

Management Of A Patient With Dengue Virus Infection And Tetralogy Of Fallot

by Muhammad Vitanata Arfijanto

Submission date: 08-May-2023 10:22AM (UTC+0800)

Submission ID: 2087004763

File name: Patient_With_Dengue_Virus_Infection_And_Tetralogy_Of_Fallot.pdf (491.57K)

Word count: 3269

Character count: 18133

PAPER • OPEN ACCESS

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

To cite this article: M V Arfijanto *et al* 2018 *IOP Conf. Ser.: Earth Environ. Sci.* **125** 012093

4

View the [article online](#) for updates and enhancements.

You may also like

- [Passive blood plasma separation at the microscale: a review of design principles and microdevices](#)

Siddhartha Tripathi, Y V Bala Varun Kumar, Amit Prabhakar *et al.*

- [The effect of differences in altitude location of an aquaculture on fish's hematocrit and fish's haemoglobin of Carp fish and resistance to bacterial attack](#)

Rosidah, A Rizal, I Rustikawati *et al.*

- [Comparison of blood flow models and acquisitions for quantitative myocardial perfusion estimation from dynamic CT](#)

Michael Bindschadler, Dimple Modgil, Kelley R Branch *et al.*



The Electrochemical Society
Advancing solid state & electrochemical science & technology

243rd Meeting with SOFC-XVIII

Boston, MA • May 28 – June 2, 2023

Accelerate scientific discovery!

Learn More & Register



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

M V Arfijanto^{1*}, E Oktiawan², Purwati¹ and U Hadi¹

¹Division of Tropical Medicine and Infectious Disease, Department of Internal Medicine Faculty of Medicine, University of Airlangga-RSUD Dr. Soetomo, Surabaya, Indonesia

²University of Airlangga-RSUD Dr. Soetomo, Surabaya, Indonesia

*Corresponding author: divtropin@yahoo.com

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 compare with non-congenital heart disease. A 22-year-old man complains offever 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.

29

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 aventricular 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



Content from this work may be used under the terms of the [Creative Commons Attribution 3.0 licence](https://creativecommons.org/licenses/by/3.0/). Any further distribution of this work must maintain attribution to the author(s) and the title of the work, journal citation and DOI.

Published under licence by IOP Publishing Ltd

¹⁹ 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 2nd May 2016, the general condition was weak, ²⁴ 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 2nd 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 2nd 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 ²⁶
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 ²³
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 O₂ 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, Bisoprolol 1.25-0-0, Ramipril 2.5-0-0.

The follow up for this patient on the second day of treatment (3rd May, 2016), he complains of body weakness, no fever, breathless and bleeding. From physical examination found that general condition was weak, compositus mentis, blood pressure 120/80 mmHg, pulse 80x/minute, respiratory rate 20x/minute, axillary temperature 37^oC. 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 a first 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 Rumplesede.

The laboratory findings on 3rd May 2016. Negative NS1 and IgG anti-dengue, positive IgM anti-dengue, Hb 15 g/dl, leukocyte 9900/ μ L, platelet 60,000/ μ L, hematocrit 75%. The final diagnosis was the first 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 Ramipril 2.5-0-0

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.

27 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, meningoenephalitis, 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 toumiquet 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).

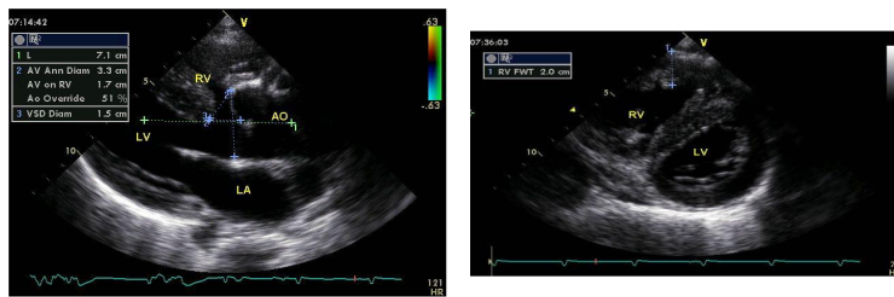


Figure 1. Echocardiography:RV (Right ventricle), RA (Right atrium), LA (Left atrium), AO (Aorta) RV (Right ventricle), RA (Right atrium), LV (Left Ventricle), LA (Left atrium), RVDB (Right ventricular dilatation), RV (Right ventricle), LV (Left Ventricle).

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).

