Common bug at an Uncommon site

BY-
DR. GARIMA GODHA (Paediatric Resident)

UNDER THE GUIDANCE OF-
Dr. Shailaja Mane, Professor & HOD
Dr. Sanjay Chavan, Professor & PG Incharge
Dr. Manojkumar Patil, Professor & PICU Incharge

PRESENTING COMPLAINTS

Previously well, 10 year old adolescent girl, was brought to us on 6/1/2025 with complaints of :

- Fever and vomiting since 8 days.
- Generalized weakness with pain in bilateral lower limbs since 5 days.
- Vesicular rash (2-3 vesicles on lower and upper limb) noticed on 4^{th} day.
- Over past 12 hours, developed difficulty in breathing aggravating in supine position for which she consulted a private practitioner.

COURSE IN OUTSIDE HOSPITAL

- The patient had received treatment on OPD basis for the first few days (received oral CEFIXIME and symptomatic treatment for 5 days).
- On DOI-8, developed difficulty in breathing for which she was admitted at a nearby private hospital.
- She received antibiotics, antivirals, nebulization and supportive management for 3 days. (CEFTRIAXONE, DOXYCYCLINE, AZITHROMYCIN, OSELTAMIVIR)
- Referred to DYP for further management.

LABORATORY INV	
CBC	**Relative neutrophilia**
LFT	WNL
RFT	WNL
SARS COV-2 IgG	**POSITIVE**
CK	18.1
DENGUE	NEGATIVE
CRP	**30.5mg/L**
ABG	**Respiratory acidosis**

PAST HISTORY-
No history of previous admissions or surgical interventions. **H/o Varicella infection 1.5 years ago**

FAMILY HISTORY-
1st born child, Non-consanguineous marriage, no contributory family history

ANTENATAL HISTORY-
Uneventful, received Iron and Folic acid supplements.

BIRTH HISTORY-
FT /LSCS i/v/o NPOL / BW-good weight as per mother / CIAB / NICU stay for 1 day for observation

POSTNATAL HISTORY-
Exclusively breastfed till 6 months of age, weaning and complementary feeding done appropriately for age.

IMMUNISATION HISTORY-
Immunized up to 10yrs of age as per UIP

DEVELOPMENTAL HISTORY-
Developed appropriate for age

Sick looking child

RR- 68/ min
associated with respiratory distress
(ICR/SCR)
SpO2-90% (on O2 by nasal prongs 3 lit/ Min)
BP- **80/46mmHg**

ON ADMISSION

Temperature- 98.6F
PR- 138 bpm
PP- feeble
CRT>3 secs

Pallor +
Icterus/ Cyanosis/ Clubbing- absent
Cervical Lymphadenopathy +

CENTRAL NERVOUS SYSTEM

GCS- E3V3M4

- Higher Mental Functions-

Lethargic, poor orientation.
Not responding to verbal commands
Inappropriate words

- Cranial Nerve Examination- Normal
- Tone- Normal
- Power- B/L U/L- 3/5, B/L L/L- 1/5

- DTR- Brisk
- Plantar- Flexor
- Bilateral pupils equal & reactive to light
- Bilateral generalised lower limb tenderness and pitting pedal oedema+

CARDIOVASCULAR SYSTEM

Inspection
- No visible precordial bulge
- No visible apex impulse
- No scars, sinuses, dilated veins

Palpation
- Apex beat palpated in left 5th ICS
- No other palpable sounds or thrills

Percussion
Cardiac dullness percussed

Auscultation
- Muffled Heart sounds, gallop rhythm +
- **Parasternal Pericardial rub +**

RESPIRATORY SYSTEM

Upper Airway
ENT NAD
Oral Cavity- NAD

Inspection
- Bilaterally symmetrical expansion of chest
- Trachea- Central
- **Use of accessory muscles of respiration +**
- **Alar Flaring +**
- **ICR+**

Palpation
- All inspectory findings confirmed
- No local rise of temperature, no tenderness
- B/L equal expansion of chest

