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UNUSUAL PRESENTATION OF SECONDARY IGA GLOMERULONEPHRITIS AND CEREBELLAR ABSCESS IN A PATIENT WITH STAPHYLOCOCCUS AUREUS BACTEREMIA

Pathology

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ABSTRACT

Background: Staphylococcus aureus bacteremia (SAB) is a severe condition with potential for widespread dissemination. Infection of central nervous system (CNS) and renal complications in an immunocompetent adult is rare. **Case Summary:** The current study reports a rare diagnostically challenging case of a 59 year old male patient with no history of comorbidities developing a persistent high-grade fever followed by septic shock, hematuria and multifocal brain infarcts. Investigations revealed Methicillin Sensitive Staphylococcus aureus (MSSA) bacteremia, cerebellar abscess, along with a biopsy confirming IgA glomerulonephritis. Blood cultures initially reported positive, later turned sterile, despite consistent fever. The patient responded well to sustained antibiotic treatment alone. **Conclusion:** This case underlines the diagnostic complexity of uncontrolled bacteremia with CNS complications and renal injury. The study emphasises on the significance of early biopsy, prompt imaging, and adaptive antibiotic management for positive outcomes.

KEYWORDS

Staphylococcus Aureus, Bacteremia, Post-infectious Glomerulonephritis, Infection Associated Glomerulonephritis, IgA Glomerulonephritis, Cerebellar Abscess, Septic Emboli, Nephropathy, Case Report

INTRODUCTION

Staphylococcus aureus Bacteremia (SAB) is a high risk condition with a potential for hematogenous dissemination. Metastatic complications such as infective endocarditis, osteomyelitis and cerebral abscess are well documented, however, cerebellar complications are rare. The occurrence of secondary glomerulonephritis with IgA dominant immune complex deposition is even more unusual although the presence of IgA-dominant immune deposits in the glomeruli can be attributed to infections caused by underlying conditions such as liver cirrhosis and inflammatory bowel disease. SAB is frequently reported among the immunocompromised and hospitalised patients, its prevalence in the immunocompetent individuals without comorbidities, causing CNS and renal complications is rare. This current study presents a unique case of persistent Methicillin sensitive Staphylococcus aureus (MSSA) bacteremia with cerebellar abscess and secondary IgA glomerulonephritis successfully controlled without immunosuppressive therapy.

Case History

A 59 year old male, retired civil servant from Bhutan with no known comorbidities presented with a history of high grade fever for 23 days with intermittent chills, non-productive cough, profuse diarrhoea, vomiting and drowsiness. The patient developed hematuria four days prior to admission at Manipal Hospital. He was previously admitted in a different hospital on day 9 of illness where he experienced hypotension, hypoxia, and was febrile. Investigations indicated elevated inflammatory markers, renal impairment, low platelet count and transaminitis. Blood cultures consistently yielded MSSA. The patient developed a severe occipital headache around day 12. On day 14, he was delirious and drowsy. An MRI scan of his brain indicated multifocal infarcts with evidence of abscess formation and hemorrhagic transformation. Chest X-ray revealed bilateral consolidation; and he exhibited symptoms of multiple organ dysfunction (MODS). The patient was transferred to our hospital on the 23rd day of illness.

Investigations Performed

Upon admission, complete blood count, renal and liver function tests, iron study, inflammatory markers, urine analysis and autoimmune screening was done. Blood and urine cultures were repeated. Imaging studies consisted of chest X-ray, ultrasound of the abdomen, MRI of the brain and echocardiography. Cerebro-spinal fluid analysis (CSF) was performed to eliminate meningeal infection. A renal biopsy was done due to recurrent hematuria and increased levels of creatinine.

Clinical Course

Upon admission, the patient had a temperature of 101°F, with 100/60 mmHg blood pressure and an oxygen saturation (SpO_2) of 96%. GCS was E3V4M6. The patient exhibited drowsiness, slurred speech and neck rigidity.

Bibasilar crackles were audible on respiratory examination. There was no organomegaly, edema or lymphadenopathy.

The initial haematological evaluation reported normocytic normochromic anaemia (Hb: 9.2 g/dL), TLC: 6220/mm^3, (N: 77%), and platelets: 3.68 lakh/mm^3. C-reactive protein (CRP) 95.9 mg/L and serum ferritin of 3650.42 ng/mL.

Blood urea 91 mg/dL, serum creatinine levels 2.44 mg/dL. Serum electrolytes were within normal limits.

