

Rhinosinusitis and Allergies in Elderly Patients



Constanza J. Valdés, MD^{a,b}, Marc A. Tewfik, MD, MSc, FRCSC^{c,*}

KEYWORDS

• Rhinitis • Rhinosinusitis • Elderly • Management • Presbynasalis

KEY POINTS

- The anatomy and physiology of the sinonasal tract changes with advancing age, occasionally resulting in symptoms.
- Multiple factors in geriatric patients can lead to a decrease in olfactory function.
- The causes of rhinitis in elderly patients are variable, and treatment should be tailored to the patient's individual needs, medications, and comorbidities.
- Chronic rhinosinusitis management can be more challenging in geriatric patients because of previous treatments and surgeries.

INTRODUCTION

The elderly population has increased in developed countries and, with this, diseases in the geriatric population are becoming increasingly important. It is projected that by the year 2050, individuals older than 65 years will represent 20% of the population in the United States and 25% of the Canadian population.^{1,2} Up to one-third of patients seen by an otolaryngologist are older than the age of 65 years.³ The Canadian population has a mean life expectancy of 81 years of age⁴ and they expect a good quality of life as they age.

Although evidence suggests that allergic rhinitis decreases with age, the prevalence of nonallergic rhinitis is higher in the elderly, and rhinosinusitis is the sixth most common chronic disease in the elderly population.⁵ Furthermore, elderly patients are often affected by multiple comorbidities, which can be more severe than rhinitis and rhinosinusitis. Nevertheless, poorly controlled rhinitis and rhinosinusitis can act as triggers for respiratory disease exacerbation and affect the patient's quality of life, underlining the importance of assessing and treating these conditions.⁶ Of course, a careful

^a Department of Otolaryngology–Head and Neck Surgery, Hospital del Salvador, Universidad de Chile, Av. Salvador 364, Providencia, Santiago 7500922, Chile; ^b Department of Otolaryngology–Head and Neck Surgery, Clínica Las Condes, Av. Estoril 450, Las Condes, Santiago 7591047, Chile;

^c Department of Otolaryngology–Head and Neck Surgery, McGill University Health Center, 1001 Decarie Boulevard, Room D05.5718, Montreal, Québec H4A 3J1, Canada

* Corresponding author.

E-mail address: marc.tewfik@mcgill.ca

evaluation of comorbidities and potential drug interactions should be undertaken before prescribing any pharmacologic therapy.

Anatomic and Physiologic Changes with Age

Several changes in nasal physiology, anatomy, and in the immune system occur with advancing age; these changes can influence the onset of rhinitis and rhinosinusitis symptoms in older adults.

The term *presbynasalis* refers to the changes in the sinonasal tract that occur with age.⁷ These changes involve the anatomy, the mucosa, and the viscoelastic properties of nasal secretions.

Anatomy

Fibroconnective tissues become weaker because of collagen fiber atrophy and a decrease in facial musculature; this leads to a loss of tip support and ptosis.⁸ There can also be septal cartilage fragmentation and retraction of the columella. These structural changes can decrease nasal airflow and lead to symptoms of nasal obstruction.

Nasal mucosa

There is often atrophy of the nasal mucosa with advancing age caused by a thinning of both the epithelium and the basal membrane,⁹ variably affecting nasal airflow and altering mucociliary clearance. These same changes are observed in postmenopausal women.¹⁰ There is a decrease in ciliary beat frequency and mucociliary clearance¹¹ accompanied by alterations of the microtubules.^{7,12} Nasal vasculature also changes as submucosal vessels become less patent, resulting in a decreased ability of nasal structures to warm and humidify inhaled air. Consequently, older individuals are more susceptible to suffering from nasal dryness.¹³

Viscoelastic properties of the secretions

With a decrease in the production and secretion of nasal mucous, there is an increase in the viscosity of secretions, which further contributes to the sensation of dryness and irritation.