Percussion
- Resonant
- **Air entry reduced in bilateral inframammary region**
- **Crepitations in bilateral inframammary region**

PER ABDOMEN

1. INSPECTION
- Not distended
- Umbilicus central
- No dilated veins or scars
- No signs of visible peristalsis
- All regions move equally with respiration
- No visible lumps

2. PALPATION
- Inspectory findings confirmed
- No s/o local rise of temperature
- No guarding/ rigidity
- No tenderness at the [illegible]nal angle
- **Hepatomegaly+**

LIVER-
Palpable
Surface- Smooth
Consistency- Firm
Tenderness +
Liver span- 16cms
6 cms below the Right SCM

3. PERCUSSION
- Liver and cardiac dullness percussed
- **No signs of obvious free fluid**

4. AUSCULTATION
- Bowel sounds +

DIFFERENTIAL DIAGNOSIS

(Clinical)

- CARDIOGENIC SHOCK
- SEPTIC SHOCK
- MENINGOENCEPHALITIS

LABORATORY INVESTIGATIONS ON ADMISSION

ROUTINE	
Hb	9.6g/dl
TLC	7850/µl
PLT	1.7L/µl
HCT	29.30%
N/L	80/16
Na	133mmol/l
K	4.67mmol/l
Cl	100mmol/l
Sr.Ca/ iCa	**7.7/ 1.1mg/dl**
Sr.Mg	2.56mg/dl
Sr.Phos	4.30mg/dl

LIVER FUNCTION	
Bili(T)	1.03mg/dl
Conj. Bili	0.82mg/dl
Un.Bili	0.21mg/dl
SGOT	77U/L
SGPT	50U/L
ALP	105U/L
Total Pr	5.20mg/dl
A/G	2.5/2.7g/dl
GGT	27
PT/INR	16.30s /1.37
aPTT	30.50s

INFECTIVE	
Dengue	**IgM-equivocal**
chikungunya	IgM-Negative
Rickettsia	Negative
CRP	**9.75mg/L**
ESR	22
CPK	**410U/L**
Sr.Ferritin	**2079.15ng/mL**
Sr.Creat	0.59
Sr.Urea	44

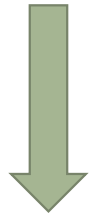
CARDIAC MARKERS	
NT-pro-BNP	**14,314.2 pg/mL**
CK-MB	**12.82U/L**
ANA Blot	Negative
Urine R/M	WNL
Urine C/S	No growth

DOA-1

WEEK 1

- HHHFNC support
- 1 NS bolus given
- Low dose noradrenaline and Adrenaline in view of persistent shock.
- IV Antibitiocs- CEFTRIAXONE, AZITHRYOMYCIN, CLOXACILLIN and OSELTAMIVIR. DOXYCYCLINE was added empirically to cover Rickettsial infection.

- 2D ECHO was done in view of pericardial rub on auscultation, cardiomegaly on CXR, hypotension and tachycardia (DOA-1)



- ✓ Normal chamber dimensions, EF-60%, no RWMA, no MS/MR/AS/AR
- ✓ IAS, IVS intact, no clot/ vegetations
- ✓ **Pericardial effusion +,** non tappable
- ✓ IVC- normal
- ✓ RV free wall- 0.3cms and LV free wall-0.8cms

DOA-2

WEEK 1

- In view of worsening distress, respiratory support escalated **to NIV**.
- Fever spikes were persistent, clinically the child showed no improvement.
- In view of intermittent drowsiness and altered sensorium- CSF studies and MRI Brain were done- **not S/O Meningoencephalitis**
- Lower limb doppler was done in view of persistent lower limb pain and prolonged immobilization, however there **was no evidence of Deep Venous Thrombosis**

DOA-4

WEEK 1

3 serial blood cultures were sent on DOA-1,4 & 7, all were **positive for MRSA**

Results of blood cultures sent on admission - growth of **Methicillin Resistant Staphylococcus Aureus (MRSA)-** sensitive to VANCOMYCIN and CLINDAMYCIN.

