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 The 1st International Conference on Tropical Medicine and Infectious Diseases (ICTROMI) Faculty of Medicine Universitas Sumatera Utara in conjunction with The 23rd National Congress of The Indonesian Society of Tropical and Infectious Diseases Consultant and The 18th Annual Meeting of Internal Medicine Department Faculty of Medicine Universitas Sumatera Utara  
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 Analysis cluster of differentiation 4 number and c-reactive protein concentration in patient with human immunodeficiency virus with or without lung tuberculosis  
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 Correlation between HIV-1 genotype and clinical progression in HIV/AIDS patients in Surabaya, Indonesia  
 B E Rachman, S Q Khairumisa, A M Witaningrum, M Q Yunifiar and Nasronudin  
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 Prevalence of drug-resistant mutation among drug-treated HIV/AIDS inpatient in Airlangga University teaching hospital, Surabaya, Indonesia  
 B E Rachman, S Q Khairumisa, A M Witaningrum, M Q Yunifiar, P Widiyanti and Nasronudin  
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 HIV impact on women: gender difference among late testers and advanced HIV infection  
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 Analysis of the association opportunistic infections with c-reactive protein focus toxoplasma, cytomegalovirus, rubella, and hepatitis in human immunodeficiency virus  
 K H Khadjah, K Ferica, S Katu, R Halim and A H Mubin  
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 Effect of isoniazid preventive therapy on tuberculosis incidence in people living with HIV/AIDS at Hasan Sadikin hospital  
 I Satiawan, Y Hartantri, B Werry, Y Nababan, R Wisaksana and B Alisjabban  
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 Chronic kidney disease in HIV patients  
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 Association between CD8 T-cell subsets and CD4/CD8 ratio with HS-CRP level in HIV-infected patients on antiretroviral therapy  
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 Correlation of depression and quality of life in HIV/AIDS patients  
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 Detection of micro RNA hsa-let-7e in peripheral blood mononuclear cells infected with dengue virus serotype-2: preliminary study  
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 The worsening factors of dengue hemorrhagic fever (DHF) based on cohort study with nested case-control in a tertiary hospital  
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 A comparison of the immune response between early exposed and 1 year post exposure to *Bacillus anthracis* in Indonesia  
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## Dominant risk factors for malaria at Puskesmas Labuhan Ruku, Talawi Batu Bara, Indonesia

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<a href="#">Sequence analysis of DBL2<math>\beta</math> domain of <i>vargene</i> of Indonesian <i>Plasmodium falciparum</i></a>				
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<a href="#">The first evaluation of glucose-6-phosphate dehydrogenase deficiency (G6PD) gene mutation in malaria-endemic region at South Central Timor (SCT) district, Eastern Indonesia 2015-2016</a>				
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<a href="#">RDT accuracy based on age group in hypoendemic malaria</a>				
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<a href="#">The comparison of detection methods of asymptomatic malaria in hypoendemic areas</a>				
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<a href="#">Severe falciparum malaria: A case report</a>				
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<a href="#">Association of serum ferritin levels with immunological status and clinical staging of HIV patients: a retrospective study</a>				
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<a href="#">Higher plasma CD4 lymphocyte count correlates with better cognitive function in human immunodeficiency virus-acquired immunodeficiency syndrome (HIV-AIDS) patients</a>				

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<b>Profile of hepatitis B and C virus infection in prisoners in Lubuk Pakam correctional facilities</b>	012033
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<b>Associated risk factors for urinary tract infection among pregnant women at Puskesmas Kenangan, Deli Serdang district</b>	012035
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<b>The accuracy of formol-ether concentration in diagnosing soiltransmitted helminths in elementary school 27 Peusangan in Bireuen</b>	012040
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A Syahputra, M L Siregar and K F Jamil			
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## Management of a patient with dengue virus infection and tetralogy of Fallot

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# Management of a patient with dengue virus infection and tetralogy of Fallot

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**Abstract.** TOF belongs to cyanotic heart disease group, which has polycythemia and a high baseline hematocrit. A heart defect that features four problems: a hole between the lower chambers of the heart, an obstruction from the heart to the lungs, the aorta lies over the hole in the lower chambers, the muscle surrounding the lower right chamber becomes overly thickened. Dengue viral infection in patients with TOF would have a greater potential for the occurrence of heart failure because the baseline of hematocrit is already higher compared with non-congenital heart disease. A 22-year-old man complains of fever and nausea since three days before hospitalized. The principal treatment is enough rest and rehydration to achieve normal range of hematocrit (around 65%) and to avoid drugs that may precipitate bleeding (like salicylic acid). In the management of this patient, we should be more careful because there was comorbid with TOF. The focus of the management is to prevent dehydration during the critical phase and aware of overhydration in the recovery phase.