The immune system is also affected with age, with 2 major changes noted: immunosenescence and the development of chronic inflammation.¹⁴

Immunosenescence describes changes in both innate and acquired immunity with age, which can cause an increased susceptibility to infections and autoimmune disorders. These changes include

1. Decreased expression and signaling of toll-like receptors¹⁵
2. Involution of the thymus gland, resulting in the decreased production and differentiation of naïve T cells, and a decreased responsiveness of T-cell populations¹²
3. Increased production of aberrant antibodies to pneumococcus and other bacteria by B cells.¹⁶

This process of immunosenescence affects the sinonasal tract, resulting in a greater vulnerability to allergens and pathogens in the elderly population.⁷

With age, the olfactory neuroepithelium also undergoes modifications: it becomes thinner, the density of receptors decreases, and the pattern of receptors changes.¹⁷ These changes are more pronounced in smokers.¹⁸ This results in a decreased sense of smell with age: after the age of 65 years, about 20% of patients present with alterations in their sense of smell and in patients older than 80 years up to 62.5% have alterations in olfaction.¹⁹ There is not only a decrease in the perception of odors but also in distinguishing between different odorants.²⁰ This decrease adversely affects quality of life because the ability to distinguish flavors and taste diminishes.

Decreased olfaction may also present as an early symptom of neurodegenerative diseases. Loss of smell is an early symptom in Parkinson disease that is present in approximately 90% of affected patients and precedes motor symptoms by approximately 4 to 6 years. The mechanisms responsible for olfactory dysfunction are currently unknown.^{21–23} It also occurs in other disorders such as Alzheimer disease, Huntington disease, and multiple sclerosis.

Although the loss of smell is frequent, only about 9% of the patients perceive and report it, putting these patients at risk for cooking mishaps, natural gas leaks, and inadvertently consuming spoiled food. In patients with allergic rhinitis, there is a decrease in olfaction that is attributed not only to obstruction but also to inflammation of the olfactory cleft.^{24,25} In older adults, multiple factors often contribute to the loss of smell.

Rhinitis in the Elderly

Rhinitis is an inflammation of the nasal mucosa, characterized clinically by 1 or more of the following symptoms: nasal congestion, rhinorrhea or posterior discharge, itching of the nose and/or eyes, and sneezing. Rhinitis is a prevalent condition in the elderly and is of concern because of its relationship with asthma; it has a substantial socio-economic cost and heavily affects quality of life. It can be classified as allergic or nonallergic (**Table 1**).

Allergic rhinitis seems to decrease with age, with a prevalence of 12%,²⁶ although recent literature suggests a prevalence of approximately 32%²⁷ in the 54 to 89 years age group. Several studies have suggested that rhinitis symptoms become milder with time and that allergic skin reactivity also decreases.^{28–30} The 2005 National Center for Health Statistics Report noted the prevalence of allergic rhinitis as 7.8% in those 65 to 75 years old, and 5.4% in those older than 75 years.³¹ Although there is little research regarding nonallergic rhinitis, the prevalence seems to be greater in women and seems to increase with age.^{32,33}

Table 1 Classification of rhinitis	
Allergic	Nonallergic
Intermittent	Noninfectious
Persistent	Occupational
	Caused by work: symptoms arises of causes attributable to a particular work environment
	Exacerbated by work: preexisting rhinitis exacerbated in the workplace
	Drug-induced
	Various drugs (see Table 2)
	Medicamentosa
	Hormonal
	Hypothyroidism, acromegaly
	Idiopathic
	Vasomotor rhinitis
	Other
	Nonallergic rhinitis with eosinophilia syndrome (NARES)
	Gustatory rhinitis
	Atrophic
	Infectious
	Viral
	Adenovirus, influenza, parainfluenza
	Bacterial
	Streptococcus, hemophilus

