Bacterial conjunctivitis treatment experiment

Introduction and Background

Thanks to the wildly popular Judd Apatow hit “ Knocked Up”, an alarming number of Americans believe that you can contract “ pinkeye” (conjunctivitis) by farting into your pillow. Contrary to popular belief, simply passing gas is not enough to spread conjunctivitis.

Conjunctivitis is categorized by the redness or swelling of the conjunctiva – the membrane that lines the eyelid and eye surface. This membrane is typically clear but when it is infected, it becomes red or pink and swells – thus, the common name “ pinkeye” since the infected eye literally appears to be pink. 10

Common symptoms associated with conjunctivitis include eye redness (hyperemia), swollen or red eye lids, an excess of tearing, a burning or itching feeling in the eye, sensitivity to light (photophobia) and drainage from the eye. Conjunctivitis is common but not typically considered threatening – as it can disappear on its own in 7 to 10 days. However, particular strains of bacterial conjunctivitis – namely those caused by the sexually transmitted infections gonorrhea or Chlamydia – can very harmful. 9

Most cases of conjunctivitis are caused by viruses or bacteria. However, dry eyes caused by lack of tears or over exposure to wind and sun, chemicals, fumes or smoke (known as chemical conjunctivitis) and allergies are also common culprits.

The viral and bacterial forms of conjunctivitis are the contagious forms and subsequently, the most common. The majority of cases are caused by

adenoviruses and can be attributed to poor hygiene (i. e. not washing your hands after using the restroom or poor care of contact lenses). 10 Since there is no medication available to treat the viral form of conjunctivitis, patients are advised to avoid contact with others until symptoms begin to improve – which typically lasts three to five days.

Bacterial conjunctivitis can be treated with a wide variety of antibiotics including Levofloxacin, Vigamox Opht (Vigamox), Azasite Opht (Azasite) and Polymyxin B Sul-Trimethoprim Opht (Polytrim). 5 Patients may return to usual activities such as work and school 24 hours after taking their first does of the prescribed antibiotic.

To test and diagnose conjunctivitis, your primary care physician or optometrist can take a sample of eye secretions from the conjunctiva and send the sample to a laboratory for analysis. To prevent the spread of conjunctivitis – bacterial or viral – patients are advised to wash their hands often, to avoid sharing any form of eye make-up, to replace contacts with eye glasses if available and to wash all bed linens, pillowcases and towels with hot water and detergent.

Bacterial Conjunctivitis

Bacterial conjunctivitis is relatively less common than viral conjunctivitis, especially in adults. 3 and essentially, despite having clinically suggestive signs and symptoms of bacterial conjunctivitis, the diagnosis can be incorrect in approximately 50% of cases. Further, bacteria that reside among the normal ocular flora can result in “ false positives” when microbiologic

tests are performed. 3 This makes treatment of this form of conjunctivitis difficult.

In fact, according to multiple studies, general practitioners are unable to determine whether conjunctivitis is bacterial or viral and therefore resort to prescribing antibiotics regardless. According to an article published in BMJ, when confronted with acute infectious conjunctivitis, most general practitioners feel unable to discriminate between a bacterial and a viral cause. In practice, more than 80% of such patients receive antibiotics. Hence, in cases of acute infectious conjunctivitis, many unnecessary ocular antibiotics are prescribed. 4 In 2001 in the Netherlands; more than 900, 000 prescriptions for topical ocular antibiotics were issued, at a cost of £8. 85 million ($10. 9 million). In England 3. 4 million community prescriptions for these antibiotics are issued each year, at a cost to the NHS of £4. 7 million ($7. 1 million, $8. 7 million). 4

Figuring out why diagnosis of bacterial conjunctivitis is so tricky has been the subject of much research. Staphylococci and Streptococci, among other Gram positive and Gram negative organisms are the most common causes of bacterial conjunctivitis. 8 Although it is considered to be a self limiting infection, antibiotics are often prescribed based on the assumption that they shorten the duration of the infection and reduce the risk of spreading the pathogen. Current research and controlled trials of antibiotics for the treatment of bacterial conjunctivitis are important because they address the question of whether or not these prescribed antibiotics are actually significant and beneficial to the patients using them.

Current Research

There are multiple options for antibiotic treatment of bacterial conjunctivitis but it is difficult to tell which ones are most effective. Currently in the world of conjunctivitis there is a lot of buzz about a new antibiotic called levofloxacin. A 2003 study published in the British Journal of Opthamology conducted a controlled clinical trial of 0. 5% Levofloxacin ophthalmic solution for the treatment of bacterial conjunctivitis. 1 Levofloxacin is a new member of the fluoroguinolone family of antibiotics and has multiple advantages over its older competitors. Levofloxacin is the pure L-enantiomer of ofloxacin, and it appears to have expanded activity against Gram positive organisms (mainly Streptococcus species) compared to the older generation fluroguinolones, while retaining excellent activity against Gram negative pathogens. 1 Levofloxacin works by inhibiting bacterial DNA synthesis, a process that eventually results in cell death. 2

The purpose of this study conducted was to compare the efficacy and safety of levofloxacin 0. 5% ophthalmic solution with placebo for treatment of bacterial conjunctivitis. 1

Study Design and Methods

The design of this clinical trial was a randomized, double masked, placebo controlled study conducted at 14 sites in the United States. It was conducted under good clinical practice (GCP) and according to the FDA requirements and guidelines for phase III pivotal trials. 1 All participants were over the age of two years and were diagnosed with clinical bacterial conjunctivitis. The participants were randomly assigned to receive the topical treatment of 0.

