Practical Aspect of Vaccines
Clinical Cases and Quiz

ASVAC 2019

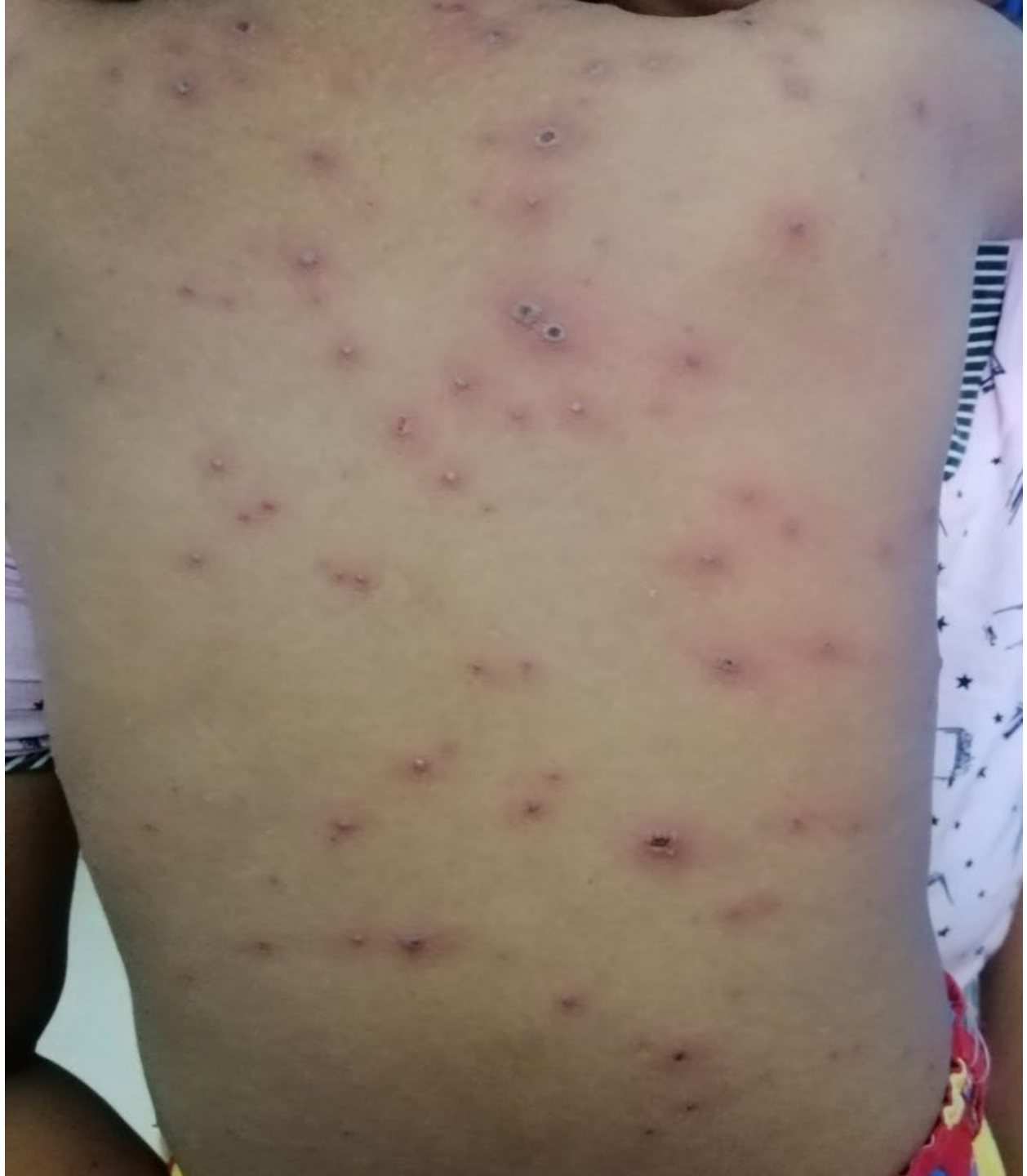
Dr. Nyein Aye Wint

Yangon Children Hospital

Case 1

- A 3 years old girl with nephrotic syndrome who is being given prednisolone – 60 mg/m2 for 3 weeks, admitted to Yangon Children Hospital presenting with appearance of vesicular lesions on both hands, trunk and face for 3 days. History of fever for 2 days before the appearance of vesicles present.

- Crops of vesicular lesions surrounded by red areola became pustular within 3 days and finally crusted.
- associated with pruritus.
- She got pentavalent vaccine and pneumococcal vaccine for only one time.



What is the diagnosis?

Chicken
Pox
infection

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What is the management of this skin lesion ?

1. Only Conservative treatment
2. VZIG + PO acyclovir
3. Only VZIG
4. Only IV Acylovir
5. VZIG + IV acyclovir

People at risk for severe varicella include:

- Immunocompromised people without evidence of immunity to varicella, such as:
  - People with leukemia or lymphoma
  - People on medications that suppress the immune system, such as high-dose systemic steroids or chemotherapeutic agents
  - People with cellular immune-deficiencies or other immune system problems
- Newborns whose mothers have varicella from 5 days before to 2 days after delivery

People at risk for severe varicella include (contd)

- Premature babies exposed to varicella or herpes zoster, specifically:
  - Hospitalized premature infants born at ≥28 weeks of gestation whose mothers do not have evidence of immunity
  - Hospitalized premature infants born at <28 weeks of gestation or who weigh ≤1,000 grams at birth regardless of their mothers' varicella immunity status
- Pregnant women without evidence of immunity to varicella

Management of Severe Varicella

- *Varicella-Zoster Immune Globulin* is recommended for -
- people who cannot receive varicella vaccine and

(1) who lack evidence of immunity to varicella,

(2) whose exposure is likely to result in infection, and

(3) are at high risk for severe varicella.

