mmol, conjugated was 244 mmol (predominantly conjugated hyperbilirubinemia), direct Coomb's test negative
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- **Breastfeeding jaundice**
- - some factors in the breastmilk prevents bilirubin from being conjugated; if physiologic jaundice does not resolve after 10 days or maximum of 2 weeks, it is most probably due to this
- **Biliary atresia**
- **Neonatal Hepatitis**

- **APPROACH**
- **History:**
- When did the jaundice start? What day is the baby on? Where did it start first? Is it progressing?
- **o Well Baby questions:**
- **a.** Mental state of the baby: has he been really irritable, or has been hard to wake up?
- **b**. Eating/Drinking: has he been eating and drinking fine? Was there any change in the frequency of feeding?
- **c.** Wet nappies: Has he not been producing wet nappies for the last 8 hours? (very dehydrated), change in the number of wet nappies?

Rule out sepsis:

Have you noticed any fever?

Meningitis: have you noticed any rash, vomiting?

Pneumonia: have you noticed any increased work breathing? Do you think he breathing harder that usual? fever,? Cough?

Gastroenteritis: have you noticed any vomiting, diarrhea or blood in the stools?

UTI: any pinkish discoloration or blood in the nappies? Any overly smelly nappies?

Clinically differentiate unconjugated and conjugated hyper bilirubinemia

What is the color of the stools? What is the color of the urine?

ABO and Rh incompatibility: What are the blood group of the baby and the blood group of the mother? Did you have a previously threatened miscarriage or a previous pregnancy? (if the mother is Rh-negative, then the baby is at risk if he is positive).

Birth trauma: Delivery: was he a term baby? What is the mode of delivery? (any instrumentation/forceps? What is the reason for the mode of delivery? Did he require resuscitation, or did he cry immediately after birth? Any birth trauma or injuries to the baby?

Breastfeeding jaundice: are you breastfeeding him? Have you noticed any issues with sucking? Any issues with attachment? Have you been counselled by lactation nurses?

RBC dyscrasias: Any family history of any blood disorders?

Neonatal hepatitis: Has he been in contact with anyone with hepatitis? Anyone sick at home

- **Galactosemia:** Any family history of cataracts? What was the result of the heel-prick test?

BINDSMA questions

- a. Birth and antenatal: what was your age when you had your child? Did you have any infections or any medical condition during pregnancy? Did you take any drugs or medication, or had any trauma? (these are important in heart diseases in newborn, a baby with a vision problem, baby with a hearing problem, the child is mentally retarded, the child with developmental issues, a child with slow school performance)

  Postpartum: did he spend any time in a special nursery? Was the heel-prick test done?

- **b.** Immunizations: Are the immunizations up to date? (Ask it is relevant in cases of fever, rash, AGE, etc)
  - **c. Social history**
  - 1. Does the child have any siblings? Do they have the same symptoms? (fever, rash, diarrhea, vomiting) Any family member with the same problem?
  - 2. Do you have good support? Is there any other in your home that can look after your children? Do you have any other things that you have to look after? **d. Medications e. Allergies**

- **Physical Exam o**
- General appearance: PICCLED**(Jaundice head to toe)**, dysmorphic features, growth charts
- V/S
- o ENT: look for bilateral cataracts (galactosemia)
- o Office tests: **UDT - will tell if conjugated or unconjugated; • if positi**ve **bilirubin, but negative urobilinogen = CONJUGATED hyperbilirubinemia**
- **• If negative bilirubin, but positive urobili**nogen = **UNCONJUGATED hyperbilirubinemia**

- **INVESTIGATION:**

- FBE, UEC, LFT, CRP/ESR, TFT, direct and indirect bilirubin, Direct Coomb's test (measures the level of antibodies of the mother present in the baby's blood), peripheral blood film, blood group of mother and baby • ?If you think it is unconjugated bilirubin, check for haemolysis: reticulocytes, LDH, haptoglobin, unconjugated bilirubin, peripheral blood film (spherocytes for HS)

