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SHORT COMMUNICATION

The Effect of Antibiotic Ointment on Nasal Packings: Is it Effective in Reducing Postoperative Nasal Bacterial Loads?

Po-Yueh Chen [1], Kuei Chen [2], Pin-Zhi Chao [1,3], Hsin-Te Hsu [3,4], Shih-Han Hung [3,4]*

[1] Department of Otolaryngology, Head & Neck Surgery, Shuang-Ho Hospital, Taipei, Taiwan
[2] Department of Laboratory Medicine, Hsinchu Cathay General Hospital, Taipei, Taiwan
[3] Department of Otolaryngology, School of Medicine, Taipei Medical University, Taipei, Taiwan
[4] Department of Otolaryngology, Taipei Medical University Hospital, Taipei, Taiwan

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Nasal packing is a widely used procedure in various types of nasal surgery and the management of nasal bleeding. The purpose of this study was to evaluate a simple procedure of applying antibiotic ointment to the surface of the packing during the packing procedure. Six patients who were undergoing septomeatoplasty were enrolled in this study. All patients received postoperative antibiotics by mouth (cephalexin 500 mg 4 times daily for 7 days). In addition, all patients received bilateral nasal packing with Merocele. On one randomly chosen side, ointment containing neomycin sulfate 5 mg plus bacitracin zinc 12.5 mg was applied on the surface of the packing prior to use. On the control side of the same patient, Vaseline ointment was used instead. The packs were removed 3 days later and a 1 cm^3 piece of the packing was taken from the middle section. The samples were sent for bacteriological analysis. Tryptic soy broth was added to the samples and they were evenly dispersed on blood agar plates. After incubating overnight, colony formation was observed and recorded. The data from each group were compared using the Wilcoxon signed rank test. Among the control nasal packing side, *Pseudomonas putida* and *Staphylococcus epidermidis* were the bacteria most commonly cultured. The mean ± SD number of colony-forming units for the removed nasal packing ($n = 6$) on the neomycin side and the control side of the same patient were 70 ± 105 units and 165 ± 166 units, respectively. In addition to the systemic administration of antibiotics, a significant reduction in bacterial load was achieved if a topical neomycin antibiotic ointment was applied to the nasal packing prior to use. We suggest that this simple application of topical neomycin on the nasal packing surface should be used whenever nasal packing is needed.

1. Introduction

Nasal packing is the application of gauze or cotton packs to the nasal chambers and is widely used in everyday otolaryngology practice. The most common purpose of nasal packing is to control bleeding after nasal surgery, trauma, or other causes.[1,2] Sometimes packing is also used to provide support to the septum after surgery.[3] Packing comes in many forms, including gauze, cotton balls, preformed cotton wedges, and blocks or wedges made from synthetic materials. The surface of the pack is usually coated with petroleum-based ointment such as petrolatum (Vaseline) and sometimes with antibiotic ointment. Nasal packing may lead to cardiovascular changes, continued bleeding, nasal injury, hypoxia, foreign body reaction, or infection. Although some procedures, such as septal suturing, have been proposed to provide a reliable alternative, nasal packing continues to be more universally performed after nasal surgery.[4]

In most cases, nasal packing will be placed in the nasal cavity for up to 24–48 hours. During this period, bacterial growth around the nasal packing should be expected and sometimes even leads to severe infections, such as toxic shock syndrome.[5–7] Although petroleum-based ointments containing antibiotics are often applied to the surface of the packing prior to use, there are no clear indications or studies to justify the application of topical antibiotics to nasal packing.

In this study, we evaluated the antibacterial effectiveness of a simple procedure involving the application of antibiotic ointment

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* Corresponding author. Shih-Han Hung, Department of Otolaryngology, Taipei Medical University Hospital, Number 252, Wu-Hsing Street, Taipei City 110, Taiwan.
E-mail: S.-H. Hung <seedturtle@gmail.com>

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to the surface of the packing during the packing procedure in six patients who underwent bilateral septomeatoplasty. Each patient served as their own control as they received Vaseline alone on one side of the nose and neomycin-treated nasal packing on the other.

2. Methods

2.1. Nasal packing protocols

The study protocol was approved by our institutional review board. Four men and two women who underwent bilateral septomeatoplasty were enrolled in this study. All patients received bilateral nasal packing with Merocele (polyvinyl alcohol sponge; Medtronic, Minneapolis, Minnesota, USA) in each side of their nose. On one randomly chosen side, ointment containing antibiotics (neomycin sulfate 5 mg plus bacitracin zinc 400 IU plus polymyxin B sulfate 5,000 IU; Spercin, Sigma Pharmaceuticals, Victoria, Australia) was applied to the surface of the packing prior to use. On the other side of the nose of the same patient, petroleum jelly ointment (Vaseline) was used instead of antibiotic ointment. All patients received postoperative cephalexin by mouth (500 mg 4 times daily for 7 days). The packing was removed 3 days after the operation and a 1 cm^3 block of the packing was sampled from the middle section of the packing sponge. The samples were evenly shaken in 3 mL of bacterial culture medium as a sample fluid and sent for bacteriological analysis.