Management of Severe Varicella (Contd)

Intravenous acyclovir therapy is recommended –

- for severe disease (e.g., disseminated VZV such as pneumonia, encephalitis, thrombocytopenia, severe hepatitis) and

- for varicella in immunocompromised patients (including patients being treated with high-dose corticosteroid therapy for >14 days).

https://www.cdc.gov/chickenpox/hcp/index.html

Case 2

A 28 year old woman in labour was admitted to Central Women Hospital and she was found to have the following serological results from her antenatal booking visit.

- HBsAg positive,
- HBeAg positive,
- Anti-HBe negative
- IgG anti-HBc positive.
- (HBsAg = hepatitis B surface antigen; HBeAg = hepatitis B ‘e’ antigen; HBc = hepatitis B core antigen)

Question 2

Which of the following is the MOST appropriate for mother's hepatitis B status and further plan for her baby?

1.These results suggest complete recovery from past infection with hepatitis B; the mother is not a carrier and no further action is required.

2. These results suggest previous immunization with hepatitis B vaccine; the mother is not a carrier and no further action is required .

3. The mother is not a carrier, but is at risk of hepatitis B herself; she and her baby should be immunized

4.The mother is a carrier of hepatitis B; hepatitis B vaccine should be administered to the baby within 48 hours of delivery and the course of immunization completed.

5.The mother is a carrier of hepatitis B; hepatitis B immune globulin (HBIG) and vaccine should both be administered to the baby within 12 hours of delivery, followed by completion of the course of immunization.

Interpretation of Hepatitis B Serology Test Results

HBc = Hepatitis B core antigen
HBeAg = Hepatitis B e antigen
HBsAg = Hepatitis B surface antigen

HBsAg	HBV DNA	Antibody HBcAb (IgM)	Antibody HBcAb (IgG)	HbeAg	Antibody HBeAb	Antibody HBsAb	Interpretation
–	–	–	–	–	–	–	Susceptible to HBV infection
✓	✓	✓	✓	✓	–	–	Acute HBV
✓	✓	–	✓	+/-	+/-	–	Chronic HBV (> 6 months)
–	–	–	✓	–	–	✓	Immune to HBV (past infection)
–	–	–	–	–	–	✓	Immune to HBV (vaccinated)

Figure 6 Interpretation Hepatitis B Serology Testing Results
Source: Mast EE, Weinbaum CM, Fiore AE, et al; Advisory Committee on Immunization Practices (ACIP) Centers for Disease Control and Prevention (CDC). A comprehensive immunization strategy to elimina
of hepatitis B virus infection in the United States: recommendations of the Advisory Committee on Immunization Practices (ACIP) Part II: immunization of adults. MMWR Recomm Rep. 2006;55(RR-16):1-3

Modified from https://cdp.bhcvw.edu/pdf/co-occurring-condition/hepb-coinfection/core-concept/all

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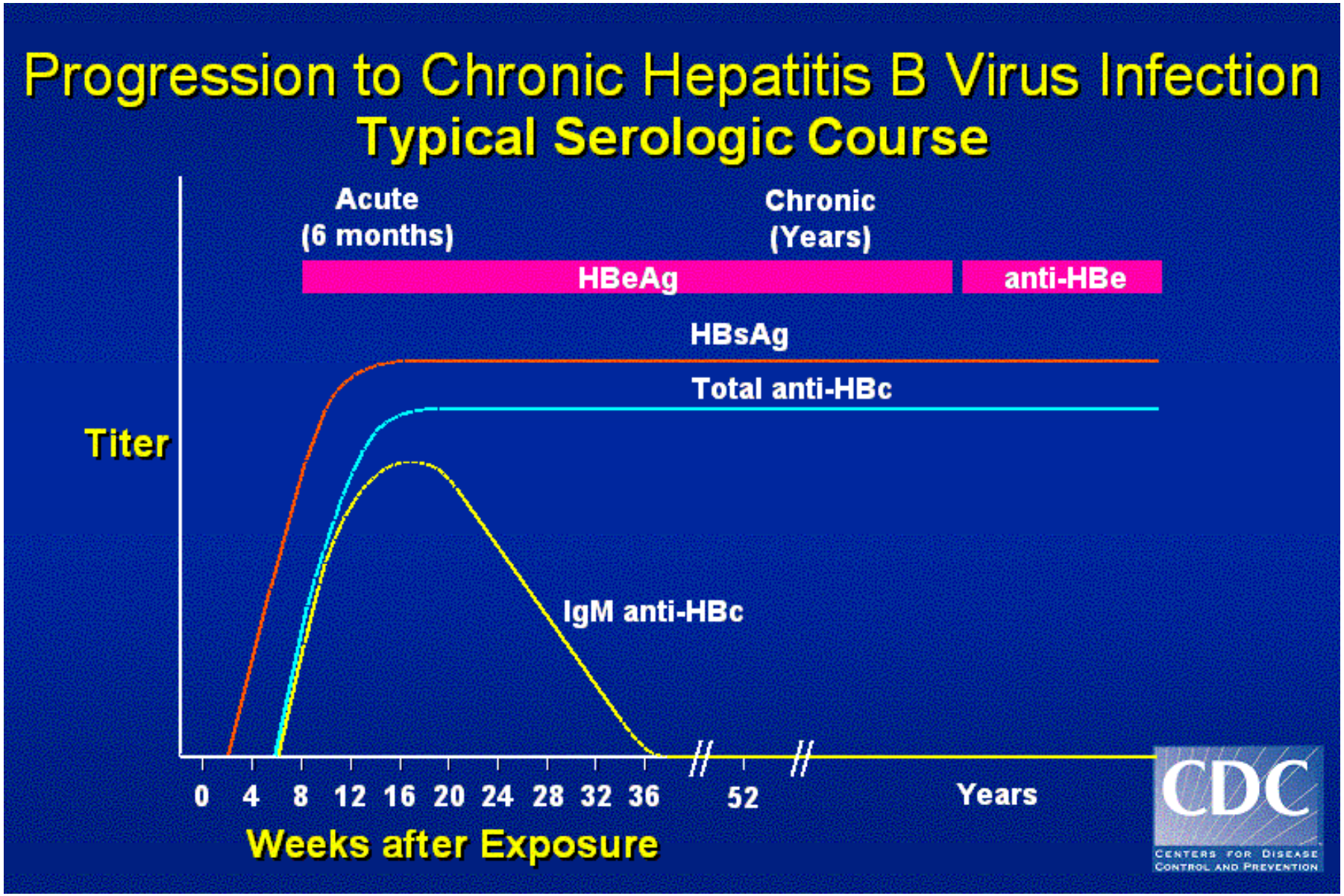


