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# Chiropractic care of a patient with thoracic outlet syndrome and arrhythmia

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## Abstract

**Objective:** The purpose of this article is to describe a case report and discuss a possible anatomical explanation of the occurrence of arrhythmias in patients with thoracic outlet syndrome (TOS).

**Clinical Features:** A 60-year-old man experienced arrhythmia when he turned his head to the left and had these symptoms for 7 years. The patient attributed his symptoms to TOS. The arrhythmia was triggered while performing an Adson test during the clinical evaluation.

**Intervention and Outcome:** The Grostic procedure as a measure of analysis of the biomechanical relationship of C1 to C0 and the lower cervical spine was performed. According to this analysis, the patient had a right laterality malposition of the atlas. High-velocity, low-amplitude manipulations (adjustments) were applied. The patient's symptoms improved after one visit and demonstrated resolution upon evaluation at the third visit. In the year following the initial presentation, he has had minor recurrent short-lived episodes of arrhythmia that abated with the atlas manipulation/adjustment.

**Conclusion:** There is a paucity of published reports describing the management of patients with arrhythmias through manipulative methods. This appears to be the first case that describes the successful amelioration of an arrhythmia associated with TOS using chiropractic adjustment of the atlas vertebra as the sole intervention.

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## Introduction

Cardiac arrhythmias may be seen with a variety of disorders, including thoracic outlet syndrome (TOS).

There appears to be only one case of TOS and arrhythmia reported in the literature.<sup>1</sup> In another case report, tachycardia was linked with TOS and increased cardiac sympathetic activity. Kaymak et al<sup>2</sup> reported on a 22-year-old woman with the diagnosis of neurogenic TOS. The patient was evaluated with a Holter monitor during the performance of Roos test, both before and after surgical removal of her first rib. The tachycardia resolved after the surgery, and

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Kaymak et al postulated that the stellate ganglion or the postganglionic efferent sympathetic fibers forming the cardiac plexus were compressed while Roos test was being performed. There are a few reports of chiropractic care of patients with arrhythmias in the literature.<sup>3-5</sup> Previous studies have demonstrated that spinal adjustment/manipulation appears to have had an effect on heart rate and blood pressure.<sup>6-8</sup> In addition, stimulation of local cardiac nerves in animal experiments has induced arrhythmias.<sup>9</sup> Arrhythmias are an uncommon presentation of TOS.<sup>10</sup>

This article discusses a patient who presented with cardiac arrhythmia and TOS, explores the relevance of this case to doctors of chiropractic and other health care practitioners, and suggests a hypothesis explaining the possible mechanism of structural and functional compromise.

## Case report

Permission to have personal health information published without divulging person identifiers was obtained from the patient before the writing of this case report. A 60-year-old man had a chief complaint of an irregular heart rate when he turned his head to the left side. Secondary complaints included pain in the hip, thoracic spine, and neck. Medical history revealed similar prior episodes for approximately a 7-year period. Two months before our evaluation, he visited a local emergency department where an electrocardiogram was performed showing a pattern consistent with premature ventricular contractions.

Examination at the initial visit revealed a 6'1" white man weighing 214 lb, blood pressure of 112/78 mm Hg, and pulse of 68 per minute and regular. Chiropractic evaluation was performed using the protocols of supine leg check and radiograph examination based on the John F. Grostic Model and Procedure.<sup>11</sup> Eriksen and Rochester<sup>11</sup> report that inter- and intraexaminer reliability for the supine leg check was found to be very high and that reduction of a chiropractic upper cervical subluxation correlates with the balancing of the leg length inequality.

Supine leg check revealed a physiologic left leg length inequality of 3/8 in (.9525 cm). Cervical range of motion was within normal limits with the exception of left lateral flexion that was restricted to 30°/40° and left rotation that was restricted to 40°/60°. Adson test was performed by checking the patient's radial pulse and

then having the patient rotate his head to the left and extend the neck while taking a deep breath while holding it.<sup>12</sup> Performance of this test produced an irregular pulse. Upper cervical specific radiographic analysis included nasium, lateral, and vertex views and were analyzed using the Grostic procedure. Eriksen and Rochester<sup>11</sup> report that multiple studies on this method of upper cervical biomechanical assessment have shown good to excellent reliability with a 95% confidence interval.

The radiographic analysis demonstrated a biomechanical shift of right laterality and anterior rotation on the right at C1. The lower cervical spine had an acute angle on the right side relative to the atlas horizontal plane line. Practitioners familiar with orthogonal analysis procedures will recognize this as a right ipsilateral lower angle.

A high-velocity, low-amplitude thrust was delivered to the atlas using a vector determined by the Grostic analysis. After a rest period of approximately 5 minutes, the provocative Adson test was repeated and did not trigger any arrhythmias. Cervical range of motion after the first adjustment returned to normal. Leg length inequality balanced postmanipulation (postadjustment).

The patient was evaluated again 1 week later. Evaluation revealed a balanced functional leg length, and the patient reported having only occasional episodes (less than 1 per day) of arrhythmia during the 1-week period as compared with frequent daily episodes before the initial chiropractic adjustment. There was no chiropractic adjustment rendered on the second visit. The patient was instructed to return in 1 week. When the patient returned for the third visit, supine leg length evaluation demonstrated balanced leg length. The patient reported an absence of arrhythmias during the prior week. There was no chiropractic adjustment rendered on the third visit.

Approximately 2 weeks later, the patient presented with a complaint of arrhythmia observed on left cervical rotation. The supine leg check revealed a physiologic left leg length inequality of 3/8 in (.9525 cm). A specific high-velocity, low-amplitude chiropractic adjustment of the atlas was performed on this fourth visit and again 4 days later when evaluation demonstrated a left leg length inequality of 3/8 in (.9525 cm). After each adjustment, the leg length inequality balanced; and the Adson test did not trigger arrhythmias. Over the following 12-month period, this patient has only had minor recurrences on 5 occasions of the arrhythmia that responded positively to Grostic-style chiropractic intervention.

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