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Bilateral subretinal abscess in community-acquired meticillin-susceptible *Staphylococcus aureus* infection

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Abstract

Subretinal abscesses due to endogenous staphylococcal blood stream infection is a rare occurrence. A young adult male presented with subretinal abscesses, necrotising pneumonia, pleural empyema, skin and soft tissue infection, muscle abscesses and deep vein thrombosis. Aspirate from one of the abscesses and blood culture revealed meticillin-susceptible *Staphylococcus aureus*. We present here a case of probable Panton–Valentine leucocidin (PVL) syndrome. PVL is a cytotoxin produced by *S. aureus*. Infection with PVL-positive *S. aureus* produces a clinical disease that is characterised by necrotising pneumonia and disseminated infection that often carries a high mortality. Our patient showed prompt clinical response to cloxacillin that was given for a total duration of 6 weeks. At the end of 6 weeks vision also recovered. The successful outcome in our patient was likely due to early and appropriate antibiotic therapy.

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Introduction

Bilateral subretinal abscesses are a sight threatening and rare complication of staphylococcal endogenous endophthalmitis. We present here a patient with disseminated community-acquired meticillin-susceptible *Staphylococcus aureus* (MSSA) infection with subretinal abscesses in both eyes, with good clinical outcome and good recovery of vision with systemic antibiotics.

Case presentation

A 31-year-old male presented with fever and abdominal pain for 1 month, yellowish discoloration of eyes and urine, and blurring of vision for 10 days. Fever was initially low grade and became high grade (axillary temperature ≥103°F) at 10 days prior to admission. Abdominal pain was associated with right-sided thigh pain and gluteal pain. The patient had noticed jaundice and dimness of vision 10 days prior to presentation. Vision loss was painless, bilateral and gradually progressive. Other systemic features such as loss of weight, loss of appetite and generalised body pains were also present. The patient also gave the history of easy fatigability, exertional breathlessness and dry cough.

Examination revealed icterus and conjunctival congestion. A small tender and fluctuant swelling 1 × 1 cm in size was noted over the right posterior superior iliac spine (PSIS). Cellulitis was noted in the right foot. At the time of admission pulse rate was 124 beats per minute, blood pressure was 110/70 mmHg and respiratory rate was 32 breaths per minute. Oxygen saturation at room air by pulse oximeter was 93%. Visual acuity in right eye was 3/60 and in left eye was 1/60. Anterior segment examination was normal. Fundus examination revealed a large subretinal abscess along the superotemporal quadrant with multiple subretinal infiltrates in the right eye. The left eye had similar fundus findings along with subretinal haemorrhage (Figure 1).

Investigations revealed leucocytosis with total leucocyte count (TLC) of 25,890 cells/dl. The total bilirubin was 4.31 mg/dl, direct bilirubin 1.8 mg/dl, alkaline phosphatase 534 IU/l and gamma-glutamyltransferase 119 IU/l suggestive of cholestasis. Plain radiograph of chest revealed loculated right pleural effusion, which on evaluation turned out to be empyema (glucose was 54 mg% and lactate dehydrogenase was 1,764 IU/l; TLC was 5,490 cells/dl with 80% neutrophils and 20% lymphocytes). The patient was empirically given intravenous (IV) ceftazidime and IV vancomycin to cover for *Burkholderia pseudomallei* (meliodosis) and *Staphylococcus*. Owing to the loculated empyema empirical anti-tubercular treatment (ATT) was also commenced. Intercostal tube drainage was carried out for the empyema. Ultrasonography of abdomen

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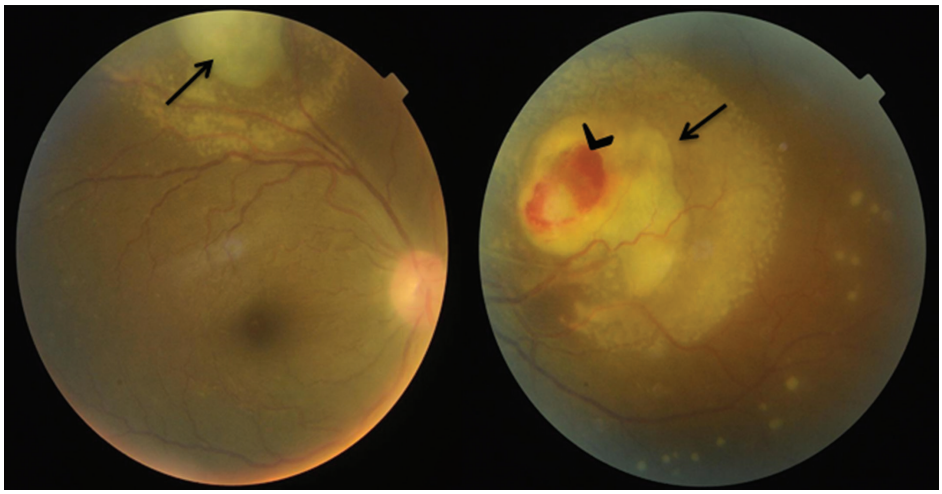