CSF Study: Study showed elevated protein and low gluocse. Multiplex PCR from CSF did not detect any micro-organism included in the panel.

Test Name	Result	Unit	Bio. Ref. Range	Method
Sample : CSF				
Collection Date: 20/09/2024 08:29PM	Ack Date: 21/09/2024 8:29PM		Report Date: 21/09/2024 10:55AM	
CSF				
Physical Examination:				
CSF Volume	8.5	mL		
C & F Colour	Pale yellow			
Appearance	Slight hazy			
Coagulum	Absent			
Chemical Examination:				
Reaction	Alkaline			pH paper
CSF Glucose	**21 L**	mg/dL	50 - 80	GOD POD
CSF Protein	**151 H**	mg/dL	15 - 45	Pyrogallol red and molybdic
CSF Chloride	**141 H**	mmol/L	118.00 - 132.00	ISE Direct
Microscopic Examination:				
CSF Total Count	**143 H**	cells / cumm	0 - 5 (0 - 5)	Microscopy
Cell Type:				
Lymphocytes	85	%		Microscopy
Neutrophils	10	%		Microscopy
Macrophages	05			
RBC	Nil			

End Of Report

MICROBIOLOGY

Test Name	Result	Unit	Bio. Ref. Range	Method
Sample : CSF				
Collection Date: 21/09/2024 08:29PM	Ack Date: 21/09/2024 11:27PM		Report Date: 22/09/2024 11:20AM	
MENINGITIS PANEL				
VIRUSES				
Entero Virus	Negative		Negative	RTPCR
Herpes Simplex Type 1 (HSV-1)	Negative		Negative	RTPCR
Herpes Simplex Type 2 (HSV-2)	Negative		Negative	RTPCR
Human Parecho Virus	Negative		Negative	RTPCR
Human Herpes Virus 6 (HHV-6)	Negative		Negative	RTPCR
Varicella Zoster Virus (VZV)	Negative		Negative	RTPCR
BACTERIA				
Streptococcus Pneumoniae	Negative		Negative	RTPCR
Neisseria Meningitidis	Negative		Negative	RTPCR
Streptococcus Agalactiae	Negative		Negative	RTPCR
Listeria Monocytogenes	Negative		Negative	RTPCR
Haemophilus Influenzae	Negative		Negative	RTPCR
Escherichia Coli K1	Negative		Negative	RTPCR
Streptococcus Pyogenes	Negative		Negative	RTPCR
Mycoplasma Pneumoniae	Negative		Negative	RTPCR
FUNGI & YEAST				
Cryptococcus Neoformans/Gattii	Negative		Negative	RTPCR
MENINGITIS PCR PANEL	POSITIVE Remarks - Indicates organisms detected and identified as likely causing signs & symptoms of Meningo-encephalitis. Co-infection by more than one organism is not uncommon. Positive result do not distinguish between a viable or replicating organism and the presence of a non-viable organism and the presence of a non-viable organism or nucleic acid, nor do they exclude the potential for coinfection by organism not included in the panel. NEGATIVE:- Remarks - Indicates organism tested were not detected and the signs and symptoms may be caused by a condition other that an infection or pathogen that was not tested for.			

Liver Function Tests (LFT) showed albumin of 2.7 g/dL, elevated globulin (5.8 g/dL), and a low albumin to globulin ratio (A:G) of 0.47. Other parameters were within normal range.

Urine routine examination (R/E) showed albuminuria (++), hematuria (RBCs 3-5/hpf), and blood (++), indicative of glomerular pathology.

Urine culture and blood cultures collected upon admission were sterile.

Iron studies indicated normal serum iron (74.5µg/dL) with low TIBC (118µg/dL), and a transferrin saturation of 63.14% which is consistent with anemia of inflammation.

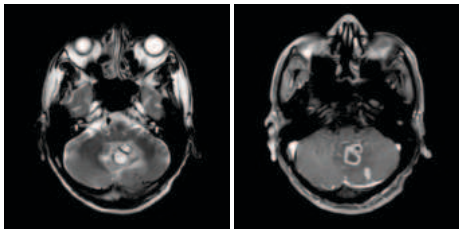
Vitamin B12 was within normal (880 pg/mL).

