

Clinical Management of Dengue Fever in Paediatric Patients

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Dengue Fever in Children

- Diagnosing dengue fever in children is a challenge as the exanthem may mimic other diseases like **scarlet fever, measles, rubella** and **adenovirus infection**.
- Familiar with the epidemiological characteristics of febrile diseases in locally



Throat swab Strept A
Dengue NS1 -ve

NPA – Adenovirus +ve
Dengue NS1 -ve

Dengue Fever in Children - Symptoms

- Children with Dengue fever are more likely to present with:
 - anorexia, cough, vomiting,
 - abdominal pain, abdominal tenderness
 - epistaxis, oliguria, rash,
 - positive tourniquet test compared with adult suffered from Dengue fever

Liver Involvement

- Studies found that infants and children were at higher risk of hepatic involvement than adults with Dengue Fever
- Liver involvement in children ranged from jaundice, hepatomegaly, elevated liver enzymes, even to hepatic failure,
- An Indian study reported correlation between mortality and severe liver dysfunction in children with Dengue infection.

Case 1: CCV (1)

- F/8 yrs
- Referred from Private Hospital
 - Seen by **two GP** before admission, diagnosed as **URI**
 - Px: **Ibuprofen**, Panadol, Anti-histamine, Augmentin.....
- Travelled to Jakarta (Indonesia), city area, **mosquito bite +++ve**, 30th Nov – 3rd Dec
- Fever since 5th Dec, 39.5^oC
- Nausea, RUQ pain, skin rashes since 9th Dec (D5)
- Pain behind the eyes since 10th Dec (D6)
- Admit on 11th Dec (D7)

Case 1:CVV (2)

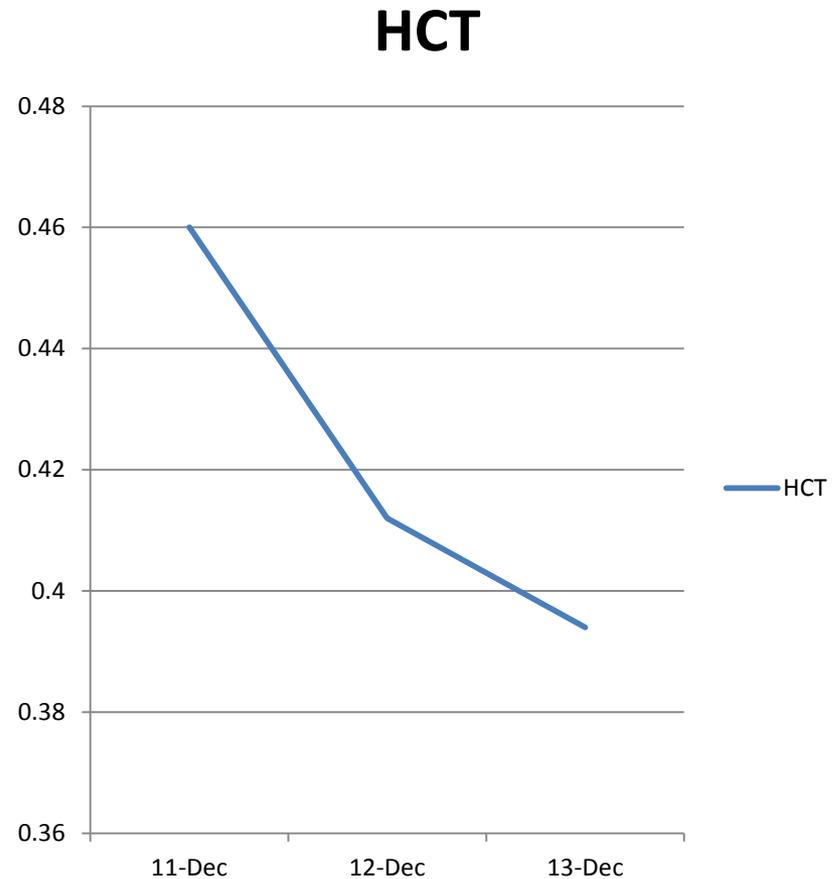
- Physical Exam: -
 - Retro-orbital pain
 - Blachable Maculopapular rashes
 - No SOB, Chest clear
 - CVS no heart murmur
 - Abdomen soft, Hepato (2cm) Spleno (tip) megaly