## 1. Introduction

Congenital heart disease (CHD) is still the problem around the world, the estimate of CHD is around 8 per 1,000 live births, and tetralogy of Fallot (TOF) ranked number 5.[1] According to the center for disease control and Prevention (CDC), Atlanta the prevalence of TOF in the United States of America is around 4 per 10,000 children born alive. In Indonesia, the prevalence of TOF approximately 10-15% of all congenital heart disease, and ranked number 4 after a ventricular septal defect, atrial septal defect and patent ductus arteriosus.[2,3] TOF belongs to cyanotic heart disease group, which has polycythemia and a high baseline hematocrit. Tetralogy of Fallot has four problems; they are a ventricular septal defect, overriding aorta, right ventricular hypertrophy, stenosis pulmonary artery.[4,5] Patients with TOF may be well compensated under normal circumstances. However, an infection such as Dengue that causes high fever, tachycardia and increased metabolic demands may precipitate decompensation of cardiac functions. Patient with TOF cannot compensate dehydration or overhydration. Therefore, rehydration therapy should be guided by frequent clinical assessments, hematocrit examination, and blood gas analysis during the acute phase of the disease. The principle of TOF treatment is to prevent a decrease in systemic vascular resistance (SVR).[6,7]

Dengue fever (DF) and dengue hemorrhagic fever (DHF) is an infection caused by dengue virus with clinical manifestations of fever, muscle aches or joint pain that is accompanied by leucopenia, rash, lymphadenopathy, and hemorrhagic diathesis.[8] In the state of DHF plasma leakage occurs





which is characterized by hemoconcentration (increased hematocrit) or a buildup of fluid in the body cavity. Ministry of Health noted the number of patients with dengue virus infection in Indonesia in January and February 2016 as many as 8487 cases with 108 deaths. Most classes are experiencing dengue virus infection in Indonesia at the age of 5-14 years reached 43.44% and the age of 15-44 years reached 33.25%.[9] Dengue viral infection in patients with TOF would have a greater potential for the occurrence of heart failure, the baseline of hematocrit is already higher compare with non-congenital heart disease.

In this case, presentation mainly emphasizes the management of DHF in a patient with TOF, which need serious clinical observation and management. A better understanding of cardiac physiology in TOF will potentially improve management of this patient.

## 2. Case report

The patient was coming with chief complain of fever for three days before hospitalized, high fever directly, nausea, no vomiting, chill, abdominal pain, and headache. Normal urinate, no pain during his urination and normal bowel. No obtained of complaint of nosebleed, gum bleeding, petechiae. Besides this, the patient complains of intermittent breathless since he was 2-month-old, accompanied by swelling and blue colors of the fingers. That arise during his higher intensity activities, such as running, climbing stairs. Breathless reduced when he was in squatting position, no chest pain and palpitation. The patient complains fatigue rapidly and difficult to gain the body weight. From the history of past illness, he had congenital heart disease, arise for two months old and does not control routinely.

From physical examination on 2<sup>nd</sup> May 2016, the general condition was weak, compos mentis, blood pressure 130/80 mmHg, pulse 90x/minute, respiratory rate 20x/minute, axillary temperature 37°C. Head and neck examination: no anemia, icteric, and enlargement of lymph nodes, there was dyspnea and cyanotic. The thorax examination found the shape and movement symmetric, single first and second of a heart sound, heart murmur holosystolic at intercostal space II-III left parasternal. Vesicular breath sound of left and right lung, no wheezing and rhonchi. On abdominal examination found that liver and lien not palpable, clubbing fingers and cyanotic on extremities examination. Rampedleede was positive.