- Mothers who have detectable ‘e’ antigen have high rates of active viral replication and are at particularly high risk (>90%) of mother to child transmission
- their infants should receive additional protection within 12 hours of delivery with the administration of anti-hepatitis B immune globulin (HBIG) i.e. combined active and passive immunization.
- HBIG and vaccine should be administered in separate limbs.
- Infants of HBsAg positive mothers who have been immunized at birth should complete a course of immunization, with further doses of vaccine given at 1, 2 and 12 months (or less satisfactorily at 2 and 6 months).

https://www.cdc.gov/mmwr/volumes/67/rr/rr6701a1.htm

Prevention of Hepatitis B Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices

Recommendations and Reports / January 12, 2018 / 67(1);1–31

Case 3

A 2 year old boy presenting with

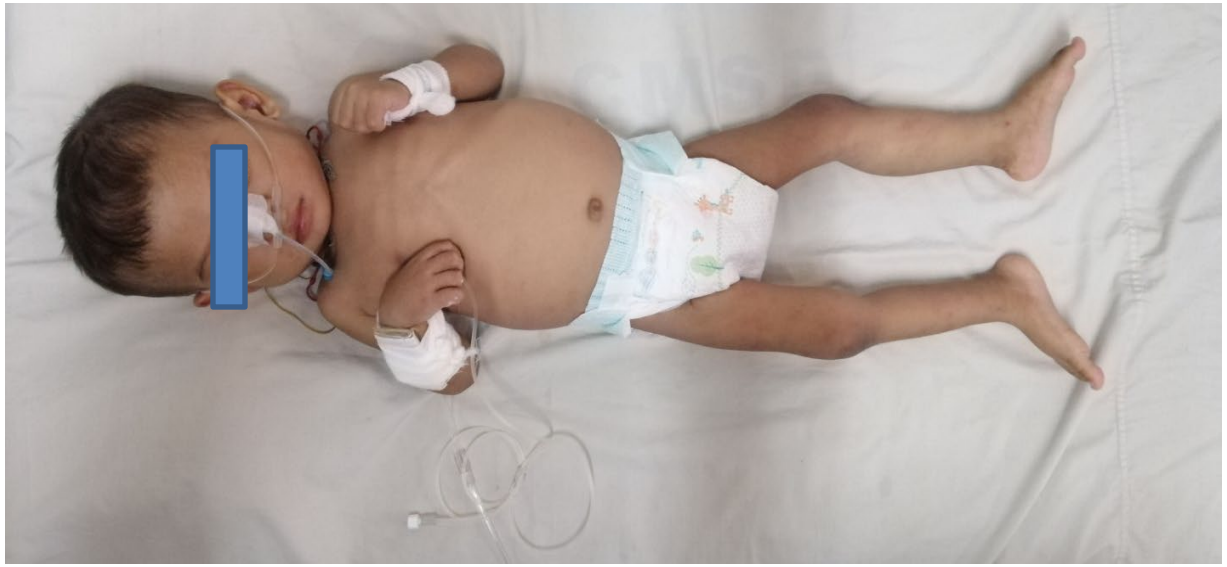
- Fever with cough (off & on) for 1 month
- Bilateral cervical lymph-node enlargement for 1 year

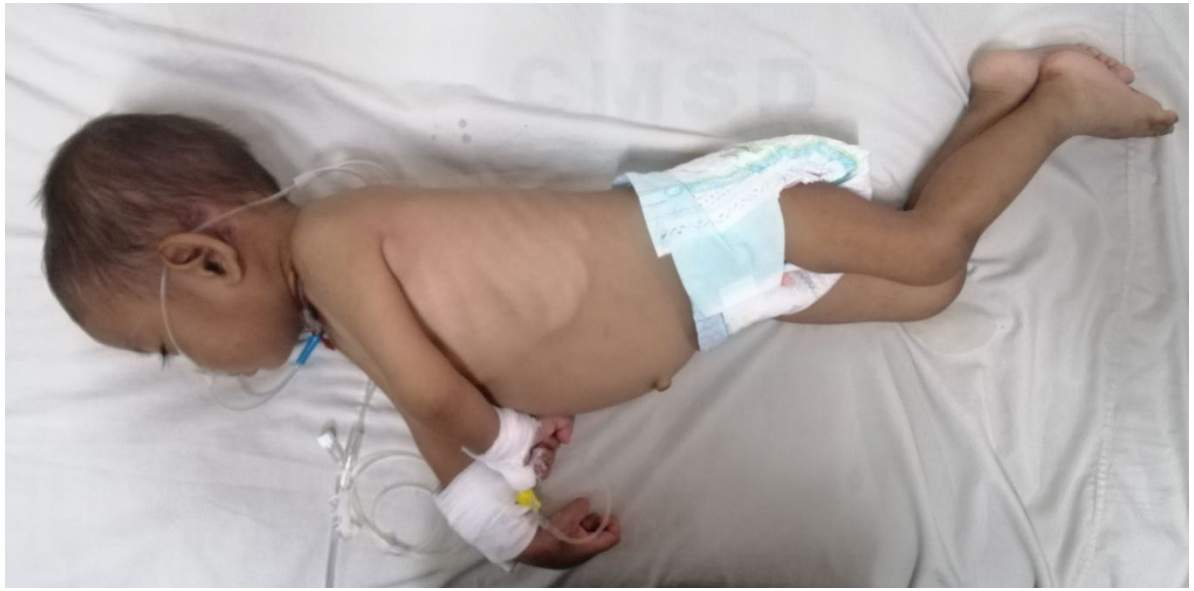
- Immunization- said to be complete including BCG vaccination

On Physical Examination,

- GCS- 10/15, AF- tense & full, pupils- 3mm equal, Light reflex(+)
- BCG scar (+)
- Bilateral cervical lymphadenopathy present.
- Left sided ear discharge present.
- Motor examination reveals all 4 limbs are spastic, exaggerated deep tendon reflexes and bilateral extensor plantar response present.