Erythematous Blanchable Rash



Investigations

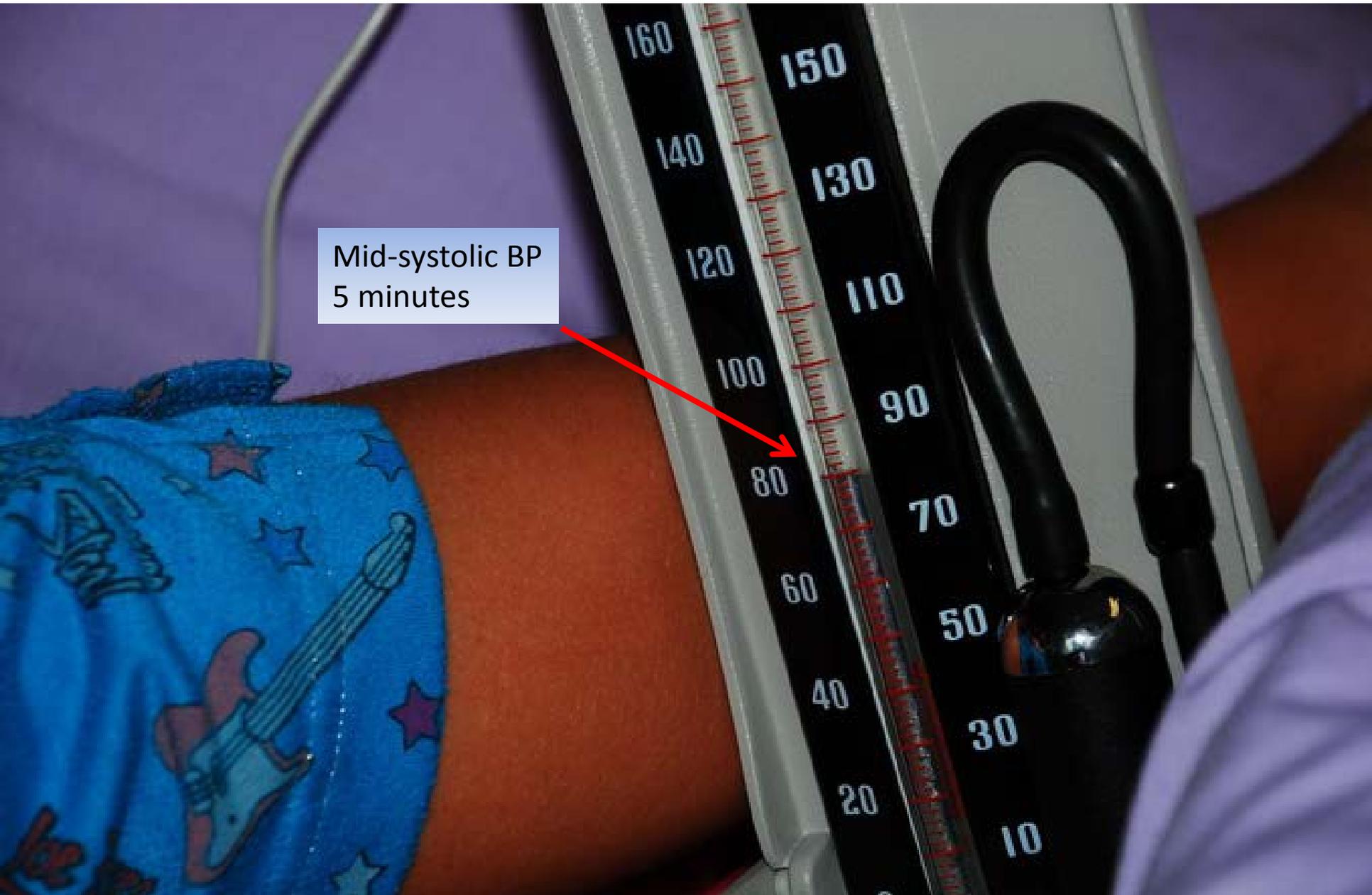
- WCC **2.7** > 4.2 > 3.9 > 7.2
- ANC **0.9** > 1.4 > 3.5
atypical lymphocyte 8%
- Platelet count **44** > 104-> 215
> 344
- deranged LFT: **ALT 259** > 211
> 23
- CXR: see film 
- USG abdomen – **Ascites +ve**

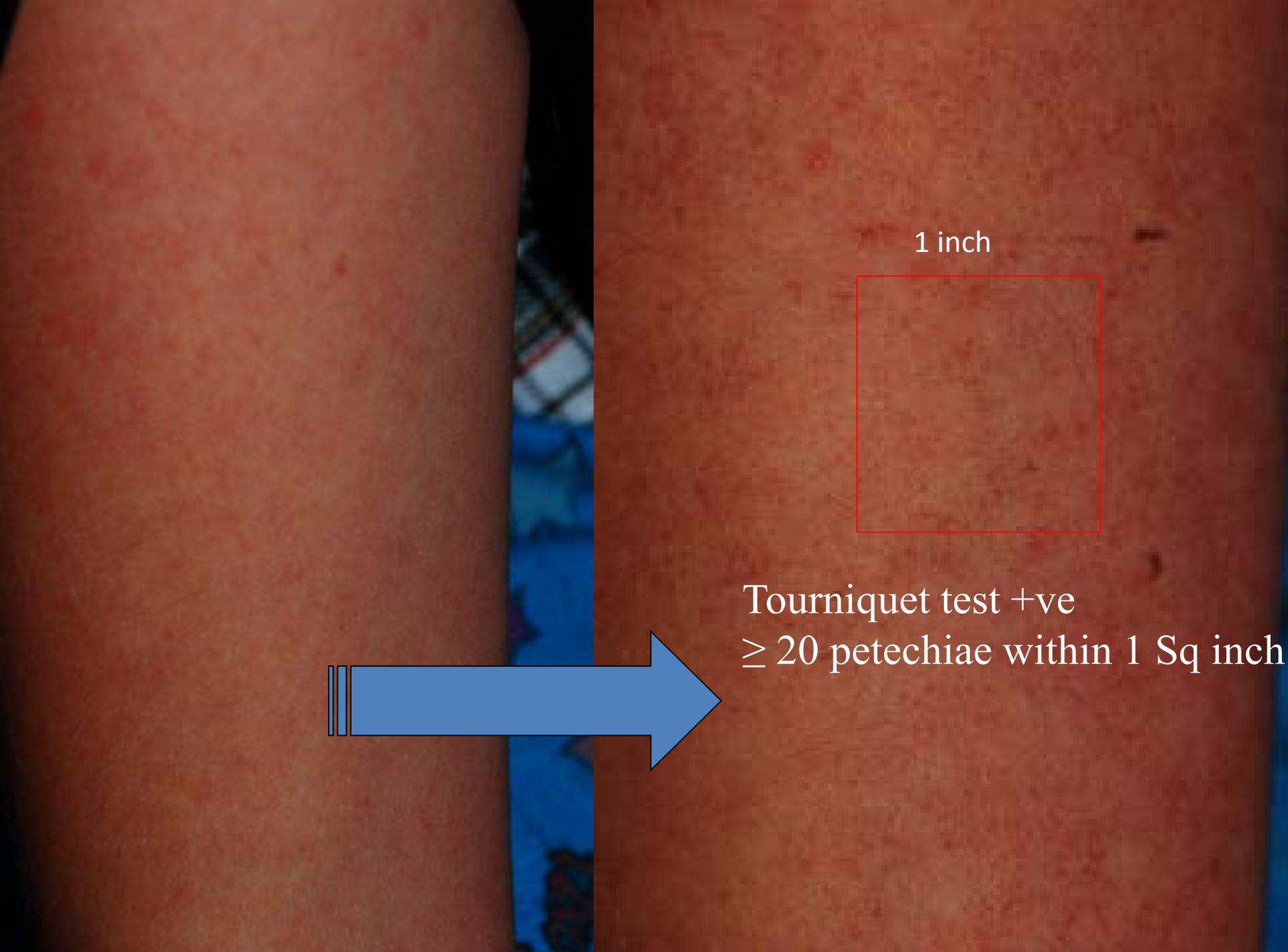


Day 7

Tourniquet test

Mid-systolic BP
5 minutes





1 inch

Tourniquet test +ve
≥ 20 petechiae within 1 Sq inch

RT Decubitus
Portable



CXR: a thin rim of pleural effusion identified



- Close monitoring (SaO₂, BP & cardiac monitor)
- Strict fluid balance monitored
- Investigations:
 - Dengue NS1 +ve, **Dengue serotype 3**