ALLERGIC RHINITIS

Allergic rhinitis is characterized by intermittent or persistent symptoms such as rhinorrhea, nasal congestion, sneezing, itching, or pruritus.³⁴ These symptoms are the result of a type I hypersensitivity reaction with an immunoglobulin (Ig)E-mediated allergic inflammation in the nasal mucosa triggered by various allergens; the symptoms can be perennial or seasonal. After the cell is exposed to an allergen, it produces specific IgE antibodies directed against these extrinsic proteins that bind to the surface of mast cells. When the patient is exposed again to the allergen, the mast cells release previously formed mediators, consisting mainly of histamine, which then exert their effects on the nasal mucosa. The early phase response is immediate up to 2 hours after exposure to the antigen. It relies on preformed mediators within the sensitized mastocyte that degranulates, releasing histamine to produce symptoms. The late-phase response is produced by neoformed mediators from the mastocyte membrane, such as lipoxygenase (prostaglandins and thromboxanes), cyclooxygenase (leukotrienes), and cellular recruitment (basophils, eosinophils). These mediators will cause vascular endothelial dilation, which subsequently causes mucosal edema. This leads to the symptoms of congestion, redness, tearing, swelling, and postnasal drip. The allergen will stimulate irritant receptors, causing itching and sneezing. Both phases present similar symptoms; however, sneezing and itching are less prominent in the late phase, whereas congestion and mucus production are more severe.³⁵ In elderly patients, however, the late phase may be not noticed by patients due to a very limited or nonexistent course.³⁶

To make a diagnosis of allergic rhinitis, there must be objective evidence of allergen sensitivity (skin test or serum testing). Allergen sensitization, as well as total IgE, seems to diminish with age. Simola and colleagues³⁰ showed that prick test reactivity trended down in older subjects and that there were no associations between this decrease and the duration of rhinitis symptoms or changes in symptom severity. Additionally, symptoms tended to become milder with time, independent of prick test sensitivity. A more recent study analyzed the symptoms, skin prick testing (SPT), serum total, and specific IgE and nasal eosinophils 15 years after primary testing. In 180 subjects, symptoms became milder with a decrease of specific serum IgE and nasal eosinophils, with no differences in serum IgE or SPT. They showed that the decrease in nasal symptoms was related with nasal eosinophil independently of SPT and IgE.³⁷ Allergic rhinitis is classified as intermittent or persistent disease and its severity as mild or moderate to severe (Fig. 1).³⁸

NONALLERGIC RHINITIS

Nonallergic rhinitis is also characterized by signs and symptoms of nasal inflammation but without any identifiable type 1 hypersensitivity. It can be subdivided into several categories as follows.

Idiopathic Rhinitis, Also Known as Vasomotor Rhinitis

The cause of idiopathic rhinitis is unclear but there seems to be a role for nasal inflammation, C-fibers, parasympathetic hyperreactivity, and/or sympathetic hyporeactivity, as well as glandular hyperreactivity. Patients are hyperresponsive to nonspecific environmental triggers such as changes in temperature and humidity, exposure to tobacco smoke, and strong odors. It commonly causes watery rhinorrhea, which can be unilateral or bilateral.