Antimicrobial susceptibility	MIC (µg/ml)	Interpretation
Ciprofloxacin	8	Resistant
Clindamycin	0.25	Susceptible
Erythromycin	0.25	Susceptible
Gentamicin	8	Intermediate
Oxacillin	4	Resistant
Penicillin	0.5	Resistant
Teicoplanin	<=0.5	Susceptible
Tetracycline	1	Susceptible
Trimethoprim/Sulfamethoxazole	40	Intermediate
Vancomycin	<=0.5	Susceptible

To rule out causes of fever with rash, COXSACKIE & RICKETTSIA antibodies were sent- **NEGATIVE**

MAS (Macrophage Activation Syndrome) was suspected due to multisystem involvement- **NEGATIVE**

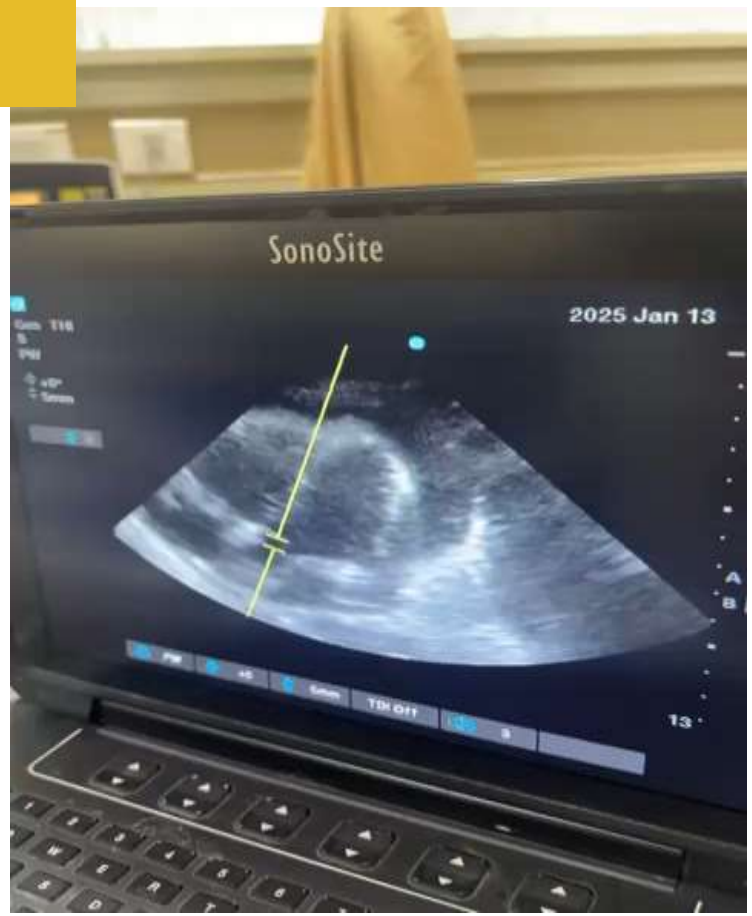
DOA 6

WEEK 1

BEFORE DRAINAGE

In view of increasing respiratory distress, a Repeat 2D ECHO was done

AFTER DRAINAGE



13/01/2025

13/01/2025

DOA 6

Large Pericardial effusion +

Purulent pericardial fluid

Pericardial fluid drained, approximately **400-450ml.** CARVEDILOL, ALDACTONE added

Pericardial Fluid- R/M :

