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Original Contributions

UTILIZATION OF PROPHYLACTIC ANTIBIOTICS AFTER NASAL PACKING FOR EPISTAXIS

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☐ **Abstract—Background: There have been few investigations examining the benefits, consequences, and patterns of use for prophylactic antibiotics for nasal packing in the emergency department setting. Given the frequency of epistaxis in the emergency department, it is an ideal setting to study the efficacy and utilization patterns of prophylactic antibiotics in nasal packing. Objective: Our aim was to assess both rates of utilization and evidence of benefit for prophylactic antibiotics in patients with nasal packing for epistaxis. Methods: A single-institution retrospective review of 275 cases of anterior nasal packing in an urban emergency department between September 2013 and April 2017 was performed. Chi-square statistical analysis was used to evaluate results. Results: Among 275 cases studied, there were no instances of toxic shock syndrome. Roughly 73% of patients with nonabsorbable packing received prophylactic antibiotics. Only one (1.1%) case of sinusitis was noted among the nonabsorbable packing with prophylaxis group, with no such complication in the nonprophylaxis group. In contrast, 95% of patients with absorbable nasal packing were not given prophylactic antibiotics. Analysis of all cases given prophylactic antibiotics vs. no prophylaxis, regardless of packing type, revealed no statistically significant difference in the development of acute sinusitis (1% vs. 0.56%; $p = 0.6793$). Conclusions: There was no observed advantage or disadvantage to using prophylactic antibiotics in anterior nasal packing in the emergency department, regardless of whether patients received absorbable or nonabsorbable packing. However, patients who receive nonabsorbable nasal packing were more likely to receive antibiotic prophylaxis.**

☐ **Keywords—epistaxis; prophylactic antibiotics; nasal packing; toxic shock syndrome; acute sinusitis**

INTRODUCTION

Epistaxis is a common chief symptom in the emergency department (ED) setting, with an estimated 60% of the world's population affected at some point in their lifetime and roughly 6% requiring medical attention (1). Nasal packing is frequently used to control or prevent epistaxis in the ED, and often remains in place for several days. As such, it is common practice to use antibiotics after nasal packing as prophylaxis against infectious complications, such as toxic shock syndrome (TSS) or acute sinusitis. In 2001, the American Rhinologic Society conducted a survey and found that its members were more likely to use antibiotics in patients post septoplasty if nasal packing or splints were used, due to concern for infection (2).

The use of antibiotics with nasal packing is supported by microbiologic evidence showing decreased bacterial growth in antibiotic-treated nasal packs (3–5). However, there is little clinical evidence to support the use of systemic prophylactic antibiotics in nasal packing for epistaxis. In 2017, a systematic review by Lange et al. found no statistically significant benefit to prophylactic

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antibiotics use in patients with nasal packing across six studies (6). In 2019, Murano et al. evaluated the antibiotic prescribing practices of emergency physicians treating anterior epistaxis, finding 53.7% (57 of 106) of patients with packing were prescribed prophylactic systemic antibiotics (7). They found no significant difference with respect to rate of infection between the two groups. In 2020, Tran et al. performed a meta-analysis evaluating whether prophylactic antibiotics prevented clinically significant infections (CSIs) (8). They included 281 patients from five articles, with 42% of the patients not receiving prophylactic antibiotics (8). They found 0.8% of the pooled cohort developed infectious complications, with the likelihood of developing a CSI not significantly different between the two groups (8). Based on the difference of absolute risk of infection between the two groups, they determined that the number needed to treat was 571 (8). To date, there are relatively few studies specifically investigating the use of prophylactic antibiotics for nasal packing in epistaxis and all are underpowered to detect a meaningful difference (9–12). Notably, Pepper et al. conducted a nonrandomized, nonblinded study of patients who received nasal packing for epistaxis and found no infectious complications regardless of antibiotic use (10). Similarly, Derkay et al. investigated the efficacy of i.v. antibiotics in posterior nasal packing and also found no infectious complications between groups (11). On review of the current literature, there have been relatively few studies evaluating the benefits, consequences, and patterns of use for prophylactic antibiotics for nasal packing in the ED setting. However, given the frequency of epistaxis in the ED, it is an ideal setting to study the efficacy and use patterns of prophylactic antibiotics in nasal packing. This study sought to investigate the patterns of use, benefits, and harms of prophylactic antibiotics by retrospectively reviewing 275 cases of anterior nasal packing for epistaxis in the ED.