What are the differential diagnosis?





- He has strong TB contact in uncle whose sputum is AFB positive (? MDR-TB) and currently taking anti-TB on 2nd month.
- Father is 45 years old manual worker Mother is 38 years old who are healthy. He has 9 month old younger sister.

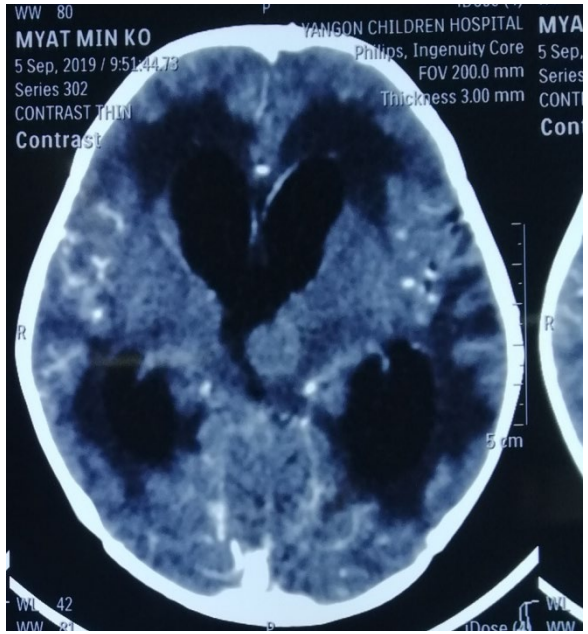
- Investigations

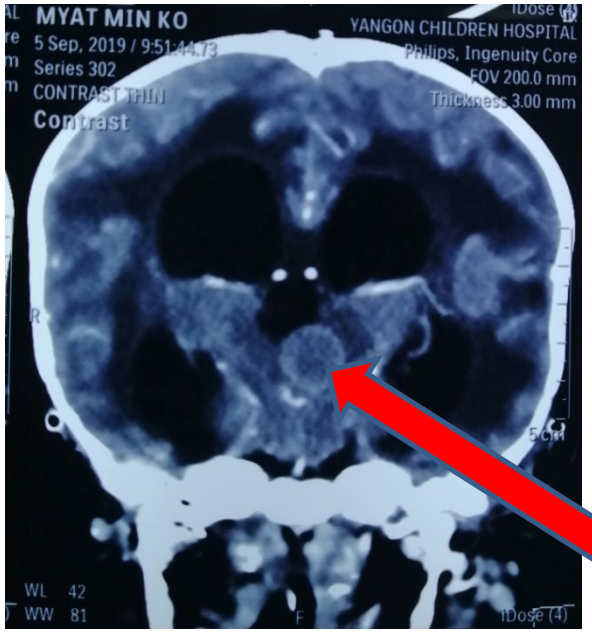
  - HIV Ab- non reactive

  - CXR- bilateral hilar enlargement, bilateral upper lobes consolidation

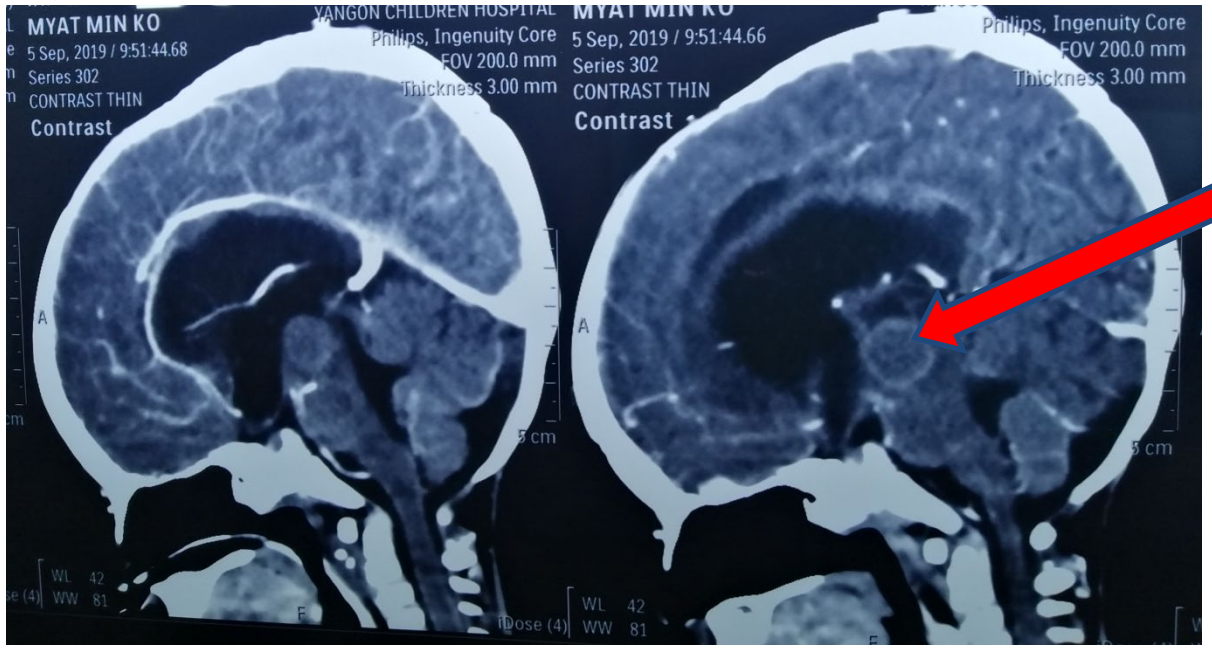
  - Gene X-pert for TB- Mycobacterium Tuberculosis detected

  - CT (Head)-was done.





What abnormalities in CT ?



