Review Article

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Adenoviral Conjunctivitis: A Systematic Review

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ABSTRACT

Background: *Adenoviral conjunctivitis is an infection of the conjunctive which is the mucous membrane covering the white part of the eye called sclera. Conjunctivitis also refers as pink eye causes conjunctiva inflammation. Adenovirus is responsible for 75% of viral conjunctivitis. Adenoviral conjunctivitis provider infection is still widespread in the US healthcare system and poses a serious risk to patient welfare. Some of the complex of adenoviral conjunctivitis include subepithelial infiltrates, pseudomembrane formation, corneal ulceration and conjunctival scarring. A recent development of the adenoplus assay which is a rapid test to detect adenovirus (Rapid Screening for pathogen Inc. USA) has made it possible to obtain results from samples within 10 minutes. Adenoviral conjunctivitis may produce a pseudomembrane, that is a membrane consisting of inflammatory cells, mucus and dead cells that could stick to the surface of the eye. This systematic review is aimed to design to provide an insight on the clinical characteristics, presentation and treatment about this issue.*

Methodology: *This current study is a systematic review to published studies and articles by using PubMed and Google. Search strategy using appropriate keywords and title.*

Conclusion: *The majority of viral conjunctivitis cases are due to adenoviruses, so effective management of conjunctivitis includes timely diagnosis, appropriate differentiation of the various etiologics and appropriate treatment.*

Key words: Adenovirus; Dexamethasone; Epidemic Keratoconjunctivitis (EKC); Pseudomembrane.

Introduction

Conjunctivitis also refers as pink eye causes conjunctiva inflammation. The conjunctiva is a narrow, semitransparent membrane protects the sclera (The white portion of the eye). Adenovirus accounts for the great majority of instances and is one of the three most common causes of conjunctivitis, along with allergic and bacterial conditions. Viral conjunctivitis is responsible for 75% of infectious conjunctivitis. The most frequent causes are viral ones. Adenoviral conjunctivitis provider infection is still widespread in the US healthcare system and poses a serious risk to patient welfare. Adenovirus is responsible for 90% of viral conjunctivitis.[1,2,3] Conjunctivitis has great impact on economy and society as cost of diagnostic test, prescribed medicine, health care visits result in losses of working hours. Major costs of viral conjunctivitis also include antibiotic prescription which is not effective for it. Community oriented antibiotic therapy is provided to 80% to 90% of patient diagnosed with infectious conjunctivitis in UK. For example, over 1,000 of the 10,000 full-time employees at Johns Hopkins Medicine attended the occupational health clinic between 2011 and 2016 with "Pink eye", 10% of them was infected with viral conjunctivitis that was confirmed by PCR, according to a previous assessment of the medical system at Johns Hopkins Medicine.[4] This systematic review is aimed to design to provide an insight on the clinical characteristics, presentation and treatment about this issue.

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Search Strategy

This is a systematic review article carried out during the period of 10th January to 1st April 2023. Available studies and abstracts were identified through PubMed and Google Scholar (2000-2023). Key search topics were "Adenoviral Conjunctivitis : A Systematic Review and relevant articles from reference lists of reviewed articles were also searched. The search term were the following key words used in combination: Adinovirus; Dexamethasone; Epidemic Keratoconjunctivits (EKC); Pseudomembrane. Bibliography was also searched for relevant full text.

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Complication

Adenoviral conjunctivitis occasionally causes severe complications. But there have been several reports regarding certain complications related to adenoviral conjunctivitis. Some of the complex complications include subepithelial infiltrates, pseudomembrane formation, corneal ulceration and conjunctival scarring.