Islands of Sparing

Case 2

Investigations

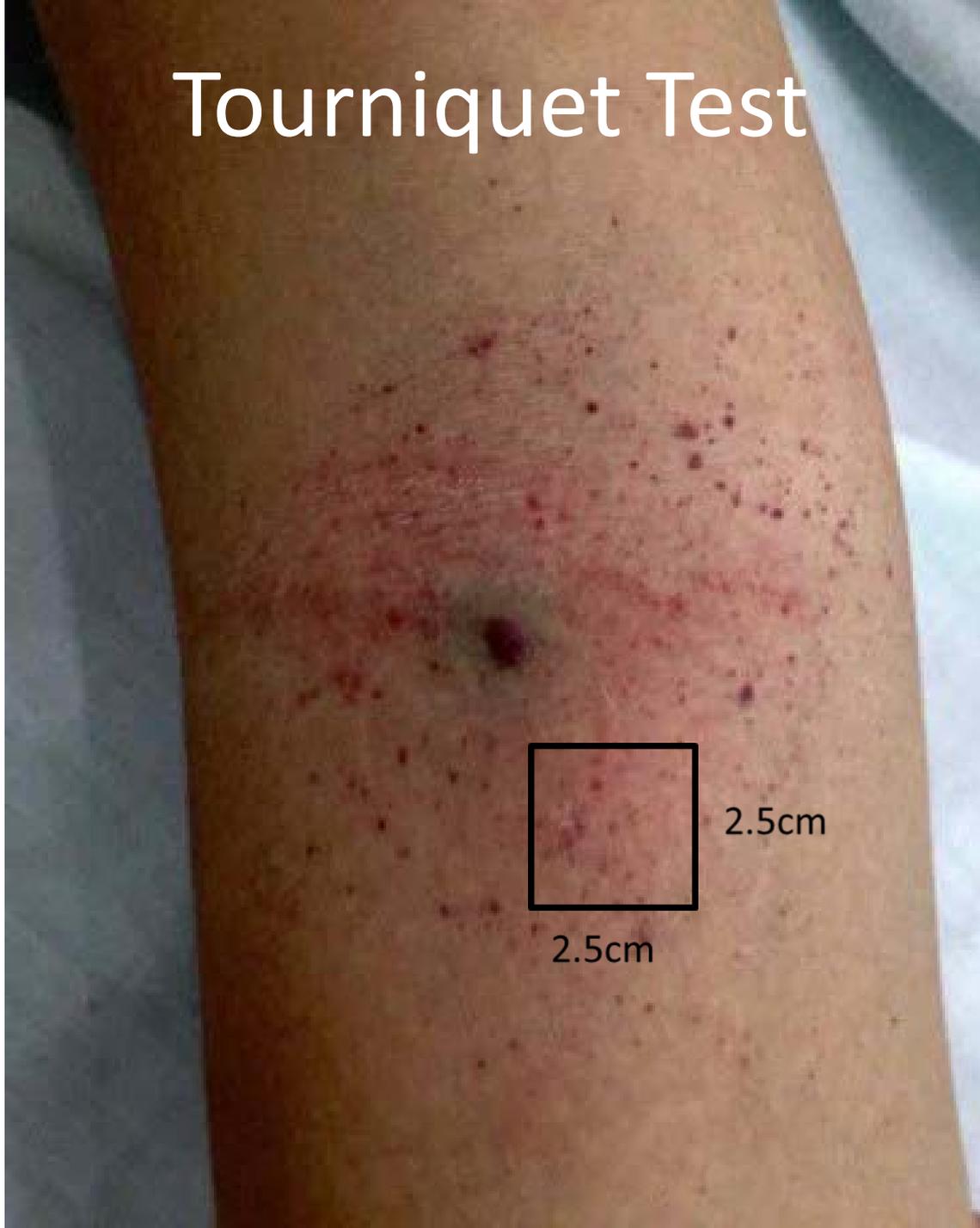
Case 1

- WCC **2.7** > 4.2 > 3.9 > 7.2
- ANC **0.9** > 1.4 > 3.5
atypical lymphocyte 8%
- Plt **44** > 104-> 215 > 344
- deranged LFT: **ALT 259** > 211
> 23
- CXR – **pleural effusion +ve**
- USG abdomen – **Ascites +ve**

Case 2

- WCC **1.9** > 5.3
- ANC **0.3** > 0.7 > 4.3
- Atypical Lymphocyte 12%
- Plt **62** > 98 > 138
- Deranged LFT: **ALT 227**>
171> 125

