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Nasal vestibulitis: etiology, risk factors, and clinical characteristics☆ A retrospective study of 118 cases

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ABSTRACT

Background: Nasal vestibulitis (NV) is a common infection; however, scant data is available in the literature as it pertains to NV. We aim to describe the clinical characteristics of NV in respect to its potential complications.
Methods: A retrospective chart review of 118 NV cases admitted to a tertiary medical center between 2008 and 2015.
Results: Identified risk factors for NV included nasal hair plucking ($n = 15$, 14.41%), nose blowing ($n = 10$, 9.32%), nose picking ($n = 9$, 8.47%) and nose piercing ($n = 5$, 3.39%). Twelve patients (10.17%) were diabetic, and 3 patients were immunosuppressed. Mid-facial cellulitis was observed in the majority of patients (78.81%), and abscess of the nasal vestibule was observed in almost half (48.30%). Cultures were taken from 33.33% of patients demonstrated MSSA as the most common isolate (81.25%). No complications were observed.
Conclusion: Even in complicated cases of NV requiring admission, the risk of major complications is extremely low.

1. Introduction

Nasal vestibulitis (NV) is a localized infection of the hair-bearing nasal vestibule, caused predominantly by *Staphylococcus aureus* (*S. aureus*). NV is associated with topical minor trauma such as nose picking, hair plucking, excessive nose blowing, and topical nasal steroid therapy, (Dahle and Sontheimer, 2012; Ruiz et al., 2015) that serves as the port of entry for infection.

NV usually presents with severe pain, redness and swelling of the nasal vestibule and tip. Physical examination reveals redness, swelling, and severe tenderness with manipulation of the nasal tip. Thick yellow crusting overlying the nasal septum is a typical finding. Systemic symptoms and signs are not common and may include fever and elevated white blood count. NV may be accompanied by mid-face cellulitis and abscess formation requiring drainage. It is traditionally assumed that if left untreated, NV may progress to severe mid-facial cellulitis with its possible associated intracranial complications (Ruiz et al., 2015).

The vascular supply of the mid-face is characterized by interconnected and valveless venous system connections between the facial and angular veins and the superior ophthalmic vein and cavernous sinus (Rohana et al., 2008; van Dissel and de Keizer, 1988). The facial vein also communicates with the cavernous sinus via the inferior ophthalmic vein and pterygoid plexus (Janfaza and Cheney, 2001). In these paths, infection of the mid- facial skin (the "danger area") may potentially be transmitted intracranially causing cavernous sinus thrombosis.

Thus, although local treatment may suffice in mild cases, systemic antibiotics, as well as topical treatment, are indicated for the more severe infections. Most cases can be treated as outpatients; however admission is indicated in complicated cases, including treatment failure or the presence of cellulitis and abscess.

In recent years we have noticed a significant number of patients with the diagnosis of nasal vestibulitis who failed therapy in the outpatient setting and were admitted to our medical center. Although NV is considered a common condition, the literature provides only scant data that mainly focuses on rare severe complications. This work is aimed to describe the clinical characteristics of NV in respect to its potential complications in patients requiring admission.

2. Materials and methods

2.1. Patients

The medical records of all patients admitted to a tertiary medical center due to NV between October 2008 and January 2015 were retrospectively reviewed for patients' demographic and clinical characteristics. The retrieved data included age, gender, past medical history, smoking and alcohol consumption, clinical presentation of NV,

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laboratory results, local and systemic antibiotic treatments, occurrence of complications, and length of hospital stay. The study was approved by the institutional ethics committee.

2.2. Statistical analysis

Data analysis was performed using IBM SPSS Statistics for Windows version 21.0 statistical analysis software (2012; IBM Corp., Armonk, NY). Differences were evaluated using Fisher's exact test and Pearson Chi-Square as needed for categorical variables, and student's t-test for continuous variables. Correlations were calculated using Pearson correlation coefficient. A difference was considered statistically significant at $P < 0.05$.