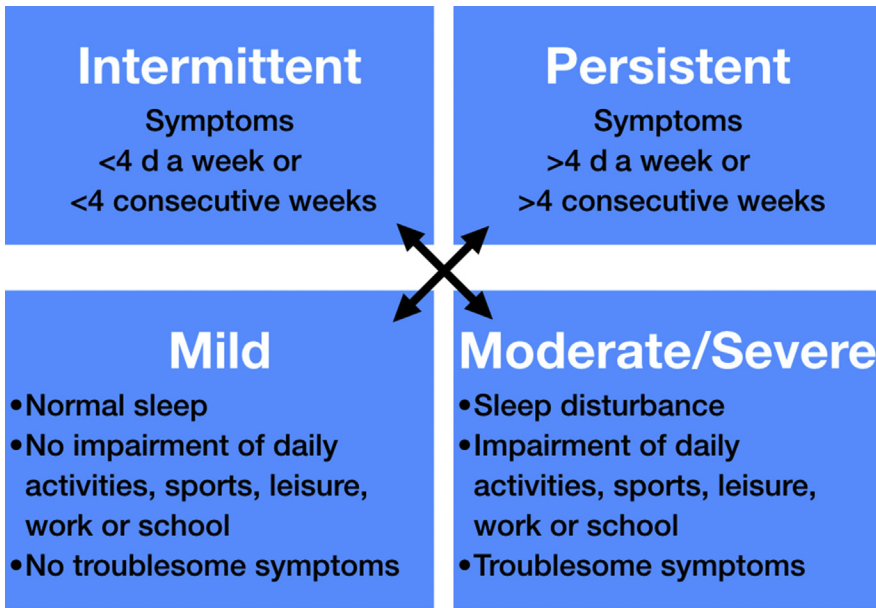


Fig. 1. Classification of allergic rhinitis. (Adapted from Bousquet J, Van Cauwenberge P, Khaltaev N. Allergic rhinitis and its impact on asthma. *J Allergy Clin Immunol* 2001;108(Suppl 5):S148; with permission.)

Atrophic Rhinitis

Atrophic rhinitis is a chronic disease of the nasal cavity mucosa of unknown cause. This condition is progressive and is characterized by atrophy of the nasal mucosa and the underlying bone of the turbinates, with abnormal dilatation of the nasal cavities, paradoxical nasal congestion, and formation of viscous secretions and dry crusts, leading to a characteristic fetidity, commonly called *ozena*.³⁹ Secondary atrophic rhinitis occurs as a consequence of a particular condition that acts as the main triggering factor, such as extensive nasal surgery, trauma, inflammatory processes, granulomatous diseases, or radiation therapy.

Drug-Induced Rhinitis

The symptoms of drug-induced rhinitis usually reduce sympathetic vascular tone, causing vasodilation and increased nasal congestion ([Table 2](#)). More than 400 brand name drugs list rhinitis as a side effect. It is of importance because of the polypharmacy often seen in the geriatric population; on average, patients older than 65 years use at least 5 medications and 12% use at least 10 medications.⁴⁰ Rhinitis medicamentosa is a persistent nasal obstruction after using nasal sympathomimetic agents due to rebound vasodilation with overuse.

Gustatory Rhinitis

Gustatory rhinitis is watery rhinorrhea after ingestion of certain foods.

EVALUATION

The evaluation of the elderly patient should include a full history of symptoms, their aggravating and alleviating factors, temporality, and response to medications. It is

Table 2 Medications contributing to drug-induced rhinitis		
System	Medication	Mechanism of Action
Cardiovascular	Beta-blockers (propranolol) Alpha-blockers (clonidine) Centrally acting antihypertensives (methyldopa, reserpine) Angiotensin converting enzyme inhibitors Vasodilators (hydralazine) Diuretics (hydrochlorothiazide) Niacin	Interferes with normal sympathetic tone that causes vasoconstriction of local vessels, leading to vasodilation and symptoms of nasal congestion
Central Nervous System	Typical or atypical antipsychotics Chlormethiazole Citalopram Psychotropics (risperidone, chlorpromazine, amitriptyline) Gabapentin	Alpha-blocking and beta-blocking properties
Endocrine	Oral contraceptives Estrogens Phosphodiesterase 5 inhibitors (sildenafil, tadalafil, vardenafil)	
Other	Aspirin or nonsteroidal antiinflammatory drugs Mycophenolate mofetil Penicillamine Lamivudine Metamucil Intraocular or ophthalmic preparations of beta-blockers	

important to assess the environment for the presence of animals, tobacco smoke, pollution, and dust inside the home. It should include all comorbid conditions and medications taken. It is also important to rule out disorders such as granulomatous disease, nasal polyposis, cerebrospinal fluid leak, and malignancies. Even though older patients may be of retirement age, long-term occupational exposures from former careers may still be relevant and should be recorded.

Examination should include the external anatomy, inspecting the tip of the nose, and whether there is static or dynamic valve collapse. Internally, the inferior turbinates, septum, and presence secretions should be assessed. Nasal endoscopy is often useful and should be considered as part of a thorough nasal examination.