2.2. Bacteriology

A 100-μL aliquot of sample fluid was added to 200 μL of tryptic soy broth and evenly mixed. All of the tryptic soy broth mixture was then evenly dispersed on blood agar plates. The blood agar plates were then incubated overnight (18–24 hours) at 37°C and 5% CO_2. Colony formation was then observed and recorded. If bacterial colonies were not present, the blood agar plates were incubated for another 24 hours and then counted again.

2.3. Statistical methods

The data from each group were compared using the Wilcoxon signed rank test (paired test) and $p < 0.05$ was used to indicate significant statistical differences.

3. Results

Five of six (83%) patients had identical bacterial strains cultured from each side of their nose. Among the group that had no applied antibiotics, *Pseudomonas putida* and *Staphylococcus epidermidis* were the most commonly cultured bacteria, in two of six (33%) patients. *Staphylococcus aureus* was cultured in one of six (17%) patients (Table 1). As shown in Figure 1, the side of the nose with the antibiotic ointment applied on the nasal packing had a significantly lower bacterial load. Individual comparisons showed that this application was effective in all patients (Figure 2). All patients received postoperative antibiotics by mouth (cephalexin 500 mg 4 times daily for 7 days). The number of colony-forming units counted for the nasal packing in which neomycin and bacitracin were applied was 70 ± 105 units, whereas for the nasal packing without neomycin and bacitracin the number of colony-forming units was 165 ± 166 units. The application of antibiotic to the nasal packing significantly reduced the bacteria load 3 days after the packing had been placed ($p < 0.05$).

4. Discussion

The results of this study support the suggestion that a simple application of antibiotic ointment to nasal packing could greatly reduce the bacterial load. Although a limited number of patients was studied, the result was impressive. There are many different opinions about whether antibiotics should be administered once nasal packing has been used.[8–11] However, in addition to different results being obtained, these studies focused on systemic antibiotic prophylaxis. There have been several prospective controlled trials; however, these randomized control trials lack the power needed to detect differences between prophylactic antibiotics given for nasal packing compared with placebos.[10–12] In a recent study by Pepper et al,[13] the routine prescription of prophylactic antibiotics for patients undergoing nasal packing for spontaneous epistaxis was recommended. However, we found that even with postoperative prophylactic antibiotics (cephalexin 500 mg 4 times daily for 7 days by mouth), the bacterial load was still apparent if topical antibiotic ointment had not been applied and, in one patient, even *S. aureus* was cultured.

These studies may indirectly suggest that either prophylactic antibiotic use minimized the systemic effects of invading bacteria or, in healthy individuals, the bacterial load on the nasal packing was insufficient to cause complications. Bogris et al[14] used gel tampons soaked with antibiotics and cortisone to achieve better postoperative hemostasis and anti-inflammatory care. Shikani[15] showed that the use of antibiotics for the expansion of Merocel packing following endoscopic sinus surgery resulted in a 36% decrease in bacterial growth, along with a decrease in the severity of pain associated with the removal of the pack. Although the study was conducted on patients with chronic sinusitis with a more complicated bacteriology, these early results are supported by the current findings.

This study shows that the bacterial load on nasal packings can be suppressed, which might be beneficial for immunocompromised patients. However, the true effects of the bacterial load on immunocompromised patients remains to be determined. *P. putida* was cultured in two patients in the control group. Although often regarded as environmental flora, a study by Yang et al[16] implied that the clinical spectrum of diseases caused by *P. putida* is broader and the incidence of true infection higher than previously expected, especially among patients in hospital. They reported that 55% of *P. putida* infections were nosocomial and that the fatality rate may be as high as 29%. This must be taken into serious consideration as in many institutes patients remain in hospital until their nasal packing is removed.

Table 1 Results of bacterial culture for the removed postoperative nasal packing samples.

Patient no.	Control side bacterial load (CFU)	Control side bacterial species	Neomycin and bacitracin side bacterial load (CFU)	Neomycin and bacitracin side bacterial species
1	80	*Pseudomonas putida*	10	*P. putida*
2	90	*P. putida*	5	*Corynebaterium* spp.
3	40	*Escherichia coli*	20	*E. coli*
4	32	*Staphylococcus aureus*	23	*S. aureus*
5	>500	*Staphylococcus epidermidis*	300	*S. epidermidis*
6	250	*S. epidermidis*	60	*S. epidermidis*

CFU = colony-forming unit(s).
All samples were added to tryptic soy broth and evenly dispersed on blood agar plates. After incubating overnight, colony formations were observed and recorded.