Osteopathic Manipulative Treatment for Postural Orthostatic Tachycardia Syndrome

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Postural orthostatic tachycardia syndrome (POTS) is associated with many symptoms including orthostatic intolerance, fatigue, palpitations, and cognitive dysfunction. Treatment, which typically consists of exercise, increased dietary sodium and fluids, compression garments, and medications for orthostatic intolerance, frequently produces unsatisfactory results. The authors report the case of a 26-year-old woman who presented with a 6-year history of severe fatigue, orthostatic intolerance, heat intolerance, cognitive dysfunction, and diffuse pain. She had previously injured her jaw on an obstacle course. Results of a standing test were consistent with POTS. After standard medical therapy was unsuccessful, the patient was referred for osteopathic manipulative treatment. At her 18-month follow-up, the patient's symptoms had improved dramatically. Physicians should consider osteopathic evaluation and manipulative treatment when caring for patients with POTS.

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Postural orthostatic tachycardia syndrome (POTS) is a condition associated with orthostatic intolerance, exercise intolerance, fatigue, palpitations, tremulousness, cognitive dysfunction, nausea, headache, near syncope, and syncope.[1] Patients with POTS have either an increase in heart rate of at least 30 beats per minute for adults (40 beats per minute for adolescents) or a heart rate of at least 120 beats per minute for adults within 10 minutes of standing or upright tilt testing.[1] Patients may develop POTS insidiously or acutely, often after an apparent infectious illness.[2] Common features of POTS include low blood volume, excessive pooling of blood in the dependent circulation, and high resting levels of catecholamines, most notably norepinephrine.

The literature has described a relationship between POTS and autoantibodies to acetylcholine receptors and lipid raft proteins.[3,4] In addition, POTS is associated with sepsis, pregnancy, surgery, trauma,[2] head injury,[5] Chiari malformation type I,[6] Ehlers-Danlos syndrome, joint hypermobility,[1] as well as a variety of systemic diseases and conditions such as diabetes mellitus, amyloidosis, lupus, Sjögren syndrome, heavy metal intoxication, and chemotherapy toxicity.[1] Patients with chronic fatigue syndrome frequently experience symptoms of POTS.[7]

We report the case of a patient with long-standing POTS whose symptoms improved promptly and dramatically after osteopathic manipulative treatment (OMT).

Report of Case

Presentation

A 26-year-old woman presented to the cardiology department of the hospital with a 6-year history of fatigue, presyncope, severe heat intolerance, cognitive dysfunction, diffuse joint pain, and insomnia. The patient denied any precipitating event but related injuring her jaw when she fell during an obstacle course. She could not remember whether her jaw injury preceded or followed the onset of her symptoms. In addition, she denied syncope, palpitations, chest pain, and shortness of breath. The patient was previously treated for 6 years with methylphenidate and later amphetamine salts at doses of 30 to 90 mg per day; these medications provided some relief of symptoms. Surgical history was remarkable for breast augmentation.

Physical examination findings included a blood pressure of 120/70 mm Hg and a resting heart rate of 72 beats per minute with the patient in the supine position. After 5 minutes of standing, the patient reported lightheadedness; although her blood pressure remained stable, her heart rate increased to 104 beats per minute. Examination findings were otherwise unremarkable.

The patient was initially treated with fludrocortisone acetate 0.1 mg per day, which was ineffective. After 2 weeks, midodrine hydrochloride was added to the treatment regimen and titrated to 40 mg per day, which provided a modest degree of improvement in the patient's lightheadedness. She refused compression stockings because she was intolerant to anything tight on her legs.

First Osteopathic Structural Examination

The patient received an osteopathic structural examination (performed by L.J.B.) 3 months after she presented to the cardiology department. The examination was performed with the patient in the standing position and revealed exaggeration of the lumbosacral angle, the thoracolumbar and lumbar lordosis, and the sacral convexity. Additional findings included straightening of the midthoracic kyphosis, exaggeration of the upper thoracic kyphosis, and a straightening of the lower cervical lordosis. Evaluation of the patient in the supine position revealed somatic dysfunction at the sacrococcygeal articulation and spinal levels S2, S3, L1, C6, and C2, as well as the occipitoatlantal articulation. Of note, L1 was compressed inferiorly on L2 secondary to restricted motion of the filum terminale. Spinal level C6 was fixed in anterior translatory strain on C7 secondary to restricted motion of the denticulate ligaments of the spinal cord at these levels. Motion of the temporomandibular joint was restricted to internal rotation bilaterally, and motion of the right temporal bone was restricted to external rotation at the jugular process.

The patient's somatic dysfunction was treated using 2 OMT techniques, ligamentous articular strain (LAS) and osteopathic cranial manipulative medicine (OCMM), with marked improvement in motion observed after treatment. The patient noted an obvious change in the spinal curves and an improvement in posture.

