Group B *Streptococcus tricuspid* valve endocarditis with subsequent septic embolization to the pulmonary artery: A case report following elective abortion

Sabrina Piedimonte¹, Mohammad Almohammadi² and Todd C Lee³

Abstract

Background: Tricuspid valve endocarditis caused by Group B streptococcus is a rare clinical entity with poor prognosis and has been previously reported following gynecologic procedures.

Case summary: We report a case of an 18-year-old female diagnosed with Group B streptococcus tricuspid valve endocarditis with septic emboli following an elective therapeutic abortion. After six weeks of treatment with ceftriaxone, she returned with recurrent symptoms and was found to have embolized a sizable vegetation to the pulmonary artery with probable lung infarction. She underwent surgical embolectomy and was treated with antibiotics and anticoagulation and was subsequently discharged in stable condition.

Conclusion: Group B streptococcus endocarditis is a serious complication of gynecologic procedures. The role of preoperative antibiotics, post-operative clinical suspicion of endocarditis based on respiratory symptoms and a multidisciplinary approach may lead to enhanced patient outcomes.

Keywords

Endocarditis, Group B streptococcus, dilatation and curettage, preoperative antibiotics

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Introduction

Tricuspid valve infectious endocarditis (TVIE) accounts for 5–36% of all endocarditis cases and carries a greater propensity for septic emboli than the traditional fulminant left-sided endocarditis.^{1,2} TVIE is most often encountered in intravenous drug users and most likely caused by *Staphylococcus aureus* (60–90% in IVDU), or coagulase negative staphylococci, streptococci or HACEK organisms.² It is rare to encounter right-sided endocarditis resulting from *Streptococcus agalactiae* (hereafter referred to as Group B *Streptococcus* (GBS)) bacteremia. When GBS endocarditis is seen, it is most commonly in people with artificial valves or those with risk factors such as IVDU or comorbid diabetes mellitus, alcoholism, and immunosuppression and in women with history of obstetric and gynecologic procedures.³ Endocarditis due to GBS carries a higher mortality rate compared to other streptococci (approximately 45%) due to the presence of larger vegetations, rapid destruction of the valve and a higher likelihood for subsequent embolization which can occur in up to 50% of cases.^{1,4–6}

GBS is commonly a normal flora of the genitourinary tract and, for healthy young women, is usually of clinical significance only during labor and delivery where it can infect the neonate and lead to sepsis, meningitis, ARDS, and subsequently death. Thus, GBS screening and treatment are performed in many centers during the perinatal period. After ensuring consent, we present a case of GBS tricuspid valve endocarditis occurring postdilatation and curettage in a young woman who subsequently required thrombectomy and tricuspid valve repair due to significant septic pulmonary emboli.

We hereby review the literature on GBS endocarditis occurring postgynecologic procedures and discuss the implications of early treatment to prevent septic emboli and adverse outcomes in this rare but aggressive clinical entity.

Case report

We present a case of an 18-year-old female diagnosed with GBS positive tricuspid valve endocarditis with septic emboli following an

elective abortion by dilatation and curettage with subsequent embolus of the vegetation to the pulmonary artery and infarct of the right middle and lower lobes.

The patient had no past medical history other than an uncomplicated therapeutic abortion in 2012. In June 2015, she underwent an elective therapeutic abortion with dilatation and curettage at 13 weeks gestation age by ultrasound parameters. The procedure was uncomplicated. She received preoperative antibiotic prophylaxis with doxycycline. An IUD was also inserted at that time of the procedure for contraceptive purposes. Gonorrhea and chlamydia status were negative at the time of IUD insertion.