Tourniquet Test



2.5cm

2.5cm



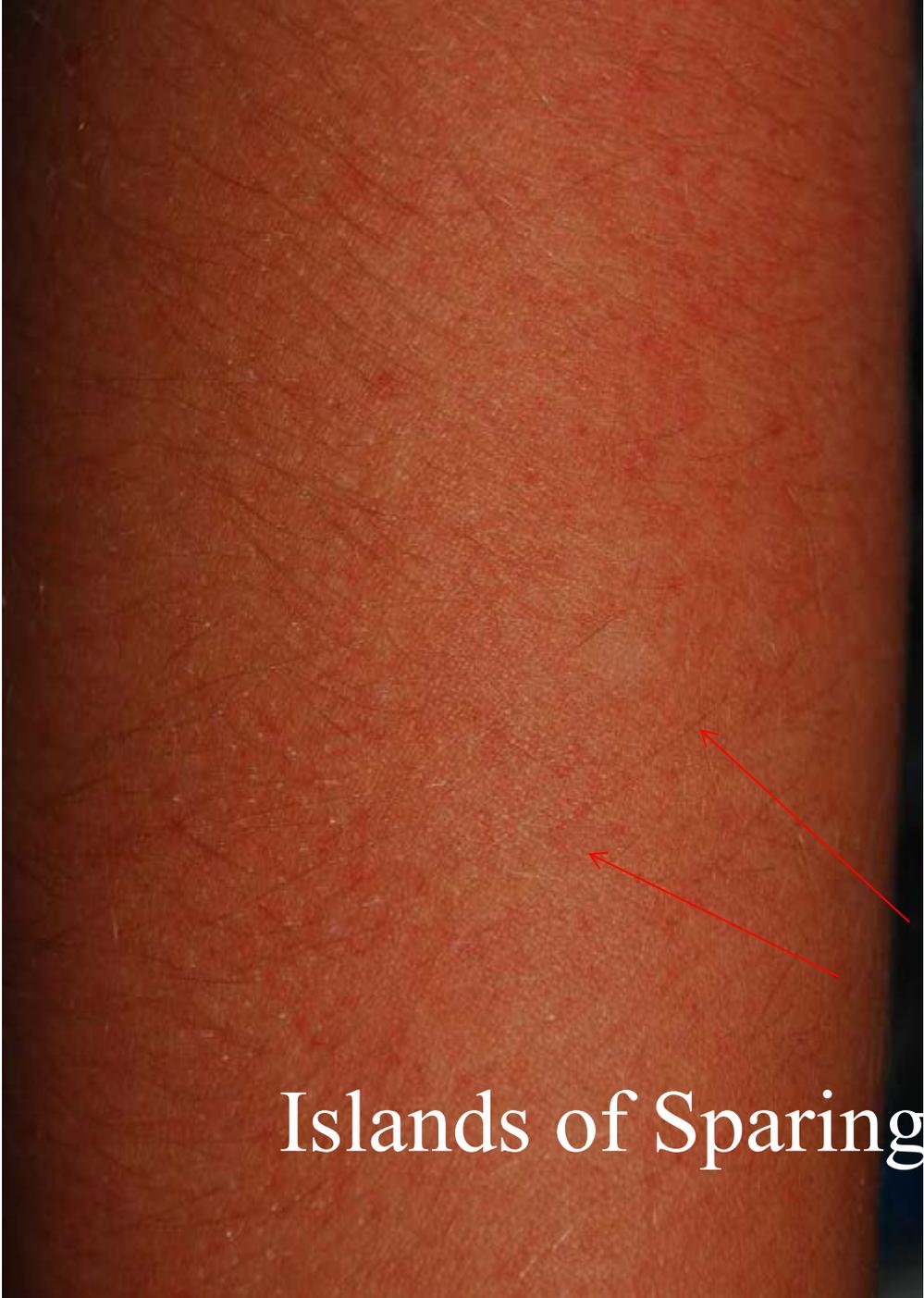
Generalized
Erythema







Islands of Sparing

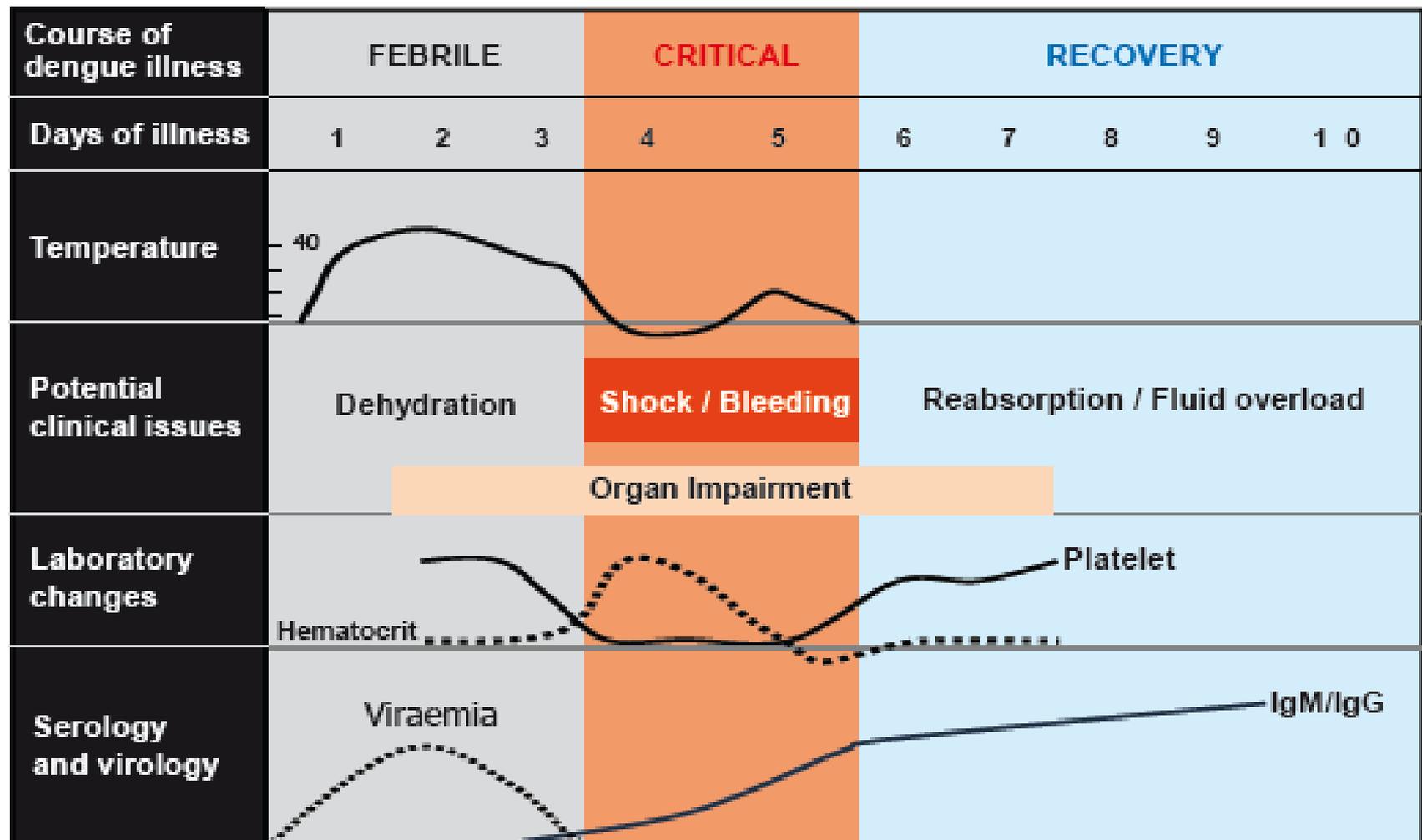


Islands of Sparing



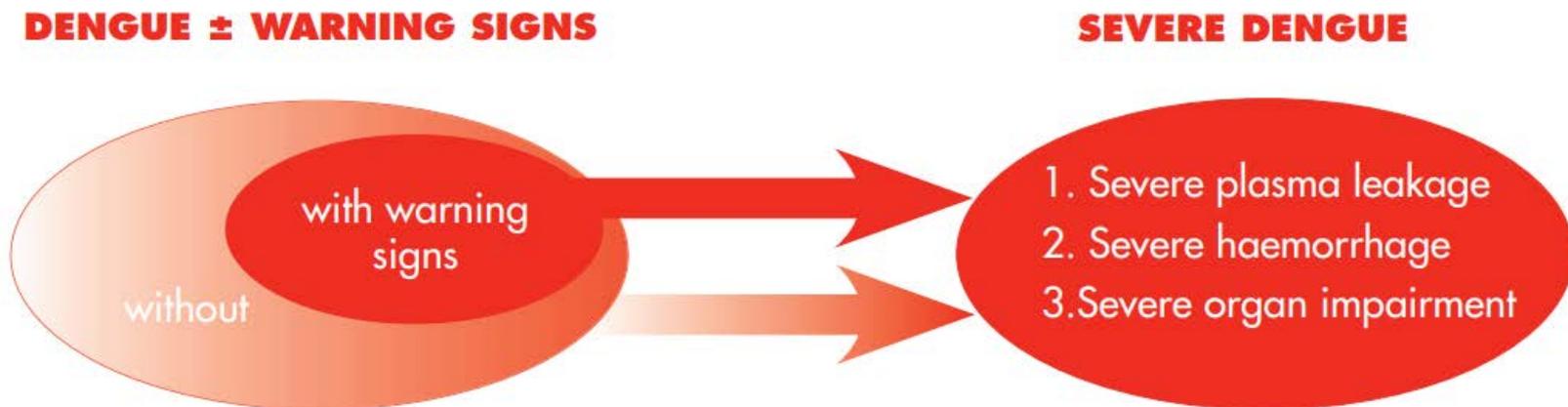


CLINICAL COURSE OF DHF



Note : Onset of defervescence usually occurs between day 3 to day 5 of illness

Figure 1.4 Suggested dengue case classification and levels of severity



CRITERIA FOR DENGUE ± WARNING SIGNS

Probable dengue

live in /travel to dengue endemic area.

Fever and 2 of the following criteria:

- Nausea, vomiting
- Rash
- Aches and pains
- Tourniquet test positive
- Leukopenia
- Any warning sign

Laboratory-confirmed dengue

