Natural History and Prognostic Significance of Purulent Rhinitis

Kenneth K. Steinweg, MD, Maj, MC, USA
Honolulu, Hawaii

Purulent rhinitis, or nasopharyngitis, is a common outpatient problem in children, although the recommended course of action varies and includes all modalities from observation to antibiotics. This study compared complications and duration of illness between children with clear rhinorrhea and those with purulent rhinorrhea. Nasopharyngeal and throat cultures were compared between these groups and well children. No significant difference was found between rhinorrhea groups with respect to complications or duration of illness. Children with purulent rhinorrhea did have a significant higher level of middle ear pathogens ($P < .01$) isolated from nasopharyngeal cultures. Observation with throat culture is the desired method of treatment.

Purulent rhinitis, or nasopharyngitis, is a common outpatient problem in children. In spite of this, the recommended course of action varies from textbook to textbook. The 1975 edition of *Nelson Textbook of Pediatrics*[1] states that most viral upper respiratory illnesses have a purulent phase and require no treatment. On the other hand, the 1980 *Current Pediatric Therapy*[2] and *Current Pediatric Diagnosis and Treatment*[3] recommend appropriate antibiotic therapy for yellow or green nasal discharge. Ballenger, in his textbook *Diseases of the Nose, Throat and Ear,*[4] states that secondary bacterial invasion may occur "which prolongs the illness 6 to 8 days." The implication is that the purulence represents a complication of clear rhinorrhea that prolongs an illness. Fergerson and Kendig[5] state that a secondary purulent bacterial rhinitis may follow a viral rhinitis. Neither of these last two sources, however, makes a recommendation to treat with antibiotics. Study of all the above sources revealed that references were scarce, and in a literature search, no clinical trials could be found to substantiate the suggested treatments.

There are three clinical approaches to this problem. The most common is to assume purulent rhinorrhea has no special significance. No special measures are taken because purulence is a natural phase of the common cold.[1] Another approach is to culture the discharge for evidence of pathogens. The 1979 edition of *Nelson Textbook of Pediatrics*[6] recommends this approach if any question exists with regard to streptococcal infection. Others consider the middle ear pathogens, β-hemolytic streptococcus, Haemophilus influenzae, pneumococcus, and Staphylococcus aureus to be pathogenic in this situation.[3] The last approach is to treat the discharge with broad-spectrum antibiotics because of the purulent nature of the discharge, as proposed in the textbooks *Current Pediatric Therapy*[7] and *Current Pediatric Diagnosis and Treatment*.[3]

This study was designed to compare children having purulent rhinorrhea with those having clear

From the Department of Family Practice, Tripler Army Medical Center, Tripler AMC, Hawaii. The opinions or assertions contained herein are the private views of the author and are not to be construed as official or as reflecting the views of the Department of the Army or the Department of Defense. Requests for reprints should be addressed to Major Kenneth K. Steinweg, MC, Tripler Army Medical Center, PO Box 855, Honolulu, HI 96859.

rhinorrhea for duration of illness, complications, and culture results.

Methods

Children six months to five years of age who presented to the Womack Army Community Hospital Family Practice Clinic with clear or purulent rhinorrhea were examined during the periods from October 1980 to May 1981 and September 1981 to March 1982. To qualify for the study, the subjects must have experienced the acute onset of rhinorrhea with a history of wellness prior to admission to the study and must have been found at that time to be without illness requiring antibiotics. The first 20 children to qualify for each were entered into the purulent and clear rhinorrhea groups. Purulent nasal discharge was defined as a thick nasal discharge with coloration either yellow or green from both nares. Thick white and thin colorless discharges were considered to be clear rhinorrhea. For controls, 20 well children seen in the Family Practice Center for routine physical examinations or accompanying other family members were examined and cultured during the same period and matched for age, sex, and no previous serious disease. Children with a history of recent or present antibiotic use or multiple ear infections (more than two) were not included in the study.