References

- [1] Van der Linde D, Konings E E M, Slager M A, Witsenburg M, Helbing W A, Takkenberg J J M and Roos-Hesselink J W 2011 Birth prevalence of congenital heart disease worldwide *JACC* **58**(21) 2241-7
- [2] Sakidjan I 2014 Analisis kelengkapan catatan rekam medis kasus tetralogy of fallot pada implementasi INA-CBGS di RSPJN Harapan Kita *J. ARSI* **1**(1) 26-30
- [3] Ismail M T, Hidayati F, Krisdinarti L, Noormanto, Nugroho S and Wahab A S 2015 Epidemiological profile of congenital heart disease in a national referral hospital *Acta Cardiologica Indonesia* **1**(2) 66-71
- [4] Apis C, Webb G D and Redington A N 2009 Tetralogy of fallot Available from: <http://www.thelancet.com/journals/lancet/issue/vol374no9699> [Accessed: January 5, 2017]
- [5] National Heart Lung and Blood Institute (NHLBI) 2016 What is tetralogy of fallot? Available from: <https://www.nhlbi.nih.gov/health/health-topics/topics/TOF/> [Accessed: March 6, 2017]
- [6] Dausawati A F and Fuadi I 2013 Penatalaksanaan anestesi pasien tetralogy of fallot pada operasi mouth preparation *JAP* **1**(2) 119-22
- [7] Shirodkar C G, Venkateshwar P M, Amte R and Rao S M 2015 A rare case of dengue fever in patient with dual inlet left ventricle *Ann. Trop. Med. Pub. Health* **8**(2) 37

- [8] Suhendro, Nainggolan L, Chen K and Pohan H T 2006 Demam berdarah dengue *Buku ajar ilmu penyakit dalam edisi 4* ed A W Sudoyo, B Setiyohadi, *et al.* (Jakarta: Pusat Penerbitan departemen ilmu penyakit dalam FKUI) pp 1731-5
- [9] Kementerian Kesehatan RI (KEMENKES, RI) 2016 Wilayah KLB DBD ada di 11 provinsi Available from: <http://www.depkes.go.id/> [Accessed: March 4, 2017]
- [10] WHO 2009 Hand book for clinical management of dengue Available from: <http://whqlibdoc.who.int/publications/2009> [Accessed: January 5, 2017]

Management Of A Patient With Dengue Virus Infection And Tetralogy Of Fallot

ORIGINALITY REPORT

18%

SIMILARITY INDEX

15%

INTERNET SOURCES

9%

PUBLICATIONS

8%

STUDENT PAPERS

PRIMARY SOURCES

1	www.jaypeejournals.com Internet Source	1%
2	www.denguevirusnet.com Internet Source	1%
3	repositori.unud.ac.id Internet Source	1%
4	Michael Bindschadler, Kelley R Branch, Adam M Alessio. "Quantitative myocardial perfusion from static cardiac and dynamic arterial CT", <i>Physics in Medicine & Biology</i> , 2018 Publication	1%
5	go.gale.com Internet Source	1%
6	utpedia.utp.edu.my Internet Source	1%
7	link.springer.com Internet Source	1%
8	media.neliti.com Internet Source	

1 %

9

gu.nhp.gov.in
Internet Source

1 %

10

P. Syamasundar Rao. "Diagnosis and management of cyanotic congenital heart disease: Part I", The Indian Journal of Pediatrics, 01/2008
Publication

1 %

11

unsworks.unsw.edu.au
Internet Source

1 %

12

Submitted to Academy of Family Physicians of Malaysia (AFPM)
Student Paper

<1 %

13

docobook.com
Internet Source

<1 %

14

www.ina-jghe.com
Internet Source

<1 %

15

Submitted to St. Joseph's College
Student Paper

<1 %

16

austinpublishinggroup.com
Internet Source

<1 %

17

dokumen.pub
Internet Source

<1 %

www.karger.com

18	Internet Source	<1 %
19	www.world-today-news.com Internet Source	<1 %
20	Submitted to 87986 Student Paper	<1 %
21	Submitted to Universitas Airlangga Student Paper	<1 %
22	www.atmph.org Internet Source	<1 %
23	amjcaserep.com Internet Source	<1 %
24	balimedicaljournal.org Internet Source	<1 %
25	estatedocbox.com Internet Source	<1 %
26	agmv.ro Internet Source	<1 %
27	G D Rook, R Lopez, N Shimizu, J M Cooperman. "Folic acid deficiency in infants and children with heart disease.", Heart, 1973 Publication	<1 %
28	academic.oup.com Internet Source	<1 %

29 www.scirp.org Internet Source <1 %

30 zenodo.org Internet Source <1 %

31 Seongcho Yu, Jeffrey W. Lynn. "X-Ray Diffraction Studies of Ni-Cr-Based Amorphous Alloys", Japanese Journal of Applied Physics, 1990
Publication <1 %

32 M Susanti, Y H Oktaviono, A Lefi. "OR45. Improving the migratory function of endothelial progenitor cells under high glucose conditions via engineering with human umbilical cord blood mesenchymal stem cell-derived secretome", European Heart Journal Supplements, 2021
Publication <1 %

33 Scott Mio, Jeffery, A. Barker, Lori, M. Domenech Rodríguez, Melanie. "Multicultural Psychology", Multicultural Psychology, 2023
Publication <1 %

Exclude quotes Off

Exclude matches Off

Exclude bibliography On

Management Of A Patient With Dengue Virus Infection And Tetralogy Of Fallot

GRADEMARK REPORT

FINAL GRADE

/0

GENERAL COMMENTS

Instructor

PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5

PAGE 6

PAGE 7
