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Vision Loss following Intraocular Listeriosis Associated with Contaminated Cantaloupe

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Abstract
Intraocular listeriosis, a rare manifestation of invasive listeriosis, has a poor visual prognosis. We report an intraocular listeriosis case related to a multistate outbreak associated with contaminated cantaloupe. Increasing awareness of rare listeriosis presentations might facilitate timely diagnosis and treatment, and case reporting can clarify medical and epidemiologic aspects of listeriosis.

Introduction

Invasive listeriosis is caused by foodborne transmission of *Listeria monocytogenes* (LM) infection, which typically results in septicemia or meningitis among older adults and immunocompromised persons. Focal infections (e.g. endocarditis, septic arthritis and osteomyelitis) occur infrequently [1]. Intraocular listeriosis is an exceptionally rare manifestation that typically results in profound vision loss [2, 3]. Since the first published report of a culture-confirmed case in 1967 [4], intraocular listeriosis has been described infrequently in medical literature.

Early diagnosis and treatment of intraocular listeriosis is challenging. Clinical presentation includes eye pain, decreased vision, high intraocular pressure (IOP) and a fibrinous anterior chamber reaction. In each case, LM was identified by culturing intraocular fluids

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(aqueous and vitreous humor); bacteria were believed to have entered the eye from the bloodstream, causing an endogenous endophthalmitis [2].

We report a case of invasive listeriosis in a New Mexico resident who presented with acute endogenous endophthalmitis. The patient was an otherwise healthy Hispanic woman, aged 88 years. Her illness was associated with a large, multistate outbreak of listeriosis during 2011, which was caused by consumption of whole cantaloupe from a single farm [5].

Case Report

On October 12, 2011, the patient experienced acute onset of blurry vision, increasing pain, and redness in her right eye, and she consulted her primary eye care doctor. Notably, she had primary open-angle glaucoma in both eyes (controlled by using timolol and dorzolamide drops) and cataract surgery with intraocular lens implantations in both eyes in 1980. Ocular examination revealed high IOP, and she received topical and systemic IOP-lowering medications.

On October 14, she was referred to a Texas medical center because of worsening vision and severe, constant right eye pain. She had no fever, chills, rigors or headache and was systemically well except for nausea and anorexia. She did not report any history of previous ocular trauma, recent surgery, infection, indwelling catheter use, contact lens wear, foreign bodies or animal contact. She was a smoker, did not drink alcohol and had no history of intravenous drug abuse. She did not have a history of diabetes, cardiac disease or malignancy.

On examination, she had no light perception in the right eye, and visual acuity was 20/200 in the left. IOP of the right and left eyes were 47 and 13 mm Hg, respectively (normal range 9–21 mm Hg). Her right eye pupil was fixed and nonreactive. Ocular adnexa examination revealed mild erythema and swelling around the right eye only.

Slit-lamp examination of the right eye revealed conjunctival chemosis, subconjunctival hemorrhage and corneal haze. The anterior chamber exhibited an intense fibrinous reaction and inflammatory debris with a 30–40% (3–4 mm) white hypopyon. No keratic precipitates were noted. A grade of 4+ was given to quantify anterior chamber flare. The iris, lens and posterior segment could not be visualized. B-scan ultrasonography of her right eye revealed dense vitreous opacities and attached retina.

Her clinical presentation raised suspicion of endogenous bacterial endophthalmitis. Treatment with cycloplegics, IOP-lowering medications, topical steroids and topical antibiotic eye drops was initiated. She underwent emergent pars plana vitrectomy. Culture samples were obtained from aqueous and vitreous fluids during vitrectomy. Intravitreal injections of vancomycin and ceftazidime were administered. The patient was admitted to the hospital for a sepsis workup. On examination, she was not in acute distress; her vital signs were normal. Her neck was supple. No skin wounds, cellulitis, abscesses, joint arthritis or cardiac murmurs were noticed. Blood and urine cultures were obtained, and intravenous vancomycin and ceftazidime were initiated. Laboratory data were notable for leukocytosis (19.1×10^9/l white blood cell count; 88% neutrophils), hyperglycemia (178 mg/dl glucose; 6.2% HbA1c), hyponatremia (131 mmol/l sodium) and hypokalemia (2.5 mmol/l potassium). She received a new diagnosis of diabetes mellitus. An echocardiogram showed no vegetation or signs of infective endocarditis. No extraocular septic focus was identified.

On October 16, preliminary vitreous and aqueous cultures yielded LM. Treatment was changed to intravenous ampicillin (2 g, 4 times/day for 4 weeks) and fortified vancomycin eye drops; glaucoma eye drops were continued. The following day, blood cultures also

yielded LM. On October 24, the patient was transferred to a New Mexico healthcare facility. Upon transfer, visual acuity in the right eye was limited to light perception; IOP was normalized, and she reported no eye pain. On November 2, her right eye was comfortable with no sign of inflammation; however, there was no light perception in the right eye.

