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CAROTID SINUS HYPERSENSITIVITY SYNDROME: AN EXPANDED SCIENTIFIC REVIEW

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Abstract

Carotid Sinus Hypersensitivity Syndrome (CSHS) is an exaggerated baroreflex-mediated response triggered by stimulation of the carotid sinus, leading to clinically significant bradycardia, hypotension, or both. It represents an important and potentially reversible cause of syncope, particularly in older adults. The syndrome is classified into cardioinhibitory, vasodepressor, and mixed types based on hemodynamic response patterns. Diagnosis is established by carotid sinus massage under controlled monitoring conditions. Management strategies depend on subtype, with permanent pacemaker implantation being highly effective in cardioinhibitory forms. This review summarizes the anatomy, physiology, pathophysiology, clinical features, diagnostic criteria, and evidence-based management of CSHS.

Introduction

Carotid Sinus Hypersensitivity Syndrome is a disorder of autonomic cardiovascular regulation characterized by an excessive reflex response to carotid sinus stimulation. While carotid sinus hypersensitivity may be observed in asymptomatic individuals, it becomes clinically significant when associated with spontaneous syncope, presyncope, or unexplained falls. The condition is most commonly diagnosed in elderly populations and remains underrecognized in clinical practice.

Anatomy and Baroreceptor Physiology

The carotid sinus is located at the bifurcation of the common carotid artery. It contains mechanosensitive baroreceptors that detect arterial wall stretch and transmit afferent impulses via the glossopharyngeal nerve to the nucleus tractus solitarius in the medulla oblongata. Physiologically, increased arterial pressure enhances parasympathetic output and suppresses sympathetic tone, resulting in heart rate reduction and vasodilation. In CSHS, this feedback mechanism becomes pathologically amplified.

Pathophysiology

The underlying mechanism involves heightened baroreceptor sensitivity and abnormal autonomic integration. Minor external stimuli such as neck rotation, shaving, or tight collars may provoke marked vagal activation and/or sympathetic withdrawal. Age-related fibrosis, atherosclerotic vascular changes, and impaired central autonomic processing contribute to increased susceptibility. Three response patterns are identified:

1. Cardioinhibitory type – dominant bradycardia or asystole.
2. Vasodepressor type – predominant hypotension without major heart rate change.
3. Mixed type – combined bradycardia and hypotension.

The cardioinhibitory form is more responsive to pacing therapy, whereas vasodepressor responses are often more difficult to manage.

Clinical Manifestations

Patients typically present with recurrent syncope, unexplained falls, or transient dizziness. Episodes are usually brief and may be triggered by head turning or mechanical neck stimulation.

In older adults, unexplained falls without documented loss of consciousness should raise suspicion for CSHS. Injury risk is substantial due to sudden onset of symptoms.

Diagnostic Evaluation

Carotid sinus massage (CSM) performed with continuous ECG and blood pressure monitoring remains the diagnostic gold standard. A pathological response is defined as asystole ≥3 seconds and/or a systolic blood pressure drop ≥50 mmHg. The procedure should be avoided in patients with recent cerebrovascular events or significant carotid artery stenosis. Additional investigations include Holter monitoring, echocardiography, and tilt-table testing to exclude alternative causes of syncope.

Management and Treatment

Management is guided by subtype. Permanent dual-chamber pacemaker implantation is recommended for symptomatic cardioinhibitory CSHS and has demonstrated significant reduction in syncope recurrence. Vasodepressor forms require conservative strategies including adequate hydration, salt intake (if not contraindicated), physical counterpressure maneuvers, and avoidance of triggering factors. Pharmacological therapies such as fludrocortisone or midodrine may be considered in selected cases, though evidence remains variable.

Prognosis

Although overall mortality is not markedly increased, morbidity due to trauma and recurrent falls is significant. Early recognition and targeted therapy substantially improve patient quality of life and reduce complications.

Conclusion

Carotid Sinus Hypersensitivity Syndrome is an important autonomic disorder that should be considered in elderly patients with unexplained syncope or falls. Proper diagnostic evaluation and subtype-specific treatment, particularly pacemaker therapy in cardioinhibitory forms, provide effective symptom control and improve long-term outcomes.

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