

## Infective endocarditis following prolonged umbilical catheterisation in an extreme preterm: A case report

AI Ayede, TA Lawal, OO Tongo, BE Adebayo and OF Ashubu

Department of Paediatrics, College of Medicine, University of Ibadan, Ibadan and University College Hospital Ibadan, Nigeria

### Abstract

Care of extreme preterm newborns remains a challenge in resource poor settings as management is fraught with many constraints. Use of indwelling umbilical catheters is part of routine care in the preterm newborns, however it increases the risk for thrombus formation and subsequent infection. Infective endocarditis is rare in them. We describe a case of infective endocarditis in an extreme preterm following prolonged umbilical catheterization which resolved after use of sensitive antimicrobial.

**Keywords:** *Preterm neonate, Catheterisation, Infective endocarditis, Echocardiography*

### Résumé

La prise en charge des nouveau-nés prématurés extrêmes reste un défi dans les milieux pauvres en ressources vu que la gestion est offusquée à de nombreuses contraintes. L'utilisation de cathéters ombilicaux domiciliaire fait partie de leur gestion de routine, mais ces cathéters peuvent prédisposer au risque de formation de thrombus et de subséquentes infections. L'endocardite infectieuse est rare chez ces derniers. Nous décrivons un cas d'endocardite infectieuse chez un prématuré extrême suite à un cathétérisme ombilical prolongé qui s'est résolu après l'utilisation d'un antimicrobien sensible.

**Mots-clés:** *Nouveau-né prématuré, cathétérisme, endocardite infectieuse, échocardiographie*

### Introduction

Preterm infants are at risk of thrombi formation which commonly follows use of indwelling umbilical or other vascular catheters which results in obstruction of flow, endothelial damage and reduced blood flow [1]. Formation of intracardiac thrombi is not unexpected when catheters are placed in the cardiac chambers even in the absence of a cardiac lesion [2]. Dissolution of vegetations is usually difficult in extreme preterms despite prolonged use of antimicrobials and removal of offending catheters [2,3].

Most cases of infective endocarditis in preterm infants are associated with use of central venous catheters and most of the vegetations are in the right atrium [2]. *Coagulase negative staphylococcus, staphylococcus aureus and candida* are the common isolates in such cases [2-4]. Marks et al in their review reported a survival rate of 60% and clinical course was complicated by prolonged sepsis, multiorgan dysfunction and progressive cardiac failure [2]. Most cases reviewed were managed using prolonged course of anti-infective agents [2,4]. Surgical removal of thrombus especially for fungal agents was associated with high mortality [5,6], few cases however reported use of recombinant tissue plasminogen activator [2,7-9].

We describe a case of infective endocarditis in an extreme preterm following prolonged umbilical catheterization which resolved after use of sensitive antimicrobial agents. The echocardiographic diagnosis, the type of organism and the sensitivity pattern as well as response to therapy are documented.

### Case history

A preterm neonate was admitted into the Special Care Baby Unit of University College Hospital, Ibadan at 8 hours of life following referral from a peripheral centre. Her delivery was at a gestational age of 27 weeks via spontaneous vaginal delivery vertex presentation and her birth weight was 900 grams. Mother did not receive antenatal care, delivery was at a Primary Health Care centre.

She was dyspnoeic at presentation, with a respiratory rate of 64/min and vesicular breath sounds. Pulses were of normal volume, heart rate was 148/min, heart sounds were normal with no murmur. Ballard score was compatible with gestational age of 26-28 weeks. She was managed on admission as a case of extreme prematurity with respiratory distress syndrome and neonatal sepsis. She had umbilical venous catheterization for intravenous infusions and antibiotic- ampicillin-sulbactam and amikacin.

Initial electrolyte, urea and creatinine showed hypocalcemia of 7.9mg/dl which was corrected. Full blood count was essentially normal.



On 7<sup>th</sup> day of life, clinical condition deteriorated as child had worsening respiratory distress, apnoea and reduced activity. Blood culture revealed methicillin resistant staphylococcus *aureus* sensitive to vancomycin and gentamycin and resistant to ampicillin/sulbactam, cefoxitin, ceftazidime, ciprofloxacin. Antibiotics were changed to the sensitive drugs. She commenced oral diuretics and an ACE inhibitor on the 15<sup>th</sup> day of life on account of heart failure secondary to possible patent ductus arteriosus (PDA). She did not improve appropriately and was therefore evaluated for infective endocarditis and had bedside echocardiography on the 27<sup>th</sup> day of life which showed small PDA, secundum ASD and vegetation in the right atrium, the umbilical catheter was removed at this time. Repeat blood culture yielded methicillin resistant Staphylococcus *aureus* sensitive to vancomycin. She was subsequently continued on Vancomycin at 15mg/kg/dose 12hourly for 6 weeks.

