

# A Rare Triad of Osteomyelitis, Thrombophlebitis and Septic Pulmonary Embolism caused by *Enterococcus* in an Adolescent: A Case Report

SHEELA OMPRAKASH PANDEY<sup>1</sup>, SAMEER SHRIKANT YADAV<sup>2</sup>, DIVIT PRAJESH SHAH<sup>3</sup>, NEELAM NARENDRA REDKAR<sup>4</sup>, RAUNAK RABINDRANATH MANDAL<sup>5</sup>



## ABSTRACT

Acute febrile illnesses in Indian subcontinent commonly occur in monsoon season and presents with fever, bodyache, rash, headache, myalgia and sometimes with complications like acute respiratory distress, renal failure, bleeding tendencies. Herein, authors report an unusual case of 13-year-old boy presenting with fever and respiratory distress preceded by history of trivial trauma to his left arm. On subsequent investigations, including Magnetic Resonance Imaging (MRI) of left arm, CT-Pulmonary Angiography (CTPA), High Resolution Computed Tomography (HRCT) thorax and blood culture, he was found to have Septic Pulmonary Embolism (SPE) secondary to acute osteomyelitis induced deep vein thrombophlebitis. Blood culture grew *Enterococcus* species which is a rare finding. Patient required invasive ventilation, anticoagulant and higher antibiotics for six weeks, following which his condition gradually improved and did not require surgical intervention. A trivial trauma to left arm resulting into enterococcal acute osteomyelitis leading to deep vein thrombophlebitis and SPE. The triad of acute osteomyelitis, deep vein thrombophlebitis and SPE may lead to life threatening complications, if not diagnosed early.

**Keywords:** Anticoagulation, Trauma, Vancomycin

## CASE REPORT

A 13-year-old boy reported to emergency department during monsoon period with complaints of fever with chills, cough with minimal expectoration since two days and acute onset breathlessness of grade 3 based on the modified Medical Research Council (mMRC) scale, which progressed to grade 4 in one day. He gave history of trauma to left shoulder and elbow four days back while playing for which he was treated with Non Steroidal Anti-Inflammatory Drugs (NSAIDs) and was applied above elbow slab with arm pouch by local doctor. There was no history of jaundice, rash, oliguria and bleeding from any orifices. Physical examination revealed pulse of 110 beats/min, respiratory rate of 45/min and BP of 110/70 mm of Hg. He was febrile with temperature of 38.6°C, having bilateral crackles on chest auscultation with saturation of 91%. His left arm local examination findings were suggestive of tenderness at proximal humerus and elbow with mild oedema, painful range of movements without distal neurovascular deficit or external wound. He was admitted in intensive care unit, in view of hypoxia on his Arterial Blood Gas (ABG) pH-7.28, pO<sub>2</sub>-73.3 mmHg, pCO<sub>2</sub>-46 mmHg, HCO<sub>3</sub><sup>-</sup> - 20.5 mmol/L he was intubated and put on invasive ventilator. Initial blood reports suggested Haemoglobin (Hb) 10.5 gm/dL, White Blood Cells (WBC) 13500 cells/mm<sup>3</sup> with neutrophilic predominance, platelet 57000 cells/ $\mu$ L, C-Reactive Protein (CRP)- 348 mg/L, normal liver and renal function tests. His chest X-ray showed bilateral lung infiltrates. Monsoon season contributes to rise in cases of tropical diseases e.g., dengue, malaria, leptospirosis and viral fever [1]. Commonly, these conditions present with acute febrile illness, sometimes associated with breathing difficulties. These overlapping symptoms may complicate the diagnosis. As patient had presented with fever, respiratory distress and thrombocytopenia during monsoon season, monsoon related tropical illnesses were considered as differential diagnosis and he was started on empirical antibiotic i.v. ceftriaxone 1 gm BD, tablet doxycycline 100 mg BD, antimalarial i.v. artesunate 90 mg BD for one day then OD, tablet trypsin-chymotrypsin 1,00,000 units TDS and i.v. fluids (Normal saline) 80 mL/hour. ECG revealed sinus tachycardia with S1Q3T3 pattern, owing to which D-dimer and CT-

