Idiopathic Carpal Tunnel Syndrome in Children and Adolescents

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Purpose A retrospective review of a single institution's experience with idiopathic carpal tunnel syndrome (CTS) in children and adolescents was performed to evaluate management and outcomes in an effort to establish a treatment protocol.

Methods All patients diagnosed with idiopathic CTS from ages 1 to 16 years of age between 1983 and 2013 were reviewed. The results of diagnostic testing and efficacy of therapeutic interventions were analyzed. The Boston Carpal Tunnel Questionnaire was sent to all patients following medical or surgical management.

Results A total of 20 patients with 31 involved wrists met criteria for entrance into the study. The mean age at diagnosis was 14.4 years. Orthosis fabrication was used as the initial treatment in 30 of 31 wrists and was successful in completely alleviating symptoms in 9 of 30 wrists. A steroid injection was performed in 11 of 31 wrists, completely relieving symptoms in 5 of 11 wrists. Carpal tunnel release was performed in 10 of 31 wrists. Following surgery, patients had complete relief of symptoms in 5 of 10 wrists and partial relief of symptoms in 5 of 10 wrists. Questionnaire response incidence was 55% (11 of 20), with an average long-term follow-up of 17.6 years. Eight questionnaire respondents continued to have mild to moderate symptoms while performing activities of daily living.

Conclusions Once metabolic, anatomical, and hereditary causes of pediatric CTS are ruled out, a reasonable treatment course should follow that of adults with orthosis fabrication, followed by injection, and then surgery for those that are refractory to nonsurgical treatment. *(J Hand Surg Am. 2015;40(4):773–777. Copyright © 2015 by the American Society for Surgery of the Hand. All rights reserved.)*

Type of study/level of evidence Prognostic IV.

Key words Carpal tunnel syndrome, adolescent, childhood, pediatric, idiopathic.

Hand surgeons are familiar with the diagnosis and treatment of carpal tunnel syndrome (CTS) in adults, but may be less confident about how to care for a child with CTS. CTS in children and adolescents is rare and was described by Martin and Masse in 1958.[1] Since then, it has become a well-recognized entity associated with metabolic causes and genetic syndromes that are not seen in adults. Etiologies for pediatric CTS can be divided into 3 broad categories (Table 1).[2] Children with mucopolysaccharide metabolic disorders will commonly present with CTS, but the diagnosis is sometimes delayed because the association may not be recognized or the child may have difficulty communicating with their providers owing to developmental delay. Mechanical causes include genetically inherited conditions such as Klippel-Trenaunay syndrome or familial CTS.[2] Other mechanical causes include trauma and space-occupying lesions such as

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TABLE 1. Reported Causes of Pediatric CTS

Metabolic Causes	Mechanical Causes	Idiopathic/Overuse
Mucopolysaccharidosis	Primary familial CTS	Idiopathic
Mucopolysaccharidosis IH (Hurler)	Schwartz-Jampel	Sports related
Mucopolysaccharidosis IS (Scheie)	Hemophilia	Musical instrument
Mucopolysaccharidosis II (Hunter)	Massive hemangiomatosis	
Mucopolysaccharidosis IV(Maroteux-Lamy)	Macrodactyly	
Mucolipidosis	Melorheostosis	
Mucolipidosis II—I cell disease	Aberrant anatomy	
Mucolipidosis III—pseudo-Hurler polydystrophy	Hamartoma	
	Acromicric dysplasia	
	Juvenile idiopathic arthritis	
	Pseudohypoparathyroidism	

hamartomas, lipofibromatosis, or ganglion cysts. Early carpal tunnel release is indicated in a patient with CTS who has a metabolic or mechanical etiology.[2]

Idiopathic pediatric CTS does exist. Case reports and small case series have recognized otherwise healthy children or adolescents who present with classic symptoms of CTS.[3–11] It is unclear from the scarce literature how to treat children with idiopathic CTS. It is also not known what the long-term outcomes are of children who have been treated for idiopathic CTS. Therefore, we performed a single-institution retrospective review of our 30-year experience and propose a treatment algorithm to help guide management.

MATERIALS AND METHODS

After obtaining institutional review board approval, an institutional database was used to collect records for all patients from 1 to 16 years of age diagnosed with idiopathic CTS between 1983 and 2013. A retrospective chart review was performed.

Inclusion criteria included clinical symptoms of CTS (numbness within the median nerve distribution, paresthesias, pain, weakness, or nocturnal symptoms), diagnosis of CTS by a physician, treatment at our institution, and documented follow-up. Exclusion criteria included a diagnosis of CTS with no documented follow-up or diagnosis with treatment elsewhere. Patients were included in the study if they were diagnosed with CTS in at least one wrist before their seventeenth birthday. Treatment information for patients including subsequent development of CTS in the contralateral wrist was included even if it occurred after their seventeenth birthday. CTS due to metabolic causes, genetic overgrowth syndromes, anatomical abnormalities, familial CTS, mechanical causes such as a ganglion, intraneural hamartoma, or a history of trauma as the inciting cause of their initial CTS were excluded. Electromyography (EMG) or nerve conduction study (NCS) was not considered a criterion for the diagnosis of pediatric CTS, because this is invasive and/or uncomfortable and many parents declined an initial request for these tests. Study subjects were then mailed a questionnaire that included the validated Boston Carpal Tunnel Questionnaire to assess long-term outcomes.[12] Subjects responded by mail or telephone and received no compensation for their participation.

RESULTS

Twenty patients with CTS due to idiopathic causes were diagnosed at our institution over a 30-year period. Patient sex, laterality of symptoms, age at diagnosis, body mass index (BMI), length of follow-up, handedness, and etiology are reported in Table 2. Two of the patients were obese, which we defined as a BMI greater than or equal to the ninety-fifth percentile of their age and sex. Presenting symptoms, examination findings, and electrodiagnostic testing results are reported in Table 3.[13] Treatment results are reported in Table 4.

The questionnaire response incidence was 55%. No patients who presented with unilateral symptoms developed contralateral CTS. A single patient originally treated with orthosis fabrication had recurrence of her symptoms 11 years later, which was also treated with orthosis fabrication. Results of the Boston Carpal Tunnel Questionnaire are summarized in Table 5 according to the classification proposed by Storey et al.[14] One patient continued to have severe symptoms. This individual, initially treated with a