On October 17, the New Mexico Department of Health interviewed the patient and her family using the standardized *Listeria* Initiative questionnaire [6] and a supplemental questionnaire that was developed to investigate the ongoing multistate listeriosis outbreak associated with cantaloupe [5]. The patient reported eating cantaloupe 2–4 times/week during the month before illness onset. She also reported having mild gastroenteritis (nausea, vomiting and diarrhea) approximately 2 weeks before the onset of her ocular complaints. She had purchased cantaloupe from a single, large chain grocery store in her hometown; the traceback investigation linked this store to the implicated farm.

LM isolates from vitreous, aqueous and blood specimens were forwarded to the Texas Department of State Health Services' laboratory and subsequently confirmed at the Centers for Disease Control and Prevention (CDC). Pulsed-field gel electrophoresis (PFGE) subtyping of the isolates revealed a 2-enzyme pattern combination that was indistinguishable from 1 of 5 PFGE pattern combinations identified during the investigation of the multistate outbreak. Antimicrobial susceptibility testing performed by the CDC revealed that the isolates were sensitive to ampicillin, penicillin and trimethoprim-sulfamethaoxazole (TMP/SMZ).

Discussion

This is the first published report of an outbreak-associated case of intraocular listeriosis. Epidemiologic and microbiologic evidence indicates that the case was associated with a multistate outbreak caused by contamination of whole cantaloupe from a single farm [5]. PFGE subtyping determined that clinical isolates from the patient were indistinguishable from other outbreak-associated isolates of LM that were cultured from samples of cantaloupe collected during the investigation. The patient had no cantaloupe leftover for testing and did not have a shopper card available to facilitate product traceback. However, the traceback investigation linked a grocery store, where the patient reported shopping for cantaloupe, to the implicated farm. Also, the timing of the patient's cantaloupe consumption prior to the onset of her ocular symptoms may be consistent with the incubation period of listeriosis (estimated median 3 weeks).

This case demonstrates the importance of obtaining intraocular fluid to determine the cause of endogenous endophthalmitis and provide a specific therapy to eradicate the organism from the infection site. LM was isolated from intraocular fluids; no extraocular septic focus was identified. The patient had a poor visual outcome despite an aggressive combined medical and surgical approach. Notably, the role of vitrectomy is controversial in endogenous endophthalmitis. However, it can be valuable to obtain biopsy specimens in cases that do not appear to have obvious septic foci or in those who respond poorly to medical treatment [7].

The optimal antibiotic regimen for intraocular listeriosis management has not been determined. Intraocular listeriosis can run an aggressive course leading to blindness [2]. Despite favorable in vitro sensitivities, intraocular infections may respond poorly to the treatment of choice for systemic listeriosis (i.e. combination of an aminopenicillin, such as ampicillin or amoxicillin, and an aminoglycoside, such as gentamicin [8]). Because a majority of cases of intraocular listeriosis reported in the literature resulted in poor visual outcomes [2, 3], a discrepancy between in vitro sensitivities and clinical response has been suggested

[9]. This discrepancy might be related to the duration of the infection before treatment, strain virulence or lack of appropriate antibiotics for the treatment of focal infections at all anatomic sites.

Intravitreal antibiotics are critical in the management of endophthalmitis [10]. They achieve levels above the minimum inhibitory concentrations of most pathogens and can be maintained for days. Additionally, lipid-soluble antibiotics achieve superior concentrations in the aqueous and vitreous when administered by extraocular routes, compared with sparingly lipid-soluble antibiotics that penetrate the eye poorly (e.g. penicillins, cephalosporins and aminoglycosides) [11]. Notably, a patient with *Listeria* endophthalmitis responded well to vitrectomy and systemic lipid-soluble TMP/SMZ therapy [12]. Another patient had complete vision recovery after intravitreal ampicillin [13]. Our patient received empiric intravitreal injections of vancomycin and ceftazidime, and both antibiotics were initially administered to control systemic infection. On the basis of the culture results, antibiotics were changed subsequently to systemic ampicillin only. No approved clinical or laboratory standard criteria are available for vancomycin and ceftazidime testing against LM. Additionally, whether these 2 antibiotics achieve high enough concentrations against LM in the aqueous and vitreous when administered by extraocular routes is undetermined.

In summary, this case report demonstrates the need for early diagnosis and optimal management of focal listeriosis. Intraocular listeriosis is exceptionally rare; the probable source of infection is hematogenous spread secondary to ingestion of contaminated food. Late presentation, delay in diagnosis and lack of a standard treatment have contributed to poor visual outcome in cases of endogenous endophthalmitis caused by LM. Increasing awareness of atypical listeriosis among eye care doctors and professionals can facilitate timely diagnosis and treatment. Diligent reporting of atypical cases should further clarify the epidemiologic and medical aspects of listeriosis.

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Disclosure Statement

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the CDC. All authors have no conflicts of interest, funding or other sources of support relevant to this article to disclose.

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