PA were done. D-dimer was raised >3000 ng/mL and CTPA showed peripheral wedge shaped consolidations with multiple tiny nodules in both upper and lower lobes suggestive of septic emboli with infarct [Table/Fig-1]. A 2D-ECHO showed mild pulmonary hypertension with no evidence of right ventricle strain or clot in main pulmonary artery, left pulmonary artery and right pulmonary artery. There were no vegetation, thickening of valves, and no evidence of infective endocarditis. Patient was started on low molecular weight heparin after his platelet counts improved. His screening for febrile illnesses (Dengue NS1, IgM and PCR, rapid malaria antigen and peripheral smear for malarial parasites, leptospirosis IgM and PCR, COVID-19 and H1N1 RT-PCR) turned out to be negative. After two days, he was successfully extubated, owing to decreased FiO<sub>2</sub> requirement on ventilator, improving ABG parameters and haemodynamics. But in view of, persistent fever spikes, blood and urine culture, USG of abdomen and HRCT thorax were done. Urine and USG abdomen didn't reveal any infective focus. Blood culture grew *Enterococcus*

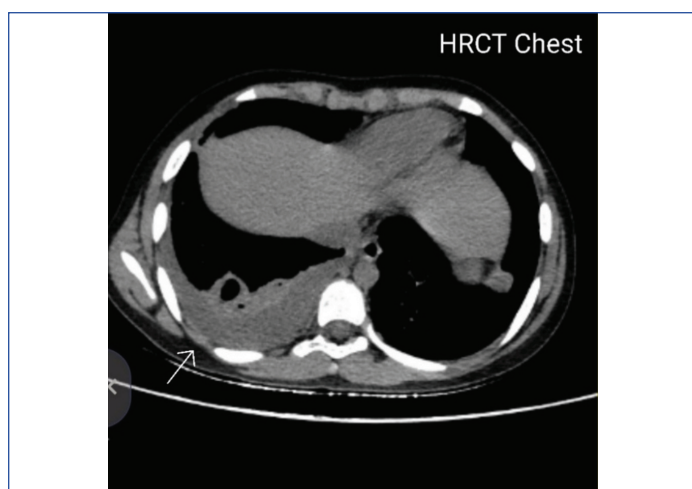


**[Table/Fig-1]:** In CT-PA white arrows showing peripheral wedge shaped consolidations with multiple tiny nodules in lower lobes of suggestive of septic emboli with infarct.

species, sensitive to vancomycin and linezolid, hence patient was started on i.v. vancomycin 500 mg TDS. HRCT thorax showed temporal changes in septic emboli with development of internal cavitation changes and right-sided pleural effusion [Table/Fig-2]. The pleural fluid analysis depicted exudative effusion of infective aetiology with neutrophilic predominance. Fever started resolving after i.v. antibiotics but there was lack of clinical improvement in left arm pain and oedema. USG local of left arm and elbow revealed changes of cellulitis with minimal elbow joint effusion, synovial thickening and cephalic vein thrombophlebitis. Hence, MRI of left shoulder and elbow [Table/Fig-3a,b] was done, which showed altered signal intensity areas in humeral shaft, head adjacent to epiphysio-diaphyseal junction and distal shaft of humerus with endosteal scalloping with adjacent inflammatory changes in inter and intramuscular planes of shaft of humerus, axillary region, distal arm and around elbow joint with minimal fluid intensity collection in biceps tendon sheath and elbow joint effusion pointing towards acute osteomyelitis. The i.v. vancomycin 500 mg TDS was continued for six weeks. During the course of treatment, blood cultures were sent which were found to be negative and patient did not require surgical debridement.



[Table/Fig-3b]: MRI left elbow showing high signal intensity areas in distal shaft of humerus with endosteal scalloping with adjacent inflammatory changes (white arrow).



[Table/Fig-2]: HRCT Chest showing temporal changes in septic emboli with development of internal cavitation changes and right-sided pleural effusion (white arrow).



