

Conventional management of inappropriate sinus tachycardia

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Abstract Inappropriate sinus tachycardia is a challenging problem to manage. There are limited data on the best method to evaluate and treat the problem. Here, we consider a conventional approach to inappropriate sinus tachycardia.

Keywords Inappropriate sinus tachycardia

It is difficult to imagine a conventional approach to such an unconventional problem as inappropriate sinus tachycardia (IST). Even though the syndrome is now defined by consensus [1], on reflection, the meaning of “inappropriate” remains nebulous [2]. Likely, this syndrome represents a broad spectrum of clinical conditions and circumstances varying from an undiagnosed anxiety disorder to unidentified abnormalities of the autonomic nervous system and/or the sinus node [3]. The mechanism(s) and natural history of the condition remain uncertain; knowledge of potential mechanisms, causes of ensuing and exacerbating factors, and the clinical presentation may help individualize therapy. However, there is little science and more art to the conventional management of IST.

Typically, IST occurs in otherwise healthy, young women (but not always [4]) bothered with palpitations and rapid heart-beat, along with dizziness, fatigue, weakness, and various nonspecific complaints [5] (including, rarely, syncope [6]). IST is generally self-limited, but in middle aged women, it may become a longstanding problem [7]. Symptoms, not the rhythm, are the focus of therapeutic interventions since rarely

does sinus tachycardia alone lead to serious hemodynamic or life-threatening consequences including cardiomyopathy [8]; aside from potentially related symptoms, the tachycardia may go unrecognized. The tacit assumption when attempting to treat this condition is that tachycardia is the cause for the symptoms but this is not always so.

Conditions mimicking “true” IST need exclusion. “Appropriate” and transient causes for sinus tachycardia must be considered and ruled out including, but not limited to, exercise, “stress”, anxiety, panic attacks, drug use or withdrawal (anticholinergic drugs, catecholamines, alcohol, caffeine, cocaine, other stimulants, tobacco, and beta-blocker withdrawal), and pain. Pathological, but obscure, triggers precipitating sinus tachycardia may only become manifest on repeated evaluations. Determination of catecholamine levels is often considered part of the diagnostic work-up but more often than not, the search is quixotic.

“Deconditioning” and panic attacks can be difficult to distinguish from IST and may coexist without any direct causal relationship. Psychological disorders, often present in IST, may not be the cause for symptoms or tachycardia. All IST patients in one series referred for ablation had some form of psychiatric disorder (schizophrenia, depression, panic disorder, or somatoform disorder [9]). Yet, IST patients tend to deny psychiatric problems. Nevertheless, specific psychological triggers initiating “appropriate” sinus tachycardia should be considered.

Postural orthostatic tachycardia syndrome (POTS) should be ruled out although IST and POTS may have similar clinical dysautonomic presentations [10]. In POTS, the sinus rate increases with standing and does not cause supine sinus tachycardia [10]. IST is not so dependent upon position as much as it is on exertion. An overlap between the two may occur [11], but distinctions are important as IST treatments may worsen orthostatic intolerance in POTS and treatments for POTS may be useless for IST [12].

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To distinguish the two syndromes, orthostatic vital signs, an electrocardiogram and, potentially, a treadmill and/or a tilt-table test may be helpful. In POTS, exercise may accelerate the heart rate and, during tilt-table testing, there may be a gradual increase in heart rate (with no drop in blood pressure), whereas, in IST, the heart rate starts off fast at rest and accelerates rapidly with tilt, perhaps, due to impaired baroreflex gain [13]. Tachycardia is less dependent on position and more on exercise with IST. Rates can be excessive on a treadmill test in contrast to POTS.

Monitoring techniques can secure a diagnosis and an association of the rhythm to symptoms. With advances in monitoring techniques including the use of smart phone technology (e.g., AliveCor), correlation of heart rate to symptoms has improved. Occasionally, it is uncertain whether tachycardia is sinus or not. An electrophysiology test may be necessary to secure a diagnosis (and to test the effects of catecholamine infusion and its blockade) [14].