Allergy testing is useful to determine atopic status. Other investigations, such as sinus computed tomography (CT) scan or MRI, are indicated when there is a lack of response to medical treatment, when there is suspicion of an underlying cause for the symptoms such as tumors, or for planning sinus or nasal surgery.

TREATMENT
Allergic Rhinitis

Specific treatments include reduction or elimination of allergens from the patient environment, pharmacologic treatment, and immunotherapy. Surgery is reserved for symptoms that are refractory to medical treatments.

Environmental management

Environmental management includes avoidance of exposures to allergens, some of which are present all year round and others which are seasonal. If the patient is allergic to *Dermatophagoides* (dust mites), a bedroom with large windows is preferable (airing it out easily), high beds, washable (uncarpeted) floors, limited dust-accumulating elements, and dust mite covers for pillows and mattresses. If the patient is allergic to pollen, traveling with closed windows and leaving used clothing outside the bedroom during the day should be recommended. For nasal dryness, the use of saline nasal irrigation is useful by helping to clear the mucus and moisten the nasal mucosa.

Pharmacologic treatment

The principal concern with medications in the elderly pertains to the possibility of interactions with other drugs and diseases. The risk of adverse events increases exponentially with the number of drugs used and with concomitant liver or renal impairment. The type of drug used should be related to the clinical symptoms of rhinitis; for example, if the predominant symptom is nasal obstruction, then intranasal corticosteroids should be used. Intranasal corticosteroids and intranasal and/or oral antihistamine drugs constitute first-line therapies.⁴¹ Other medications that can be used include anticholinergics, intranasal chromones, oral decongestants, and leukotriene antagonists.

Intranasal corticosteroids Intranasal corticosteroids are used in upper airway diseases, including allergic and nonallergic rhinitis, and are recommended as first-line treatment regardless of the severity in patients older than 60 years of age.^{42,43} They reduce nasal congestion, pruritus, rhinorrhea, eye symptoms, and sneezing.⁴⁴ They potentially reduce nasal inflammation and are currently the most effective treatment of allergic rhinitis. However, they have a slow onset of action compared with antihistamines, and a trial of 1 week minimum should be attempted. Side effects such as nasal irritation and bleeding are rare, and septal perforations are an exception. There are no data to suggest an increase in side effects from the use of these drugs in older patients.⁴⁵ Mometasone and ciclesonide have minimal bioavailability and, therefore, are the safest options; this characteristic is particularly important in the elderly.⁴⁶

Antihistamines: Antihistamines are widely used for allergic rhinitis, conjunctivitis, and allergic skin diseases in elderly patients. They act by blocking H1 receptors on smooth muscle cells, nerve endings, and glandular cells.

First-generation antihistamines such as chlorpheniramine, diphenhydramine, triprolidine, and hydroxyzine, are associated with marked sedation. Other undesirable side-effects from these medications include anticholinergic effects (dry mouth, blurred vision); cognitive alteration and central nervous system effects (drowsiness and global alteration); cardiovascular effects; and interactions with fluoxetine, cimetidine, macrolides, and ketoconazole. Although these first-generation antihistamines control the symptoms of allergic rhinitis effectively, their side effects limit their usefulness, especially in older patients.

Second-generation H1-receptor antagonists provide excellent, safe, and effective treatment of allergic rhinitis in elderly patients, thanks to a relatively low rate of passage across the blood-brain barrier. This results in much less sedation, and the higher specificity for the H1 receptor decreases anticholinergic and antiserotonergic side effects. Fexofenadine, cetirizine, loratadine, levocetirizine, desloratadine, bilastine, and ebastine are most commonly used in elderly people.⁴⁷ Interactions with other drugs

are relatively minimal but because they are metabolized by the cytochrome 450 enzyme during their first pass through the liver they are not recommended for patients with significant liver disease.⁴⁸ Patients with renal impairment should take lower daily doses of antihistamines such as azelastine, ebastine, desloratadine, and cetirizine because they are excreted by the kidney.⁴⁹ They act rapidly and are effective against pruritus, sneezing, rhinorrhea, and ocular symptoms, and their effects can last up to 7 days after ceasing of the medication.