- TLC >50,000
- N/L/M- 85/10/5
- LDH- 23,505 and ADA- 135.19

Pericardial fluid C/S : **Methicillin Resistant Staphylococcus aureus**

MRSA Pericarditis

Pericardial Fluid for **malignant** cytology- Negative

Pericardial Fluid CBNAAT- Negative, ZN- Negative

SUMMARY OF EVENTS

WEEK 1

INFECTIVE ETIOLOGY Dengue Chikungunya Rickettsia

AUTOIMMUNE ETIOLOGY ANA Blot

CRP

9.75

↓

180

NT-Pro-BNP

14314

↓

3936.5

ANTIBIOTICS

1. Ceftriaxone
2. Azithromycin
3. Doxycycline
4. Vancomycin
5. Clindamycin

BLOOD & PERICARDIAL FLUID CULTURES POSITIVE FOR MRSA

DOA 8

WEEK 2

- Post- drainage 2D ECHO showed minimal pericardial effusion
- Distress reduced and the child was comfortable on O2 by Nasal prongs.
- Ionotropic support were weaned off.
- TUBERCULOSIS workup turned up **NEGATIVE**.
- However, fever spikes persisted- **Antibiotics escalated to MEROPENEM to combat HAI.**

DOA 9

WEEK 2

2D ECHO was repeated

↓

Showed a vegetation arising off interatrial septum, measuring **17mm- INFECTIVE ENDOCARDITIS**

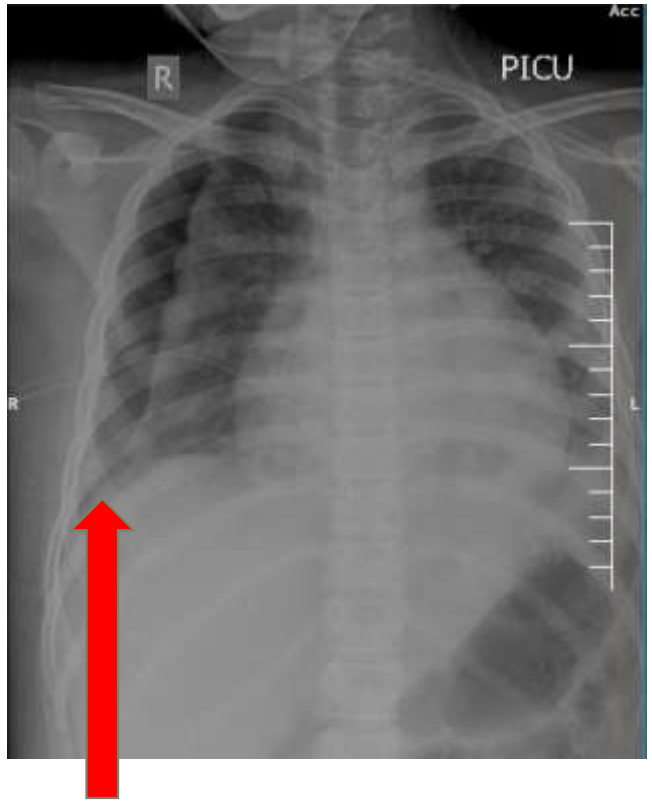
↓

CTVS team suggested no active intervention in view of florid sepsis state.
Antibiotics were continued.