From laboratory finding on 2<sup>nd</sup> May 2016: Hb 15 g/dl, leukocyte 4100/μL, platelet 50,000/μL, hematocrit 70%. Random blood sugar 120 g/dl, SGOT 48 U/L, SGPT 26 U/L, albumin 3.3 g/dl, BUN 7 mg/dl, serum creatinine 0.8 mg/dl, total bilirubin 0.5 mg/dl, direct bilirubin 0.9 mg/dl, sodium 139 mmol/l, potassium 4.5 mmol/l, chloride 105 mmol/l.

Thoracic x-ray on 2<sup>nd</sup> May 2016 showed boot shape appearance of heart with impression cardiac enlargement with CTR 70%.

The early diagnosis was suspect dengue hemorrhagic fever (DHF) and tetralogy of Fallot (TOF). The Planning for diagnosis: IgG and IgM anti-dengue examination, NS-1, serial blood examination.

On echocardiography examination revealed (04/05/2016)

1. Valvular of heart: light aorta regurgitation, severe tricuspid regurgitation, moderate infundibular pulmonary stenosis
2. The size of a heart cavity: left atrium and left ventricle was normal, right atrium dilatation, right ventricle dilatation, no intra-cardiac thrombus and vegetation
3. Normal left ventricular systolic function (EF 64%). Abnormal relaxation of left ventricular diastolic function, normal right ventricular systolic function
4. There was no left ventricular hypertrophy
5. There was interventricular defect (malalignment size 1.6 cm)
6. Revealed overriding aortic.
7. Revealed right ventricular hypertrophy (2.0 cm)

The conclusion is supported overview of Tetralogy of Fallot (TOF).

Planning for treatment: nasal O<sub>2</sub> 3L/minute, high caloric and protein diet 2100 kcal/day, PZ infusion 14 drops/minute, fluid balance I=O+500cc (drink up 600 cc), Ranitidine 2x1 ampoule iv, Paracetamol 3 x 500 mg, Bisoprololol 1.25-0-0, Ramipril 2.5-0-0.

The follow up for this patient on thesecond day of treatment (3<sup>rd</sup>May, 2016), he complains of body weakness, no fever, breathless and bleeding. From physical examination found that general condition was weak, compos mentis, blood pressure 120/80 mmHg, pulse 80x/minute, respiratory rate 20x/minute, axillary temperature 37<sup>o</sup>C. Head and neck examination: no anemia, icteric, and enlargement of lymph node, cyanotic without dyspnea. Examination of thorax found symmetric shape and movement, single of afirst and second heart sound, heart murmur holosystolic at ICS II-III left parasternal. Vesicular breath sound from left and right lung, no wheezing and Ronchi. Abdominal examination showed that liver and lien not palpable. Extremities examination showed that there were clubbing fingers, cyanotic and positive Rumpfleede.

The laboratory findings on 3<sup>rd</sup> May 2016. Negative NS1 and IgG anti-dengue, positive IgM anti-dengue, Hb 15 g/dl, leukocyte 9900/ $\mu$ L, platelet 60,000/ $\mu$ L, hematocrit 75%.The final diagnosis was thefirst grade of DHF and TOF. Our planning therapy for this patient was bed rest, high caloric and protein diet 2100 kcal/day, PZ infusion 14 drops/minute, fluid balance I = O + 500 cc (drink up to 600 cc), Ranitidine 2 x 1 ampoule iv, Paracetamol 3 x 500 mg, Bisoprolol 1.25-0-0 and Ramipril2.5-0-0

### 3. Discussion

Rarely patients with TOF who lived in adult-hood without cyanotic symptoms. The following factors can worsen cyanosis in patients with TOF: acidosis, stress, infection, posture, exercise, beta-adrenergic agonists, and dehydration. The predominant shunt is from right to left with flow across the VSD into the left ventricle (LV). This flow will produce cyanosis and an elevated hematocrit value. When the pulmonary stenosis is mild, bidirectional shunting may occur.

Symptoms generally progress secondary to hypertrophy of the infundibular septum, results in low oxygenation of blood due to the mixing of oxygenated and deoxygenated blood. This occurs in the left ventricle via the ventricular septal defect (VSD) and preferential flow of the mixed blood from both ventricles through the aorta because of the obstruction to flow through the pulmonary valve. Worsening of the right ventricle outflow tract (RVOTO) leads to RV hypertrophy, increased right-to-left shunting, and systemic hypoxemia.