[Table/Fig-3a]: MRI left shoulder showing high signal intensity areas in humeral shaft, head adjacent to epiphysio-diaphyseal junction (white arrow).

## DISCUSSION

The triad of acute osteomyelitis, deep vein thrombophlebitis, and SPE have been reported in limited number of cases in literature [2-7]. The sequence in which these three conditions appear is

still a bone of contention. Gorenstein A et al., were among first to report cases of acute osteomyelitis and septic thrombophlebitis in children, accompanied by SPE, occurring as part of a widespread staphylococcal infection [2].

Osteomyelitis occurs in children and adolescent in the metaphysis of long bones. The bone vascular network is well developed around the large joints of long bone. Metaphysis and epiphysis are vascularised by triple network of metaphyseal, peripheral and epiphyseal vessels. Bone metaphysis is susceptible to frequent bacterial infections as it is richly vascularised. A recent history of trivial local trauma to long bones or mild skin infection can be entry point for the bacteria [3]. In this case, as osteomyelitis was not detected early, the infection spread to drainage venous system of upper limb leading to thrombophlebitis and venous thrombosis. Septic emboli from this infected source travelled to the lungs causing septic cavitary nodules. In this case, organism isolated on blood culture was *Enterococcus* species. Patient was treated and recovered with mechanical ventilation, anticoagulation and intravenous vancomycin.

Infectious osteomyelitis is monomicrobial commonly due to *Staphylococcus aureus*, *Streptococcus agalactiae*, *E. coli*, *Streptococcus pyogenes*, *H. influenzae* [4]. LePage AA et al., have described two cases of septic thrombophlebitis with acute osteomyelitis where in one case there was cephalic and subclavian vein thrombophlebitis due to acute osteomyelitis resulting in pulmonary embolism and blood culture was suggestive of Methicillin Sensitive *Staphylococcus aureus* (MSSA) [5]. Patient required surgical drainage, systemic antibiotics and anticoagulation. Whereas in second case, they described common femoral vein septic thrombophlebitis leading SPE due to *Fusobacterium necrophorum*. This patient required surgical debridement, thrombectomy and antibiotics. Gite A et al., reported three children who developed Deep Vein Thrombosis (DVT) due to osteomyelitis of femur. In the two cases out of three, osteomyelitis occurred due to *Staphylococcus aureus* and *Enterococcus* respectively and no organism isolated in one case. All these patients required with mechanical ventilation, in two cases for suspected pulmonary embolism and in one for Acute Respiratory Distress Syndrome (ARDS) [6].

Sheikh Najeeb M et al., described a case of DVT causing septic pulmonary thromboembolism due to post-traumatic femur osteomyelitis [7]. Blood and Bronchoalveolar Lavage (BAL) fluid culture showed growth of Extended-spectrum beta-lactamases (ESBLs) producing *Klebsiella pneumoniae*. Patient was treated with surgical drainage, antibiotics and anticoagulants. Hollmig ST et al., in their retrospective study of 11 children, diagnosed as

osteomyelitis due to *Staphylococcus aureus* developed DVT in femoral, popliteal and iliac vein [8]. Eight out of 11 patients had Methicillin Resistant *Staphylococcus aureus* (MRSA) on culture. Hansen J et al., described a case of femur osteomyelitis with popliteal vein thrombosis due to *Streptococcus viridans*. Patient underwent surgical and medical management [9].

While most of the cases described above isolated *Staphylococcus* as the causative organism, in smaller number of reports, other organisms have been implicated. In present case, *Enterococcus* species was isolated, which was a unique finding. This finding matches closest with Gite A et al., because *Enterococcus* was isolated as the causative organism in one of their cases and cases recovered with systemic antibiotics, anticoagulation and mechanical ventilation [6]. Only difference was the site of involvement which was upper limb osteomyelitis in present case and lower limb in Gite A et al., case report [6].