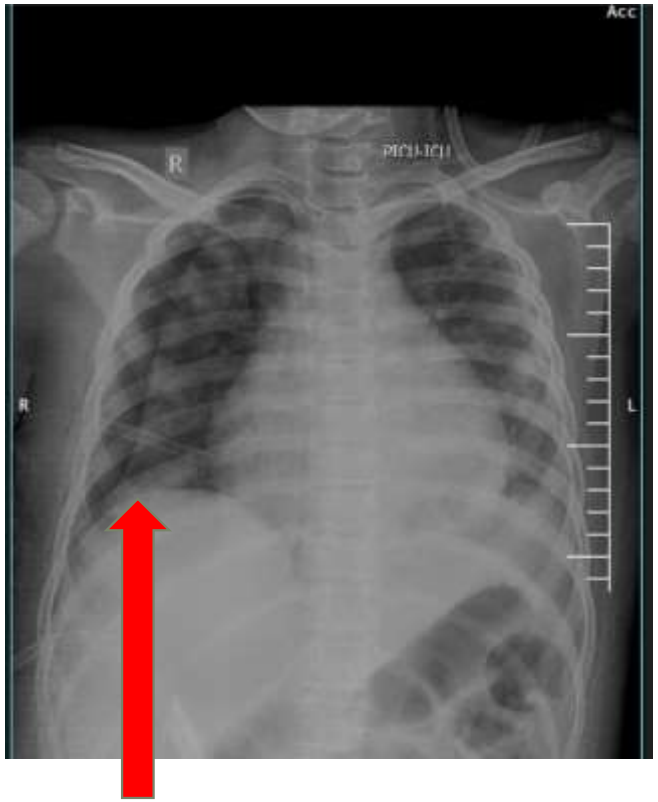
DOA 13

WEEK 2

- Child developed spontaneous pneumothorax requiring ICD. ICD also drained small quantity of sterile transudative fluid over 5-6 days.



