Inpatient management of epistaxis: Outcomes and cost

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OBJECTIVE: **Evaluate treatments for epistaxis.**
STUDY DESIGN AND SETTING: **Retrospective review of Nationwide Inpatient Sample (1998-2000).**
RESULTS: **A total of 9778 admissions with admitting diagnosis "epistaxis" were identified. Among admissions involving 1 treatment, 454 (9.6%) received arterial ligation, 94 (2.0%) embolization, and 4188 (88.4%) nasal packing. There were no differences in length of stay, transfusions, complications, or deaths between groups (all $P > 0.05$). Mean total hospital charges were $6,282 for the packing group, $12,805 for the ligation group, and $17,517 for the embolization group; differences between ligation and packing groups, and embolization and packing groups demonstrated significance ($P < 0.05$).**
CONCLUSIONS: **Nasal packing is used commonly for epistaxis that requires inpatient management. Although embolization and arterial ligation are associated with higher hospital charges, complications, transfusion rates, and lengths of stay are similar. Further studies are needed to quantify other outcome measures, such as recurrence rates and patient quality of life.**
SIGNIFICANCE: **Nasal packing is associated with lower hospital charges and similar complication rates as arterial ligation or embolization.** (Otolaryngol Head Neck Surg 2005;132:707-12.)

Epistaxis remains a common problem treated by otolaryngologists. Although most cases are managed on an outpatient basis, some require hospitalization for more invasive treatments. Treatment modalities commonly used include nasal packing, cauterization, angiography with embolization, and arterial ligation. Although many studies have shown the feasibility and efficacy of these techniques, there is conflicting data regarding their cost-effectiveness. Some authors[1-4] have advocated the use of nasal packing for the initial management of posterior epistaxis, citing shorter hospitalization periods, fewer complications, and lower costs than surgical management. Others[5-7] contend that surgical techniques, such as arterial ligation, may be associated with fewer complications, shorter length of stay, and higher success rates than nasal packing in the management of posterior epistaxis. Moreover, some authors[5,8] have suggested that early use of surgical intervention in the treatment of posterior epistaxis might limit costs and shorten hospitalization attributed to initial use of conservative measures. In this study, we use a nationwide database to analyze the complications and cost-effectiveness of several methods used to treat epistaxis in the inpatient setting. Such information is critical in allowing physicians to determine the appropriate management strategy for patients with epistaxis.

MATERIALS AND METHODS

We accessed the 1998, 1999, and 2000 Nationwide Inpatient Sample (NIS; Healthcare Cost and Utilization Project Central Distributor, Silver Spring, MD), a publicly available database of hospital admissions from over 980 hospitals in 28 states. All records listing a primary admitting diagnosis of epistaxis (International Classification of Diseases, Ninth Revision, Clinical Modification [ICD-9] diagnosis code 784.7) were extracted. Three separate subgroups were then created based on the type of treatment received by searching each admission for specific ICD-9 procedure codes as follows: (1) ligation group, codes 21.04 ("ligation, artery, ethmoid"), 21.05 ("ligation, artery, maxillary"), 21.06 ("ligation, artery, external carotid"), or 21.09 ("ligation, artery"); (2) embolization group, codes 38.80 ("surgical vessel occlusion NEC") or 38.82 ("occlusion head/neck vessel NEC") and 88.41 ("contrast cerebral arteriogram"); and (3) packing group, codes 21.01 (anterior nasal packing) or 21.02 (posterior nasal packing). Records containing more than 1 of the above procedure codes (ie, codes for both packing and embolization) were excluded from the treatment group analysis.