Tuberculoma at left thalamus

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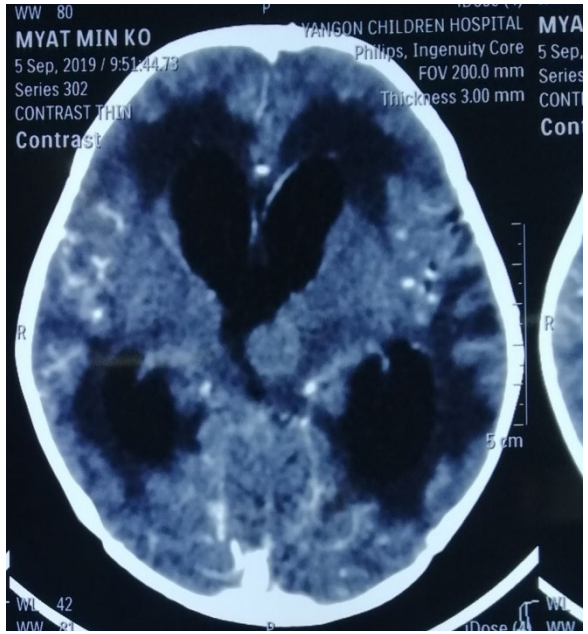

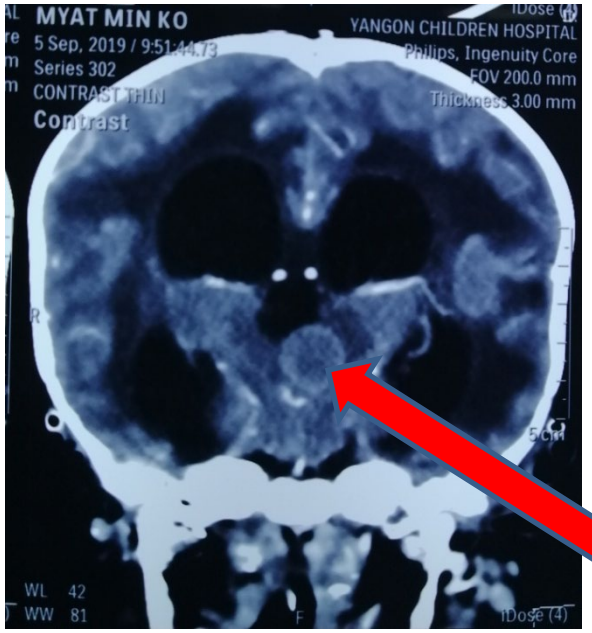

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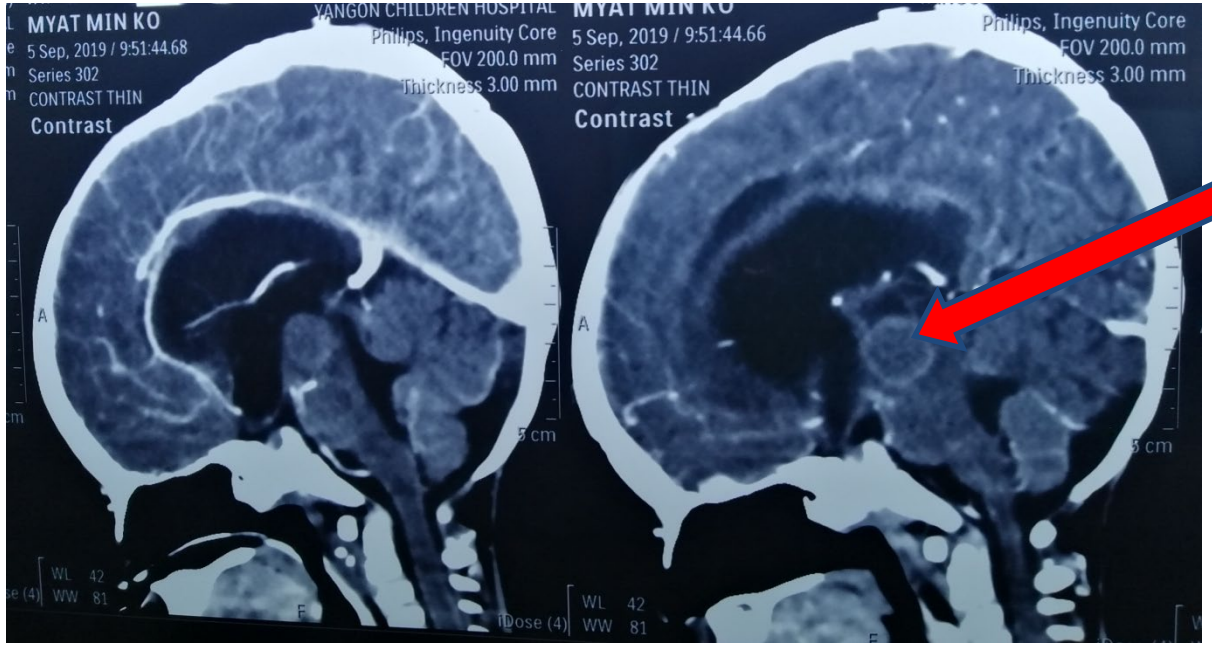

Tuberculoma
at left thalamus

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Following is/are correct?

1) Contact tracing should be conducted for all household and close contacts.
2) Gastric aspirate and CSF should be obtained for culture and drug susceptibility testing (DST).
3) BCG vaccination is effective in preventing drug-resistant TB.
4) This child does not need to be isolated.
5) Evaluation of TB should be done to his younger sister and Isoniazid preventive therapy should be commenced only when it was found to have no active TB.

- Clinical evaluation of household and close contacts for active TB should be done on the basis of their risk for having or developing active TB or for the potential consequences of the disease if it develops. Priority should be given to contacts who are:
- children with symptoms suggestive of TB,
- children <5 years of age,
- children with known or suspected immuno-compromised conditions (especially those living with HIV), and
- child contacts of index cases with MDR-TB or XDR-TB (proven or suspected)

- Drug-resistant TB should be suspected when:

  –there is contact with known DR-TB;

  –there is contact with suspected DR-TB, i.e. source case is a treatment failure or a retreatment case or recently died from TB;

  –a child with TB is not responding to first-line therapy despite adherence;

  –a child previously treated for TB presents with recurrence of disease.
- When DR-TB is suspected, every effort should be made to confirm the diagnosis by obtaining specimens for culture and drug susceptibility testing (DST).