Two weeks following the procedure, she presented to another institution with fever, chills, pleuritic chest pain, and shortness of breath. She was diagnosed with a viral upper respiratory tract infection and discharged with no medications. Two weeks later, she returned due to worsening symptoms and a dry cough. At that time, blood cultures were positive for GBS (sensitive to penicillin and clindamycin) and a transthoracic echocardiogram revealed tricuspid leaflets with two large vegetations on septal and anterior leaflets, somewhat mobile but not pedunculated measuring 18.3 × 15.6 and 17.6 × 9.3 mm with mild associated tricuspid regurgitation. She was subsequently transferred to our institution. The patient was started on IV ceftriaxone in hospital as per consultation with infectious diseases team and a cardiac surgery

¹Department of Obstetrics and Gynecology, McGill University Health Center, Montreal, Canada

²Department of Medicine, McGill University, Montreal, Canada

³Division of Infectious Diseases, McGill University Health Center, Royal Victoria Hospital, Montreal, Canada

Corresponding author:

Todd C Lee, Division of Infectious Diseases, McGill University Health Center, Royal Victoria Hospital, 1001 rue Decarie, Montreal, QC H4J 1C1, Canada.

Email: Todd.lee@mcgill.ca

consultation was arranged which suggested conservative management. One week later, the patient was febrile despite antibiotic therapy. A repeat TTE on July 27 showed a mild decrease in vegetation size to 17.9×15.4 mm on the tricuspid anterior leaflet and 13.7×10.7 mm on the septal leaflet. A CT chest subsequently performed on July 29 showed a hypodense well-defined oval filling defect at the level of the tricuspid valve, measuring 2×1.8 cm, corresponding to the vegetation previously documented on echocardiography with associated pulmonary emboli, cavitated lesions with bilateral lower lobes multifocal consolidation and nodularities corresponding to septic emboli. Areas of infarction were also seen. Subsequently, the patient defervesced and began to feel much better. Consequently, she discharged home after 17 days on intravenous ceftriaxone at home via PICC line. Of note, daily administration was by her partner, rather than a home care nurse, thus the aseptic technique and compliance may be put into question.

Four weeks later, while still receiving ceftriaxone, she returned with a one-day history of fever, chills, dyspnea, and right-sided chest pleuritic chest pain radiating to the shoulder. In the emergency room, she was tachycardic and febrile, but always maintained adequate oxygen saturation on room air. Her white blood cell count was 22.87 with a left-sided shift and she was empirically changed to piperacillin with tazobactam in case of nosocomial gram negative or PICC line infection. A chest CT done the night of the admission showed a large pulmonary artery filling defect, consistent with embolus with possible area of infarction (Figures 1 and 2). She was started on anticoagulation. The following day, repeat TTE revealed resolution of the tricuspid vegetation and tricuspid regurgitation, consistent with the findings on CT chest of embolization to the pulmonary artery. A second CT chest revealed new pulmonary hemorrhage/infarction in addition to filling defects in the right pulmonary artery and distal left pulmonary artery. After much discussion with all of her consultants, a decision was made to pursue thoracotomy and pulmonary artery endarterectomy (Figure 3). The patient continued to be anti-coagulated and received antibiotics prior to the procedure. Culture of the explanted vegetation was only positive for two species of coagulase negative staphylococci. The patient then completed a total of six additional weeks of IV beta-lactam as an outpatient and was discharged home on postoperative day 10. She remains cured of the infection.

Figure 1. CT angiography done at the time of readmission and progression of septic emboli despite treatment with Ceftriaxone showing extensive occlusion of the pulmonary artery with septic emboli.

CT: computed tomography.

Interpretation

GBS is a common pathogen of the female reproductive tract and is usually only of pathologic significance during childbirth, at which time screening and treatment is indicated to prevent adverse outcomes in the neonate. Otherwise, GBS colonization is usually of low clinical significance and seldom leads to bacteremia. GBS infection of the tricuspid valve is a rare occurrence but has a high propensity for pulmonary artery embolization and thus confers a higher morbidity and mortality as compared to other pathogens.⁷ In addition, it is mostly reported in patients with states of polymorphonuclear cell impairment such as diabetes, alcoholism, IVDU or complications of pregnancy, which diminish host response to the organism's anti-phagocytic polysaccharide capsule.⁴ GBS endocarditis has been reported in 0.03–0.14 in 1000 gynecological procedures and in one in a million following abortions.¹⁸ In a review of the literature of the reported cases of GBS endocarditis following gynecologic procedures (see Table 1), 10 cases were reported following elective abortion. The mean age for the patients was 27.2 years.