(important when no sign of plasma leakage)

Warning signs*

- Abdominal pain or tenderness
- Persistent vomiting
- Clinical fluid accumulation
- Mucosal bleed
- Lethargy, restlessness
- Liver enlargement >2 cm
- Laboratory: increase in HCT concurrent with rapid decrease in platelet count

*(requiring strict observation and medical intervention)

CRITERIA FOR SEVERE DENGUE

Severe plasma leakage

leading to:

- Shock (DSS)
- Fluid accumulation with respiratory distress

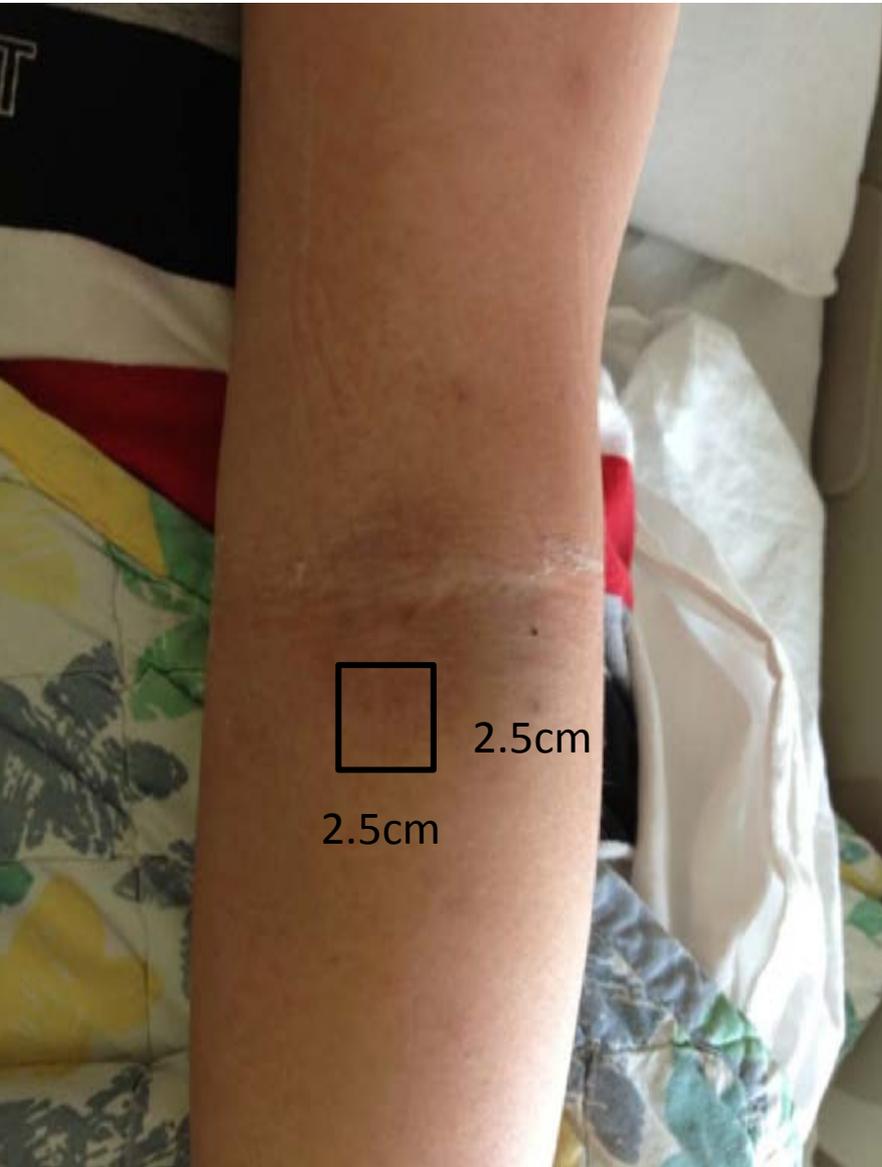
Severe bleeding

as evaluated by clinician

Severe organ involvement

- Liver: AST or ALT \geq 1000
- CNS: Impaired consciousness
- Heart and other organs