- BCG vaccine has a documented protective effect against meningitis and disseminated TB in children.
- It does not prevent primary infection and, more importantly, does not prevent reactivation of latent pulmonary infection, the principal source of bacillary spread in the community.
- The impact of BCG vaccination on transmission of Mtb is therefore limited.
- All children with cavitary or sputum smear-positive TB disease should be isolated.

References:

- Recommendations for investigating contacts of persons with infectious tuberculosis in low- and middle-income countries. Geneva: World Health Organization; 2012. (WHO/HTM/TB/2012.9) [PubMed]
- Revised BCG vaccination guidelines for infants at risk for HIV infection. Weekly Epidemiological Record. 2007;82:193–196. [PubMed]

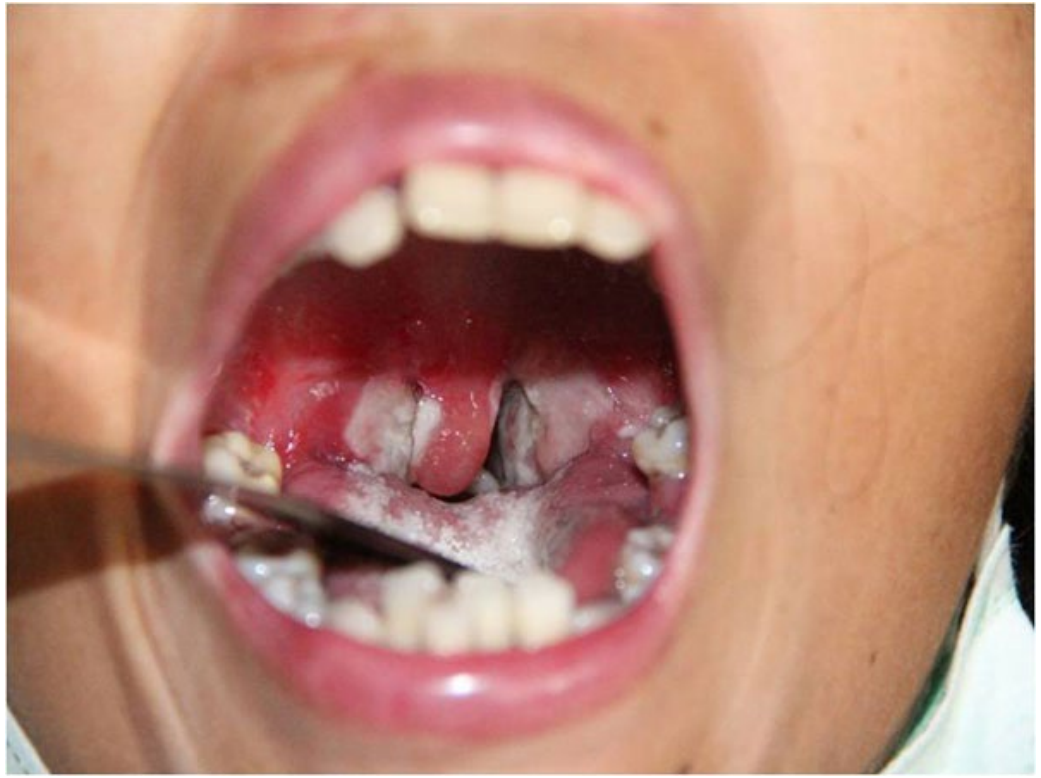
https://www.ncbi.nlm.nih.gov/books/NBK214436

https://www.who.int/biologicals/areas/vaccines/bcg/en

Case 4

- A 12 years old boy was admitted to Yangon Children Hospital presenting with
- fever and cough for 4 days and noisy breathing for 2 days duration.
- There was no history of foreign body aspiration.
- He only got DPT immunization for only 1 time. He had 2 years old younger brother who had no immunization at all.

Examination:
GC- ill and toxic looking
Stridor (+)
Pallor(+), Bull neck (+)
HR- 180/min
BP- 80/50 mmHg
SpO_2 – 55-60%
On throat examination, Grayish Membrane (+) on both Tonsils.



CULTURE AND SENSITIVITY REPORT

Laboratory No : B - 17914

Patient's Name [redacted]

Age :

Sex : M

Address :

Hospital: : ရန်ကုန်ကလေးဆေးရုံကြီး။

Referred by :

Voucher No : FOC

Date of Report: : 14.11.18

Type of Specimen : Throat swab for Diphtheria

Condition of specimen :

Test Required : C&S

Date & Time of Collection :

Date &Time of Receipt : 8.11.18

MICROSCOPY

Direct:

Gram stain:

CULTURE

Organism isolated: ***Corynebacterium diphtheriae*** **isolated (Vitek 2 result form attached).**

Microbiologist

for Consultant Microbiologist

Bacteriology Section

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What is/are your management plan for further prevention?

1. Provide Td to index case during convalescent phase and 2nd dose of Td 1 month later.
2. Give primary series of pentavalent vaccines for 3 times to 2 years old younger brother and oral erythromycin 40mg/kg per day for 7-10days.
3. Provide Tdap to index case during convalescent phase.
4. Give only Diphtheria antitoxin 60,000 IU and antimicrobial therapy for 10 days to index case.
5. Give oral erythromycin and diphtheria antitoxin to household contacts.

Advisory Committee on Immunization Practices recommended that

- Tetanus and Diphtheria Toxoids Adsorbed (Td) Td can be used for post-exposure diphtheria prophylaxis in
  - persons 7 years of age and older who have not completed primary vaccination, and
  - whose vaccination status is unknown, and
  - who have not been vaccinated with diphtheria toxoid within the previous 5 years..