Figure 2. CT angiography done at the time of readmission and progression of septic emboli despite treatment with Ceftriaxone showing extensive occlusion of the pulmonary artery with septic emboli.

CT: computed tomography.

Figure 3. Fragments of the septic emboli removed from the pulmonary artery at the time of operative embolectomy.

Table 1. Review of all cases of GBS endocarditis following gynecologic procedures.

Paper	ID	Risk factor	Echocardiogram	Size of the vegetation based on TTE or TEE	Initial presentation	Complication	Treatment	Outcome
Aslam et al. ⁸	26 F	Postabortion endometritis, therapeutic abortion at 17 weeks	Multiple large vegetations on tricuspid valve with moderate to severe tricuspid regurgitation	No size reported, multiple vegetations	Sepsis 20 days post-op	Large pulmonary embolism in right main pulmonary artery and airspace opacities with cavitations. No evidence of LL DVT.	intravenous vancomycin, intravenous gentamicin and oral rifampin (penicillin allergy)	Resolution
Scarvelis and Malcolm ⁹	30 F	Therapeutic abortions (remote) and IVDU	Multilobar vegetation on the tricuspid valve, with severe tricuspid regurgitation	TTE: 4.7 cm	Confusion, weight loss, arthralgia, eruption of skin pustules, and epistaxis.	DIC, multiple bilateral cavitory lesions. The mass occupied most of the RA.	Antibiotics and tricuspid valve excision with a right PA thromboendarterectomy (day 19)	Resolution
Palys et al. ¹⁰	22 F	Elective abortion 15 weeks	PAP 55 RA and RV dilation Large tricuspid vegetation with severe TR. LVEF 56%	TTE: 1.14 × 1.12 cm	Patchy LL infiltrate with cavitation	ICU admission, pulmonary artery aneurysm, and pulmonary hypertension	Initially, ceftriaxone, azithro, metronidazole. Recurrence treated with PenG, Clindamycin, gentamycin × 3 weeks + PenG only × 3 weeks	Loss to follow-up
Crespo et al. ¹¹	37 F	Elective abortion with antibiotics prophylaxis prosthetic heart valve secondary to previous infective endocarditis, IVDU	Vegetation on aortic outflow tract	No size reported	Sepsis, PVB,	Septic emboli to spleen	Ampl and genta × 6 weeks	Refusal of surgery. Resolution at 10 months
Azzam et al. ⁴	33 F	Therapeutic abortion, IUFD at 20 weeks	Large vegetation attached to the anterior tricuspid valve leaflet with a severe regurgitation Day 14: progression of vegetation and abscess formation	No size reported	Two days: Fever, chills, fatigue × 4 weeks	Septic emboli and lung abscesses	Penicillin and gentamycin × 6 weeks. Surgical resection and bioprosthetic valve replacement	Resolution
Salih et al. ⁵	36 F	Postpartum (PP), IUFD	Two tricuspid valve vegetations 3.5 × 2, mobile, pedunculated, 1 cm on septal leaflet	Two vegetations: 1st TTE: 3.5 × 2 cm 2nd TTE: 1 cm	Sepsis three days PP, murmur	Right heart failure after five days Septic shock	Ceftriaxone, gentamycin, metronidazole	Death

(continued)

