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Original Article

Rapid Response to Gauze Strip Soaked in Triamcinolone, Neomycin, and Nystatin in Acute Otitis Externa

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Abstract

Background: Acute otitis externa (AOE) is a common condition with multiple available treatments. This study aimed to compare gauze strips soaked in triamcinolone, neomycin, and nystatin with conventional eardrops for the treatment of AOE.

Methods: This experimental study included patients with AOE referred to the Otolaryngology Clinic of Shahid Mohammadi Hospital, Bandar Abbas, Iran, 2014-2015. Based on their signs and symptoms, patients were divided into two clinical groups of mild to moderate and moderate to severe AOE. Patients treated with polymyxin B, neomycin, and hydrocortisone (polymyxin NH), or ciprofloxacin plus betamethasone eardrops were regarded as controls (conventional eardrops), and those whose ear canal had been filled with a gauze strip soaked in triamcinolone, neomycin, and nystatin (triamcinolone NN) were regarded as cases.

Results: A total of 76 ears were included in this study (36 and 40 cases with mild to moderate and moderate to severe AOE, respectively). After 24 hours, in both clinical groups with mild to moderate and moderate to severe AOE, response to treatment with triamcinolone NN-soaked gauze strips was significantly higher than conventional eardrops (94.4% vs. 11.1%, $P<0.001$ and 80% vs. 10%, $P<0.001$, respectively).

Conclusion: Patients with mild to severe AOE appear to rapidly respond to gauze strips soaked in triamcinolone, neomycin, and nystatin.

Keywords: Otitis externa, Corticosteroid, External Ear canal, Drug combination

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Background

Otitis externa (OE), defined as the inflammation of the external auditory canal, can be infective, with bacterial, viral, or fungal etiology (1). OE is a common condition accounting for 5-20% of all otorhinolaryngology visits. It can affect both men and women of all ages (2); however, adults are more commonly involved with it (3). OE has a multifactorial pathogenesis, and its predisposing factors include anatomical factors, skin diseases, environmental factors such as humidity and high temperature, trauma, systemic diseases, endogenous factors, and other factors such as water or irritants in the ear canal, radiation, chemotherapy, prior surgery of the external ear canal, purulent otitis media, and stress (4). The majority of OE cases are bacterial, with *Pseudomonas aeruginosa* and *Staphylococcus aureus* being responsible for 22%-62% and 11%-34% of cases, respectively (5).

Ear canal cleansing, topical antibiotics, and/or corticosteroids make up the mainstay of uncomplicated acute otitis externa (AOE) treatment (6,7). Quinolones (ciprofloxacin), aminoglycosides (neomycin), and polymyxins (polymyxin B) are topical antibiotics that have been approved as eardrops for the treatment of OE and cover the most common pathogens. Rapid cure and symptomatic relief, as well as lower recurrence rates, have been observed with these antibiotics compared to a placebo (8). Topical corticosteroids can reduce edema, but antifungal and antimicrobial effects have also been reported with these agents. Nevertheless, corticosteroid monotherapy has not been widely investigated yet (6). Treatment with a combination of topical corticosteroids and antibiotics has been more effective than antibiotics alone in terms of alleviating erythema, swelling, and secretions (9,10). Antifungal drug-soaked wicks can be placed in the ear canal in the case of fungal infection. These antifungal agents include nystatin, ciclopirox, clotrimazole, and miconazole (4). To the best of our knowledge, there has been no published randomized trial evaluating the efficacy of drug-soaked wick insertion into the ear canal as the only treatment of AOE; nonetheless, this method has been proposed to be effective for the reduction of edema and improvement of the topical treatment efficacy in a meta-analysis (6).

Objectives

The current study sought to compare gauze strips soaked in triamcinolone, neomycin, and nystatin with conventional eardrops for AOE treatment.

Materials and Methods

Participants

This experimental study included patients with AOE referred to the Otolaryngology Clinic of Shahid Mohammadi Hospital, Bandar Abbas, Iran, from June 22, 2014, to July 23, 2015. The inclusion criteria were age > 14 years and AOE limited to the external auditory canal. On the other hand, patients with concomitant otitis media and localized folliculitis at the beginning of the ear canal were excluded from the study. The sample size was calculated as at least 16 ears in each group with $\alpha = 0.05$, and $\beta = 0.2$. Written informed consent was obtained from all participants.