- Infants and young children are recommended to receive a 5-dose series of diphtheria and tetanus toxoids and acellular pertussis (DTaP) vaccines
- Primary (3 doses)
    - 1 dose at ages 2, 4, and 6 mos

1st booster

- 1 dose at age 15–18 mos

2nd booster

- 1 dose at age 4–6 yrs

Prevention of Pertussis, Tetanus, and Diphtheria with Vaccines in the United States: Recommendations of the Advisory Committee on Immunization Practices (ACIP)
Recommendations and Reports / April 27, 2018 / 67(2);1–44
https://www.cdc.gov/mmwr/volumes/67/rr/rr6702a1

Case 5

- A 4-year-old child with HIV infection has moved into the local area and is seen in the outpatient clinic for the first time. Her father reports that she has had two admissions with respiratory infection, and several episodes of diarrhea and three or four ear infections which have been managed on an outpatient basis.
- She has had a recent febrile illness which has now resolved but she has no weight gain for a year.
- She is on no regular treatment and has not started antiretroviral treatment.
- She didn't get any vaccine since birth. So appropriate vaccines are planned to give.

Which of the following vaccines can be given in this child ?

1. One dose of BCG vaccine
2. Diphtheria toxoid
3. Three doses of hepatitis B vaccine
4. Three doses of oral poliovirus vaccine
5. Hib vaccine
6. Two doses of MMR vaccine

General Best Practice Guidelines for Immunization: Best Practices

Specific immunodeficiency	Contraindicated vaccines	Risk-specific recommended vaccines	Effectiveness and comments
HIV/AIDS	▪OPV(b) ▪Smallpox ▪BCG ▪live attenuated influenza vaccine ▪MMR, varicella, and zoster vaccine ▪Yellow fever vaccine	▪Pneumococcal ▪Hib ▪Hep B	MMR and Varicella vaccine in those with mild immunosuppression, rotavirus, and all inactivated vaccines, including inactivated influenza as per routine vaccination schedule, might be effective(k)

https://www.cdc.gov/vaccines/hcp/acip-recs/general-recs/immunocompetence

- WHO currently recommends BCG vaccination for asymptomatic HIV-infected children who are at high risk for infection with M. tuberculosis (i.e., in countries in which the prevalence of TB is high).
- WHO does not recommend BCG vaccination for children who have symptomatic HIV infection or for persons known or suspected to be infected with HIV if they are at minimal risk for infection with M. tuberculosis.

Ref : Full report of GACVS meeting of 29-30 November 2006 published in the WHO Weekly epidemiological record of 19 January 2007

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Polio vaccination in HIV infected children

- **Polio**: The live, attenuated oral polio vaccine should be avoided because of an increased risk of paralytic polio in immunocompromised vaccine recipients.
- The CDC recommends use of the inactivated polio vaccine for HIV-infected children.
- The inactivated polio vaccine increases antibody titers in most patients with CD4 counts of >200 cells/µL, but a small number of patients with CD4 counts of <200 cells/µL failed to respond.

MMR vaccination in HIV infected children

- CDC recommends measles vaccine for all HIV-infected children who are not severely immunosuppressed (with severe immunosuppression defined as a CD4 percentage of <15%) and who lack evidence of measles immunity.
- As with other vaccines, serologic response may be poor in HIV infection, and children with severe HIV-related immunosuppression should be considered susceptible to measles even if they have received measles vaccine.
- The ACIP also recommends mumps and rubella vaccines for HIV-infected children.
- The CDC recommends MMR vaccination for all HIV-infected adults with CD4 counts of >200 cells/µL who lack evidence of measles immunity.

Case 6

A 7 month old girl was presenting with

fever x7 days and

drowsiness x 4 days.

Fever was low grade , evening rise in temperature (+) and it was associated with cough.

She had history of close contact with TB present in grandmother who is sputum positive for AFB and said to be sensitive to antiTB.

She had no history of BCG immunization.

Which management regarding immunization would be true for this child?

1. BCG immunization should be offered after doing tuberculin skin test if it is negative.
2. BCG immunization should be given without tuberculin testing.
3. BCG immunization can prevent reactivation of latent pulmonary infection.
4. Other immunization can be given in the arm used for BCG immunization within three months.
5. Higher rate of local reaction may result from using intradermal injection in comparison with reactions from subcutaneous injection.

- BCG vaccination should only be considered for children who have a negative TB test and who are continually exposed, and cannot be separated from adults who are untreated or ineffectively treated for TB disease, and the child cannot be given long-term primary preventive treatment for TB infection.
- BCG vaccine has a documented protective effect against meningitis and disseminated TB in children.
- It does not prevent primary infection and, more importantly, does not prevent reactivation of latent pulmonary infection.
- The impact of BCG vaccination on transmission of Mtb is therefore limited.

https://www.who.int/biologicals/areas/vaccines

- No further immunization should be given in the arm used for BCG immunization for at least three months because of the risk of regional lymphadenitis.
- Higher rates of local reactions may result from using subcutaneous injection in comparison with reactions from intradermal injection.

https://www.who.int/biologicals/areas/vaccines

Case 7

- A family including 6 year old boy and 3 year old girl from the United State had planned to travel in Myanmar. They was informed that Myanmar is endemic area of Japanese B Encephalitis and considered for JE vaccination .

Which conditions are indication for JE vaccine for them?

1. Plan to spend at least a month in areas where JE occurs
2. travel for less than a month, but will visit rural areas and spend a lot of time outdoors
3. Travel to areas where there is a JE outbreak
4. Are not sure of their travel plans
5. Travel for just one week to Yangon, Myanmar

Japanese encephalitis vaccination

should get vaccinated if you're:

- planning a long stay in a high-risk country (usually at least a month)
- visiting a high-risk area during the rainy season or where there's a year-round risk because there's a tropical climate
- visiting rural areas in a high-risk country, such as rice fields, marshlands or somewhere close to pig farms
- taking part in activities while in a high-risk country that may increase your risk of becoming infected, such as cycling or camping
- working in a laboratory with potential exposure to the virus

https://www.nhs.uk/conditions/japanese-encephalitis/prevention/
https://www.cdc.gov/japaneseencephalitis/vaccine/

- The following vaccine dosing schedules and ages of administration are recommended:
  - Inactivated Vero cell-derived vaccine: generally 2 doses at 4 week intervals starting the primary series at ≥6 months of age in endemic settings
- Live attenuated vaccine: Single dose administered at ≥8 months of age
- Live recombinant vaccine: Single dose administered at

≥9 months of age

https://www.cdc.gov/japaneseencephalitis/vaccine/

Case 8

- A 14 year old child who is up-to-date with the vaccine schedule, stepped on a rusty nail a year ago and was given a vaccination following the injury.
- There is no written record of what was given, although the parents believe this was tetanus vaccine.
- The child has now presented for a school leaving booster.