Data were collected on age, sex, reason for seeing the physician, duration of nasal discharge prior to visit, presence of fever, and medications used. Throat cultures were done as well as nasopharyngeal cultures of the nasal discharge. The nasal discharge cultures were plated on chocolate culture medium, eosin-methylene blue agar, sheep-blood medium, and Thayer-Martin medium. The only medications prescribed were antipyretics, antihistamines, and antitussive agents.

Each child's parent was then contacted by telephone every two days, at which time an interval history was taken until the child was judged by the parent to be no longer having rhinorrhea. Children having persistent fever, exhibiting deteriorating clinical behavior, or causing parental concern were seen a second time.

Results

The data on age, duration of illness, and complications for the three groups of children appear in Table 1. Average age among the three groups and duration of illness between the two rhinorrhea groups were very close and do not vary significantly using the t test at the 0.05 level. The total number of complications remained small in both rhinorrhea groups, and the number was not significant. Two children in the clear rhinorrhea group developed otitis media. One child in the purulent group developed otitis media, one child had a positive throat culture for β-hemolytic streptococcus only, and one child had both a positive throat culture and a positive nasal culture for β-hemolytic streptococcus. The groups did not differ significantly in sex, presence or absence of fever, or medications used.

Summary figures for comparing the two rhinorrhea groups for presence of total middle ear pathogens and number of positive cultures for middle ear pathogens are provided in Table 2. Because some cultures contained two middle ear pathogens, the number of positive cultures is lower than the total middle ear pathogens isolated in each group. The difference in isolates among the purulent group (22), the control group (13), and the clear rhinorrhea group (8) are statistically significant at the .01 level. Table 3 lists the specific nasopharyngeal culture isolates.

If analyzed by positive culture instead of by total middle ear pathogen isolates, the difference between positive cultures in the well control group (10) and positive cultures in the clear group (7) is not significant, but the difference between positive cultures in the control group (10) and the purulent group (15) is significant at the .05 level using chi-square analysis with Yates correction. The difference between positive cultures in the clear group (7) and the purulent group (15) is significant at the .01 level.

Discussion

The findings of this study are in keeping with the quoted duration of rhinitis[1,3,4,6] of one to two weeks, with the average being two weeks for both groups.

If the duration of illness and complication rates were higher for the purulent group, then some justification could be given for antibiotic treatment. If duration of illness and complication rates were similar, then an approach different from that used for clear rhinorrhea would not seem indicated. In

Table 1. Age, Duration, Illness, and Complications, by Illness Group

	Healthy Controls	Clear Rhinorrhea	Purulent Rhinorrhea
Sample size	20	20	20
Mean age (mo)	22.7	24.8	24.5
Standard deviation	13	14.2	10.6
Minimum age	8	7	10
Maximum age	58	45	48
Mean illness duration (d)		13.5	14.8
Standard deviation		3.5	4.2
Minimum illness duration		8	8
Maximum illness duration		24	24
Complications		Otitis media (2)	Otitis media (1) β-hemolytic streptococcus throat culture (1) β-hemolytic streptococcus throat and nasal culture (1)

Table 2. Nasopharyngeal Culture Results

	Total Middle Ear Pathogens*	Significance Level	Total Positive Cultures**	Significance Level
Controls (n=20)	13		10	
		$P < .01$		$P < .05$
Purulent (n=20)	22		15	
		$P < .01$		$P < .01$
Clear (n=20)	8		7	

*Haemophilus influenzae, pneumococcus, β-hemolytic streptococcus, Staphylococcus aureus
**Because some cultures contained two pathogens, total culture is less than total isolates

this study, 50 percent of the health controls had one of the pathogens, compared with 75 percent of the purulent group. Since the rate of complication and duration of illness were similar for the two groups, these culture differences seem to be unimportant. It must be questioned, then, whether there is any good reason to culture for pathogens, let alone treat with antibiotics. The one notable exception would be to culture for β-hemolytic streptococcus. Two patients with purulent nasal discharge grew this organism in the throat. In one patient β-hemolytic streptococcus was also isolated from the nasopharynx. Therefore, routine throat culture may be indicated in these children.