Study Design

Overall, 65 patients (76 ears) were included in the study. Patients were compared in two clinical groups of mild to moderate and moderate to severe AOE based on their signs and symptoms. Those with mild to moderate AOE suffered from pain and edema of the external auditory canal. In these patients, there was an opening of ≥ 3-4 mm in the ear canal. On the other hand, in patients with moderate to severe AOE, the edema was more severe measuring at 1-3 mm. In addition to pain, these patients had fever, lymphadenopathy, or cellulitis. Accordingly, 36 and 40 ears were included in the mild to moderate and the moderate to severe groups, respectively.

Ear canal was cleansed for all patients; moreover, all participants were advised to use a warm compress and were prescribed analgesics (ibuprofen). Then, the ears of the mild to moderate clinical group and the moderate to severe group were divided into two treatment groups based on the received treatment. The first treatment group of mild to moderate AOE receiving polymyxin B, neomycin, and hydrocortisone (polymyxin NH [Myxacort®, Sina Darou, Iran]) or ciprofloxacin (Ciplex®, Sina Darou, Iran) plus betamethasone (Betasonate®, Sina Darou, Iran) eardrops, and clotrimazole lotion for AOE of fungal etiology was regarded as the control group (conventional eardrops). The case group included the treatment group of mild to moderate AOE whose ear canal was filled with a gauze strip soaked in triamcinolone, neomycin, and nystatin (triamcinolone NN [Kenacomb®, Aspen Pharmacare, Australia]). All patients were advised to eat soft foods for the next 24 hours to prevent gauze displacement by jaw movement.

In addition, the first treatment group of moderate to severe AOE, for whom a cotton wick soaked in povidone-iodine solution was first inserted into the ear canal and polymyxin NH eardrops were applied on the cotton, was regarded as the control group, and the second treatment group of moderate to severe AOE receiving the same treatment as mild to moderate AOE was considered the case group. All patients with moderate to severe AOE also received 500 mg oral cephalexin every 6 hours for 5 days. For the administration of eardrops, the patients were lying down on their sides with the affected ear up. The drops were applied in the ear canal, and the patients kept lying on one side for 3-5 minutes.

All patients were visited after 24 hours and were divided into 3 groups based on their response to treatment:

- Group A: Satisfactory; patients' symptoms had improved and the ear canal was open on examination.
- Group B: Partial improvement; the opening of the ear canal was wide enough for the application of eardrops.
- Group C: No improvement or deterioration; the ear canal was still obstructed or the obstruction had progressed.

Data Analysis

The Statistical Package for the Social Sciences (SPSS) software (version 25.0, Armonk, NY, IBM Corp., USA) was used to analyze the data. Frequencies and percentages were utilized to describe qualitative variables. Chi-square and Fisher's exact tests were employed to compare qualitative variables between groups, and P values ≤ 0.05 were considered statistically significant.

Results

A total of 76 ears were included in this study (36 with mild to moderate and 40 with moderate to severe AOE). After 24 hours, in the clinical group with mild to moderate AOE, response to treatment was satisfactory in 17 ears (94.4%) receiving triamcinolone NN-soaked gauze strip, which was significantly higher compared to the eardrops group with a satisfactory response only in 2 (11.1%) ears ($P < 0.001$, Table 1).

Likewise, in the clinical group with moderate to severe AOE, response to treatment was satisfactory in 16 ears (80%) receiving triamcinolone NN-soaked gauze strip, representing a significantly higher rate in comparison to the other group with a satisfactory response only in 2 (10%) ears ($P < 0.001$, Table 2).

Discussion

The findings of the current study demonstrated that patients with mild to moderate and moderate to severe AOE rapidly responded to triamcinolone NN-soaked

Table 1. Comparison of Response to Treatment in Ears With Mild to Moderate AOE

Variables	Eardrops (n = 18)	Gauze Strip (n = 18)	*P* Value*
Response to Treatment, N (%)			
Satisfactory	2 (11.1)	17 (94.4)	< 0.001
Partial improvement	5 (27.8)	1 (5.6)	
No improvement/deterioration	11 (61.1)	0 (0.0)	

Note. N: Number; AOE: Acute otitis externa.
*Analyzed by Fisher's exact test.