Question

Which of the followings is/are true ??

1. The booster is not necessary
2. There is a risk of side effects from another tetanus vaccination so soon after the last one so that Td/IPV should not be given
3. The vaccination given at the time of injury should be discounted and Td/IPV given now
4. The child should have a further tetanus vaccination in 10 years time
5. The child should be tested for tetanus antibodies before any further doses of tetanus vaccine.

- To be protected throughout life, WHO recommends that an individual receives 6 doses (3 primary plus 3 booster doses) of Tetanus toxoid containing vaccine (TTCV)
- The 3-dose primary series should begin as early as 6 weeks of age, with subsequent doses given with a minimum interval of 4 weeks between doses.
- The 3 booster doses should preferably be given during the second year of life (12–23 months), at 4–7 years of age, and at 9–15 years of age.
- Ideally, there should be at least 4 years between booster doses.

There are many kinds of vaccines used to protect against tetanus, all of which are combined with vaccines for other diseases:

- Diphtheria and tetanus (DT) vaccines
- Diphtheria, tetanus, and pertussis (whooping cough) (DTaP) vaccines
- Tetanus and diphtheria (Td) vaccines
- Tetanus, diphtheria, and pertussis (Tdap) vaccines

https://www.who.int/news-room/fact sheets/detail/tetanus

Tetanus prevention in injured person

Evaluate the immunization status of the patient.

- **Unvaccinated persons** should start and complete a primary series with an age-appropriate tetanus toxoid-containing vaccine (i.e., DTaP, TdaP, Td) as current recommendation.
- Consider **persons with unknown or uncertain history of receiving previous prior doses tetanus toxoid-containing vaccines** to have had no previous tetanus toxoid-containing vaccine. They should complete a primary series. This is because early doses of toxoid may not induce adequate immunity, but only prime the immune system.

Persons who have completed a 3-dose primary tetanus vaccination series:

- If the last dose of a tetanus toxoid-containing vaccine was received less than 5 years earlier, consider them protected against tetanus. They do not require another dose of tetanus toxoid-containing vaccine as part of the current wound management.
- If the last dose of a tetanus toxoid-containing vaccine was received 5 or more years earlier, then administer a booster dose of an age-appropriate tetanus toxoid-containing vaccine.
- Rarely have cases of tetanus occurred in persons with a documented primary series of tetanus toxoid.

https://www.cdc.gov/tetanus/clinicians.html

Case 9

1 yr and 8 month old boy presenting with loose motion, 5 times per day for 2 days and generalized tonic clonic seizure for 4 times.

No history suggestive of CNS infection and underlying epilepsy.

Immunization - complete according EPI in Myanmar.

Stool for rotavirus antigen was positive

Mother has been pregnant for 3 months and she wants to know about prevention of rotavirus infection.

How do you explain about rotavirus vaccine schedule ?

1. monovalent RV1 (Rotarix) 3- oral dose schedule at ages 2, 4 and 6 months of age
2. pentavalent (Rotateq) 2 oral doses at ages 4 and 6 months of age
3. monovalent RV1 (Rotarix) 2- oral dose schedule at ages 2 and 4 months of age
4. pentavalent (Rotateq) 3 oral doses at ages 2, 4 and 6 months of age
5. pentavalent (Rotateq) 3 oral doses at age 2, 4 and 6 years of age

- Vaccine: 2 types- oral vaccine
- pentavalent RV5 (RotaTeq)
  - 3 oral doses at ages 2, 4 and 6 months.
  - the first dose of rotavirus vaccine be administered as soon as possible after 6 weeks of age
- monovalent RV1 (Rotarix)
  - a 2-dose schedule
  - at the time of DTP1 and DTP2 with an interval of at least 4 weeks between doses.

Ref: WHO recommendations: https://www.who.int/wer/2013/wer8805.pdf?ua=1

Case 10

- A baby boy was born at 26 weeks gestation. He had severe hyaline membrane disease and was ventilated for 3 weeks. He also had a stormy neonatal period.
- Then, he is now three months old and has just been discharged from hospital and planned to give appropriate vaccines.
- His uncle had history of seizure after giving pertussis vaccine and his mother worried about for her son.

What following condition is contraindication for acellular pertussis vaccination ?

1. His Apgar scores were 3 at 1, and 5 at 5 minutes
2. He continues to have uncontrolled convulsions two or three times a week
3. He was hypoglycaemic and very jittery for a short period
4. After a pneumothorax, a cranial ultrasound scan showed an intraventricular haemorrhage with some loss of cerebral substance
5. Severe allergic reaction to vaccine component

- Children with cerebral damage, a personal history of convulsions, or a family history of febrile convulsions are at increased risk of a febrile fit following pertussis and measles immunisation.

- However, these are not absolute contraindications and they are not at any greater risk of permanent adverse effects from the vaccines and should receive them.

Contraindications

- Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component

- Encephalopathy (e.g., coma, decreased level of consciousness, prolonged seizures), not attributable to another identifiable cause, within 7 days of administration of previous dose of DTP or DTaP

(vaccines recommendation and guidelines of ACIP)
https://www.cdc.gov/vaccines/hcp/acip-recs/general-recs/contraindications.html

Precautions

- Progressive neurologic disorder, including infantile spasms, uncontrolled epilepsy, progressive encephalopathy; defer DTaP until neurologic status clarified and stabilized
- Moderate or severe acute illness with or without fever

(vaccines recommendation and guidelines of ACIP)
https://www.cdc.gov/vaccines/hcp/acip-recs/general-recs/contraindications.html

THANK YOU