All data were analyzed and the 3 treatment groups compared with the use of the Statistical Package for the Social Sciences software (SPSS; Version 12.0; SPSS Inc, Chicago, IL). Demographic data were analyzed by frequency analysis (patient race, gender, type of admission, primary payer, secondary diagnoses, and proce-

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Table 1. Group demographics

	NIS	Epistaxis	Embolization	Ligation	Packing
N	21,477,271	9778	94	454	4188
Mean age (years)	47.2	64.8	60.1	61.5	66.5
Gender					
Male	41.0%	53.3%	54.3%	59.0%	53.4%
Female	59.0%	46.7%	45.7%	41.0%	46.6%
Race					
Caucasian	71.5%	77.3%	61.4%	80.1%	78.5%
African American	13.7%	12.2%	21.4%	11.6%	11.9%
Hispanic	9.9%	6.3%	12.9%	4.9%	5.7%
Other	4.9%	4.2%	4.3%	3.4%	3.9%
Primary payer					
Medicare	36.1%	55.3%	41.9%	47.8%	57.9%
Medicaid	16.5%	6.3%	9.7%	4.7%	5.5%
Private	39.0%	30.7%	40.9%	37.3%	28.7%
Self	4.7%	5.2%	4.3%	8.0%	5.6%
Other	3.3%	2.4%	3.2%	2.2%	2.3%
Average number of secondary diagnoses	3.86	3.89	3.15	3.15	3.86
Admission type					
Emergency/urgent	64.4%	94.4%	80.5%	92.2%	96.9%
Elective/other	35.6%	5.6%	19.5%	7.8%	3.1%

dures performed) or determination of means (patient age, number of secondary diagnoses, time from admission to index procedure, number of procedures performed). To assess outcomes for the treatment groups, we determined mean length of stay (LOS) and mean total hospital charges for each group. Mean total hospital charges reflects only those services billed by the admitting hospital. In addition, procedure codes for each record were searched for transfusion of whole blood (ICD-9 procedure code 99.03), packed cells (ICD-9 code 99.04), platelets (ICD-9 code 99.05), or serum (ICD-9 code 99.07). Lastly, the secondary diagnosis codes were searched for complications potentially related to epistaxis or its treatment, including pneumonia (ICD-9 codes 486, 997.3, and 507.0), stroke (ICD-9 codes 436 and 997.02), myocardial infarction (ICD-9 codes 410.1 to 410.9), angina pectoris (ICD-9 code 413.9), and blindness (ICD-9 codes 369.00, 369.60, 369.67, and 950.9).

For the statistical analysis, differences in demographic data between the treatment groups were analyzed with either one-way analysis of variance (ANOVA) with Tukey's post hoc test, or the cross-tabulation function of SPSS with the chi-square statistic. Differences in mean LOS and total charges between treatment groups were analyzed using one-way ANOVA followed by Tukey's post hoc test (or the nonparametric Kruskal-Wallis test when the equality of variances did not hold). Complication rate differences were examined with the cross-tabulation function of SPSS and analyzed with the chi-square statistic.

RESULTS

The combined NIS databases for 1998-2000 contained 21,477,271 admission records. Of these, 9,778 records (0.046% of the total) carried a primary diagnosis of epistaxis, referred to hereafter as the epistaxis group. This group was subsequently divided into 3 subgroups based on the type of treatment received: (1) ligation group (n = 454), (2) embolization group (n = 94), and (3) packing group (n = 4188). A total of 5042 records were excluded from the treatment subgroup analysis; 1698 had no procedures listed, 2547 had 1 or more procedures listed but none of the 3 procedures of interest; 797 had more than 1 of the above procedures listed. The demographic data for each group, and for the entire 1998-2000 NIS population, are shown in Table 1. Subjects in the epistaxis group had a higher mean age than the NIS population as a whole. Among the treatment groups, the packing group had a higher mean age than both the embolization and ligation groups (both $P < 0.005$). The epistaxis group had a higher proportion of males than the NIS population, and the 3 treatment groups had similar gender distributions. No statistically significant difference in racial distribution was observed between the 3 treatment groups, although there was a trend toward higher proportions of African Americans and Hispanics in the embolization group. There were significant differences in the distributions of primary expected payers between all 3 treatment groups (all $P < 0.025$, chi-square statistic). The main differences were a higher proportion