3. Results

During the study period 118 admissions of 115 patients (64 males, 51 females) with NV were recognized. Indications for admission included failure to improve under antibiotic treatment in the outpatient setting, presence of spreading midface cellulitis, or nasal vestibular abscess (Fig. 1). Patient's average age was 44.33 ± 15.8 years (range, 8–96 years), and 12 (10.17%) patients were over 65 years of age.

The majority of patients were healthy individuals (Table 1). Twelve patients (10.17%) were diabetic and 3 patients were immunosuppressed, including one patient with chronic myeloid leukemia (CML), one patient with systemic lupus erythematosus (SLE), and one patient with anti-phospholipid antibody syndrome. These patients had an uncomplicated clinical course. The most common risk factor was nasal hair plucking (17 patients), which was more frequent in males compared with females (22.73% vs. 3.85%, $P = 0.006$). Demographic and patient's characteristics are presented in Table 1.

Symptom duration prior to admission ranged from 1 to 30 days (mean 5.28 ± 6.35). Mid-facial cellulitis was observed in 93 (78.81%) patients, and abscess formation was encountered in 57 (48.30%) patients (Fig. 1). The right side was involved more frequently (40.68%) than left (33.05%) or midline involvement (26.27%). The presence of abscess was associated with right side involvement ($P < 0.001$).

The systemic characteristics of NV were nearly unremarkable, with normal temperature and white blood count in the majority of patients (Table 2).

Trends for association were noticed between the presence of mid-facial cellulitis and fever ($P = 0.067$), symptoms duration ($P = 0.057$) and length of hospital stay ($P = 0.054$).

Forty-seven patients (39.83%) received antibiotic treatment prior to admission, most commonly amoxicillin-clavulanate (76.6%).

The most common therapeutic agent given on admission was (IV) amoxicillin-clavulanate (103 patients, 87.29%). An oral anti-viral agent (valcyclovir) was added in 5 (4.24%) patients with suspected herpetic infection. Topical treatment was used in addition to systemic therapy, and included saline dressings in all patients, mupirocin ointment in 26 patients, and synthomycin ointment in 2 patients.

Cultures of nasal abscess taken from 19 patients (33.33%) yielded positive results in 15 cases. Methicillin-sensitive *S. aureus* (MSSA) was the most common isolate (13/15, 81.25%). Other isolates included methicillin-resistant *S. aureus* (MRSA) and Prevotella spp. in one patient each. Varicella zoster virus (VZV) was found in one otherwise healthy patient.

Mean length of hospital stay was 3.91 ± 2.49 days (range, 1–26), with a notable correlation with age ($r = 0.242$, $P = 0.008$) and with duration of symptoms prior to admission ($r = 0.307$, $P = 0.001$). The one patient who was hospitalized for 26 days was a 96-year-old man with hypertension, chronic renal failure, benign prostatic hyperplasia and a cardiac pacemaker, who developed NV with cellulitis after excessive nose blowing and use of a nasal inhaler.

Risk factors for NV (i.e. nasal hair plucking, nose blowing, nose picking or nose piercing) or the presence of diabetes mellitus or smoking were not associated with episode severity (as assessed by the presence of cellulitis, abscess, fever, leukocytosis or length of hospitalization). No major complications were encountered.

4. Discussion

NV is a common infection affecting the adult population with no sex predilection. Still to date, data on NV in the literature is limited.

An interesting observation is that NV was more common on the right side, and abscess formation was associated with right side involvement