Tourniquet test

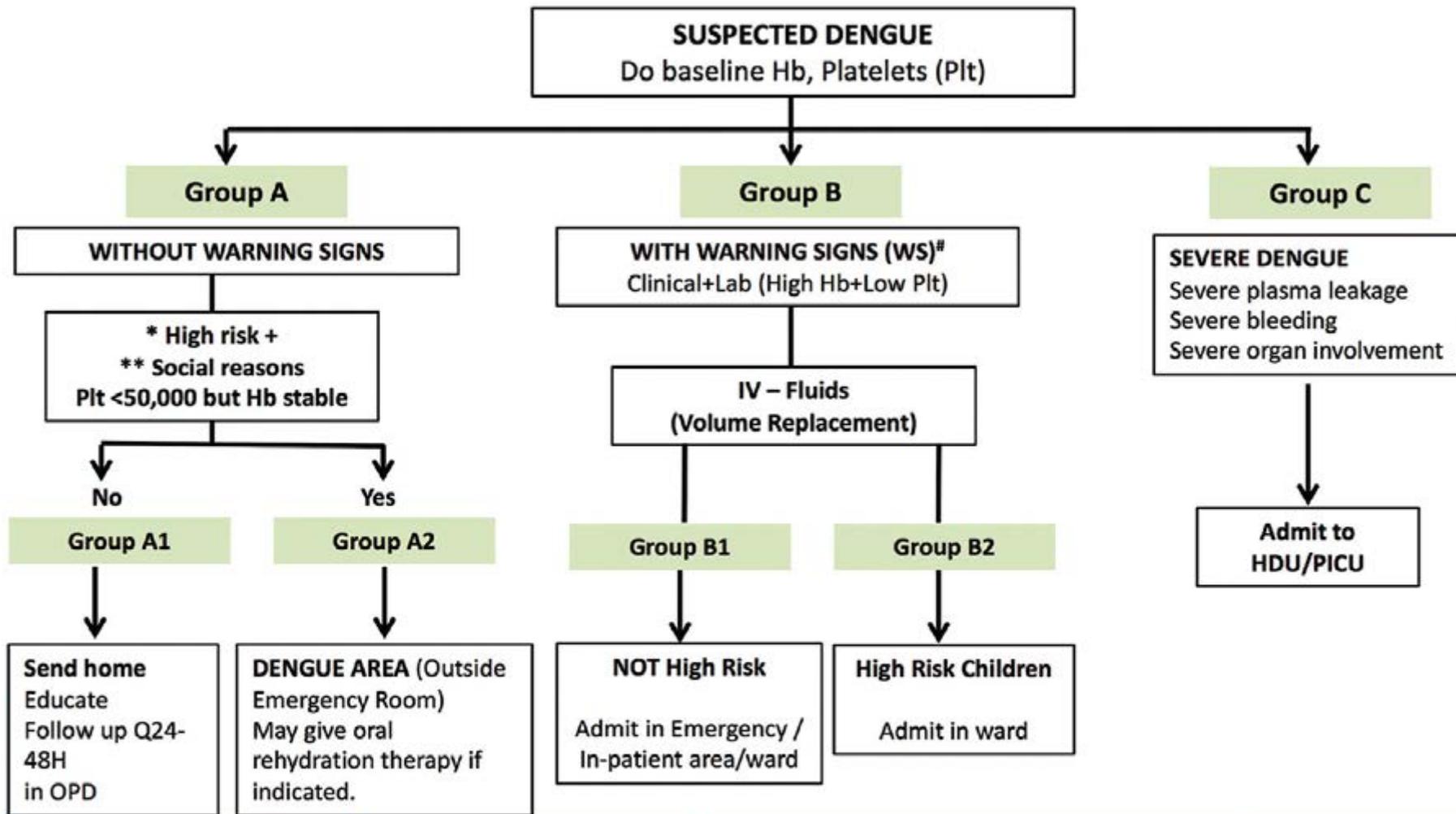


- Useful in “Febrile phase”
- Inflate BP cuff to a point midway between systolic and diastolic BP for 5 minutes
- Count number of petechiae in 2.5cm² on the volar aspect of the forearm just distal to the antecubital fossa
- Positive test
 - Increase the probability of Dengue*
 - ≥ 20 petechiae within a 1 inch square area (WHO)
 - * Sn 41.6%; Sp 94.4%
 - ≥ 10 petechiae within a 1 inch square area (CDC)
 - * Sn 45%; Sp 85%
- *Cao Xuan Thanh Phuong, et al. Evaluation of the World Health Organization standard tourniquet test and a modified tourniquet test in the diagnosis of dengue infection in Viet Nam. *Tropical Medicine and International Health* 2002;7 (2):125–132

Treatment

- No specific treatment
- Maintenance of the patient's body fluid volume is critical to severe dengue care
- Consider admission if with warning signs

TRIAGE AND ACUTE MANAGEMENT OF DENGUE IN PEDIATRIC CASUALTY



**Social Reasons

- Non-local
- Poor compliance
- Severe parental anxiety despite counselling

*High Risk

- Children <2yrs
- Cong. Heart Disease
- Renal diseases
- Blood disorders
- Obese children
- On steroids

Warning Signs (clinical)

- Persistent vomiting
- Inability to drink
- Severe abdominal pain
- Lethargy/restlessness
- Giddiness
- Less/no urine output 4 to 6 hrs
- Pale, cold, clammy hands & feet
- Difficulty in breathing
- Any bleeding/petechial rash
- Hepatomegaly > 2cm
- Ascites, Pleural effusion