- o Urine: urine culture, urine for reducing substances (galactosemia)
- o Imaging: ultrasound of the abdomen

- **Conjugated hyper bilirubinemia**

- You are an HMO in Paediatrics and David a 3-day old boy was brought to you by his mom because of yellowish discoloration since this morning.
- **TASKS**
- 1. Focused history
- 2. PE from examiner
- 3. Arrange Investigations
- 4. Diagnosis and Differential Diagnosis to the mother

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- **History:**
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- Diagnosis and Management
- Most likely your child has a condition called **conjugatehyperbilirubinemia**, where a certain type of pigment has gone up in the baby's blood. There are multiple causes of it. Let me draw a diagram for you.
- This is the liver, these are the ducts or tubes that drain bile from the liver. Bile is the substance that is required to digest the fats. There are a couple of possibilities in my mind, one is neonatal hepatitis which is an infection of the liver, second is biliary atresia where there is a malformation of the tubes carrying the bile from the liver, three is a choledochal cyst, where there is an obstruction of the biliary tubes thereby leading of retention of the bile, the last is a genetic problem called galactosemia, where you have a deposition of galactose in the liver. That is why I am going to admit him and refer him to a paediatric registrar for further evaluation.
- ****phototherapy does not work for conjugated hyperbilirubinemia**

- **ABO Incompatibility**

- You are asked to see an infant Jessica who was born 24 hours ago with jaundice. She is the first child of a mother whose pregnancy was normal. Delivery was at term by midwife and was uneventful. Her weight at birth was 3700 grams. Jaundice was noticed soon after birth. She has been sucking well at the breast. On examination, she has clinical jaundice, otherwise well and active. Mom wants to go home as soon as possible because she's got a cat to look after.
- **TASKS**
- 1. Advise the mother about the diagnosis
- 2. Explain further management to the mother

- **Positive points in the investigations:** mother O+, baby A+, Coomb's test strongly positive, unconjugated is 244 mmol/L, conjugated is 6 mmol/L

- Most likely Jessica has a condition called **ABO incompatibility**. The red blood cells in our body, they've got a special protein on their surface called antigens, and there are certain proteins in the blood called antibodies which help fight against infections. Your blood group is O positive.
- ▪ ✍In people with O blood group, they have no antigens in the surface of their RBCs, but they have anti-A and anti-B antibodies which are the proteins that fight against infection or foreign red blood cells. The baby has A positive blood. So, he has the A antigen and anti-B antibodies. Sometimes during the 3rd stage of labour, or during delivery, there is a silent exchange of blood between the mother and the baby. Since you've got anti-A antibodies which reacted to the baby's A antigen, that lead to the breakdown of the RBCs in the baby's blood, leading to the formation of pigment, making the baby jaundiced.

- It is a serious condition because if it is left untreated, this pigment can damage the baby's brain, leading to long-term neurological deficits, hearing impairment, learning disabilities, and mental retardation, or what we call kernicterus.
- ▪ ✍That is why she needs to be admitted to the hospital. We will do a treatment called phototherapy where she will be placed under a special type of lights which will help in excreting this pigment from the body through her urine and faeces. There are some side effects of this treatment such as retinal and genital damage, that is why we are going to cover the baby's eyes and the genitals. She can also have dehydration, so we will make sure that she is only under the lights when she is sleeping and not feeding. She can also have green-coloured stools, however, this is expected, because the excessive pigment will be excreted in the faeces. We will continuously monitor her pigment levels or bilirubin levels.

- If the bilirubin level keeps going up despite the treatment, we will consider another treatment modality called exchange transfusion, where we will try to exchange the baby's blood with fresh blood.
- ▪ ✍Address the mother's concern about the cat: do you have any relatives or neighbours who can come and look after the cat? If there's none, I can call the social worker to arrange a temporary kennel service for the cat.