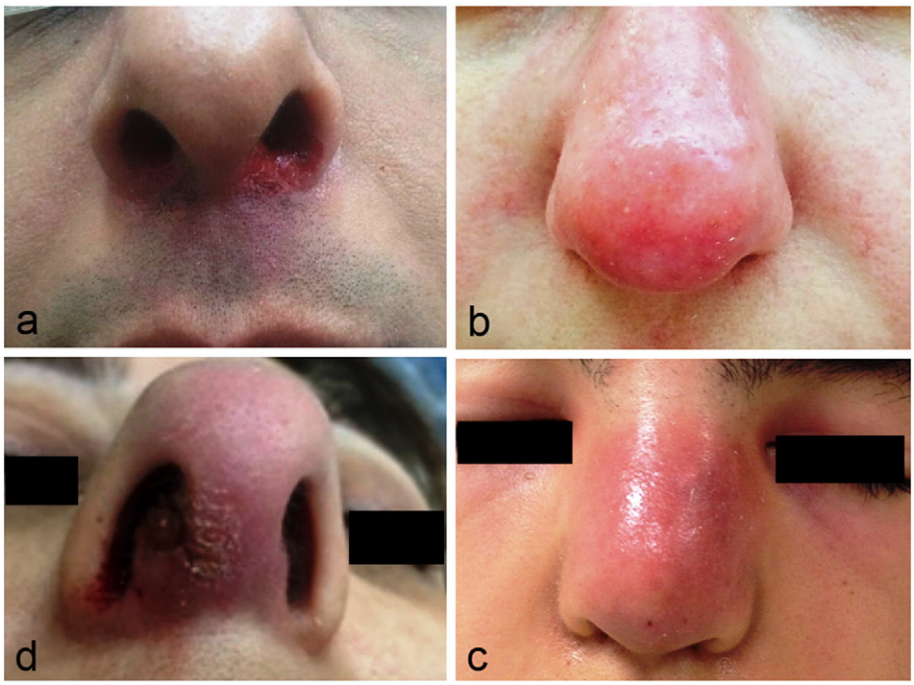

Fig. 1. *Clinical presentations of nasal vestibulitis.* (A) Left nasal vestibulitis with crusting. (B) Nasal vestibulitis with localized cellulitis. (C) Mid-face infection/cellulitis. (D) Nasal vestibular abscess.

Table 1
Patients' demographics and characteristics.

Gender (years)	
Male	64 (55.65%)
Female	51 (44.35%)
Age (mean)	44.33
Habitual risk factors	
Nasal hair plucking	17 (14.41%)
Nose blowing	11 (9.32%)
Nose picking	10 (8.47%)
Nose piercing	4 (3.39%)
Smoking	21 (17.80%)
Prior episode	13 (11.02%)
Diabetes mellitus	12 (10.17%)
Immunosuppression	3 (2.54%)

Table 2
Clinical characteristics of nasal vestibulitis episodes.

Side	
Right	48 (40.68%)
Left	39 (33.05%)
Midline	31 (26.27%)
Cellulitis	93 (78.81%)
Abscess	57 (48.30%)
Fever	14 (11.86%)
Leukocytosis (>10.8×103/ μL)	35 (29.66%)
Mean C-reactive protein (mg/L)	32.75
Mean length of hospital stay (days)	3.91
Antibiotic treatment (intravenous)	
Amoxicillin-clavulanate	103 (87.29%)
Cefazolin	4 (22.22%)
Clindamycin*	18 (15.25%)
Piperacillin-tazobactam$	1 (3.39%)

* Clindamycin was used in cases of penicillin allergy, or as a second-line agent.
$ Piperacillin-tazobactam was initiated in an immunocompromised patient with chronic myeloid leukemia.

($P < 0.001$). This could be related to right hand predominance (in 90% of the population) (Migirov and Wolf, 2014) and possibly to nasal picking; however, we did not collect data on patient's handedness. In addition, nasal picking was reported by only 8.47% of patients. As this is a common habit, it's possible that this is an underestimation as not all patients feel comfortable disclosing such a habit.

Most patients in this study were healthy individuals younger than 65 years old with only one child of 8 years old. One could expect the prevalence of nasal vestibulitis to be higher in children, as nose picking and nose blowing is more frequent in children.

Approximately 10% of the study population was diabetic and 3 more patients were immunocompromised. These patients had an uneventful recovery, and diabetes was not associated with episode severity, suggesting that with proper treatment a favorable outcome is anticipated in these populations. This supports a previous report on NV in cancer patients (Ruiz et al., 2015).