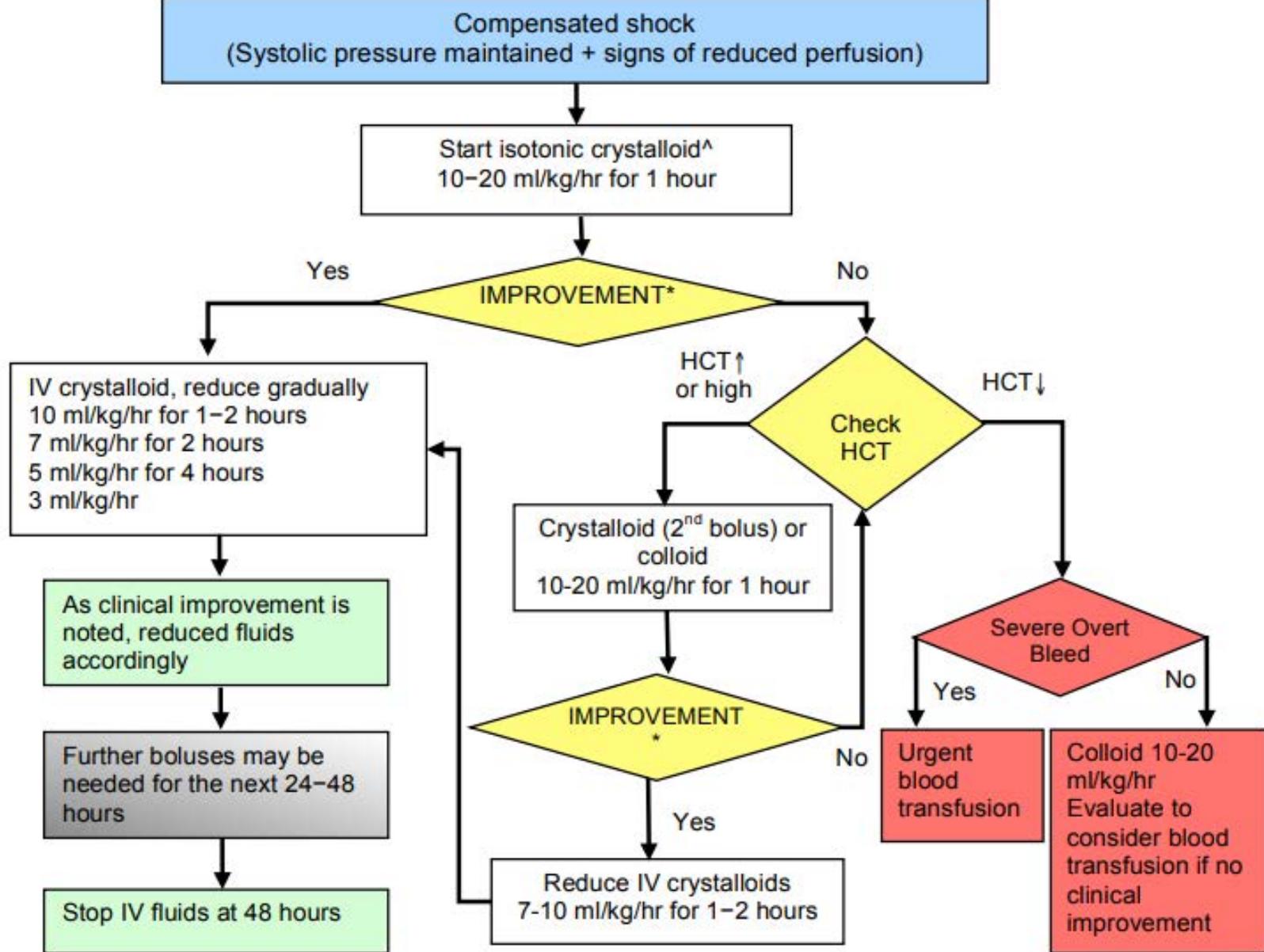
Mx of patient non-severe Dengue

- Dengue without warning signs:
 - Oral rehydration
 - Usual maintenance IVF if can't tolerate oral rehydration
- Dengue with warning signs:
 - Give minimum IVF required to maintain good perfusion and urine output.
 - IVF usually only needed for 24-48hrs

IV crystalloid, reduce gradually
5-7 ml/kg/hr for 1-2 hour
3-5 ml/kg/hr for 2-4 hour
2-3 ml/kg/hr for 2-4 hour