MATERIALS AND METHODS

This was a single-center retrospective study performed at the New York University (NYU) Langone Health Medical Center. Investigators identified and reviewed 1173 cases of epistaxis by diagnosis code in an urban ED between September 2013 and April 2017 after receiving Exempt Institutional Review Board (IRB) approval from the NYU IRB. Those cases included for analysis were all adult patients (older than 18 years) presenting to the ED with documented epistaxis that was controlled with absorbable nasal packing (Surgicel® Fibrillar™ [Ethicon, Somerville, NJ] or Gelfoam [Pfizer, New York, NY]) or nonabsorbable nasal packing (Merocel® [Medtronic ENT, Jacksonville, FL], RapidRhino® [Smith&Newphew, London, UK], Rhino Rocket® [Shippert Medical, Centennial, CO]), or strip gauze. Exclusion criteria included postoperative epistaxis, patients that did not receive any nasal packing, patients who were cauterized without packing, patient's whose bleeding resolved with pressure, and patients presenting with posterior epistaxis or who had incomplete data regarding packing type. Of the 1173 cases reviewed, 277 cases of documented anterior nasal packing for epistaxis were identified among 224 unique patients. The following variables were recorded by two independent investigators: duration of nasal packing, use of systemic oral antibiotics, packing type, infective complications, patient age, sex, history of epistaxis, and pre-existing conditions.

Cases were sorted into the following groups: absorbable nasal packing with antibiotic prophylaxis, absorbable nasal packing without prophylaxis, nonabsorbable nasal packing with prophylaxis, and nonabsorbable nasal packing without prophylaxis. Chi-square statistics assessed proportional differences between cases that received prophylactic antibiotics and those that did not; a p value < 0.05 was considered significant.

RESULTS

Overall, 224 patients were included in this study, with 275 total episodes of epistaxis. Patients ranged in age from 18 to 96 years with a mean age of 65.6 years. Patient characteristics are described in Table 1. Of the studied cases, 38.4% were female; 61.6% were male; 62% were on anticoagulants; and 4.5% had predisposition to bleeds due to a bleeding disorder, such as factor XI deficiency or hematologic malignancy, such as non-Hodgkin lymphoma and multiple myeloma. Five patients were immunocompromised due to long-term steroid or immunosuppressant use and 44 had diabetes mellitus. There were 19 patients who presented to our ED more than once, with a median of 2 visits and an interquartile range of 0 (the first and third quartile both equal to 2). One patient with hereditary hemorrhagic telangiectasia had 33 visits during the study period, and each episode of epistaxis was treated uniquely, depending on the provider (i.e., absorbable and nonabsorbable packing and both with and without antibiotic). Nasal packs remained in situ between 0 and 6 days, with a mean duration of 3 days. Among all included cases for study, 25.8% received bilateral nasal packing. Similarly, analysis of the entire cohort revealed that 54.5% of cases received absorbable nasal packing with either Surgicel Fibrillar or Gelfoam, and 45.5% received nonabsorbable nasal packing with Merocel, RapidRhino, Rhino Rocket, or Vaseline® (Unilever, London, UK) gauze. Only 112 cases (40.2%) had documented follow-up. Ninety-five cases (34.5%) had documented ear, nose, and throat follow-up visits, of which 45 (47.4%) were in the

absorbable nasal packing group and 50 (52.6%) were in the nonabsorbable packing group. Seventeen cases (6.2%) presented to the ED for follow-up and removal of nasal packing, all were in the nonabsorbable packing group.

Among the 275 cases studied, there were no instances of TSS. There was only one (1.1%) case of sinusitis among the nonabsorbable packing with prophylaxis group, and no such complication in the corresponding nonprophylaxis group. There were no reported instances of sinusitis among the absorbable packing with prophylaxis group. However, there was one (0.7%) reported cases of sinusitis in the absorbable packing without prophylaxis group (Figure 1). When analyzing all cases that were given prophylactic antibiotics vs. no prophylaxis, regardless of packing type, there was no statistically significant difference in development of acute sinusitis (1% vs. 0.56%; $p = 0.6793$).

Further evaluation revealed that of the 125 cases with nonabsorbable nasal packing, 72.8% received prophylactic antibiotics. Of the 150 cases with absorbable nasal packing, 4.7% of cases received prophylactic antibiotics ($p < 0.001$). Mean duration of nasal packing for the cases with prophylaxis and those without was 2.75 days and 2.55 days, respectively. Of the 125 cases of nonabsorbable packing, bilateral packing was used 21 times (16.8%). Of the 150 cases of absorbable packing, bilateral packing was used 50 times (33.3%). An examination of patient-specific factors revealed that 28.6% of patients with prosthetic heart valves, 0% of immunocompromised patients, and 41% of patients with diabetes mellitus received prophylactic antibiotics after nasal packing (Table 1).