The treatment for loculated pus in the absence of cellulitis is drainage. Antibiotics are not needed.[8] Since children with purulent rhinorrhea do not manifest signs of cellulitis and the nose is a draining hollow tube rather than a confined space, antibiotics would appear not to be indicated on this basis either. The presence of increased numbers of middle ear pathogens in children with puru-

Table 3. Specific Nasopharyngeal Culture Isolates

	No Illness	Clear Rhinorrhea	Purulent Rhinorrhea
Actinobacter species	1	—	1
α-Hemolytic streptococcus	5	6	4
β-Hemolytic streptococcus	—	—	1
Corynebacterium species	3	4	3
Diphtheroids	—	1	2
Gram-negative rods	1	2	—
Haemophilus influenzae	3	2	7
Moraxella species	—	4	2
Neisseria species	8	10	8
Pneumococcus	8	6	12
Staphylococcus aureus	2	—	2
Staphylococcus epidermidis	8	3	3
Total isolates	39	38	45

lent nasal discharges probably represents an increased colonization rate with the organisms, but does not portend any prognostic or therapeutic difference.

The definition of the term *purulent* is difficult and posed a problem for the study. Gellis and Kagan[7] state "bacterial rhinitis should be suspected when nasal congestion is accompanied by thick yellow or green purulent discharge." The definition for this study was a nasal discharge with the presence of green or yellow coloration. This definition leaves much to be desired, but the literature provides no better answer. For centuries physicians have called secretions "pus" and "purulent" based on color or smell without much scientific investigation.

Conclusions

Physicians caring for children see purulent rhinorrhea every day, and this clinical entity currently has multiple recommendations regarding treatment. This study demonstrated that when compared with the presence of clear rhinorrhea in children, purulent rhinorrhea in examined but untreated children has no significant difference in the complication rate or duration of illness. Children with purulent rhinorrhea do differ from their clear rhinorrhea counterparts by having a significantly high incidence of middle ear pathogens, which reflects a higher colonization rate. These children should not need antibiotic treatment, but routine throat culture for β-hemolytic streptococcus would be indicated.

Finally, all the children studied were healthy before the study began, and the duration of illness was short, averaging about 14 days. Since not one of the children was ill more than 24 days, caution should be exercised in attempting to extrapolate these conclusions to unexamined children or to children having purulent rhinorrhea longer than 24 days.

Acknowledgment

This project is supported by grant No. 5D15TE54008-03, Faculty Development in Family Medicine, from the Bureau of Health Professions, Health Resources Administration; Department of Health and Human Services.

References

1. Vaughn VC, McKay RJ (eds): Nelson Textbook of Pediatrics, ed 10. Philadelphia, WB Saunders, 1975, p 940
2. Gellis SS, Kagan BM: Current Pediatric Therapy, ed 9. Philadelphia, WB Saunders, 1980, p 103
3. Kempe CH, Silver HK, O'Brien D (eds): Current Pediatric Diagnosis and Treatment, Los Altos, Calif, Lange Medical, 1980, p 248
4. Ballenger J: Disease of the Nose, Throat and Ear, ed 12. Philadelphia, Lea & Febiger, 1977, p 148
5. Fergerson CF, Kendig EL: Disorders of the Respiratory Tract in Children, ed 2. Philadelphia, WB Saunders, vol 2, 1972, p 982
6. Vaughn VC, McKay RJ, Behrman RE (eds): Nelson Textbook of Pediatrics, ed 11. Philadelphia, WB Saunders, 1979, p 906
7. Gellis SS, Kagan BM (eds): Current Pediatric Therapy, ed 8. Philadelphia, WB Saunders, 1978, p 107
8. Isselbacher KJ, Adams RD, Braunwald E, et al (eds): Harrison's Principles of Internal Medicine, ed 9. New York, McGraw-Hill, 1980, p 567