Culture results in our study demonstrated MSSA in the majority of positive results as expected especially in otherwise healthy individuals. Nasal colonization with *S. aureus* was previously described with association to NV (Dahle and Sontheimer, 2012) and may explain NV cases originating in inner (vs. outer) nasal trauma. While *S. aureus* nasal colonization has been estimated to be 30% in healthy individuals, (Berla-Kerzhner et al., 2017; DeLeo et al., 2010) a lower carriage rate was reported in Israel (17.2% of 3373 individuals screened) (Regev-Yochay et al., 2006).

Only one case of MRSA was isolated in our study; however with the worldwide spread of community acquired MRSA (CA-MRSA) results may differ in other geographical areas. Skin and soft tissue infection (SSTI) is the most common clinical manifestation of CA-MRSA, yet more invasive disease has also been described (Biber et al., 2015; DeLeo et al., 2010). The prevalence of CA-MRSA varies according to geographic location. In Israel, the proportion of MRSA among *S. aureus* isolates was reported to be 35% (Shitrit et al., 2015). A nationwide study in Israel found that the prevalence of CA-MRSA was approximately 20% of MRSA infections, (Berla-Kerzhner et al., 2017; Biber et al., 2015) and indeed, the majority of cultures in our study were MSSA positive. CA-MRSA is much more common in the United States (with some reports of over 50% prevalence), (DeLeo et al., 2010; Moran et al., 2006) whereas lower rates have been reported in China (Liu et al., 2016) and the prevalence varies in different European countries (Köck et al., 2010). Ruiz et al. (Ruiz et al., 2015) reported on NV in cancer patients treated with targeted therapies from the United States and the Netherlands, and found MSSA was the most common isolated organism (43%), with 3% prevalence of MRSA. The remaining isolates included other gram positive and gram negative bacteria. As this is a mixed cohort that includes high risk cancer patients from both high (United States) and low (the Netherlands) (van Rijen et al., 2013) prevalence areas of CA-MRSA, it is still reasonable to expect a higher rate of CA-MRSA NV in high prevalence areas.

This epidemiology of CA-MRSA should direct treatment and antibiotic choice in NV. In addition, it is unknown whether CA-MRSA NV is associated with a more complicated clinical course and thus warrants more aggressive treatment.

The incidence and prevalence of NV have not been reported so far, though previous reports describe NV as a common condition (Dahle and Sontheimer, 2012). The high incidence of nasal vestibule abscess in this study (48.30%) might be explained by the fact that hospitalization was reserved for the more severe cases, whereas mild cases were often treated in the community.

The criteria for admission of NV patients in our institution include failure of oral antibiotics, midface cellulitis progression or abscess formation. The assumed risk of intracranial complications associated with midfacial infection is the main reason for a close surveillance or admission of patients with NV. However, we found only two reports on NV with intracranial complications in the English literature: ophthalmic vein thrombosis with cavernous sinus thrombosis in an otherwise healthy teenage female with nasal furunculosis (Rohana et al., 2008) and bilateral orbital abscesses in a 2-year-old healthy child (Mahasin et al., 2001). Other reports on cavernous sinus thrombosis were associated with facial trauma or coagulation disorders (Rana and Moonis, 2011; Rohana et al., 2008; van Dissel and de Keizer, 1988). No intracranial complications were observed in our study, suggesting either these complications can be avoided with appropriate treatment or being merely rare.

Topical treatment for mild cases with localized skin infection has been reported to be adequate (Dahle and Sontheimer, 2012). However, with any signs of a more diffuse infection, systemic antibiotic treatment should be initiated. A more aggressive approach should also be considered in immunocompromised or diabetic patients, as well as in patients with other risk factors (i.e. hypercoagulability disorders). Our study suggests that in otherwise healthy subjects with NV, hospitalization may be indicated in non-responders, or progressive infection. No intracranial complications were encountered.

5. Conclusion

NV is a common infection affecting mainly healthy individuals. Systemic and topical antibiotics with closed surveillance are recommended in more diffuse or progressive infections or abscess formation. Intracranial complications were not encountered and are most likely, non-existent with appropriate therapy.

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