

ROTH SPOTS IN A CHILD WITH INTRACRANIAL HEMORRHAGE

Kaai Voon Tan¹, Kwang Kwok Iu¹, Wendy Ong Chin Feng¹,
Khairy Shamel Sonny Teo^{1*}

¹Department of Ophthalmology, School of Medical Sciences, Health Campus, Universiti Sains Malaysia, Kubang Kerian, Kelantan, Malaysia

*Corresponding author: Khairy Shamel Sonny Teo, Department of Ophthalmology, School of Medical Sciences, Health Campus, Universiti Sains Malaysia, Kubang Kerian, Kelantan, Malaysia, E-mail: khairyshamel@usm.my

<https://doi.org/10.32827/ijphcs.6.6.233>

ABSTRACT

Background: Infective endocarditis (IE) is uncommon in children. It may not be presented with classical signs and symptoms but late complications such as aneurysm, brain abscess and intracranial haemorrhage. Roth spots are classically associated with IE but it is rare to be seen in paediatric patients. Here we report a rare case of culture negative infective endocarditis with Roth spots in a child who presented with intracranial haemorrhage.

Case Report: A 9-year-old girl with underlying uncorrected Tetralogy of Fallot presented with difficulty of breathing associated with fever, headache and vomiting for 2 days. Upon arrival to casualty, her Glasgow Coma Scale was 4 and she developed multiple episodes of convulsions. Urgent computed tomography (CT) of the brain showed right occipital haemorrhage with intraventricular haemorrhage. She was then proceeded for emergency craniectomy and external ventricular drainage. Postoperatively patient had persistent fever and infective endocarditis was suspected. Hence, bedside echocardiography (ECHO) was carried out and revealed vegetations of tricuspid valve. On ocular examination noted extensive Roth spots in bilateral eye. Blood cultures taken from multiple sites but negative finding. She was treated empirically with antibiotics but her condition continued to deteriorate and patient succumbed to her disease on day 16 of admission.

Conclusion: High index of clinical suspicion of IE should be raised in children who presented with fever and underlying heart disease or new murmurs to prevent further complications and reduce the mortality rate. Ocular assessment can aid in early detection of IE for prompt multidisciplinary treatment.

Keywords: Roth spots, Infective endocarditis, Tetralogy of Fallot, Intracranial Haemorrhage.

1.0 Introduction

Infective endocarditis (IE) is uncommon in children. It may not be presented with classical signs and symptoms but late complications such as aneurysm, brain abscess and intracranial haemorrhage. Roth spots are classically associated with IE but it occurs in only 2% of patients. Other ocular findings of IE include conjunctival haemorrhages, chorioretinitis and endophthalmitis (Loughrey, 2015). Here we report a rare case of culture negative infective endocarditis with Roth spots in a child who presented with intracranial haemorrhage.

2.0 Case Report

A 9-year-old girl with underlying uncorrected tetralogy of Fallot (TOF) presented with difficulty of breathing associated with headaches and vomiting for 2 days. On physical examination, her Glasgow Coma Scale was 4. Blood pressure was 95/69 mm Hg, heart rate was 128 beats per minute and oxygen saturation (SpO₂) was 78% on room air. Temperature noted to be 38.7 degree Celsius. She also has clubbing of digits. Upon intubation, patient developed multiple episodes of generalised convulsions.

Laboratory tests revealed haemoglobin of 12.5g/dl and platelet count was $121 \times 10^9/L$. Prothrombin time (PT) and activated partial thromboplastin time (APTT) were elevated at 19.1 and 240 seconds, respectively. The values of arterial blood gas analysis were pH 7.27, PO₂ 41.9 mmHg, PCO₂ 49.5 mmHg.

Urgent computed tomography (CT) of the brain was done and noted there was right occipital haemorrhage with intraventricular hemorrhages. Intravenous phenytoin and ceftriaxone were initiated prior to craniectomy and external ventricular drain. Post operatively, patient was supported haemodynamically with two inotropes.

On day 4 of admission, her fever was not settled and infective endocarditis was suspected. Bedside echocardiography (ECHO) was carried out and noted the presence of tricuspid vegetations. Multiple blood cultures and urine culture taken but negative results, however the endotracheal tube secretions grew *Pseudomonas Aeruginosa*. C-reactive protein was elevated at 16.51mg/L. Diagnosis of definite infective endocarditis was made according to Modified Duke clinical criteria and she was referred to Ophthalmology team for assessment which revealed extensive Roth spots in bilateral eye.