1 Treatment—a conservative approach

The first goal of managing IST is to engage the patient in the treatment, recognizing that the condition is not necessarily a disease and may improve gradually with conservative measures and no specific therapeutic intervention. Lifestyle changes and exercise, as tolerated, can help. Exercise may affect more than just the autonomic nervous system; it may affect the sinus node itself [15]. Effective patient communication and attention to symptoms may improve outcomes [9]. A cure is unlikely with a conventional approach and patients need to be aware of this.

If specific triggers can be identified, they can be modified or eliminated. Environmental toxins and chemicals, and inflammatory and immunological conditions [16] may be the culprit as initiators of tachycardia. Exercise, starting slow and working up to a higher level, especially coupled with β -blockade, can facilitate enhancement of vagal tone and affect withdrawal of sympathetic activation. This approach may be useful in such “acquired” forms of IST.

Patients should avoid stimulants (drugs, alcohol, and caffeine) and strive for consistent and reasonable sleep patterns. Rarely, though, is IST so severe that aggressive, possibly excessive, use of drugs and interventions is utilized. Simply slowing or normalizing the sinus rate may not be enough to allay symptoms. In the best of all possible circumstances, a multidisciplinary approach to treatment, engaging and empowering the patient to help treat him/herself along with the caregivers who have his/her best interest in mind, is beneficial. A conciliatory therapeutic attitude may have a negative (“nocebo”) effect.

2 Beta-blockade

The cornerstone of conventional medical management is β -blockade; presently, no specific therapy is approved for IST, including β -blocker. Although alteration in the autonomic nervous system or suppression of catecholamine stimulation can slow the heart rate in many patients, data are weak for β -blocker use in IST. Many experienced practitioners who care for patients with IST, find little, if any, benefit from even large doses of various β -blockers alone in maximal doses or in combinations.

Despite lack of evidence, in terms of a conventional approach, it makes sense to start with a β -blocker and even consider an intravenous β -blocker challenge (to offset compliance issues and test effects of the drug). No recommendation can be made regarding a β -blocker type or potency as no such evidence exists. If no effect is seen with large pharmacological doses of a β -blocker, or if the rate improves but symptoms do not abate, attempting to institute a surgical or ablative approach aimed at sympathetic denervation also makes little sense.

IST patients may occasionally benefit from β -blockade [10, 17]. Not uncommonly, β -blockers tend to be associated with other symptoms or issues, particularly if IST is misdiagnosed [18]. Some have suggested that nebivolol may be uniquely effective, but no data support this.

Small dosages of benzodiazepines, in addition, may provide relief as it is likely that many IST patients have a superimposed anxiety disorder. Fludrocortisone, volume expansion, compression stockings, phenobarbital, clonidine, psychiatric evaluation, erythropoietin, recommended by some, have not been proven valuable [11] as these therapies more likely target patients with POTS instead.

A case report has shown benefit in a patient with asthma based on the potential mechanism of sinus tachycardia [19]. Verapamil alone, or in combination with a β -blocker, may be effective.

3 Conclusion

“Conventional” management is the first-line approach to the patient with IST although this method is nonspecific and based on scant data. Treatment for IST begins conservatively with a multidisciplinary approach focusing on potential underlying causes in conjunction with escalating doses of β -blockers. The success of this approach, however, is not well tested, and other therapeutic interventions may become necessary. IST may abate spontaneously over time making the need for therapy moot. In IST, any treatment could potentially be worse than the syndrome itself.

4 The conventional approach to IST

Determine if sinus tachycardia exists with symptoms and if sinus tachycardia has an explainable cause and/or if tachycardia is reproducible and persistent. Rule out POTS, anxiety disorder, substance abuse, or other underlying medical/psychiatric issues as a cause.

1. If IST is present, consider risks and benefits of any therapy in light of the fact that no established conventional approach to management exists.
2. Consider a multidisciplinary and integrated approach. Empower the patient to be engaged in the treatment plan. Encourage graded physical activity as tolerated, eliminate dietary stimulants (e.g., caffeine or alcohol) and stimulant drugs, minimize drug interventions, and start with modest doses of β -blockers. No specific β -blocker is superior or free of side effects.
3. Benzodiazepines and β -blocker combinations, with careful follow-up, may be effective.

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