Figure 1 Fundus picture of right eye (left image) with subretinal abscesses in the superotemporal quadrant (arrow). Fundus picture of the left eye (right image) with subretinal haemorrhage (arrow head) and subretinal abscesses (arrow)

revealed a thrombus in the inferior vena cava. Contrast CT of thorax and abdomen showed necrotising pneumonia of the right lung with loculated empyema with multiple collections in the iliopsoas, latissimus dorsi and pectoralis major muscle groups (Figure 2). Inferior vena cava thrombosis was confirmed with the upper extent up to the retrohepatic portion of inferior vena cava. A transthoracic echocardiography did not show vegetations or pericardial effusion.

On day 6 of hospital stay a culture of pus aspirated from the collection over the right PSIS and blood was reported to grow MSSA. Antibiotics were then de-escalated, ATT was discontinued. Patient received IV cloxacillin 2 g every 6 hours. Fever subsided by day 5 of IV cloxacillin. Vision improved steadily and by day 7 of hospital stay visual acuity had improved to 6/60 in right eye and 6/24 in left eye. On repeat funduscopy (day 7) the subretinal abscesses showed resolution and hence intravitreal antibiotics were deferred in consultation with ophthalmologist. Intercostal tube was in place for 10 days, intrapleural streptokinase was given to break the loculations. The patient also received anticoagulation with enoxaparin for deep vein thrombosis (DVT). Ultrasound Doppler carried out after 1 week of antibiotics showed recanalisation of the inferior vena cava, hence anticoagulation was discontinued. IV cloxacillin was given for 4 weeks, followed by another 2 weeks of oral cloxacillin. Vision improved to 6/18 in both eyes at the time of discharge, with resolution of DVT and clearance of the pleural empyema. A repeat ultrasound showed resolution of the muscle collections. At 2 years follow up the patient was doing well.

Discussion

In addition to subretinal abscesses, the patient had multifocal skin and soft tissue abscesses, muscle involvement, necrotising pneumonia, pleural empyema and DVT. This pattern of infection is quite characteristic of PVL cytotoxin-producing *S. aureus*.[1,2] Though our patient had all the clinical features consistent with PVL toxin-producing staphylococci, identification of PVL gene could not be carried out owing to the lack of facility.