Few case reports of community acquired *Enterococcus* infection have been previously reported in children. While Bitsori M et al., described acute Urinary Tract Infection (UTI) due to *Enterococcus faecalis* in 13 children [10], Mendes AR et al., reported a case of primary lung abscess due to *Enterococcus faecalis* in a case of congenital airway deformity (tracheal bronchus) [11]. Codelia-Anjum A et al., described that community acquired UTI occur in association with risk factors [12]. Devarakonda PK et al., reported a case of *Enterococcus faecalis* bacteraemia causing infective endocarditis and osteomyelitis in an elderly patient [13].

*Enterococcus* osteomyelitis is a rare but clinically important cause of bone infection. *Enterococcus* is an uncommon pathogen in osteomyelitis (<5% of cases) [14] and often associated with healthcare related infections, especially after surgery, trauma, or prolonged hospitalisation. MRI is most sensitive imaging for early detection of osteomyelitis. Bone biopsy and culture is gold standard to identify *Enterococcus*. Blood cultures may be positive, especially in haematogenous spread of *Enterococcus*. The duration of treatment of acute osteomyelitis is six weeks or more guided by clinical response, inflammatory markers, leukocyte count [15]. *Enterococcus* osteomyelitis is treated with synergistic combination of beta lactum or vancomycin with aminoglycosides along with surgical debridement and drainage [16]. This patient was treated with vancomycin and clinically responded well to the treatment. Prognosis is better in acute infections with early diagnosis. Joint destruction and abscess formation are known complication of osteomyelitis [17]. Indications of surgical debridement are rapidly progressive bone infection or abscess formation [18].

## CONCLUSION(S)

Symptoms of SPE like fever with breathlessness were initially misled to diagnosis of monsoon related febrile illness with ARDS but trauma to arm history was the clue. High index of suspicion is necessary in such cases having a history of associated trivial trauma. Detection

of any single component of triad (acute osteomyelitis, deep vein thrombophlebitis, SPE) may prompt a search for other two associated conditions. In such cases, acute osteomyelitis should be ruled out early with MRI imaging, as X-ray of bone appears normal in the initial stages. Early diagnosis is the key to good prognosis and outcome whereas late diagnosis may lead to complications including joint destruction, abscess formation and sepsis.

