

Case Report***Granulicatella elegans* : a rare cause of infective endocarditis
A Case Report**YLCP Perera¹, WD Galagedara¹, SP Gunasekara², S Wijeykoon³, NS Chandrasiri¹*Sri Lankan Journal of Infectious Diseases 2021 Vol.11(2):121-125*DOI: <http://dx.doi.org/10.4038/sljid.v11i2.8397>**Abstract**

Granulicatella elegans belongs to nutritionally variant streptococci (NVS) which are found as normal microbiota of humans. It can cause infective endocarditis (IE) with a high mortality rate due to frequent treatment failure.

A young male with a history of migraine presented with a short history of fever, shortness of breath and a pansystolic murmur in the mitral area. Three blood cultures were positive for Gram positive cocci in chains. With echocardiographic findings of a cardiac vegetation, a definitive diagnosis of infective endocarditis was made according to Modified Duke Criteria. The culture isolate was identified as *Granulicatella elegans* by the VIETK[®] identification system. He was treated with intravenous (IV) ceftriaxone and gentamicin with subsequent improvement.

Keywords: *Granulicatella elegans*, bacterial endocarditis, ceftriaxone, gentamicin, mitral valve

Introduction

Viridans streptococci are the commonest cause of infective endocarditis (IE) in Sri Lanka.¹ Here we report a case of IE caused by an uncommon bacterium, *Granulicatella elegans*. To the best of our knowledge, this appears to be the first time *G. elegans* has been identified in Sri Lanka as the cause of endocarditis.

G. elegans is a Gram-positive coccus. It is a commensal of the upper respiratory, urogenital, and gastrointestinal tracts of humans.² It is considered as a nutritionally variant streptococcus requiring pyridoxal or cysteine for growth.³ *G. elegans* is implicated rarely as a cause of

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infective endocarditis, particularly of culture-negative endocarditis.⁴ Nutritionally variant streptococci (NVSs) are fastidious microorganisms and account for about 5% of IE cases.³ *G. elegans* bacteraemia originating from the oral cavity is a possible cause of IE, and dental workup is a predisposing factor.⁴ The mortality rate is about 17%.² NVSs can affect healthy or immunocompromised patients.

Case report

A 21 year old male presented to Colombo South Teaching Hospital with a history of fever with chills, palpitation and shortness of breath for 5 days. He had a history of frequent migraine attacks. The rest of his past medical and surgical history was unremarkable. He underwent dental cleaning and tooth extraction 5 months prior to this presentation. On examination, he was febrile. His pulse rate was 120 beats/minute with increased volume and his blood pressure was 110/70 mmHg. Oral hygiene was satisfactory. On auscultation of the heart, a pansystolic murmur was heard at the mitral area that radiated to the axillary and parasternal region. There were no respiratory signs suggestive of pulmonary oedema. The rest of the examination was normal. There were no peripheral stigmata of endocarditis.

Three blood cultures were drawn for aerobic incubation after examination of the patient. Due to the presence of the murmur, a clinical diagnosis of possible IE was made and intravenous ceftriaxone 2g daily and gentamicin 1mg/kg 8hourly were started.

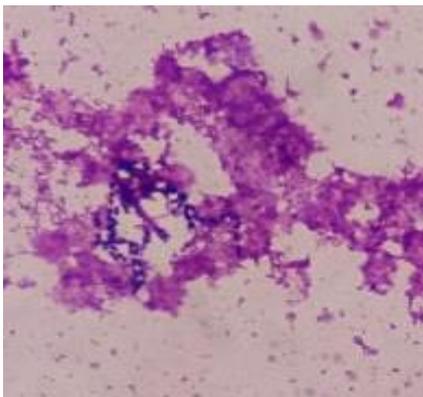


Fig. 1. Gram positive cocci in short chains (from blood culture bottle)



Fig. 2. Growth on Blood agar plate

Investigations showed a neutrophil leucocytosis ($12.56 \times 10^9 /L$) with low platelets. C-reactive protein (CRP) level was 53.5mg/L. All three blood cultures yielded Gram positive cocci in short chains resembling streptococci (smaller than usual streptococci) within 19 hours of incubation (Fig. 1).

All three blood cultures grew the same organism on blood and chocolate agar plates (Fig. 2), with no growth on the MacConkey agar plates. Colonies were small, measuring 0.2mm in diameter and were α haemolytic on blood and chocolate agar plates. The blood culture was subcultured on CLED medium on the next day. Larger colonies on the CLED plate suggested that the organism was cysteine dependent.