DISCUSSION

The use of prophylactic antibiotics in the prevention of TSS and other infective complications after nasal packing is controversial and has a high degree of variability in practice. This is not surprising, considering the lack of validated guidelines and limited studies on the subject. Although there are studies that suggest antibiotic-soaked nasal packs can reduce microbial growth, the clinical significance of systemic antibiotics in the prevention of infective complications after nasal packing for epistaxis remains unclear (3–5). Furthermore, given the numerous adverse effects of antibiotics and the risk for breeding antibiotic-resistant organisms, the necessity of antibiotic prophylaxis in nasal packing is worth investigating. In fact, the incidence of anaphylaxis from antibiotic administration is estimated to be higher than that

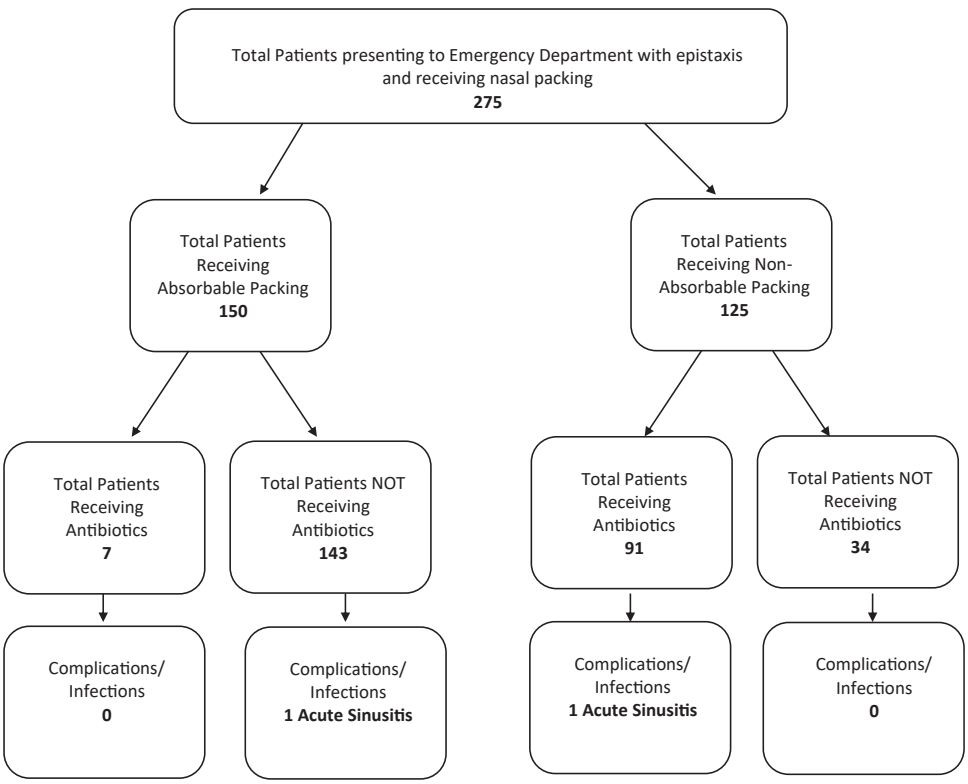

Figure 1. Flow diagram of outcomes after nasal packing.

Table 1. Demographic Characteristics of the Study Population by Intervention

Characteristics	Absorbable Packing with Prophylaxis	Absorbable Packing Without Prophylaxis	Nonabsorbable Packing with Prophylaxis	Nonabsorbable Packing Without Prophylaxis
Patients (n)	7	143	91	34
Sex (%)				
Male	71.43	47.55	62.64	58.82
Female	28.57	52.45	37.36	41.18
Age (years)				
Range	54–92	8–93	17–96	26–90
Mean	69	65	66	64
Packing site (%)				
Unilateral	42.86	66.66	82.42	85.30
Bilateral	57.14	33.33	17.58	14.70
Packing duration (days)	2.75	2.80	3.00	2.25
Anticoagulated (%)	85.71	44.05	63.74	70.59
Immunocompromised (%)	0	2.80	0	2.98
Prosthetic heart valve (%)	14.28	6.29	3.29	2.95

of TSS from nasal packing in epistaxis at 1 in 5000 vs. 1 in 6060 (13,14).