Laboratory tests on the TOF: Routine laboratory examination is important in any cyanotic congenital heart disease, to assess the progress of the disease. Hemoglobin and hematocrit is a good indicator to determine the degree of hypoxemia. The increase in hemoglobin and hematocrit have a compensatory mechanism due to low oxygen saturation. In general, hemoglobin is maintained between 16-18 g / dL, while the hematocrit between 50-65%. If levels of hemoglobin and hematocrit exceeded this limit, raised the danger of thromboembolic disorders, otherwise if less than the lower limit, this means there is a relative anemia that should be treated.

Electrocardiogram: Enlargement of the right ventricle (voltage R wave in V1-V3 is high and the S wave in V5-V6 in) and can also occur left and right ventricular enlargement (combination). P waves are high and pointy in leads II (> 2.5 mm) showed hypertrophy of the right atrium. Information:

Echocardiogram: Can be used to confirm the diagnosis and detect problems associated with TOF. Enlargement of the right ventricle, ventricular septal defect, overriding aorta, and right ventricular outflow tract obstruction can be displayed clearly; it can be shown shunting the past VSD and increased Doppler flow velocity passing through the right ventricle. The size of the main branch of the pulmonary artery and the proximal as well as any other additional blood flow to the lungs to be evaluated.

The diagnosis of TOF on this patient best on the history that the patient complains of intermittent breathless since he was 2 month-old, accompanied by swelling and blue colors of the fingers, that complains arise during his higher intensity activities, such as running, climbing stairs. Breathless reduced when he was in squatting position, no chest pain and palpitation.

On chest x-rays revealed cardiomegaly, on electrocardiography, there were Enlargement of the right ventricle (voltage R wave in V1-V3 is high and the S wave in V5-V6 in) and can also occur left and right ventricular enlargement (combination). P waves are high and pointy in leads II (> 2.5 mm) showed hypertrophy of the right atrium.

On echocardiography revealed: enlargement of the right ventricle, ventricular septal defect, theoverriding aorta.

Dengue viruses infection maybe symptomatic or asymptomatic. Symptomatic dengue virus infection has a wide clinical spectrum that includes both severe and non-severe clinical manifestation.

The diagnosis of dengue virus infection is usually made clinically. The main symptom is high fever with no localizing source of infection, a petechial rash with thrombocytopenia and relative leukopenia (low platelet and white blood cell count).

A laboratory test to confirm the diagnosis: Dengue Antigen test (NS-1), serological test IgM and IgG of dengue, these serological test can predict whether the dengue viral infection primary or secondary, in primary infection IgM usually appear after first week and IgG appear after second weeks. White Blood Cells Count usually reveal leukopenia. The presence of leukocytosis and neutrophilia excludes the possibility of dengue, and bacterial infections (leptospirosis, meningococcal meningitis, septicemia, pyelonephritis, etc.) must be considered.

The diagnosis dengue hemorrhagic fever of this patients base on the clinical manifestation that is acute fever 3 days before admission, rumple leed was positive, and serological test IgM +, and there was increasing of haematocrit (HCT) from 70% - 75%, normally in a patient with TOF haematocrit range between 50-65%, so there was increasing of HCT in this patient more than 20%. This patient could be the primary dengue viral infection because only IgM was positive and IgG negative.

Management of dengue virus infection is relatively simple, inexpensive, effective in saving lives, so long as correct and timely interventions are instituted. The key to a good clinical outcome is understanding and being alert to the clinical problems that arise during the different phases of the disease, leading to rational approach in case management.

Medical complication of DHF can be found in the three-phase of infections (Figure 1).