The patient reported feeling better immediately after the treatment. Although she was able to tolerate less than 5 minutes in a hot shower before treatment, she was able to tolerate a 45-minute hot shower with no symptoms later that day. She stopped receiving midodrine and her dose of amphetamine was lowered to 30 mg daily. The patient experienced improvement in symptoms for 8 days, after which the symptoms returned to baseline levels and the patient was seen again for osteopathic evaluation and treatment.

Second Osteopathic Structural Examination

The second osteopathic structural examination occurred 8 days after the first examination and revealed restricted external rotation of the right temporal bone at the jugular process. Somatic dysfunction was noted at the occipitoatlantal articulation, C6 through T1, S2, and the pelvis. Motion of the temporomandibular joint, L1, and the sacrococcygeal articulation was normal. The anterior translatory strain of C6 was resolved. Somatic dysfunction

at C6 through T1 was secondary to restricted motion in the deep fascia of the thoracic inlet. The patient was treated with LAS and OCMM, with marked improvement in motion after treatment. The patient experienced resolution of her symptoms for almost 4 weeks, after which the symptoms returned to baseline levels without apparent provocation.

Third Osteopathic Structural Examination

A third osteopathic structural examination, which occurred 28 days after the second examination, revealed compression and right lateral strain of the sphenobasilar junction. In addition, somatic dysfunction was present in the occipitoatlantal articulation, C6 through T1 secondary to restricted motion in the deep fascia of the thoracic inlet, and in the pelvic floor, which restricted motion of the sacrococcygeal articulation. The patient was again treated with LAS and OCMM, with marked improvement in motion after treatment.

Follow-up

At 18-month follow-up, the patient reported tolerating a hot shower without symptoms and standing for hours as long as she was able to shift her weight. Her fatigue, energy, and concentration were much improved. She no longer experienced presyncope and had minimal joint pain. Her main symptom was getting overheated. In the supine position, the patient had a baseline blood pressure of 120/74 mm Hg and a heart rate of 80 beats per minute. During a repeated standing test, she had no orthostatic symptoms during 10 minutes of standing, and blood pressure and heart rate were stable. The patient's retrospective self-rated Wellness score[8] was 40 out of 100 before presentation, with 0 representing death and 100 representing as good as a person could feel. At 18-month follow-up, the patient rated her well-being as 90.

Discussion

Treatment for patients with POTS consists of exercise,[9] increased dietary sodium and fluids, compression garments, and a variety of medications directed at improving vasoconstriction, blood volume, and blocking the release or effects of catecholamines.[8,10-12] Reversal of POTS has been reported with surgical decompression of Chiari malformation type I.[6] Chronic fatigue syndrome has been associated with POTS[7] and neuromuscular strain,[13] suggesting a mechanical component at least in part for both syndromes.

Since 1874, osteopathic medicine has recognized and explored the relationship between the neuromusculoskeletal system and the autonomic nervous system,[14] and studies have found that OMT affects the autonomic nervous system.[15-19] Osteopathic manipulative treatment has also been reported to improve postural stability in healthy elderly adults[20] and balance in patients with dizziness lasting 3 months.[21] In our experience, findings of somatic dysfunction affecting the sympathetic supply to the heart (C5-T5), as well as the parasympathetic supply (cranium, upper cervical) and the baroreceptors (cranium, upper cervical), are common in patients with POTS. These findings are consistent with the notion that somatic dysfunction and autonomic dysfunction are related.

Most of the postganglionic sympathetic innervation to the heart descends from the middle cervical ganglion at C5.[14] Somatic dysfunction at C6 may influence both the pre- and postganglionic fibers and control of the heart rate. Attenuation and even blocking of afferent baroreceptor activity by somatic afferents has been described.[14] In addition, modulation of posturally induced systemic vasoconstriction by upper cervical somatic afferent activity interacting with vestibular activity has been reported.[22] Cranial and upper cervical somatic dysfunction may adversely affect both baroreceptor afferent function and posturally induced vasoconstriction.

Although we cannot exclude a spontaneous recovery in the present case, a more parsimonious explanation for this patient's improvement would be that the somatic dysfunctions found during osteopathic structural examination—possibly related to her fall on the obstacle course—were associated with autonomic dysfunction and that treatment of these dysfunctions allowed normalization of autonomic function.

Conclusion

Although the exact physiologic mechanisms responsible for our patient's recovery are not known, the present case suggests the use of OMT in managing POTS, as well as associated conditions such as chronic fatigue syndrome, may help with the understanding of these conditions and alleviate symptoms when conventional medications are ineffective. We believe further study via clinical trials is warranted.

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