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Case Report

A cross preseptal and postseptal gonococcal orbital cellulitis in a 3-year-old male

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ABSTRACT

Gonococcal orbital cellulitis is an infrequent presentation within the pediatric age group, with very few cases reported in literature. Even rarer, is the nonvenereal transmission via fomites. Careful physical examination with detailed social evaluation must always be obtained in any child with a gonococcal infection to look for signs or evidence of sexual abuse. This paper reports a 3-year-old male who developed a left preseptal and postseptal gonococcal orbital cellulitis via a nonsexual mode of transmission.

Keywords: Abuse, Orbital, Cellulitis, Gonococcal, Prepubertal, Nonvenereal

INTRODUCTION

Gonococcal conjunctivitis is a potentially devastating infection which may be associated with severe ulcerative keratitis and potentially lead to permanent visual impairment.[1] It is characterized by rapid progression and therefore prompt diagnosis and treatment is essential. Excluding the neonatal period, gonococcal eye infections are rare and predominantly occur through autoinoculation.[2] Although recent reports show an affected predominance of sexually active young adults and adolescents, if discovered in the prepubertal period, thorough social and physical evaluation must be performed to exclude sexual abuse. [2,4-6] Herein we describe the presentation, extensive investigative work up and treatment of a 3-year-old male diagnosed with a left preseptal and postseptal gonococcal orbital cellulitis after nonvenereal transmission from an infected guardian. We also review the literature on such a diagnosis in this prepubertal age group.

CASE REPORT

A 3-year-old male was brought to the emergency department (ED) for evaluation of purulent discharge, conjunctival hyperemia and periorbital swelling from the left eye lasting for 3 days, with worsening symptoms within the last 24 hours. His right eye was unaffected. Three other family members reported similar mild ocular symptoms within the last 2 weeks which were resolved. There was no reported history of eye trauma, dental infection or fever prior to presentation.

On physical examination, he was afebrile with an oral temperature of 99.7^0 F (37.6^0C) and all vital signs were within normal limits for age and sex. Initial blood work revealed a peripheral white blood cell count of 5,600 /µl 5.6×10^9 /l and normal platelet count.

A computed tomographic (CT) scan of the orbits with contrast was performed and reported a left preseptal and postseptal orbital cellulitis. There was a rim enhanced collection along the lateral aspect of the left orbit measuring 0.7×0.47 cm with mild mass effect on the left globe (Figure 1) as well as a crescentic hypodense fluid surrounding tiny bubbles of gas in the left superior eyelid concerning for additional rim-enhancing collection measuring 1.6×0.5 cm (Figure 2). Swabs of the conjunctiva were obtained for gram staining and culture; peripheral blood cultures were drawn and the patient was

admitted to the pediatric ward to receive intravenous (IV) Ampicillin/Sulbactam, intravenous (IV) Vancomycin and topical erythromycin.

Figure 1: Computed tomographic scan of the orbits demonstrating a rim-enhancing collection along the lateral aspect of the left orbit measuring 0.7×0.47 cm with mild mass effect on the left globe.

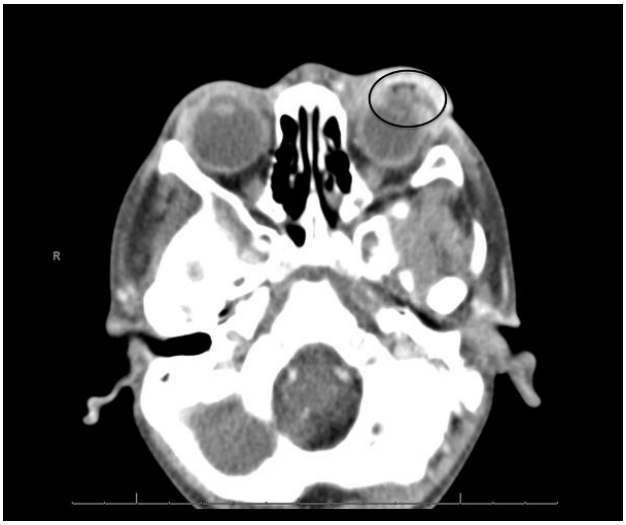

Figure 2: Computed tomographic scan of the orbits demonstrating crescentic hypodense fluid surrounding the tiny bubbles of gas in the left superior eyelid concerning for additional rim-enhancing collection measuring 1.6×0.5 cm.

Gram stain of the discharge resulted in gram negative diplococci which was later identified in culture to be heavy growth of *Neisseria Gonorrhoeae* which was susceptible to Ceftriaxone. The blood culture remained negative after 72 hours. Antibiotics were then switched to IV ceftriaxone (meningitic dosing) and topical erythromycin with regular saline flushes to the affected eye. A Sexually Transmitted Infections (STI) panel was performed based on recommendations given by Infectious disease specialty which was negative. An STI panel was also performed on the patient's 9-year-old sibling who also resided at the residence. A negative screen resulted.

On further social evaluation, both parents had been infected and had not received treatment. Mother reported symptoms of urinary and fecal incontinence and was able to identify a recent incident where possible hand to eye transmission may have occurred. Both guardians received appropriate treatment following patient diagnosis.

Social work, child protection team (CPT) and The Department of Child and Families (DCF) were actively involved in this case. This patient was discharged after resolution of symptoms, completion of a 10 days course of intravenous IV Ceftriaxone and detailed social and physical evaluation revealed no evidence or suspicion of sexual abuse.