PNEUMOTHORAX

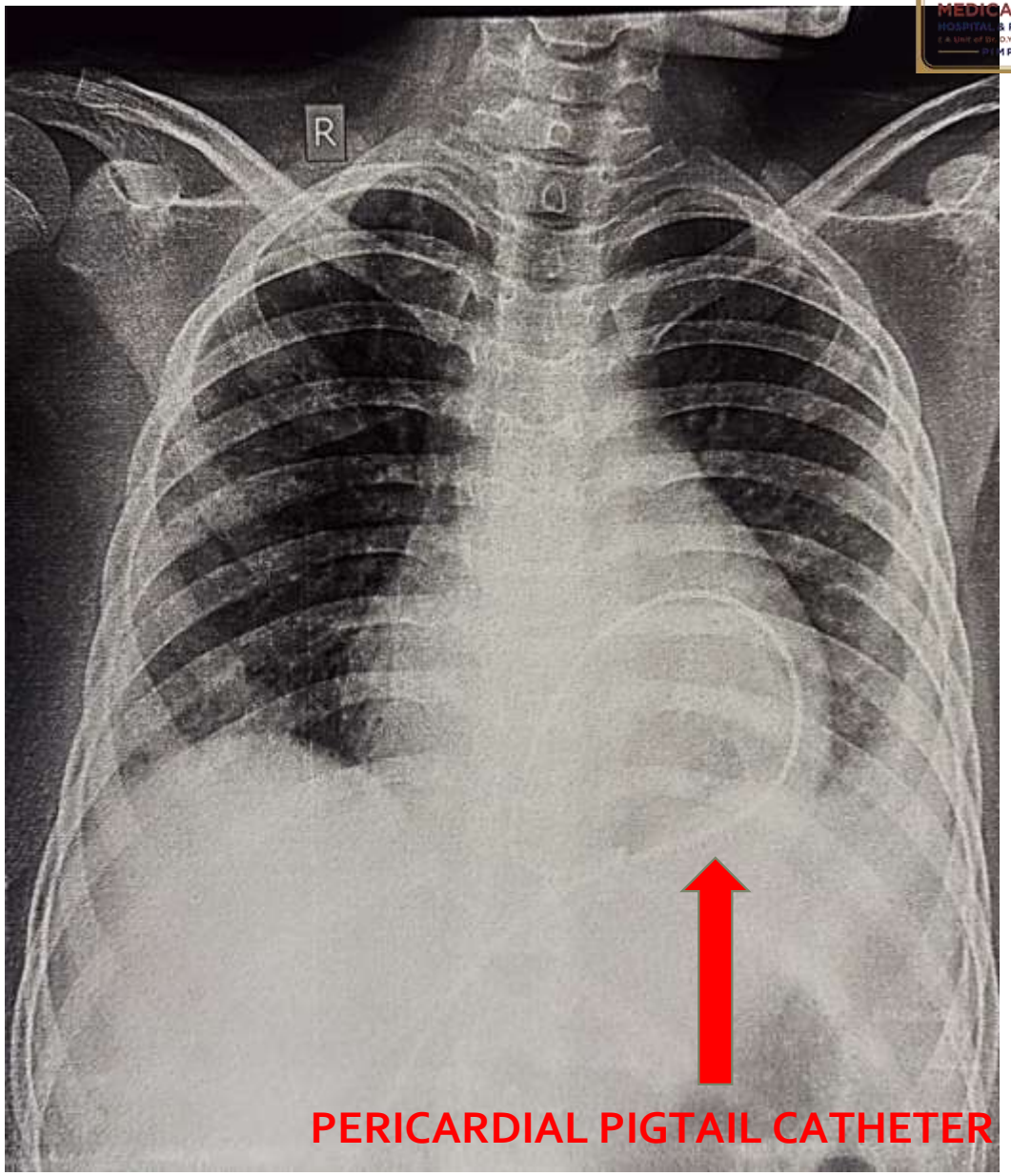


POST-ICD

DOA 14

WEEK 2

- Review ECHO was suggestive of **significant pericardial effusion with impending Cardiac Tamponade**.
- Hence, pericardial Pig tail Catheter was inserted and approximately 500cc drained.
- This fluid grew **MRSA** with similar sensitivity pattern.



SUMMARY OF EVENTS

WEEK 2

TUBERCULOSIS work up NEGATIVE.

WEEKLY ANTIBIOTIC UPDATE, GENTAMICIN VANCOMYCIN re-started on DOA-14

Pericardial fluid was sent for routine investigations, **TLC counts reduced (>55,000 to 35000),** however, cultures persistently positive for MRSA.

ICD in-situ for hydropneumothorax.

Pericardial Pigtail Catheter kept in-situ for 15 days

DOA
15-16

WEEK 3

- Department of Infectious Diseases involved in view of continuous fever spikes (moderate-high grade) and poor response to antibiotics- escalated to DAPTOMYCIN (350mg OD) and CEFTAROLIN (600mg BD) .
- Despite giving VANCOMYCIN (In septic dosages, 20mg/kg/dose, TDS) for approximately 15 days, the child did not show any clinical improvement. VANCOMYCIN trough levels were sent. Values- **9.3mcg/dl** (Therapeutic Range- 15-20mcg/dl)
- Review 2D ECHO was done which was suggestive of minimal effusion, the size of the vegetation was reduced to **14mm.**
- FLUCONAZOLE to cover secondary fungal sepsis.

DOA
17-19

WEEK 3

- Pigtail catheter in situ, observed of daily drainage of serous fluid, approximately 50ml/day.
- Child developed **ICU Psychosis -** (irrelevant speech ~~talking~~ and ~~described a few episodes of~~ visual hallucinations) ~~for which a psychiatric consultation was taken, impression -~~-Psychiatry team advised TAB.ETIZOLAM(a short acting benzo)
- **INJ. INDOMETHACIN** was given for pericarditis.
- Pedodontist consultation – teeth luxation (upper and lower incisors) with due risk of aspiration and gum hyperplasia, suggestive of Generalized Aggressive Periodontitis. Required further radiological investigations, advised after stabilization.

DOA 20

WEEK 3

- Blood cultures sent at the beginning of the week, showed growth of **ACINETOBACTER BAUMANII** complex.

Organism : Acinetobacter baumannii complex

Antimicrobial susceptibility	MIC (µg/ml)	Interpretation
Amikacin	64	Resistant
Cefepime	32	Resistant
Ceftazidime	64	Resistant
Ciprofloxacin	4	Resistant
Colistin	1	Intermediate
Gentamicin	16	Resistant
Imipenem	16	Resistant
Levofloxacin	8	Resistant
Meropenem	16	Resistant
Minocycline	16	Resistant
Piperacillin/Tazobactam	128	Resistant
Tobramycin	-	Resistant
Trimethoprim/Sulfamethoxazole	160	Resistant

Comment : Carbapenemase MBL Producer. Acinetobacter baumani is intrinsically resistant to Ampicillin,Amoxycillin/Clavulanic acid,Chloramphenicol & Kindly correlate clinically.