Patient's fever did not settle despite completed intravenous ceftriaxone for a week. Hence, she was switched to intravenous vancomycin, meropenem and fluconazole. However, hospital acquired pneumonia sets in and her general condition deteriorated. Unfortunately, the patient succumbed to her disease on day 16 of admission.

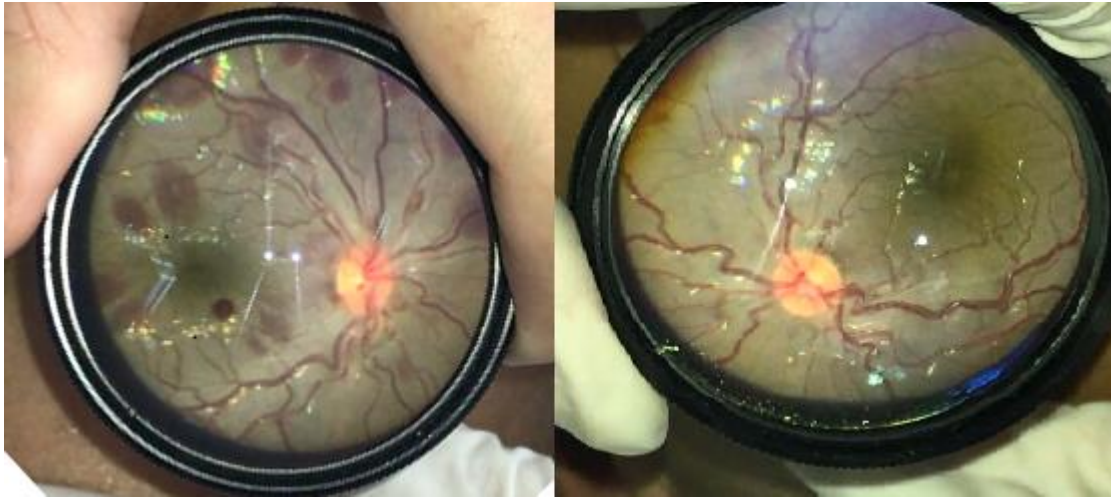


Figure 1: Right eye fundus showed optic disc haemorrhage, vessel tortuosity and extensive Roth spots involving macula. Left eye fundus also showed vessel tortuosity but less Roth spots.



Figure 2: CT brain showed right occipital intraparenchymal haemorrhage and intraventricular haemorrhage with mass effect and midline shift.



Figure 3: Echocardiography revealed vegetations of tricuspid valve measuring at 0.325 cm².

3.0 Discussion

Infective endocarditis is rare in children but it carries a high risk of mortality and morbidity especially in children with congenital heart disease. In the United States, there are around 0.05-0.12 cases of IE per 1000 paediatric admissions. (Pasquali et al., 2012). The most common causative agents in paediatrics infective endocarditis are Streptococci, Staphylococci and Enterococci. (Baltimore et al., 2015)

IE mostly present with high spike of fever and constitutional symptoms, but it may be present with neurological symptoms. A few has published on IE cases presented with extracardiac complications such as subarachnoid haemorrhage and subdural haemorrhage, ischaemic and haemorrhagic strokes. (Salaun et al., 2018)

Classical signs of infective endocarditis such as Roth spots, Janeway lesions, splinter haemorrhages and Osler's nodes are rare in children. In our patient, she presented with disc haemorrhage and extensive Roth spots in his right eye and some Roth spots in her left eye as well. Roth spots is described as pale centred retinal haemorrhages which is due to leukocyte accumulation or platelet-fibrin plugs. Several papers also published on Roth spots in leukaemia, HIV, anaemia, shaken baby syndrome, even in ocular toxoplasmosis and Cogan syndrome. (Furtado, Toscano, Castro, & Rodrigues, 2016; Kapadia & Steeves, 2011; Priluck, Chalam, & Grover, 2012; Vose & Charles, 2003; Wang, Petrak, Holz, Müller, & Krohne, 2019)

Blood culture is mandatory in identifying organism in order to target them with appropriate and adequate antibiotics. The prevalence of culture negative endocarditis is only 5% -10% of IE cases. (Baddour et al., 2015) In our patient, antibiotic was administered prior to admission and this may have contributed to the negative blood cultures.

Diagnosis of definite IE was made in this case according to modified Duke clinical criteria as positive evidence in ECHO finding contributed to the major criteria and patient fulfilled 4 minor criteria by presented with high grade of fever, congenital heart disease, intracranial haemorrhage and Roth spots in bilateral eye.