Topical antihistamines (azelastine, levocabastine, and olopatadine) have effects that are comparable to systemic second-generation antihistamines but have the added advantages of a quicker onset of action and of not inducing systemic adverse reactions. Furthermore, if combined with a topical corticosteroid, they may have more than an additive effect on symptoms. However, they generally have to be taken twice daily.

Decongestants Local or systemic decongestants relieve nasal obstruction thanks to their sympathomimetic properties, which is a significant problem in affected patients. However, they do not relieve symptoms such as sneezing, pruritus, and secretions.⁵⁰ They act on alpha-adrenergic vessels, producing vasoconstriction.

Oral decongestants, such as pseudoephedrine, may generate many adverse side effects, such as hypertension, palpitations, headache, agitation, tremor, insomnia, dry mucosa, urinary retention, and exacerbation of glaucoma or thyrotoxicosis.⁴⁷ Thus, they must be avoided in older patients with multiple comorbid conditions, such as coronary artery disease, diabetes, hypertension, hyperthyroidism, narrow-angle glaucoma, and symptoms of bladder neck obstruction.

The major side effect of topical decongestants is their potential to induce rebound congestion if used for more than 5 consecutive days, which may lead to rhinitis medicamentosa. These should be used only for short-term courses and not as monotherapy.

Antileukotrienes Antileukotrienes are selective and competitive receptor antagonists for the activity of leukotriene D₄ and E₄. They decrease the inflammatory response in allergic rhinitis and improve nasal and ocular symptoms but are less effective than antihistamines and topical steroids. The combination of antileukotrienes and antihistamines showed a synergistic effect for the treatment of seasonal allergic rhinitis. These medications are particularly useful in asthmatics, where they may have the additional benefit of improving lower airway disease.

Anticholinergics The principle agent used is ipratropium bromide, which blocks muscarinic receptors, leading to a decrease in the parasympathetic function. It is only effective against anterior rhinorrhea. These medications are usually indicated in combination with a topical corticosteroid or with an antihistamine.

Allergen-specific immunotherapy

Allergen-specific immunotherapy is the only disease-modifying treatment for allergic patients. There is no age limit for prescribing immunotherapy in the elderly⁵¹ and advanced age is no longer a contraindication.⁵² It should only be considered in patients with clinical nasal symptoms associated with a confirmation of an IgE-mediated reaction to a specific inhalant allergen. There is evidence demonstrating that it is effective in the elderly. It causes a reduction in symptoms, drug consumption, and new sensitization.⁵³ It also decreases both cutaneous sensitivity and specific IgE levels, leading to improved clinical symptoms.⁵⁴ It is contraindicated in patients with uncontrolled asthma or significant cardiovascular diseases, and it should be

administered with caution to patients on beta-blockers or angiotensin-converting enzyme inhibitors^{55,56} because of the higher risk of anaphylactic shock.⁵⁷ Comorbid conditions and contraindications should be evaluated carefully before an elderly patient is started on immunotherapy. Traditionally, subcutaneous immunotherapy (SCIT) was used; however, a growing trend toward sublingual immunotherapy (SLIT) has been noted, first in Europe, then in North America. Whether SCIT or SLIT is used, there is equal efficacy in treatment; however, the risk of systemic side effects must be taken into account. The incidence of SCIT-induced systemic reactions is 0.1%,⁵⁸ whereas SLIT has a better safety profile.⁵⁹ Because of this and its ability to be administered at home, the use of SLIT is recommended in the elderly population.⁶⁰ In elderly patients, immunotherapy may reduce the use of other medications.