Table 1. Continued

Paper	ID	Risk factor	Echocardiogram	Size of the vegetation based on TTE or TEE	Initial presentation	Complication	Treatment	Outcome
Andresen et al. ¹²	19 F	–	and one vegetation on subvalvular apparatus. PAP 60 Large lobulated mobile mass obstructing the tricuspid valve, prolapsing in the right ventricle	TTE: 6 × 3 cm	Sepsis,	GBS + endocarditis	Pulmonary artery embolization of vegetation and complete obstruction, DIC (precluding early surgery)	Death
Kangavari et al. ¹	24 F	Elective abortion, 15 weeks	Vegetation on the tricuspid valve	TEE: 2 × 2 cm	Initially presented UTI then pneumonia	Septic emboli	IV antibiotics and captopril	Resolution
McKenna and O'Brien ¹³	37 F	Elective medical termination for trisomy 21, 19 wks on doxy prophylaxis	Thickened tricuspid valve and TR	No size reported	Hip pain and fever on post-op 11	Septic emboli Recurrence at six weeks with pulmonary embolism	Ceftriaxone and gentamycin	Resolution
Shimoni ¹⁴	37 F	SVD	Mobile lesion on atrial aspect of TV leaflet	No size reported	Postpartum fever, discharged, returned four days PP with pleuritic chest pain	Septic emboli	Ampicillin gentamycin × 6 weeks	Resolution
Attri ¹⁵	18 F	Elective second trimester abortion	Pedunculated vegetation involving a previously normal tricuspid valve	TTE: 2.2 cm	–	Polyarthritic symptoms, as well as multiple pulmonary emboli	Penicillin G	Resolution
Camarillo et al. ³	15 F	Elective abortion, 13 wks -doxycycline prophylaxis	Normal on day 2. Repeat on day 7: pulmonary valve vegetation Day 12: enlarged vegetation with new pulm valve insufficiency + septic emboli Three weeks later: multiple pulmonary valve leaflet vegetation with mycotic aneurysm of RLL branch of PA	TTE: 3.3 × 1.1 cm	1 wk: fever, tachycardia, hypotension, cough, diarrhea → GBS + sepsis and pneumonia Day 7-resp distress Day 12-sepsis des-pite abx	Resp distress and pulmonary infarct Continued seeding of vegetations to multiple leaflets despite abx HIT	Initially: vanco, ceftriaxone, clinda for GBS + sepsis and pneumonia, switched to pen/genta after echo Surgery after two months of presentation, delayed due to HIT	Resolution

(continued)

Table 1. Continued

Paper	ID	Risk factor	Echocardiogram	Size of the vegetation based on TTE or TEE	Initial presentation	Complication	Treatment	Outcome
Dal Cero ¹⁶	43 y.o	Pap smear	Large floating vegetation attached to anterior MV leaflet	TTE: 3 × 1.84 cm	Three days: abdo pain and fever, dyspnea. R pleural effusion	Post-op splenic abscess, stroke, multiorgan failure	Amoxicillin Clavulinate × 6 days, switched to oxacillin, gentamicin, meropenem, intubation. Mitral valve replacement with prosthesis	Death
Vartian and Septimus ¹⁷	30 y.o	Elective saline abortion	Large mass at septal cusp of tricuspid valve (atrial myxoma)		Fever, URTI sx, arthralgia × 1 month	First-degree heart block Pulmonary emboli (day 6)	Vancomycin Surgery (day 9)	Resolution

DIC: disseminated intravascular coagulopathy; IVU: IV drug user.

Most were treated with penicillin and gentamycin for six weeks and five underwent adjuvant surgery. Nine developed septic emboli despite antibiotics between six days and six months. Overall, 10 cases resolved, three cases resulted in death, and one was lost to follow-up. This wide array of outcomes may reflect the variety of treatments used and the lack of consensus in managing GBS endocarditis.

In the present case of an 18 year old undergoing therapeutic abortion, vigorous manipulation of the genital tract during dilatation and curettage with immediate placement of an IUD may have led to bacterial translocation and subsequent seeding onto the tricuspid valve. The action of entering the endometrial cavity with a curette in contact with the GBS colonized vagina and physical shear of the highly vascularized lining allows transient bacteremia into the uterine vein draining into the internal iliac vein, to the common iliac and finally to the inferior vena cava with direct deposit into the right atrium and tricuspid valve.