Currently, one systematic review, two meta-analyses, two prospective clinical trials, two prospective cohort studies, and two retrospective cohort studies all found no statistically significant difference in rates of infective complications between patients who received systemic antibiotic prophylaxis in nasal packing for epistaxis and those who did not (6–12,15,16). However, antibiotics continue to be widely used in the context of nasal packing for epistaxis due to reported cases of TSS, infective endocarditis, and other infective complications in association with nasal packing in the setting of epistaxis (14,17–21).

Given the paucity in relevant literature and variability in practice, we sought to elucidate the efficacy and use patterns of antibiotic prophylaxis in the setting of nasal packing for anterior epistaxis in the ED in a metropolitan area. It is among the relatively few studies to examine the use and benefit of systemic prophylactic antibiotics in this context.

Chi-square analysis of all patients in the study revealed no statistically significant difference in infection rates between patients regardless of whether they received antibiotic prophylaxis. There were 2 patients in the study who developed acute sinusitis after nasal packing, 1 who received antibiotic prophylaxis and 1 who did not. Given these outcomes, our study did not find any advantage or disadvantage to systemic prophylactic antibiotics regardless of packing type.

Further investigation into how antibiotics were being used in the setting of nasal packing for epistaxis revealed that patients who received nonabsorbable packing types were 13 times more likely to receive antibiotic prophylaxis than patients who received absorbable nasal packing. This may be due to increased concern about infection with nonabsorbable nasal packing. A study by Burduk et al. found no statistically significant difference in infection rates between nonabsorbable and absorbable packing types when used after endoscopic sinus surgery, although the patients in this study were all placed on postoperative antibiotics (22). For the patients in our study, the biodegradability of nasal packs was the primary predictor of who received antibiotic prophylaxis, with no observed correlation between prophylaxis use and duration or laterality of packing. Furthermore, patient-specific factors, such as the presence of diabetes mellitus, heart valve prostheses, and immunocompromised status, did not increase the likelihood that patients received antibiotic prophylaxis.

Limitations

This study offers an initial investigation into the effectiveness and use of antibiotic prophylaxis after nasal packing for anterior epistaxis in the ED setting. As a retrospective analysis with a limited sample size, this study is restricted in its ability to demonstrate statistically significant data on rare events. As TSS is exceedingly rare, it has been estimated that more than 4000 patients would be necessary to analyze the efficacy of antibiotics in preventing this outcome for epistaxis patients (6). Another limitation of this retrospective study is documented follow-up. Fifty-nine percent of patients in this study did not have documented follow-up, which limits our ability to assess potential minor infectious complications for which patients may not have sought treatment or major complications for which patients sought care elsewhere. Unfortunately, it was not feasible in a large metropolitan area to contact every potential follow-up location outside of our institution. A single episode of TSS in this lost to follow-up group would potentially change our conclusions. In addition, as a single-center study, there is the

potential for limited diversity in patient population and limited generalizability of prophylactic antibiotic use patterns.

CONCLUSIONS

This study attempted to evaluate the use and efficacy of prophylactic antibiotics after nasal packing for anterior epistaxis in the ED. Among the cases of epistaxis in this study, there was no statistically significant benefit to using systemic prophylactic antibiotics in the prevention of infective complications regardless of packing type. However, it was noted that patients who received nonabsorbable packing types were statistically more likely to receive prophylactic antibiotics than those who received absorbable packing types. These data add to the existing literature on the use and benefit of prophylactic antibiotics in nasal packing for epistaxis that can guide further larger-scale studies.

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ARTICLE SUMMARY

1. Why is this topic important?

There have been relatively few studies examining the benefits, consequences, and patterns of use for prophylactic antibiotics for nasal packing in the emergency department setting. Given the frequency of epistaxis in the emergency department, it is an ideal setting in which to study the efficacy and utilization patterns of prophylactic antibiotics in nasal packing.

2. What does this study attempt to show?

In this article, our aim was to evaluate the use and efficacy of prophylactic antibiotics after nasal packing for anterior epistaxis. We believe this is significant in guiding future standard of care in the emergency setting for anterior epistaxis.

3. What are the key findings?

This article illustrates the lack of observed advantage or disadvantage to using prophylactic antibiotics in anterior nasal packing in the emergency department regardless of whether patients received absorbable or nonabsorbable packing. This should contribute to the literature by providing a foundation on which to discuss and potentially improve quality of care with respect to the use of antibiotics for nasal packing to control epistaxis.

4. How is patient care impacted?

With this article we hope to further the discussion surrounding the cost–benefit calculation many physicians make on a daily basis regarding the need and efficacy of prescribing prophylactic antibiotics for patients with nasal packing to control epistaxis.