Nonallergic Rhinitis

Idiopathic or vasomotor rhinitis

Anticholinergics work well for rhinorrhea and are the traditional gold standard treatment of this condition. They have not; however, been studied specifically in elderly patients. The US Food and Drug Administration has approved the use of intranasal azelastine, which has antiinflammatory effects and improves rhinorrhea, sneezing, postnasal drip, and congestion.⁶¹

Gustatory rhinorrhea

Topical ipratropium bromide before ingestion of the trigger food has been shown to be an effective treatment.^{62,63} It has few local side effects such as epistaxis and nasal dryness. This drug should, however, be avoided in patients with angle-closure glaucoma or with urinary retention due to benign prostatic hypertrophy.

Atrophic rhinitis

The goal of treatment of atrophic rhinitis is to reduce symptoms, to improve quality of life, and to eliminate secondary bacterial infections, reducing the amount of crusts and the associated odor. Management consists primarily of education regarding nasal hygiene and the use of antibiotics. Continuous and regular nasal hygiene with high-pressure irrigation remains the mainstay of conservative therapy. Moisturizing measures should be accompanied by the removal of the crusts. Systemic antibiotic therapy should be guided by nasal culture results. The antibiotics of preference, taking into account the main pathogens (gram-negative bacteria), are aminoglycosides, rifampicin 600 mg once daily for 12 weeks, and ciprofloxacin 500 to 750 mg twice daily for 8 to 12 weeks.^{39,64} In cases of malnutrition or iron, zinc, protein, and vitamin A deficiencies, supplements are recommended.³⁹

SURGERY

Surgery is effective for older individuals; however, functional status, comorbidities, and the anesthetic risk of each geriatric patient must be assessed preoperatively to determine if surgery is a suitable option. Nasal reconstruction can be performed to reverse the effects of aging on the nose, including raising the nasal tip, supporting the lateral cartilages and improving aesthetic appearance.⁶⁵ These could also help air flow and nasal function. Septoplasty and turbinateplasty have been shown to improve symptoms and reduce medication usage. In addition, quality of life scores in geriatric patients who present with nasal obstruction due to septal deviation and inferior turbinate hypertrophy improve after the surgery.⁶⁶ Radiofrequency turbinateplasty is well-tolerated and seems to be effective for treating some nonallergic rhinitis symptoms in elderly patients, including rhinorrhea and nasal obstruction.⁶⁷

CHRONIC RHINOSINUSITIS

Chronic rhinosinusitis (CRS) is a highly prevalent disease and is defined as symptomatic inflammation of the nasal mucosa and paranasal cavities for more than 3 months duration. It is considered the second most frequent chronic condition in the United States, and it is the sixth most common chronic disease in the elderly population.⁵ It affects approximately 5% to 15% of the general population, both in Europe and the United States.⁶⁸ Studies of CRS in the elderly population are generally limited; however, an increased incidence of polyposis in the elderly has been well-described in the recent literature. A 2011 review of the Korean National Health System data revealed that the incidence of CRS with polyps doubles in patients older than the age of 65 years.⁶⁹ Cho and colleagues⁷⁰ described that nasal polyps and asthma tended to be more prevalent in elderly patients compared with nonelderly patients, and that CT scan scores of the elderly group were significantly worse than those of the nonelderly group.⁷¹

For the diagnosis of CRS, subjective criteria are required, including 2 or more symptoms, among which should be nasal obstruction, blockage, or congestion or nasal discharge (anterior or posterior nasal drip); plus or minus facial pain or pressure, or hyposmia, for more than 12 weeks. Additionally, 1 objective finding is required either on nasal endoscopy (nasal polyps and/or mucopurulent discharge and/or oedema or mucosal obstruction in the middle meatus) or a CT scan (mucosal changes within the ostiomeatal complex and/or sinuses).⁶⁸

A recent study showed no differences in clinical presentation between older and younger patients, either in associated cofactors (prevalence of smoking, polyps, asthma, and aspirin sensitivity), quality-of-life instruments, or objective measures of disease severity, including a Lund-MacKay CT scan and Lund-Kennedy endoscopic scoring.⁷²

TREATMENT

Most patients with CRS require medical treatment over many years. The goal of treatment is to achieve and maintain clinical control, which is defined as having no symptoms or symptoms that are not very bothersome. Ideally, this is associated with healthy nasal mucosa with minimal topical treatment.⁷³ The treatment recommendations of European Position Paper on Rhinosinusitis and Nasal Polyposis (EPOS)-2012⁶⁸ are based on the evaluation of symptoms using a visual analog scale and endoscopic evaluation.