Autoimmune markers such as ANA, PR3, and p-ANCA were negative. c-ANCA was slightly positive (+1), and complement C-3 was low (68 mg/dL). [Table 1]

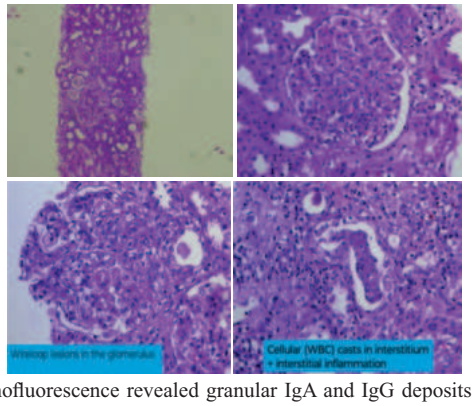
Table 1: Autoimmune Profile

Test	Result	Reference Range
ANA	Negative	Negative
PR3 Antibody	Negative	Negative
p-ANCA	Negative	Negative
c-ANCA	1+	Negative
Complement C3	68 mg/dL	90-180 mg/dL

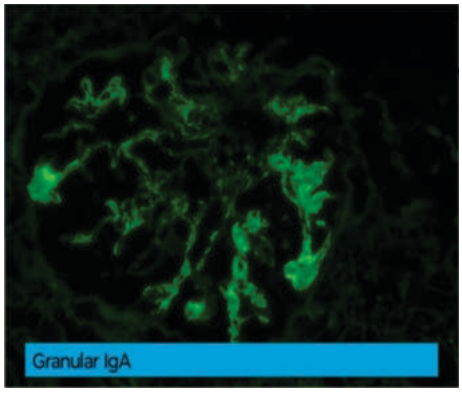
MRI of the brain showed multifocal infarcts in the bilateral frontal and temporal lobes, including a cerebellar abscess prominent in the left cerebellar vermis.



Renal biopsy detected diffuse exudative glomerulonephritis with immune complex deposition. Light microscopy depicted hypercellular glomeruli with interstitial inflammation and white blood cell casts.



Immunofluorescence revealed granular IgA and IgG deposits in the mesangium and capillary walls.



Echocardiography reported preserved ejection fraction (EF) around 60% with no evidence of valvular vegetation.

Treatment Approach

Based on prior sensitivity reports for MSSA, the patient received intravenous Cefazolin. However, his inflammatory markers remained elevated, and the sputum culture from an external hospital suggested ESBL producing Klebsiella pneumoniae so IV Meronepem was started. Following that, it was switched to Zavicefta and Aztreonam. General care continued with Ryle's tube feeding, intravenous drips and monitoring of neurological and renal parameters.

Although the patient developed glomerulonephritis, he was not initiated on corticosteroids or any other immunosuppressants, as the renal complication was secondary to infection. Renal function improved progressively with creatinine levels reducing to 1.97mg/dL by the time of discharge. Repeated MRI scans of the brain confirmed resolution of the cerebellar abscess and improved neurological status with antibiotics alone.

DISCUSSION

This case exemplifies a rare dual complication of Staphylococcus aureus bacteremia in an immunocompetent individual with cerebellar abscess and IgA dominant glomerulonephritis. Secondary IgA glomerulonephritis is a rare, but increasingly recognized, complication of Staphylococcus aureus infection, mainly in older male adults. Features that supported the diagnosis of infection related IgA glomerulonephritis encompassed timing of onset, decreased complement levels (particularly C3), a diffuse exudative histological pattern, and the presence of granular deposits of IgA and IgG. Moreover, the absence of systemic autoimmune features paired with the patient's recovery through antibiotics alone suggested a post-infectious mechanism instead of a primary autoimmune one. [1-4]

Cerebellar abscess, another severe complication of S. aureus bacteremia, is characterized by localized necrosis within the brain due to hematogenous spread. S. aureus is the second most common cause of brain abscess, which may present with non-specific neurological symptoms, making early recognition challenging. Risk groups include those with neurosurgery, endocarditis, or intravenous drug use, and effective treatment requires prolonged antibiotics and sometimes surgical intervention.[5-10]

The patient made a full recovery without needing immunosuppressive therapy. This underlines the significance of accurate distinction between infection related glomerulonephritis and primary IgA nephropathy, which often necessitates renal biopsy and correlation with clinical context.

CONCLUSION

Cerebellar abscess and IgA glomerulonephritis are rare yet severe complications of Staphylococcus aureus bacteremia. Prompt investigations were imperative in supporting the diagnosis and preventing superfluous immunosuppression. Extensive intravenous antibiotic treatment alone resulted in effective response and a complete clinical recovery, further highlighting the significance of organ specific diagnostics in complex systemic infections.

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