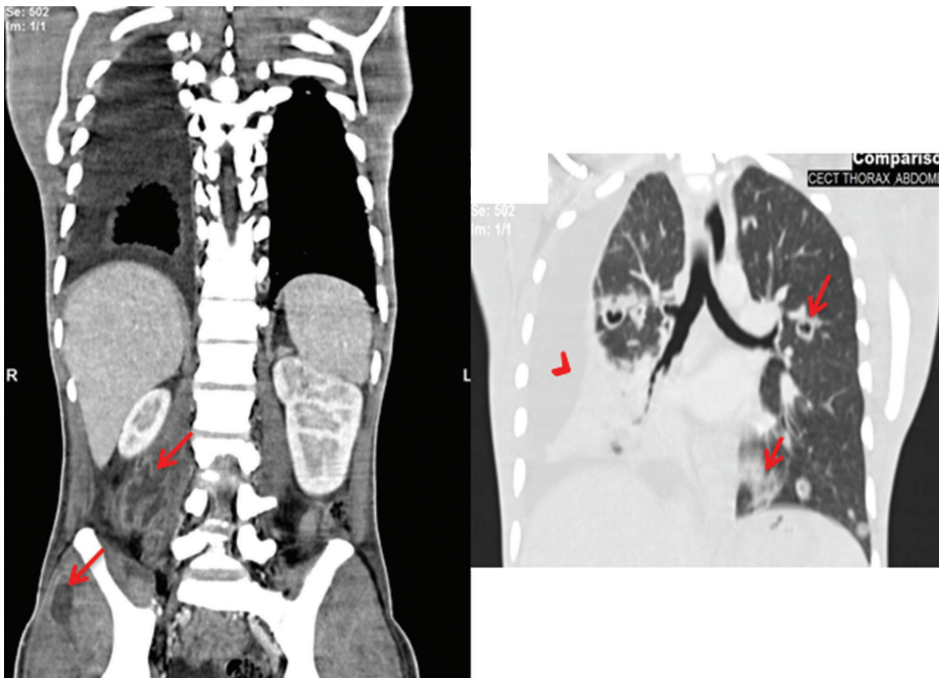

Figure 2 Contrast-enhanced CT of chest and abdomen (coronal section) with collections in iliopsoas and gluteal muscle groups (arrows; left image); loculated right pleural effusion (arrowhead) and cavitatory lesions (arrows; right image)

The PVL cytotoxin produced by <5% of *S. aureus* strains has been reported to cause necrotising pneumonia in previously healthy adults and has been associated with high mortality.[3] A comparison of 29 cases of PVL methicillin-resistant *S. aureus* (MRSA) pneumonia vs 104 cases of PVL-MSSA pneumonia found that mortality was associated with PVL producing ability of staphylococci rather than the methicillin sensitivity property.[4] However, more recent evidence from a systematic review and meta-analysis concluded that presence of PVL gene is strongly associated with skin and soft tissue disease and less commonly with pneumonia. Also, the presence of PVL gene did not predict poor clinical outcome for staphylococcal pneumonia.[5]

Staphylococcus is implicated in 10% of bacterial subretinal abscesses.[6] Other bacterial causes of subretinal abscess include *Klebsiella*, *Pseudomonas* and *Nocardia* species, etc.[6–8] A systematic review of 342 cases of endogenous bacterial endophthalmitis showed that Gram-positive infections were commonly reported from western countries while infection with Gram-negative organisms, particularly *Klebsiella*, were commonly reported from Asia.

The mainstay of treatment of subretinal abscess is antibiotic therapy by systemic and/or intravitreal route with or without vitrectomy.[6] In a systematic review by Jackson et al.,[6] of all cases of endogenous bacterial endophthalmitis reported between 2001 and 2012 consisting of 75 patients (80 eyes), 36% eyes received systemic and intravitreal antibiotics, 20% received systemic and intravitreal antibiotics and vitrectomy, 10% received only intravitreal antibiotics, while 11% received treatment with systemic antibiotics alone. In our patient vision improved steadily with systemic antibiotic therapy alone. Improvements in vision were noted by day 7 of hospital stay hence intravitreal antibiotics were deferred.

The initial and subsequent antibiotic treatment for staphylococcal infection given to our patient was as per current standard guidelines.[9] There are reports that linezolid or clindamycin can suppress PVL toxin production in vitro.[10] However, in our patient the presence of PVL was only speculated. There is also a role for IV immunoglobulin in the management of PVL-related necrotising pneumonia in cases of presence of septic shock.

Enoxaparin was given for only 7 days as the DVT was infection related, and imaging had shown resolution of the clot, hence we believed that antibiotics alone would suffice in management, akin to the management of infection-related cavernous sinus thrombosis.[11] The 2012 American College of Chest Physicians guidelines for management of venous thromboembolism does not specifically mention duration of anticoagulation treatment of infection/sepsis-associated DVT.[12] The decision to discontinue enoxaparin was because we believed that the DVT was infection related, the thrombus had resolved hence aggressive anticoagulation was not warranted. In a review of nine children who had thrombosis associated with osteomyelitis due to MRSA, the anticoagulation regime was individualised. Of these nine children one did not receive anticoagulation.[13]

Conclusion

We presented a case of community-acquired disseminated MSSA infection (probable PVL producing *S. aureus*) with subretinal abscess where good overall and visual recovery was likely because of early and appropriate antibiotic therapy. A formal ophthalmological examination is important in patients with sepsis with visual complaints in order not to miss this sight-threatening complication of staphylococcal sepsis.

Informed consent

Written informed consent for the paper to be published (including images, case history and data) was obtained from the patient/guardian for publication of this paper, including accompanying images.

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