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Case Report

From acute gastroenteritis to meningoencephalitis: an unusual neurological complication associated with *Shigella sonnei* infection in an adult

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ABSTRACT

Shigella sonnei primarily causes acute gastroenteritis, with neurological complications being uncommon, particularly in adults. We report the case of a 34-year-old female who presented with a 3-day history of fever, chills, loose stools, and overall weakness and was hospitalized with acute febrile illness, acute gastroenteritis, and dehydration. While hospitalization, she had severe headaches, vomiting, and neck stiffness, which raised further concern for the involvement of central nervous system. Magnetic resonance imaging of the brain showed results indicative of meningoencephalitis, whereas cerebrospinal fluid examination aligned with bacterial meningitis. Stool culture subsequently isolated *Shigella sonnei*, revealing the causative enteric pathogen. Following antimicrobial and supportive therapy, the patient showed consistent clinical improvement and she was discharged without any neurological deficits. On follow-up no recurrence was observed. This case underscores the significance of identifying rare neurological manifestations of shigellosis in adults. Timely diagnosis via immediate neurological assessment and suitable treatment is essential for positive results.

Keywords: Meningoencephalitis, *Shigella sonnei*, Gastroenteritis, Meningitis

INTRODUCTION

Shigellosis is a major contributor to acute bacterial gastroenteritis globally and continues to pose a considerable public health issue, especially in low- and middle-income nations. The disease is caused by gram-negative bacteria from the genus shigella and is mainly spread via the fecal-oral transmission route.[1] Of the four shigella species, *Shigella sonnei* has become the most prevalent species in numerous developing areas due to shifting socioeconomic factors and has displayed a rising incidence worldwide.[2]

Shigellosis typically shows symptoms such as fever, abdominal pain, diarrhea, and dehydration in a clinical setting. While the infection is generally confined to the gastrointestinal tract, it has been associated with extraintestinal complications including bacteremia, reactive arthritis, hemolytic uremic syndrome, and neurological abnormalities.[3]

Neurological symptoms are mainly observed in children and encompass seizures, encephalopathy, changes in consciousness, and, infrequently, meningeal involvement. Neurological complications in adults are extremely rare and are not well defined in the existing literature.[4]

We describe an uncommon instance of *Shigella sonnei*-associated meningoencephalitis in a 34-year-old female.

This instance emphasizes a rare extraintestinal expression of shigellosis and underlines the need for sustaining a heightened awareness of neurological issues in adults.

CASE REPORT

A 34-year-old previously healthy woman presented to the emergency department with a 3-day history of fever with chills, multiple episodes of loose stools, and generalized weakness. She denied any prior neurological illness, recent travel, or significant medical comorbidities. On examination, she was febrile and clinically dehydrated but remained hemodynamically stable. Systemic examination was otherwise unremarkable, and no focal neurological deficits were identified at the time of admission.

Based on her clinical presentation, she was diagnosed with an acute febrile illness associated with acute gastroenteritis and dehydration. She was admitted for inpatient management and initiated on intravenous fluids, empirical intravenous antibiotics, probiotics, multivitamins, proton pump inhibitors, analgesics, antipyretics, and supportive care. Baseline laboratory investigations were performed, and stool samples were sent for microbiological analysis.

Despite initial treatment, the patient's clinical condition deteriorated over the next few days. She developed severe persistent headache, repeated episodes of vomiting, and neck rigidity, raising suspicion for central nervous system involvement. A neurology consultation was obtained, and further evaluation was undertaken. magnetic resonance imaging (MRI) of the brain demonstrated radiological findings suggestive of meningoencephalitis. Cerebrospinal fluid (CSF) examination confirmed bacterial meningitis, supporting the diagnosis of meningoencephalitis. Serial C-reactive protein (CRP) measurements were performed to monitor the inflammatory response during treatment.