Patients with IE need to be administered with appropriate antibiotic for 4-6 weeks according to blood culture to eradicate the infection and to prevent further complications. Empirical treatment should be initiated early in patients with culture negative IE for broad coverage of microorganisms.

According to a 16-year-review of patients with IE by *Salaun et al*, only 7% of patients developed intracranial haemorrhage where as 77% of them had no neurology vascular complications. There are several publications on intracranial haemorrhage in IE but it is rare in paediatric patients. In our patient, she presented primarily with right occipital haemorrhage with intraventricular haemorrhage. It could be possibly due to rupture of mycotic aneurysm,

however our CTA unable to detect any aneurysm. Other causes such as septic necrosis of the vessel wall may explain this.

4.0 Summary

Many are not aware of risk of IE and Moon *et al* found that only 16% of patients with CHD were aware of the risk of infective endocarditis (Moons *et al.*, 2001). Hence, we need to emphasize family education in early recognition of IE symptoms especially in children with congenital heart disease (CHD) to prevent late complications as well as reducing mortality rate.

Acknowledgement

Professors, Specialists, medical officers and staff nurses of Paediatric Department, Neurosurgery Department and Radiology Department, Hospital Universiti Sains Malaysia, Kubang Kerian, Kelantan,

Declaration

The authors declare no conflict of interests. The authors are responsible for the content and writing of the paper.

Authors contribution

Author 1: Wrote the manuscript with consultation from author 2 and 3.

Author 2: Took the fundus photo.

Author 3: Provided critical feedback.

Author 4: Provided critical feedback and supervised the whole process

References

Baddour, L. M., Wilson, W. R., Bayer, A. S., Fowler Jr, V. G., Tleyjeh, I. M., Rybak, M. J., . . . Levison, M. E. (2015). Infective endocarditis in adults: diagnosis, antimicrobial therapy, and management of complications: a scientific statement for healthcare professionals from the American Heart Association. *Circulation*, 132(15), 1435-1486.

- Baltimore, R. S., Gewitz, M., Baddour, L. M., Beerman, L. B., Jackson, M. A., Lockhart, P. B., . . . Willoughby Jr, R. (2015). Infective endocarditis in childhood: 2015 update: a scientific statement from the American Heart Association. *Circulation*, *132*(15), 1487-1515.
- Furtado, J. M., Toscano, M., Castro, V., & Rodrigues, M. W. (2016). Roth spots in ocular toxoplasmosis. *Ocular immunology and inflammation*, *24*(5), 568-570.
- Kapadia, R. K., & Steeves, J. H. (2011). Roth spots in chronic myelogenous leukemia. *CMAJ*, *183*(18), E1352-E1352.
- Loughrey, P. B., Armstrong, D., & Lockhart, C. J. (2015). Classical eye signs in bacterial endocarditis. *QJM: An International Journal of Medicine*, *108*(11), 909-910.
- Moons, P., De Volder, E., Budts, W., De Geest, S., Elen, J., Waeytens, K., & Gewillig, M. (2001). What do adult patients with congenital heart disease know about their disease, treatment, and prevention of complications? A call for structured patient education. *Heart*, *86*(1), 74-80.
- Pasquali, S. K., He, X., Mohamad, Z., McCrindle, B. W., Newburger, J. W., Li, J. S., & Shah, S. S. (2012). Trends in endocarditis hospitalizations at US children's hospitals: impact of the 2007 American Heart Association Antibiotic Prophylaxis Guidelines. *Am Heart J*, *163*(5), 894-899.
- Priluck, J., Chalam, K., & Grover, S. (2012). Spectral-domain optical coherence tomography of Roth spots in multiple myeloma. *Eye*, *26*(12), 1588.
- Salaun, E., Touil, A., Hubert, S., Casalta, J.-P., Gouriet, F., Robinet-Borgomano, E., . . . Lavoute, C. (2018). Intracranial haemorrhage in infective endocarditis. *Archives of cardiovascular diseases*, *111*(12), 712-721.
- Vose, M., & Charles, S. (2003). Roth's spots: an unusual presentation of HIV. *Postgrad Med J*, *79*(928), 108-109.
- Wang, L., Petrak, M., Holz, F. G., Müller, A., & Krohne, T. U. (2019). Retinal Hemorrhages in Shaken Baby Syndrome. *The Journal of pediatrics*, *207*, 256.