T4 Syndrome: A Scoping Review of the Literature

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Abstract

Objective: The purpose of this scoping review was to identify any available evidence regarding T4 syndrome.
Methods: Databases were searched from inception through October 2015 and included PubMed, CINAHL, PEDro, Google Scholar, Osteomed-DR; Index to Chiropractic Literature, PROSPERO, and Chiroaccess. All studies with information about T4 syndrome that were published in a peer-reviewed journal or textbook were included. The information was organized in the format of the *International Classification of Functioning, Disability, and Health*. Studies were ranked using Sackett's levels of evidence.
Results: Eight articles met the inclusion criteria. Studied areas included theoretical pathophysiology and symptom etiology, diagnosis, symptoms, treatment, and outcomes of T4 syndrome. The methodological quality of included studies was low.
Conclusion: T4 syndrome is a diagnosis of exclusion that appears to be rare. It has been treated conservatively in the literature using mobilization and exercise. There is no high-quality evidence published about T4 syndrome, and we caution clinicians when considering it as a primary means to determine patient care. (J Manipulative Physiol Ther 2016;xx:0-8)
Key Indexing Terms: *T4 Syndrome; Thoracic Spine*

Introduction

T4 syndrome is a clinically rare pattern of symptoms that was originally described in 1986 textbook entries by both Maitland and McGuckin.[1,2] T4 syndrome has been described as a collection of symptoms resulting from autonomic dysfunction of the upper thoracic spine causing a pathologic condition at the location of insult as well as the occiput and either ipsilateral or contralateral upper extremity (UE).[2] The name of the syndrome is somewhat misleading because it is generally described as a dysfunction of the thoracic spine of any level from which sympathetic nerves originate. Evans suggested a change of name to "the upper thoracic syndrome," although this naming convention has not been reflected in the literature.[3]

Although a seemingly rare medical model diagnosis, information on T4 syndrome is commonly included in manual physical therapy courses (as discussed with R. Schenk regarding McKenzie Institute courses in 2014) and manual therapy residency and fellowship programs.[4] The syndrome crosses several disciplines, and references can be found in the literature reflecting the practices of chiropractic,[5] osteopathic medicine,[6] and physical therapy.[7,8] Information is readily available to patients seeking the care of those professions on popular websites related to exercise or medical self-help. Given the varieties of signs and symptoms associated with T4 syndrome, clinicians who observe similar dysfunction in their patients may benefit from understanding its pathophysiology. Although the mechanism is uncertain and insidious,[1,8] symptoms have been reported after trauma[6] and fit into the overall description of a variety of pathologic conditions.

Even though T4 syndrome has been reported and is taught in various professional programs, to date no literature reviews have been published on this topic. Therefore, the purpose of this scoping review was to identify if there is any available evidence regarding T4 syndrome.

Methods

Eligibility Criteria

The eligibility criteria were that T4 syndrome was mentioned in reference to the thoracic spine and that the

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article was printed in English and published in a peer-reviewed journal. We used the databases listed in the Information Sources and Search Strategy section and completed the search in October 2015.

Literature Search Strategy

The search strategy of these databases included the following terms and keywords: T4, T4 syndrome, fourth thoracic syndrome, and upper thoracic syndrome. Articles containing the term thyroxine were excluded by search parameters to reduce the number of nonapplicable articles about the T4 thyroid hormone.[9] In addition to our search of relevant databases, each included article was hand searched to find additional articles. A search of texts in a university library was also performed. Finally, selected active clinicians in physical therapy, chiropractic, and osteopathic medicine were consulted to ensure full inclusion of all potential information related to T4 syndrome.

Information Sources and Search Strategy

A search to identify information examining T4 syndrome was completed in October 2015. The following databases were searched: PubMed, CINAHL, PEDro, Google Scholar, Osteomed-DR, Index to Chiropractic Literature, PROSPERO, and Chiroaccess. This scoping review used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines throughout the research and reporting process. The study was exempt from Human Ethics Committee review.

Study Selection

Studies were included if they provided information about T4 syndrome of the thoracic spine and were published in a peer-reviewed journal or textbook in English. Studies were excluded if they provided information about any other disease, including T4 syndrome as it relates to the thyroid hormone thyroxine, and if they were published in non–peer-reviewed sources.

Data Collection Process

One author (A.P.) performed the initial screen of titles and abstracts to identify appropriate studies. The abstracts were then screened to determine if the articles met our inclusion and exclusion criteria. Both authors reviewed the full texts to ensure the studies were appropriate for inclusion. The small pool of available literature required us to consider all of the research that involved T4 syndrome, regardless of methodological quality. We did not perform a risk of bias assessment because the articles were further screened using the Sackett assessment rubric and the majority of sources were deemed to be expert opinion. Information was searched within each reference and recorded on a grid.

Methodological Quality Assessment

Because of the varied format of the studies and the wide range of sources used, we used the Sackett Levels of Evidence Scale to evaluate the quality of each study.[10,11] This tool ranks each article based on the type of research performed with lower numbers indicating a lower probability of bias.[12] The articles were scanned for information relating to their publication source, format, and data evaluation methods and included population studied to determine which level of evidence was used for each article. Textbook entries, case reports, and focus pieces were all considered level 5 evidence (expert opinion) because they were nonexperimental forms of evidence.[12] Most of our articles were not observational or experimental; therefore, we did not use other quality assessment tools because they would not be appropriate for evaluating the type of data included.[13,14]

The articles were then searched using a standardized form for information in the format of the *International Classification of Functioning, Disability, and Health.*[15] This system has been used widely in rehabilitation literature,[16] as well as systematic reviews of conditions related to the neuromusculoskeletal system.[17,18] The categories of collected data included body structure level data, body function level data such as sensory functions and pain, neuromusculoskeletal and movement-related functions, and activity and participation data. We also included sections on diagnostic tests and treatments with outcomes related to T4 syndrome.

Results

Selection of Studies

The initial search yielded 3821 articles pertaining to T4 syndrome. After searching each title for information related to T4 syndrome, 58 articles were included; 27 full abstracts were reviewed after removal of 31 duplicates. These abstracts were then screened for information related to the inclusion criteria, and after performing our hand search, 14 articles were selected for full review. Eleven articles met the inclusion and the exclusion criteria; 2 of the excluded articles were not about T4 syndrome, and 1 was not published in a peer-reviewed source (Fig 1).

Study Characteristics and Methodological Quality

The articles included a level 1B study that used a randomized placebo-controlled trial to determine if oscillatory mobilization at T4 in healthy individuals produced sympathetic nervous system effects in the hands.[19] There were 2 level-4 case series published. Each of these included only 2 participants and compared outcomes over time.[5,6]