Microbiological evaluation of the stool culture isolated *Shigella sonnei*, confirming the etiological diagnosis of shigellosis. Based on the culture findings and clinical presentation, antimicrobial therapy was optimized with intravenous ceftriaxone (Monocef) and oral azithromycin (Azee), along with continued supportive care.

The patient demonstrated progressive clinical improvement during hospitalization. Her fever subsided, gastrointestinal symptoms resolved, and neurological manifestations, including headache and neck rigidity, gradually improved. Inflammatory markers also showed a declining trend with treatment. She remained hemodynamically stable throughout her hospital stay without developing any neurological sequelae or treatment-related complications. Following complete clinical stabilization, she was discharged with advice for outpatient follow-up. On follow-up no recurrence was observed.

DISCUSSION

Neurological complications associated with shigellosis are well-documented in pediatric cases but are extremely rare in grown-ups. The present case showcases the diagnostic difficulties presented by this unusual presentation, as the patient first exhibited signs of acute gastroenteritis and subsequently experienced intense headache, vomiting, and neck rigidity, leading to an assessment for central nervous system involvement. The timeline from gastrointestinal sickness to neurological decline highlights the necessity of sustaining clinical vigilance when new neurological signs develop during the shigellosis.

Published adult cases have mainly reported encephalopathy or meningism instead of meningoencephalitis. Schuster et al reported a 45-year-old man with shigella flexneri gastroenteritis who exhibited changes in mental status indicative of encephalitis; however, cerebrospinal fluid analysis did not validate bacterial meningitis, and the patient improved with antimicrobial treatment.[5] Similarly, Shah et al reported an adult who exhibited fever, diarrhea, neck stiffness, and confusion due to shigellosis, in whom a lumbar puncture ruled out bacterial meningitis even with significant meningeal signs.[6] In contrast to these reports, our patient exhibited magnetic resonance imaging results indicative of meningoencephalitis and cerebrospinal fluid results aligned with bacterial meningitis, occurring in the context of stool culture-confirmed *Shigella sonnei* infection, reflecting an unusual clinical presentation.

The precise mechanism behind neurological involvement in shigellosis is still not fully understood. Research indicates that neurological symptoms might arise from a complicated interplay of systemic inflammatory responses, endotoxin-related toxicity, excessive cytokine release, endothelial dysfunction, and disruption of the blood-brain barrier rather than solely from direct bacterial invasion.[7] This hypothesis could account for the presence of neurological symptoms in patients lacking microbiological confirmation of shigella in cerebrospinal fluid, as documented in majority published cases.

Recent surveillance research has shown a rising global prevalence of *Shigella sonnei* alongside the emergence of multidrug-resistant (MDR) and extensively drug-resistant (XDR) strains, heightening concerns about empirical antimicrobial therapy and treatment results.[8] Current clinical recommendations highlight the importance of microbiological verification and antimicrobial susceptibility testing, which are crucial for directing targeted treatment, especially in patients with severe illness or extraintestinal symptoms.[9] Moreover, the increasing challenge of antimicrobial resistance has underscored the importance of ongoing monitoring and careful antibiotic application to limit the spread of resistant shigella strains.[10]

Despite the absence of standardized guidelines for handling shigella-related neurological issues in adults, successful results are typically noted with timely identification, swift neurological assessment, suitable antimicrobial treatment, and supportive care.[11] The positive recovery of our patient reinforces the significance of a multidisciplinary approach involving general

physicians, neurologists when neurological symptoms complicate acute shigellosis.

CONCLUSION

This case underscores a rare neurological complication associated with *Shigella sonnei* gastroenteritis in an immunocompetent adult. While shigellosis mainly impacts the gastrointestinal system, the appearance of new neurological symptoms should raise suspicion for potential central nervous system involvement and warrant prompt evaluation. Prompt diagnosis and proper management are essential for achieving positive outcomes. Documenting these rare cases expands the existing body of literature and improves clinical understanding of this unusual presentation.

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