Table 2. Comparison of Response to Treatment in Ears With Moderate to Severe AOE

Variables	Eardrops (n = 20)	Gauze Strip (n = 20)	*P* Value*
Response to Treatment, No. (%)			
Satisfactory	2 (10.0)	16 (80.0)	<0.001
Partial improvement	5 (25.0)	3 (15.0)	
No improvement/deterioration	13 (65.0)	1 (5.0)	

Note. N: Number; AOE: Acute otitis externa.
*Analyzed by Fisher's exact test.

gauze strips compared to conventional eardrops. Not many studies have evaluated the use of drug-soaked cotton wicks or gauze strips for the treatment of AOE and none of them are recent.

Mösges et al used medicated gauze strips in both groups of their study. In one group, the strips were medicated with polymyxin B and bacitracin, and in the other group, hydrocortisone was added to the previous combination (11). The strip was inserted into the patients' ears on the first day and was removed after 24 hours. Treatment continued with antibiotic ointment until days three to five, and then another gauze was inserted, which remained for 24 hours. Afterward, the antibiotic ointment was applied until the 10th day. Although the difference between groups was not statistically significant in terms of clinical severity scores from the first day up to day 3 or 5 or from the first day up to day 9 or 11, the resolution of severe redness or secretion was significantly higher in patients receiving gauze strips soaked in antibiotic plus corticosteroid compared to patients receiving gauze soaked in antibiotics only from the first day to day 9 or 11 (11). Their results are partially in line with our findings regarding the efficacy of strips soaked in antibiotics plus corticosteroid. However, treatment in both groups of their study was applied through gauze strips, while only one group of our study employed gauze strips. Moreover, the difference in the study design, the applied antibiotics, the frequency of gauze insertion, and the baseline severity of AOE may account for discrepancies between their study and ours.

It has been suggested that using ear wicks or gauze strips can be beneficial in cases with more edematous external auditory canals or when a large proportion of the tympanic membrane cannot be visualized (12). This method is believed to enhance drug delivery in such cases by permitting the drug to reach the furthest parts of the ear canal and the total length of the canal (5). In a quite recent study by Amani and Moeini for the comparison of polymyxin NH with boric acid, they also utilized cotton wicks in patients with severe inflammation to enable drug delivery to the inaccessible parts of the ear canal (13). This was also the case in an earlier study by Roland et al, comparing ciprofloxacin plus dexamethasone with neomycin, polymyxin, and hydrocortisone (14). In other studies, the requirement of wick was among the exclusion criteria (15).

In another study, Masood et al compared a combination of nystatin, neomycin, gramicidin, and triamcinolone on wicks with glycerin and ichthammol on wicks for the initial treatment of severe AOE. They left the wicks in patients' ears for 48 hours. There was no significant improvement in sign scores in any of the groups between days 1 and 3; nevertheless, pain significantly reduced in the first group (16).

One strength of the current study was that it compared triamcinolone NN-soaked gauze strips with conventional eardrops, a unique design that has not been implemented in any previous study. In addition, this study evaluated the efficacy of this method in separate clinical groups of mild to moderate and moderate to severe AOE and observed satisfactory results with this method in both clinical groups, while the application of cotton wicks/gauze strips was mostly limited to OAE cases with severe inflammation in previous studies. Nevertheless, our study was not without limitations. The relatively small sample size in each clinical group would restrict the generalizability of our results. Further, we cannot attribute the efficacy of triamcinolone NN to any one of its components. Each component alone could have had the highest efficacy; however, we used this combination because it was readily available in the Iranian market.

Conclusion

Triamcinolone NN applied with gauze strips appears to be an effective treatment for AOE of various degrees of severity. This method can probably result in a rapid response in terms of canal opening and pain relief. However, in some cases, another round of medicated gauze strip insertion may be required to completely resolve the infection and inflammation.

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Author's Contribution

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Competing Interests

The authors declare that they have no competing interests.

Data Availability Statement

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Ethical Approval

Review Board (IRB) of Hormozgan University of Medical Sciences. Written informed consent was obtained from all the participants.

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