## REFERENCES

- [1] Singh SK, Arora R, Menon AS, Gupta A, Vashist R, Prasad R, et al. Clinical features and etiological profile of acute undifferentiated febrile illness in western Maharashtra: A 2024 monsoon observational study. *J Clin Infect Dis Soc.* 2025;3(2):45-51.
- [2] Gorenstein A, Gross E, Houry S, Gewirts G, Katz S. The pivotal role of deep vein thrombophlebitis in the development of acute disseminated staphylococcal disease in children. *Pediatrics.* 2000;106:E87.
- [3] Grimprel E, Cohen R. Epidemiology and physiopathology of osteoarticular infections in children (newborns except). *Arch Pediatr.* 2007;14 Suppl 2:S81-S85.
- [4] Lew DP, Waldvogel FA. Osteomyelitis. *Lancet.* 2004;364:369-79.
- [5] LePage AA, Hess EP, Schears RM. Septic thrombophlebitis with acute osteomyelitis in adolescent children: A report of two cases and review of the literature. *Int J Emerg Med.* 2008;1(2):155-59.
- [6] Gite A, Trivedi R, Ali US. Deep vein thrombosis associated with osteomyelitis. *Indian Pediatrics.* 2008;45:418-19.
- [7] Sheikh Najeeb M, Alshwaiki A, Martini N, Alsuliman T, Alkharat B, Alrstom A. Acute osteomyelitis, thrombophlebitis, and pulmonary embolism: A case report. *J Med Case Rep.* 2023;17(1):471.
- [8] Hollmig ST, Copley LAB, Browne RH, Grande LM, Wilson PL. Deep venous thrombosis associated with osteomyelitis in children. *J Bone Joint Surg Am.* 2007;89(7):1517-23.
- [9] Hansen J, Ngatuvai M, Bermudez A, Salisbury J, Klahs K, Handel G, et al. Popliteal deep vein thrombosis in a pediatric patient with *Streptococcus viridans* osteomyelitis: A case report. *J Surg Case Rep.* 2024;2024(12):rae758.
- [10] Bitsori M, Maraki S, Raissaki M, Bakantaki A, Galanakis E. Community-acquired enterococcal urinary tract infections. *Pediatr Nephrol.* 2005;20(11):1583-86.
- [11] Mendes AR, Costa A, Ferreira H, Ferreira C. *Enterococcus faecalis*-associated lung abscess in a male adolescent: A case report. *BMC Pediatr.* 2020;20:98.
- [12] Codelia-Anjum A, Lerner LB, Elterman D, Zorn KC, Bhojani N, Chughtai B. Enterococcal urinary tract infections: A review of the pathogenicity, epidemiology, and treatment. *Antibiotics (Basel).* 2023;12(4):778.
- [13] Devarakonda PK, Dhulipala VR, Karki M, Ayala-Rodriguez C, Reddy S. A rarely reported case of *Enterococcus faecalis* bacteremia causing infective endocarditis and osteomyelitis. *Cureus.* 2022;14(2):e22522. Doi: 10.7759/cureus.22522. PMID: 35345720; PMCID: PMC8956490.
- [14] Sreenivasan P, Raj R, Kumaravel J, Kumar D, Anrup A. Unveiling the uncommon: A rare case report of osteomyelitis caused by *Enterococcus avium*. *Indian J Med Microbiol.* 2025;54:1100818.
- [15] Nourse C, Starr M, Munckhof W. Community-acquired methicillin-resistant *Staphylococcus aureus* causes severe disseminated infection and deep venous thrombosis in children: Literature review and recommendations for management. *J Paediatr Child Health.* 2007;43(10):656-61.
- [16] Barbari EF, Kanj SS, Kowalski TJ, Darouiche RO, Widmer AF, Schmitt SK, et al. 2015 Infectious Diseases Society of America (IDSA) clinical practice guidelines for the diagnosis and treatment of native vertebral osteomyelitis in adults. *Clin Infect Dis.* 2015;61(6):e26-e46.
- [17] Pantelli M, Giannoudis PV. Chronic osteomyelitis: What the surgeon needs to know. *EFORT Open Rev.* 2016;1(5):128-35.
- [18] Woods CR, Bradley JS, Chatterjee A, Copley LA, Robinson J, Kronman MP, et al. Clinical practice guideline by the Pediatric Infectious Diseases Society and the Infectious Diseases Society of America: 2021 guideline on diagnosis and management of acute hematogenous osteomyelitis in pediatrics. *J Pediatric Infect Dis Soc.* 2021;10(8):801-44.

### PARTICULARS OF CONTRIBUTORS:

1. Assistant Professor, Department of General Medicine, HBT Medical College and Dr. RN Cooper Hospital, Mumbai, Maharashtra, India.
2. Associate Professor, Department of General Medicine, HBT Medical College and Dr. RN Cooper Hospital, Mumbai, Maharashtra, India.
3. Assistant Professor, Department of General Medicine, HBT Medical College and Dr. RN Cooper Hospital, Mumbai, Maharashtra, India.
4. Professor and Head, Department of General Medicine, HBT Medical College and Dr. RN Cooper Hospital, Mumbai, Maharashtra, India.
5. Resident, Department of General Medicine, HBT Medical College and Dr. RN Cooper Hospital, Mumbai, Maharashtra, India.

### NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Sheela Omprakash Pandey,  
Department of General Medicine, HBT Medical College and Dr. RN Cooper Hospital, Vileparle, Mumbai-400056, Maharashtra, India.  
E-mail: doc.sheelapandey@gmail.com

### PLAGIARISM CHECKING METHODS: [Jan 11 et al.]

- Plagiarism X-checker: Sep 11, 2025
- Manual Googling: Dec 26, 2025
- iThenticate Software: Dec 29, 2025 (1%)

### ETYMOLOGY: Author Origin

### EMENDATIONS: 6

### AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. Yes

Date of Submission: **Sep 10, 2025**  
Date of Peer Review: **Nov 18, 2025**  
Date of Acceptance: **Jan 01, 2026**  
Date of Publishing: **May 01, 2026**