Typically, GBS colonization is not screened for prior to gynecologic surgery. The American Congress of Obstetricians and Gynecologists and the Society of Obstetricians and Gynaecologists of Canada now recommend antibiotic prophylaxis with doxycycline prior to therapeutic abortions to prevent postoperative infection, but not for missed or incomplete abortion nor for the sole purpose of endocarditis prophylaxis.¹⁹ The 2007 American Health Association guidelines report no evidence of infectious endocarditis following genitourinary procedures and do not advocate for antibiotics prior to these procedures to prevent infection.¹⁹ In addition, GBS colonization prior to IUD placement is neither a contraindication to insertion nor an indication for removal nor is there any indication for antibiotic prophylaxis in a nonsymptomatic patient prior to IUD insertion.¹⁹

In our patient, initial treatment with Ceftriaxone was chosen to treat the valvular vegetations. However, she returned with fever and leukocytosis six weeks after initiation, suggesting resistant, recurrent, or progressive infection; a complication of antibiotic therapy; or a mechanical complication of the infection (embolism). Most cases of postabortion GBS bacteremia report treatment with penicillin and gentamicin in GBS endocarditis (see Table 1). Given the evolution in the treatment guidelines for native valve endocarditis due to methicillin-susceptible *S. aureus* and *Enterococcus faecalis* moving away from aminoglycoside use due to toxicity, it was chosen in this case to proceed with monotherapy.²⁰ Initially while she had early evidence of embolic phenomenon, she also had sterile blood cultures after initiation of therapy and the culture of the embolism was also sterile, suggesting it may not have necessarily been a complication of ongoing infection which could have been precluded with another antibiotic choice. We believe operative cultures were negative for GBS presumably due to extensive pretreatment. Two species of coagulase-negative Staphylococci grew in the broth media of one of five intraoperative cultures and were considered to be contaminants.

Nonetheless, the risk of embolic vegetation to the pulmonary artery in right-sided GBS endocarditis is exceptionally high (up to 50%)⁷ likely due to a lack of fibrinolysis, allowing formation of large friable vegetations. In the largest report of 31 cases of GBS+ endocarditis, two had either a therapeutic or a spontaneous abortion up to six weeks prior to presentation and 10% of patients developed pulmonary vascular emboli, and the majority of cases presented with cerebral or systemic emboli in the case of left-sided endocarditis. In the cases reviewed by Crespo et al.,¹¹ embolic complications occurred in 8/11 cases of GBS endocarditis following gynecologic procedures, most of which occurred after elective abortion. They reported one case of GBS endocarditis in a 15-year-old girl undergoing elective abortion, refractory to penicillin, gentamicin, and ceftriaxone with ongoing seeding of the vegetations and septic emboli. She was anticoagulated and developed heparin-induced thrombocytopenia which further delayed surgical resection of the pulmonary vegetations. In the cases of GBS endocarditis following gynecologic procedures reviewed in the present study, septic emboli occurred in 11 cases to the lung and one to the spleen (see Table). Given the high likelihood of septic emboli occurring despite antibiotics and highly virulent potential, early surgical

intervention or prolonged course of antibiotics may need to be considered in cases of GBS endocarditis following elective abortions. The 2009 European Society of Cardiology guidelines recommend surgery according to type of organism (fungi or viral, rare agent having a worse prognosis) vegetations >20 mm or emboli, and heart failure and the timing of surgery depends on the inciting cause, the organism, coexistent left-sided disease, the response to treatment, toxicity of medication, and anticipated complications.²¹ On the one hand, purported benefits of surgical intervention over medical include less overall mortality, more rapid resolution of infection, and improved valve mechanic. Yet, upfront risks of any surgery need to be balanced against the long-term benefits and thus decision between surgical intervention versus a second course of antibiotics should be on a case-by-case basis.

Teaching points

- Preoperative antibiotics in routine gynecologic procedures should be considered in patients at moderate to high risk of GBS endocarditis and may include a broader spectrum (for instance in patients requiring postpartum D+C for retained products with a positive antenatal vaginal GBS culture).
- Early recognition and clinical suspicion of GBS endocarditis in patients presenting with respiratory symptoms following gynecologic procedures is required to prevent adverse outcomes and significant morbidity.
- A multidisciplinary approach and a case-by-case analysis, especially in young patients may help select surgical candidates from those benefiting from early, prolonged treatment with antibiotics. Based on a review of the literature, ceftriaxone may be sufficient coverage while limiting toxicity from gentamycin traditionally used.

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Ethical approval

The patient has given verbal and written consent for case and image publication.

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