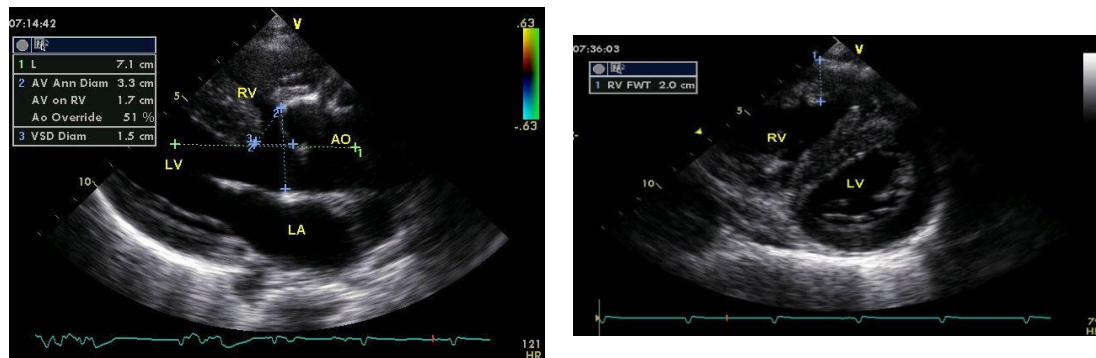
1. Febrile phase: Patients typically develop a high-grade fever. This acute febrile phase usually lasts 2-7 days and often accompanied by facial flushing, skin erythema, generalized body ache, myalgia, arthralgia, retro-orbital eye pain, photophobia, anorexia, nausea, vomiting, and headache. It can be difficult to distinguish dengue clinically from non-dengue febrile diseases in the early febrile phase. A positive tourniquet test in this phase indicates an increased probability of dengue.[10]

2. Critical phase: During the transition from the febrile to afebrile phase, patients without an increase in capillary permeability will improve without going through the critical phase. The warning signs the beginning of the critical phase, the patients become worse around the time of defervescence, when the temperature drops to 37,5- 38C or less and remains below this level, usually on days 3-8 of illness. Followed by a rapid decrease in platelets count usually precedes plasma leakage. An increasing hematocrit above the baseline may be one of the earliest additional signs. The degree of hemoconcentration above the baseline hematocrit reflects the severity of plasma leakage, however, this may be reduced by early intravenous fluid therapy. Some patients progress to critical phase of plasma leakage and shock before defervescence, in this patients rising hematocrit and rapid onset of thrombocytopenia or the warning sign, indicate the onset of plasma leakage.[10]

3. Recovery phase: As the patients survive the 24-48 hour critical phase, a gradual reabsorption of extravascular compartment fluid takes place in the following 48-72 hours. General well being improves, appetite returns, gastrointestinal symptoms abate, hemodynamic status stabilizes, and diuresis ensues. The haematocrit stabilizes or may be lower due to the dilutional effect of reabsorbed fluid. Respiratory distress from the massive pleural effusion and ascites, pulmonary edema or congestive heart failure will occur during the critical and/ or recovery phases if excessive intravenous fluids have been administered (hypervolemia).[10]

In the management of this patient, we should be more careful because there was comorbid of TOF. The focus of the management is to prevent dehydration during the critical phase and aware of

overhydration in the recovery phase. The principal treatment is enough rest, rehydration to achieve normal range of haematocrit (around 65%), and avoid drugs that may precipitate bleeding (like salicylic acid).



**Figure 1.** Echocardiography:RV (Right ventricle), RA (Right atrium), LA (Left atrium), AO (Aorta) RV (Right ventricle), RA (Right atrium), LV (Left Ventricle), LA (Left atrium), RVDB (Right ventricular dilatation), RV (Right ventricle), LV (Left Ventricle).

#### 4. Conclusion

It has been reported of a man aged 22 years with a chief complain of fever since 3 days before hospitalized, high fever directly, nausea, no vomiting, chill, abdominal pain, and headache. Normal urinate, no pain during his urination and normal bowel. Besides this, the patient complains of intermittent breathless since he was 2 month-old, accompanied by swelling and blue colors of the fingers. That arise during his higher intensity activities, such as running, climbing stairs. Examination of thorax found symmetric shape and movement, single of a first and second heart sound, heart murmur holosystolic at ICS II-III left parasternal. In the management of this patient, we should be more careful because there was comorbid with TOF. The focus of the management is to prevent dehydration during the critical phase and aware of overhydration in the recovery phase. The principal treatment is enough rest, rehydration to achieve normal range of hematocrit (around 65%), and avoid drugs that may precipitate bleeding (like salicylic acid).

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