<End>

POLYMIXIN-B & SULBACTAM added

SUMMARY OF EVENTS

WEEK 3

Blood cultures positive for ACINETOBACTER BAUMANII complex

ANTIBIOTICS UPDATE,

1. DAPTOMYCIN
2. CEFTAROLINE
3. GENTAMICIN
4. VANCOMYCIN
5. POLYMIXIN-B
6. SULBACTAM (for Acinetobacter baumanii)

VANCOMYCIN TROUGH LEVELS: 9.53 (therapeutic range 15-20mcg/dl)

Pigtail catheter in-situ, positive drain everyday.

ICD removed on Day-6

DOA

24-25

WEEK 4

- ~~In view of increasing distress, USG Thorax as done which was suggestive of bilateral pleural effusion~~
- Review Echo showed thick purulent fluid with multiple septations. Anticipating constrictive pericarditis, Adult and Pediatric cardiology team suggested - intra-pericardial fibrinolysis with TPA-Alteplase, 10mg~~) was undertaken-~~
- ✓ Following which 110ml of thick **purulent** pericardial fluid was aspirated.
- ✓ ~~Next day,75ml fluid was drained and another~~ A repeat dose was given in view of persistent high volume drain output.

DOA
29

WEEK 4

- In view of persistent pericardial collection requiring frequent drainage from the pigtail catheter multi-disciplinary team consisting of Adult and Pediatric Cardiologists, CTVS team and ID Specialist -pericardial window surgery was planned.

- Under GA, pericardial window was created. Dense adhesions with pleura were present (pericardiectomy), 100-150ml of serosanguinous fluid with flakes of pus was drained out.

- ~~Intra-op~~ OT was uneventful, No.24 drain and No. 28 ICD was placed in the pericardial and pleural cavity, respectively.

DOA
30-31

POST OPERATIVE COURSE

- POD-1 she developed AKI- ~~Child developed decreased urine output and deranged RFTs,~~ for which peritoneal dialysis was started.
- Inspite of maximum critical care support, she progressively deteriorated and developed multi-organ dysfunction -on high dose vasoactives (both vasopressors and inotropes) ~~Despite on multiple vasoactive agents, hypotensive readings persisted, bilateral pupils became sluggishly reactive to light, despite~~ , peritoneal dialysis,maximum ventilatory support. ~~patient had decreased urine output and persistent metabolic acidosis.~~ Pupils sluggishly reactive, persistent hypotension with non-palpable peripheral pulses, bleeding diathesis, refractory metabolic acidosis.
- She sustained cardiac arrest following massive pulmonary hemorrahge- on ~~—----------had one episode of massive ET bleed followed by a cardiac arrest.~~

CAUSE OF DEATH

Massive pulmonary haemorrhage with refractory cardiogenic shock in an operated case of pericarditis with infective endocarditis with bilateral pleural effusion with AKI with *MRSA* sepsis

DISCUSSION

- Methicillin-resistant *Staphylococcus aureus* (MRSA) is a pervasive organism that can cause life-threatening illnesses.
- It was initially reported in 1960s, and has been predominantly associated with health-care-associated infections. However, in more recent years, MRSA infections began to be detected also in persons who did not have contact with the health care system.
- This organism is usually found in skin infections, however it can also cause pneumonia, bacteremia, endocarditis and osteomyelitis.
- MRSA has been reported as one of the most frequent pathogens causing post-viral bacterial pneumonia especially in patients with influenza type A viral infection.
- Pericarditis due to MRSA is extremely rare, especially in the antimicrobial era and in the absence of prior surgical interventions. Of note, only 6 cases have been reported in the literature around the world.

DISCUSSION

- Primary source control is key, as survival relies on early empiric antimicrobial therapy and pericardial drainage. Adequate drainage of purulent pericarditis is vital in order to normalize hemodynamics and achieve source control. This can be done via **pericardiocentesis, pericardial window or pericardiectomy.** Percutaneous catheter drainage is the most commonly performed technique.

- Another effective adjunctive therapy includes **intrapericardial infusion of a fibrinolytic agent**, such as streptokinase or urokinase. These are shown to lyse loculated effusions and effectively accelerate its drainage, thus avoid extensive pericardiectomy.

- **NSAIDS** with or without colchicine have can also be used to reduce inflammation.