The isolate was sent to Apeksha Hospital, Maharagama where it was identified as *G. elegans* by the VIETK[®] identification system.

The minimum inhibitory concentration (MIC) of penicillin and ceftriaxone were 0.03 $\mu\text{g/ml}$ and 0.12 $\mu\text{g/ml}$ respectively. The isolate was highly penicillin susceptible with a MIC $\leq 0.12 \mu\text{g/ml}$.

Transthoracic echocardiogram (TTE) revealed an oscillatory mass attached to the anterior mitral valve leaflet with probable chordal rupture causing severe mitral regurgitation. Trans-oesophageal echocardiogram (TOE) showed a

large vegetation measuring 14 mm × 9 mm nested in the anterior aspect of the anterior mitral valve leaflet. No valve perforation or abscesses were noted. Based on the Modified Duke Criteria⁵, a definitive diagnosis of IE was made on day 5 of the illness (presence of two major criteria: cardiac vegetation and positive blood cultures).

As per the current guidelines^{5,6}, the patient was given IV ceftriaxone for 6 weeks and IV gentamicin for the first 2 weeks. A repeat blood culture taken 6 days after the initial positive cultures was negative.

Repeat TOE was performed on day 16 of ceftriaxone therapy which showed that the size of the vegetation on the anterior mitral valve leaflet had reduced in size. His clinical condition significantly improved with IV antibiotics. After 4 weeks of completion of IV ceftriaxone, the patient was transferred to a local hospital for continuation of antibiotics. He was referred to the dental clinic before transfer. He came for the follow up TOE which showed a healed vegetation. He was subsequently lost to follow up.

The timeline of the patient's illness is shown in Figure 3.

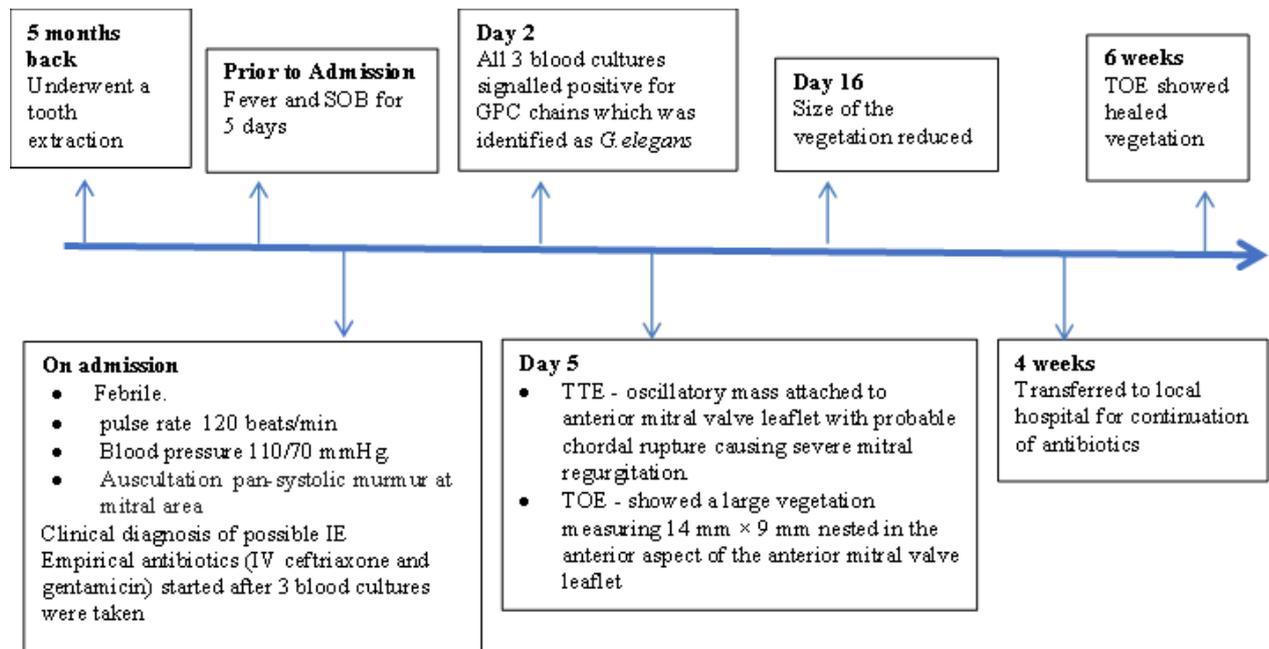


Figure 3: Timeline of illness

Discussion:

NVS were first observed as satellite colonies adjacent to colonies of "helper" bacteria and were previously considered nutritional mutants of viridans streptococcal species.³ Isolation of NVS required supplemented media containing pyridoxal 0.001% or L-cysteine 0.01%, and prolonged incubation in the past. Adding human blood to the medium enhances isolation because human erythrocytes are rich in pyridoxal. A study found that adding 5ml of human blood improved isolation to 100% in all media except tryptic soy broth.⁷ Human blood agar

is used in most Sri Lankan laboratories, which may be helpful in isolation of NVS. The genus *Granulicatella* was originally classified as a part of the *abiotrophia* group until 1995 and in 2000 classified as a separate genus on the basis of amplification and sequencing of the 16S rRNA.⁴

Recovery of strains is no longer a significant problem with current laboratory media and techniques.² Molecular diagnosis is also possible from tissues removed during surgery.⁴ A study conducted in 2013 showed that the Vitek 2 system could identify 6/10 *G. adiacens*, 1/1 *G. elegans*, and 2/3 *A. defectiva* isolates at the species level out of 14 isolates.⁸

G. elegans is a very fastidious organism among all species of *Granulicatella*.² On trypticase soy-sheep blood agar plates, it grows as satellite colonies around *Staphylococcus epidermidis* with α -hemolysis.^{2,9} It does not grow in media with 0.001% pyridoxal hydrochloride.⁹ It is present in approximately 10% of dental plaques and may thus cause transient bacteraemia with subsequent IE. Bacteriolytic activity and production of exopolysaccharides may play a role in pathogenicity.¹⁰

Antimicrobial susceptibility of *Granulicatella* species is often difficult to determine, and results may not be accurate.² IE caused by these microorganisms has been more difficult to cure compared to IE caused by a strain of non-nutritionally variant viridans group streptococci.² For these reasons, in patients with IE caused by nutritionally variant streptococci including *Granulicatella* species, it is reasonable to administer a combination regimen. Antibiotic recommendations include a beta-lactam antibiotic (penicillin G or ceftriaxone) or vancomycin for 6 weeks, combined with an aminoglycoside for at least the first 2 weeks for treatment of IE caused by *Granulicatella* species.^{2,5,6} Vancomycin is recommended for patients intolerant of ampicillin or penicillin.^{5,6}

NVSs are known to cause vegetations measuring >10 mm. TTE is routinely performed for all suspected endocarditis patients. Sometimes what is suspected as a vegetation in TTE is not confirmed by TOE. TOE is considered to be significantly more sensitive than TTE for the detection of vegetations and abscesses.^{5,6}

Dental cleaning and tooth extraction appear to be the only risk factor in this healthy young adult with no previous knowledge of damaged valves. Infective endocarditis due to this organism produces a protracted course, which is associated with large vegetations and higher rates of complications. Valve replacement is done in around 50% of patients, possibly due to delayed diagnosis and treatment.² Early identification is very important to reduce morbidity and mortality. NVSs could be suspected by colony characteristics and confirmed using an automated systems for identification and determination of MIC of the therapeutic agent/s.

In 2016, our laboratory reported a patient with endocarditis due to *Abiotrophia* but at the time it was not possible to identify the isolate with precision or to do the MIC.¹¹ Retrospectively we feel that it could belong to *Granulicatella* species. The increasing availability of automated blood culture facilities and identification systems facilitates improved diagnosis of patients with infective endocarditis as seen with this patient and highlights the development of microbiology services in Sri Lanka.

Conclusion

The isolation of a fastidious microorganism and its identification sheds more light on the causative organisms of endocarditis in Sri Lanka. The availability of automated blood cultures and identification systems led to isolation, directing treatment according to internationally accepted guidelines. However these facilities are currently not available island wide. A referral system leading to establishing team management of endocarditis as proposed by “ESC guidelines for the management of infective endocarditis”, will give better outcome benefiting patients.⁶

Declarations

Conflict of Interest – Authors declare no conflict of interest

Ethics statement – Ethical approval was not required for this manuscript.

Author contributions – All the authors contributed to patient management and preparation of the manuscript.

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