For CRS without nasal polyps, topical corticosteroids and nasal irrigations with saline solution (level of evidence Ia, recommendation A), and reevaluation in 3 months are recommended. For patients with moderate and severe symptoms, the use of long-term antibiotics can be added. For example, macrolides can be prescribed for 12 weeks, especially in patients with a low or normal total serum IgE (level of evidence Ib, recommendation C). However, caution is advised because drug interactions with macrolides are common (especially with clarithromycin), and adverse cardiac events have been described with azithromycin. In moderate and severe cases with patients who have failed medical management, it is recommended to perform a CT scan of the paranasal sinuses and consider surgical treatment.⁶⁸

For CRS with nasal polyps (CRSwNP), patients with mild disease should receive topical corticosteroids (level of evidence Ia, recommendation A) and nasal irrigations with saline solution (recommendation D) and be reevaluated after 3 months. For patients with moderate symptoms, the additional use of antibiotics like doxycycline should be considered (level of evidence Ib, recommendation A). In the severe group,

oral corticosteroids should be prescribed (level of evidence Ia, recommendation A), in the absence of any contraindications. In both moderate and severe patients, it is recommended to perform a CT scan of the paranasal sinuses and consider surgical treatment, if no improvement is seen with medical treatment.⁶⁸

In older patients, because of possible comorbidities and polypharmacy, caution has to be taken with the prescription of medications for CRS. Intranasal corticosteroids and saline solution are quite safe in the elderly population. Broad-spectrum antibiotics, such as third-generation cephalosporins, fluoroquinolones, and clindamycin, can also cause *Clostridium difficile* colitis, which is more common and fatal in the elderly compared with younger adults.⁷⁴ Oral steroids must be prescribed with caution because there are significant side effects, many of which are age-dependent (ie, osteoporosis, diabetes, and arterial hypertension).

Surgery

When maximal medical treatment fails, surgery should be considered, regardless of age. Because this is a disease that significantly affects the quality of life but is not life-threatening, the patient's comorbidities and anesthetic risk must be taken into account. If the benefit to the patient outweighs the risk, surgery should be offered. Endoscopic sinus surgery (ESS) in the geriatric population is a safe and effective treatment of CRS refractory to medical therapy.^{5,75}

Evidence shows that ESS results are similar in the older and younger patient populations, with a similar degree of improvement on endoscopy scores and quality-of-life measures.^{5,72} Ramadan and VanMetre⁷⁶ performed a retrospective study comparing complications in ESS in adults (18–64 years old) and older patients (64 years old). They found that older adults had higher overall complication rates but that this was mainly caused by higher rates of revision surgery in the older group. Primary ESS complication rates were similar between the 2 groups. Another study found no differences in complication rate between the 2 groups.⁵

SUMMARY

The geriatric population has increased worldwide, and sinonasal disorders are frequent in this population. When untreated, they can significantly affect patients' quality of life and may exacerbate respiratory diseases. With advancing age, there are several changes in both nasal physiology and anatomy, as well as in the immune system; these changes can influence the onset of rhinitis and rhinosinusitis symptoms in older adults.

The evaluation of the elderly patient should include a full history of the symptoms with a careful assessment of comorbidities; potential drug interactions should be considered before prescribing any pharmacologic therapy. A correct diagnosis of the rhinitis subtype is essential to improve the success of therapy and improve quality of life.

Surgery can be considered in this group provided the patient's comorbidities and anesthetic risk have been taken into account. In patients in whom the benefits outweigh the risks, surgery should be offered as a management option.

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