- As far as antibiotic therapy, cases of purulent MRSA pericarditis have successfully been managed with **VANCOMYCIN, DAPTOMYCIN OR CEFTAROLINE**, based on review of other cases reported so far.

CONCLUSION

- Purulent pericarditis due to MRSA is extremely rare, especially in the antimicrobial era and in the absence of prior surgical interventions.
- It carries a very high morbidity and mortality rate due to its possible complications, such as cardiac tamponade.
- Community-acquired MRSA has not been traditionally associated with sepsis and severe disease, however, as its incidence continues to grow, we need to recognize its virulence and changing spectrum.

REFERENCE
Ganji M, Ruiz J, Kogler W, Lung J, Hernandez J, Isache C. Methicillin-resistant *Staphylococcus aureus* pericarditis causing cardiac tamponade. IDCases. 2019 Aug 1;18:e00613. doi: 10.1016/j.idcr.2019.e00613. PMID: 31453103; PMCID: PMC6704044.
https://pmc.ncbi.nlm.nih.gov/articles/PMC6704044/
https://doi.org/10.1016/j.idcr.2019.e00613

ACKNOWLEDGEMENTS

MULTIDISCIPLINARY APPROACH

DEPARTMENT OF PAEDIATRICS

- Dr. Shailaja Mane

(HOD and Professor)

- Dr. Vineeta Pande

(HOU and Professor)

- Dr. Sanjay Chavan

(Professor and PG in charge)

- Dr. Manojkumar Patil

(Professor and PICU in charge)

- Dr. Balasubramanya S Tandur

(SR and PICU intensivist)

- Dr. Siddhi Gawhale

(Asst. Professor and PICU intensivist)

MANY THANKS TO

- Dr. Sridevi

(Professor and Cardiologist)

- Dr. Santosh Joshi

(Consultant, Paediatric Cardiology)

- Dr. Anurag Garg

(HOD CVTS and Professor)

- Dr. Vipul Sharma

(Professor Cardiac Anaesthesiology)

- Dr. Shehzad Mirza

(HOD Microbiology and Professor)

- Dr. Preeti Ujapure

(Consultant, Infectious Diseases)

- Department of Psychiatry
- Department of Pedodontics

TIMELINE OF EVENTS SINCE ONSET OF ILLNESS

Acute febrile illness

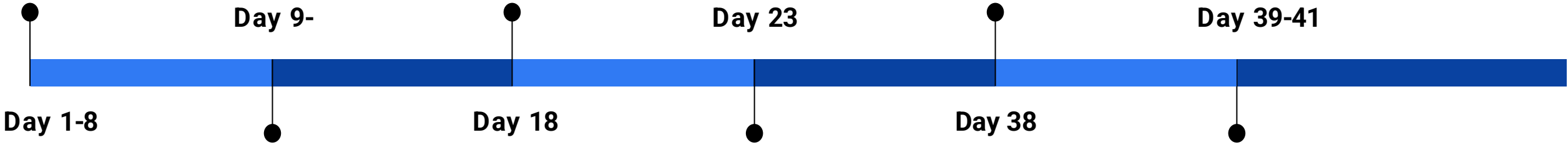
- ➔ Prior to DYP
- ➔ Oral f/b IV antibiotics
- ➔ Labs- inconclusive

Infective endocarditis

- ➔ D/T pre-existing CVC ??
- ➔ MRSA dissemination ??
- ➔ Conservative Mx

Pericardectomy

- ➔ Why ?
- ➔ Intra- op events



Acute pericarditis- purulent

- ➔ Septic + Cardiogenic shock
- ➔ Pericardial rub driving diagnosis
- ➔ MRSA growth
- ➔ Other workup inconclusive

Impending constrictive pericarditis

- ➔ Purulent fluid with septae
- ➔ Pigtail insertion
- ➔ Fibrinolysis

Multi-organ Dysfunction and Death

- ➔ BV dysfunction
- ➔ AKI, ARDS
- ➔ Refractory vasoplegia
- ➔ Encephalopathy