DISCUSSION

Neisseria Gonorrhoeae (N. gonorrhoeae) is a gram negative, intracellular coccoid organism found in pairs that infects humans. The bacterium is capable of colonizing various mucosal surfaces including genitourinary, rectal, eyes and pharyngeal sites. Unlike genital infections, the incubation period from gonococcal exposure to ocular symptoms varies from 3 to 19 days.[3] This bacterium possesses factors which contribute to its ability to adapt to varying surfaces and develop resistance to antibiotics. When involved in the eye, *N. Gonorrhoeae* attach to the columnar epithelial cells by fimbriae, invade them and replicate on the basement membrane, allowing the organism to gain access into the orbital tissues.

In developed countries, gonococcal eye infections primarily occur in teenagers and young adults and is usually spread via autoinoculation from genital site infections to the eyes.[2] In the United States, gonococcal disease is the second most commonly reported communicable disease and the second most prevalent sexually transmitted infection (STI). There may be discrepancies between the actual and reported cases as under-reporting and asymptomatic infections continue to be an issue in data collection.[4] Between 2014-2018, the Centers for Disease Control and Prevention (CDC) reported a total of 1366 cases of gonorrhea amongst children aged 0-9 years. Among teens aged 10-14, this number increased from 2450 cases in 2014 to 2683 being reported in 2018.[5] Factors that contribute to this increased risk include having multiple sexual partners concurrently, the improper use and consistency of barrier protection methods, being biologically susceptible to infection, having consecutive brief sexual relationships and encountering multiple barriers to accessing health care.[6]

STIs diagnosed in prepubertal children, although rare, must always be evaluated for sexual abuse. The

Committee on Child Abuse and Neglect deemed the following situations placed children at high risk for STDs and thus constituted a strong indication for testing:(a)Child has a sibling or other relative in the household with an STI, (b) Child has been abused by a perpetrator known to be infected with an STI or at high risk of STIs (intravenous drug abusers, men who have sex with men, or people with multiple sexual partners), (c)Child has experienced penetration of the genitalia or anus, (d)Child has signs or symptoms of STIs, (e)Child has been abused by a stranger, (f)Child lives in an area with a high rate of STI in the community, (f)Child has already been diagnosed with one STI.

In regards to testing, Polymerase Chain Reaction (PCR) tests together with culture of conjunctival swabs are by far the best diagnostic tools.[8] Gram stain and culture, when used, is diagnostic more than 90% of the time.[3]

Rare cases of gonococcal eye infections in prepubertal children have been reported. Lewis et al described four prepubertal children with confirmed gonococcal conjunctivitis.[9] The children underwent detailed social evaluation, physical examination and had cultures of pharyngeal, rectal and genital specimens which excluded infection at other sites. Three of the four children shared a bed with a parent of whom *N. gonorrhoeae* was also isolated. Lack of evidence or suspicion of sexual abuse led investigators to hypothesize a nonsexual mode of transmission may exist.[9] There have also been cases of young adults being infected via the hands with denial of sexual intercourse. It has been inferred that such cases may be from direct contact of contaminated fingers with the eye.[10] A study which explored the spread of gonococcal conjunctivitis outbreaks amongst the Aboriginal communities in Central Australia back in 1997 alluded to environmental risk factors which may have contributed to the spread. In fact, similar environmental factors were also considered during an outbreak in an Ethiopian region in 1987-1988. Although there was a high baseline predominance of sexually transmitted Gonorrhea in the adult Aboriginal community, during the outbreak, no baseline increase of sexual transmission was reported and over seventy five percent of the cases were children. This led investigators to explore other probable vectors or modes of transmission. In both outbreaks, there seemed to be a mutual correlation of heavy rainfall with increased fly densities prior to outbreaks. The flies, playing the role as mechanical vectors and aiding in the quick spread. In the Ethiopian study, the lack of the simple hygienic practice of face washing was also identified as a risk factor for spread after results showed a decrease incidence in households where the children had clean faces.[11,12]

N. gonorrhoeae has shown resistance to both penicillin, fluoroquinolones, and more recently oral cephalosporins but remains susceptible to IV or IM ceftriaxone.[13] For prepubertal children less than 45 Kilograms (kg) with gonococcal conjunctivitis, the CDC recommends a single dose of IM or IV Ceftriaxone 25–50 mg/kg (maximum 125 mg). As with this case, when there is concern or risk of meningitis, hospitalization during initial therapy, meningitic dosing of ceftriaxone (maximum 2 g/day) together with an extended antibiotic course (10-14 days) is required. Saline lavage of the eye is not considered curative however is still used as an adjunct to reduce the organism load that has access to the cornea. Moreover, Infectious disease specialists must always be consulted if any child presents with a gonococcal infection.[6]

Prompt treatment of Gonococcal eye infections is required because of severe and sometimes fatal complications. If not treated appropriately, rapid corneal ulceration may occur within hours which can lead to perforation and permanent vision loss.[1] There is also the risk of a systemic infection which may present as septic arthritis, meningitis, or even septicemia.

CONCLUSION

In the past, gonococcal eye infections were predominantly seen in neonates, acquired during birth by contact with an infected mother's birth canal. However, within recent years young adults and children have been increasingly affected. Great importance lies in distinguishing gonococcal eye infections from other common viral or bacterial causes in order to initiate prompt treatment and minimize ocular morbidity and complications due to extension of disease. A detailed social evaluation is warranted in the case of suspected direct inoculation, to rule out sexual abuse, which is often difficult to confirm. As seen in our index case, management of Gonococcal Orbital Cellulitis in children requires a multidisciplinary approach including close follow up, as potentially fatal complications can occur.

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