- **Keratoconjunctivitis:** Pink eye,which damages not only the conjunctiva but also the cornea, can also result from adenoviral conjunctivitis. Most severe form of adenoviral infections refers as Epidemic Keratoconjunctivitis (EKC). EKC can be categorized acute epithelial conjunctivitis, preauricular lymphoma, retinal involvement and the occurrence of subepithelial penetrates, which is considered one of the most severe types of viral keratoconjunctivitis. EKC is the single variant that involves the cornea. EKC-related epidemics have a high risk of infection, which can lead to considerable morbidity.[5,6]
- **Subepithelial Infiltrates:** Subepithelial infiltrates are tiny white or grayish opacities which can develop on the cornea during or after the resolution of adenoviral conjunctivitis. That can result in temporary blindness and may take a few weeks or months to heal.[1]
- **Pseudomembrane Formation:** Adenoviral conjunctivitis may produce a pseudomembrane, that is a membrane consisting of inflammatory cells, mucus, and dead cells that could stick to the surface of the eye.[1,7]
- **Corneal Ulceration:** In rare cases adenoviral conjunctivitis may lead to corneal ulcer, which are open sores on the cornea. Corneal ulcers can hurt and interfere with vision.
- **Conjunctival Scarring:** Conjunctival scarring may develop in severe and recurrent episodes of adenoviral conjunctivitis, which could cause discomfort or long-term visual problems.[8,9]

Diagnosis

Conjunctivitis can be caused by bacteria, viruses, and allergies.Viral conjunctivitis is responsible for 75% of infectious conjunctivitis. Unless the infection persists for longer than 4 weeks and the symptoms do not improve, laboratory testing is often not necessary.

The diagnosis of adenoviral conjunctivitis requires a quantitative Polymerase Chain reaction (qPCR). NucliSENS easyMag (bioMerieux, Inc., Durham, NC) is required to purify the genomic DNA. Sensitivity and specificity of PCR result is 93% and 97.3%.[10]

A recent development of the adenoplus assay which is a rapid test to detect adenovirus (Rapid Screening for pathogen Inc., USA) has made it possible to obtain results from samples within 10 minutes. This adenovirus assay is developed to identify 53 serotypes of adenovirus. The specificity rate of this assay to detect adenoviral conjunctivitis is 92% to 98%. But it has lower sensitivity than PCR analysis.[11,12]

Cell culture method is utilized to examine the adenovirus after isolation of virus. That's why cell culture is gold standard to detect and examine adenovirus.[13,14]

Treatment

Treatment/management of viral conjunctivitis are focused mainly on symptomatic relief. It can take 3 weeks or more to get relief from conjunctivitis by using artificial tears for lubrication with preservative-free tears four to ten times a day. By using cool compresses with moist sterile cloth to get rid of symptomatic relief. Some hygiene practices include frequently washing hands, stop using common towels or washcloths, and avoiding touching eyes which may stop the spreading of virus to uninfected eyes or uninfected people. An infected people with red eyes and tearing can spread it easily.

Treatment for pseudomembrane includes removing the membrane at the slit lamp, which helps to comfort the patient and halt scar formation. The membrane can be removed with a cotton swab mixed with topical anesthetic. Topical steroids prevent symptoms. Nevertheless, they can lengthen spread the infections. Infected individual should concern of infecting others. That's why they should avoid work or school. Infected individual can still shed virus while utilizing the medication or without showing any symptoms. Infected patients with subepithelial infiltrates or severe conjunctival infections causing decreased vision should get steroids.[15,16]

Dexamethasone and povidone iodine have been suggested as a novel therapy against adenoviral conjunctivitis. Dexamethasone reduces symptoms. On the other hand, iodine neutralize the infection to lessen infection spreading. Studies still have not shown that povidone iodine has beneficial action on replicating adenovirus, but the combination of povidone iodine and dexamethasone might be advantageous. It is crucial to establish the adenovirus diagnosis for making treatment effective, especially in the early stages of the illness when clinical diagnosis may be challenging and misdiagnosis may be damaging. In babies with adenoviral conjunctivitis, 2.5% povidone iodine can easily relief the sign symptoms and facilitate the improvement of situation without causing side effects.[17-20]

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Limitation

The vast majority of the studies suffer from lot of limitations including a lack of randomized, double blind design, a lack of control populations, small or under powered sample size.

Conclusion

The systematic review contains valuable information about the diagnosis, complications and available treatment of adenoviral conjunctivitis. The findings highlighted the importance of precise diagnosis to lead to suitable treatment.

Recommendation

The systematic review emphasized the need for more high quality research to improve the knowledge and ability to treat adenoviral conjunctivitis. The use of rapid antigen test to diagnose adenoviral conjunctivitis may present an approprite strategy to avoid overuse of antibiotic.

Disclosure

All the authors declared no conflicts of interest.

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