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- **Hereditary Spherocytosis**

- You are a GP and a father brings his 4-year-old boy to see you for the blood test that you did yesterday because he was looking jaundiced, after a viral URTI. The blood results show Hgb 160 g/L, increased reticulocyte count, spherocytes on the PBS.
- **TASKS**
- 1. Focused history
- 2. PE from examiner
- 3. Investigations
- 4. Diagnosis and Managemen

- **OSMOTIC FRAGILITY TEST - the first line**
- **FLOW CYTOMETRY - staining with 5-eosin Maleimide. Confirmatory test.**
- **Abdominal Ultrasound - check for gallstones - high risk to have pigmented gallstones**
- **For history and PE: same as before**

- The surface protein called beta-ankyrin is absent which maintains the normal biconcave or disc shape of RBCs. Since that skeletal protein is absent because of a genetic condition, the RBCs become spherical. The blood vessels in the spleen are very narrow. Normally the biconcave shaped RBCs can easily pass through these. However, the spherical RBCs cannot, and result to haemolysis or breaking down.

- ▪ ✍I will refer you to a hematologist who will monitor his condition. He might start the child on **FOLIC ACID** 5mg once a day (The bone marrow is under stressed to produce more RBCs (fear of becoming pancytopenic). We will monitor his hemoglobin levels regularly. He might be given a **blood transfusion** if his hemoglobin levels fall below 70

- After 6 years of age, the hematologist might suggest removal of the spleen, but you have to be aware of the possible complications of not having a spleen (post-splenectomy overwhelming sepsis) that's why we are going to give him the antibiotics he needs to take and the vaccinations needed to protect him from these bugs. I can arrange another consultation with you to discuss this further.

- Avoid contact sports as they are at high risk for splenic rupture

- Review materials

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- **Galactosemia**

- A mother brings a 2 weeks old baby boy who is having jaundice since he was 3 days old, to your GP clinic. His birth weight was 3.5kg, mother's blood group and baby's blood group are both O+.
- **TASKS**
- 1. Focused history
- 2. PE from examiner
- 3. Investigations
- 4. Diagnosis and Management

- **Positive points in the PE/Investigations: cataracts, reducing substances in UDT, Total 178 mmol, conjugated 110 mmol, unconjugated 68 mmol**
- **For history and PE: same as first case**

- Your milk has got a substance called **lactose**, which is broken down to glucose and galactose by your baby's body. He has a condition called galactosemia, in which the enzyme required to breakdown galactose is absent, leading to deposition of galactose throughout the body, including the brain, eyes causing cataract, liver causing jaundice, pancreas causing diabetes, ovaries or testes causing gonadal failure. That is why I am going to refer him to the paediatric registrar who will manage him from now on. He will most likely need lactose-free formula milk and he will be managed by a paediatric ophthalmologist for his cataracts.

- **Breast milk jaundice**

- Baby Helen was brought to see you in your GP clinic because mom is concerned about continuing jaundice. She is now 2 weeks old and was born at term by normal vaginal delivery. Her birth weight was 3700 grams. She became jaundiced on day 3. she was treated with phototherapy for 2 days. Since discharge from the hospital on day 8 of age, jaundice has persisted. Baby is feeding well from the breast and is active and clinically normal apart from jaundice. Her current weight is 3900 grams.
- **TASKS**
- 1. Focused history
- 2. PE from examiner
- 3. Investigations
- 4. Diagnosis and Management

- Most likely your baby is having **breastmilk jaundice**. There are some factors within the breastmilk that prevents conjugation of the bilirubin.
- ▪ ✍There is nothing wrong with your breastmilk, and it is a benign condition and doesn't require treatment, and you can continue breastfeeding. Breastmilk jaundice can persist for as long as 3 months of age, but the baby will remain active and gain weight

- The diagnosis can be confirmed by suspending breastfeeding for 24 to 48 hours, which results in fall of bilirubin levels, after which the breastfeeding can be continued. During the time of temporary suspension, please express your breastmilk in order to maintain lactation.
- ▪ ✍If the feeding has gone down, or the baby is overly sleepy, not gaining weight, jaundice becomes worse, wet nappies has gone down, please report back immediately.

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