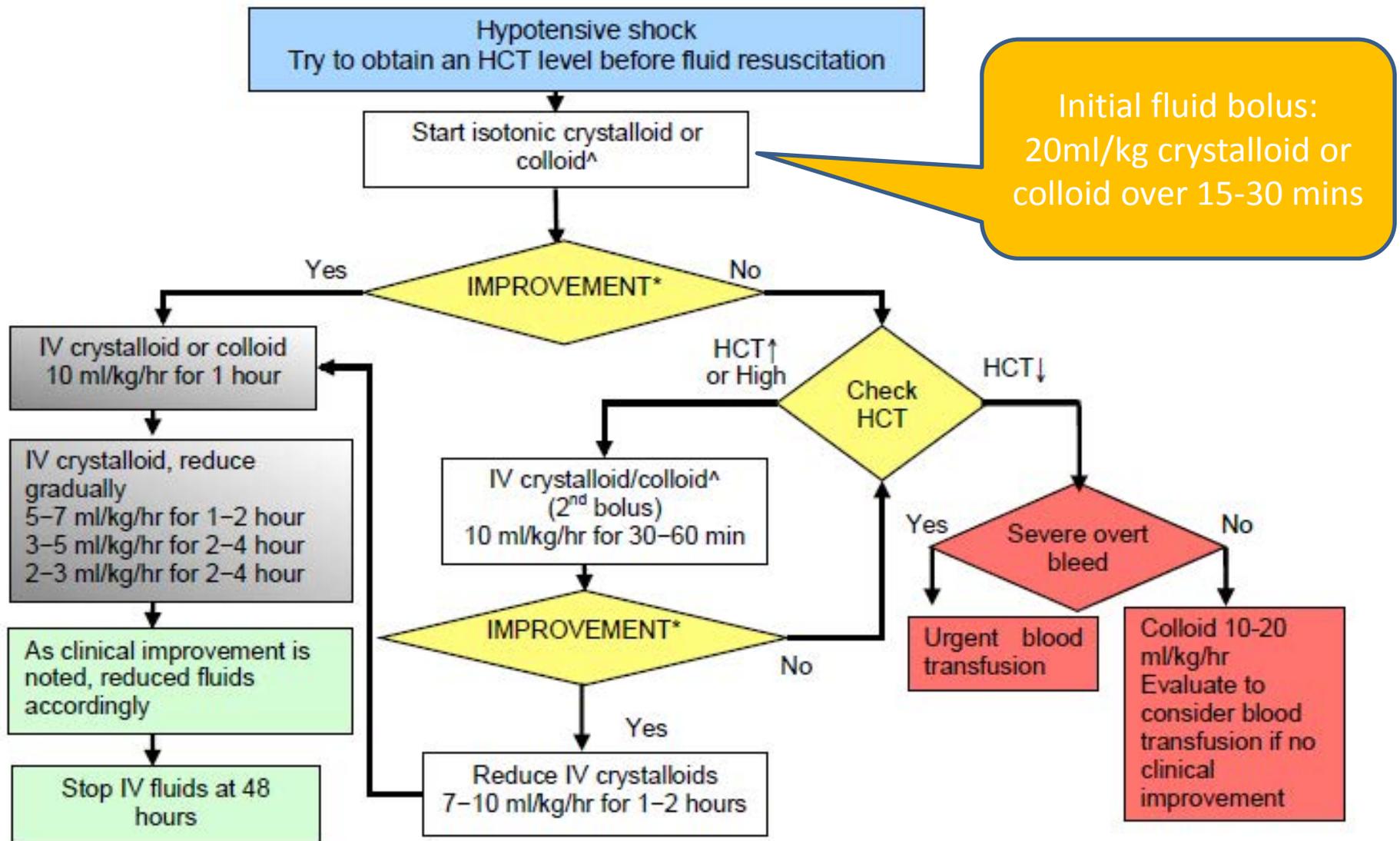
Monitor:

- Urine output
- Oral intake
- Hct decrease*



[^]Colloid is preferable if the patient has already received previous boluses of crystalloid

*Reassess the patient's clinical condition, vital signs, pulse volume, capillary refill time and temperature of extremities. IV = intravenous; HCT = haematocrit; ↑ = increased; ↓ = decreased



^Colloid is preferable if the patient has already received previous boluses of crystalloid
 *Reassess the patient's clinical condition, vital signs, pulse volume, capillary refill time and temperature of extremities.
 IV = intravenous; HCT = haematocrit; ↑ = increased; ↓ = decreased

Practical tips

- Note diastolic BP / pulse pressure
 - Considered to have shock if pulse pressure ≤ 20 mm Hg or has signs of poor peripheral perfusion (cold extremities, delayed capillary refill, rapid pulse rate)
- Baseline hematocrit – lower in infants
- Interpret Hct according to fluid status
- Use ideal body weight for IVF calculation in obese/overweight patients.
- Perform cross-match in patients with bleeding risk
- Use isotonic solution (NS / Ringer's lactate)
- Colloids are superior to crystalloids in refractory shock (Pulse pressure < 10 mmHg)
- Platelet transfusion does not reduce bleeding risk in patients with thrombocytopenia

When to stop IVF therapy

- Stable BP, pulse and peripheral circulation
- ↓ Hematocrit in the presence of a good pulse volume
- Apyrexia for $\geq 24-48$ hrs
- Resolving bowel/abdominal symptoms
- Improving urine output

** Continuing IVF beyond 48 hours of the critical phase will increase risk of pulmonary edema*

Anti-pyretic

- Use **Paracetamol**;
- Aspirin and non-steroidal anti-inflammatory drugs (NSAIDs) should be avoided in dengue fever due to increased risk of haemorrhage;
- Use of aspirin in children can be associated with the development of Reye's syndrome.

Maternal Antibodies

- There were reports of the occurrence of **DHF** during **primary dengue virus infection** in the first year of life in **children born from a mother immune to dengue virus**, as a result of acquiring maternal antibodies.
- Children **aged 5 to 10 months are at greatest risk.**
- In this context, primary dengue infection reacts like secondary or sequential infections with different virus serotype.
 - *IL De Rivera, L Parham, W Murillo, W Moncada, S Vazquez. Humoral immune response of dengue hemorrhagic fever cases in children from Tegucigalpa, Honduras. Am. J. Trop. Med. Hyg. 2008; 79(2): 262–266.*
 - *NT Huy, TV Giang, DHD Thuy, M Kikuchi, TT Hien, J Zamora, K Hirayama. Factors associated with dengue shock syndrome: A systematic review and meta-analysis. PLOS Neglected Tropical Diseases 2013; 7(9): e2412.*

Concomitant Dengue and Kawasaki Disease (川崎氏病) in Children

Circ J 2008; 72: 1492–1494

Positive Serology for Dengue Viral Infection in Pediatric Patients With Kawasaki Disease in Southern Thailand

Somkiat Sopontammarak, MD, FACC; Worakan Promphan, MD;
Supaporn Roymanee, MD; Saranwan Phetpisan, MD

Dengue Fever Triggering Kawasaki Disease

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Received: May 17, 2016;

Initial review: July 01, 2016;

Accepted: October 10, 2016.

Background: Several bacterial and viral infections are listed as triggering factors for Kawasaki disease; association with dengue fever is rare. **Case characteristics:** A 5-year-old girl who presented with fever that was confirmed to be dengue fever, and subsequently improved, except that the fever persisted. She fulfilled diagnostic criteria for Kawasaki disease on day 7 of fever. **Outcome:** Child responded satisfactorily to intravenous immunoglobulin administration. **Message:** Kawasaki disease should be kept as one of the probabilities in a case of dengue if fever persists beyond the expected duration.

Keywords: *Dengue virus, Lymphadenopathy, Mucosal inflammation, Rash, Thrombocytopenia.*



Diagnostic features of Kawasaki disease





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