5% levofloxacin opthamalic solution or the placebo both groups followed the same five day dosage plan.

On day one of the trial, demographic information and medical histories were obtained from all the participants. A bacteriological culture (calcium alginate swab of the lower conjunctiva), ocular sign assessment of symptoms, test of best corrected visual acuity, and undilated fundus examination were also performed. 1 The cultures were analyzed by an independent lab and were determined positive or negative based on the colony forming unit count for each organism. The medication was administered on day one and patients returned to the study site for interim (3-5 days) and final (5-10 days) visits. The same examinations were performed during each visit and documented.

Results

A total of 249 patients participated in the study, 126 were randomly assigned to the 0. 5% levofloxacin treatment group, and 123 were randomly assigned to receive placebo. Of these 227 patients completed the study (levofloxacin n= 115; placebo n= 112). 1 The discrepancy in numbers was caused by adverse events, failure to follow up, non-compliance, clinical worsening, entry violation, and lack of cooperation.

Statistically significant differences in microbial suppression rates in favor of 0. 5% levofloxacin treatment were observed at each of the three study visits. At each visit, approximately twice as many patients in the 0. 5% levofloxacin group as in the placebo group achieved microbial eradication1 (These results are shown in figure one). At the beginning of the study both Gram negative and Gram positive organisms were isolated, and both groups had a similar

allocation of the pathogens. At the start, the most commonly isolated organisms were Streptococcus pneumonia (found in 38% of patients) and Haemophilus influenza (found in 31% of patients). 1 At the final visit, eradication rates for both of these organisms were much higher in the . 05% levofloxacin treatment group (84% and 92%) than in the placebo group (47% and 52%)1. At the intermediate and final visits all other pathogens identified were completely eliminated in the levofloxacin group. One in six patients in the placebo group had not achieved microbial elimination at the final visit. 1

This table (Figure One) 1 clearly shows the breakdown of antimicrobial effectiveness in both groups at the intermediate visit, final visit, and end point.

This table (Figure two)1 shows that clinical cure rates were significantly greater in the 0. 5% levofloxacin treatment group than in the placebo group than in the placebo group at both the final visit and the end point.

Research Discussion

In this clinical study, the research and results show that the use of 0. 5% levofloxacin opthamalic solution greatly accelerates both the microbial and clinical cure rates of bacterial conjunctivitis in a wide variety of patients. In three separate visits, a detailed analysis of symptoms and bacterial cultures proved that microbial eradication was accomplished by approximately twice as many patients treated with the 0. 5% levofloxacin antibiotic as those who received the placebo treatment of . 09% saline solution. 1 This study also shows that the clinical cure rates were much higher in the levofloxacin group than the placebo group at multiple visits.

This particular clinical study is important because in the past patients with bacterial conjunctivitis were put on a longer seven day treatment program with different antibiotics, for example ciproflaxin . This longer treatment added to the time patients were contagious and had to miss school or work. Also a longer antibiotic regimen has greater potential for patient non compliance and antibiotic resistance. 2 The effectiveness of the five day treatment program of 0. 5% levofloxacin in this clinical trial proves that it is possible to clinically cure bacterial conjunctivitis and safely eliminate microbial pathogens in a shorter amount of time. The research in this study confirms the current idea that despite the self-limited nature of bacterial conjunctivitis treatment with topical antibiotics provides both an individual and public health benefit. 1 In addition to this particular study, levofloxacin has been tested in clinical trials against other popular antibiotics, like ofloxacin. The results from this study showed that levofloxacin still produced microbial eradication rates statistically superior to ofloxacin. 2

Conclusion

Acute conjunctivitis is one of the most common ocular infections dealt with in family practice. The condition can be bacterial or viral which is difficult to differentiate in the clinical setting. 3 Whatever the cause of conjunctivitis, antibiotics seem to be the most common treatment for either case. Deciding which antibiotic to use and whether or not use of these antibiotics is beneficial and safe is crucial to the advancement of treatment for conjunctivitis. Clinical trials and current research is providing evidence in favor of antibiotic treatments despite the risks of resistance, due to shorter treatment programs and high clinical cure rates. 1, 2

It would appear as though there is a lack of research done on the differences between bacterial and viral conjunctivitis. The July 2004 predictions study published in BMJ, was increasingly more helpful when it comes to an accurate diagnosis4 and since a physician can more effectively treat an infection when it is properly diagnosed, future researcher should focus on the bacterial conjunctivitis indicators.

In addition, there are few studies done on the prevalence of conjunctivitis in contact lens wearers. More studies should be done to identify high risk patients and through patient education and awareness possibly reduce the occurrence in that demographic.

Overall, there are still a lot of questions about the most appropriate treatment of conjunctivitis. Although recent clinical trials are proving that topical antibiotics have a positive impact microbial remission and improve clinical cure rates, conjunctivitis is still a self-limiting condition that will most likely cure itself in a matter of days. Until we know more about these different antibiotics and more research is done on the differentiation between viral and bacterial conjunctivitis, there will not be one correct answer on how to treat this condition. However, one thing we can confirm is that farting on a pillow will not cause conjunctivitis.