Repeat echocardiography after completion of antibiotics on the 61<sup>st</sup> Day of life showed no vegetation and the infant was subsequently discharged home for follow up at the neonatology out-patient clinic

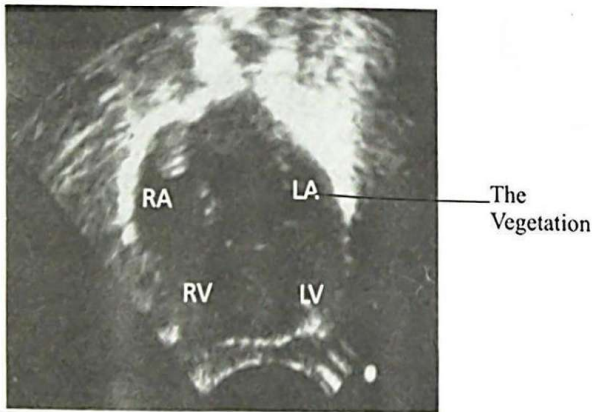


Fig.1: Echocardiographic findings of an atrial vegetation

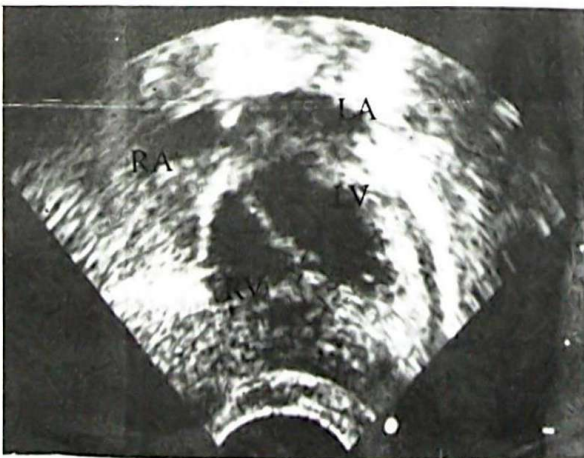


Fig.2: Echocardiographic findings showing resolution of vegetation after treatment

## Discussion

A major contributor to improved survival among extreme low birth weight infants is the incorporation of central venous catheter in the management, nevertheless the presence of these catheters increases the risk of thrombus formation [1]. Cases reported confirm that infective endocarditis is a consequence of catheterisation even though the catheters are not in-situ at the time of onset of symptoms. However, in this case report, the infective endocarditis occurred while the catheter was in-situ. The pathogenesis is related to endothelial damage caused by the catheter which acts as a focus for formation of thrombus and hence the pathology is usually in the right side of the heart especially the right atrium as described in this case. A great proportion would be prevented by appropriate positioning of the tip of catheters in the great vessels and not the right atrium. The positioning was clinically appropriate here, using the formula  $(2 \times \text{weight}) + 5 \text{ cm}$ , though could not be confirmed by bedside ultrasonography as this is not a routine practice in the centre. Initial signs and symptoms are non-specific, new onset murmurs and prolonged positive cultures may give a clue as to the possibility of infective endocarditis. However, diagnosis is usually made by echocardiography as in this patient. In the patient described, there was worsening of signs, and positive culture. The most important causative organisms are coagulase negative staphylococcus, Staphylococcus *aureus* and candida species [2]. The identified organism here was methicillin resistant Staphylococcus *aureus*. The patient's positive response to treatment might have been due to correct diagnosis aided by bedside echocardiography and appropriate use of culture sensitive antibiotic administered for the correct duration of time required for dissolution of the thrombus as it has been shown that high dose antibiotics for 4-6 weeks are associated with a survival rate of 67-87% in premature infants with staphylococcus endocarditis [2].

## Conclusion

Prolonged use of umbilical venous catheters i.e. catheter stay exceeding 10 days should be discouraged in the management of extreme preterms as it is a risk factor for development of infective endocarditis. Prevention is crucial in view of the potential high antibiotic cost, long duration of treatment and admission as well as potential high mortality associated with development of infective endocarditis. The availability of bedside echocardiography is essential in early diagnosis and monitoring of treatment of infective endocarditis in neonates.

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