Bilateral Carpal Tunnel Syndrome in a Child on Growth Hormone Replacement Therapy
A Case Report

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Carpal tunnel syndrome (CTS) is a known side effect of growth hormone therapy in adults. There is an 8% to 50% incidence of carpal tunnel syndrome (CTS) in adults treated with growth hormone replacement therapy.1,2 There is also a 35% to 64% incidence of CTS in patients with acromegaly.3-6 Carpal tunnel syndrome is extremely rare in children and adolescents and its true incidence is not clear.7 Little is known about the mechanism of median nerve compression as a result of growth hormone (GH) treatment. The use of GH treatment in children has been increasing. In a child presenting with unilateral or bilateral carpal tunnel syndrome an accurate history should be taken to exclude growth hormone induced CTS. We report a case of bilateral carpal tunnel syndrome in a 15-year-old male being treated with growth hormone for idiopathic short stature.

Case Report
A 15-year-old, left-hand dominant, male presented with a two-month history of pain in both wrists. He reported that typing worsened his symptoms. There was no reported change in his symptoms in the evening or night. He denied numbness or weakness of his hands or arms. His past medical history was significant for idiopathic short stature for which he has been receiving growth hormone therapy (protropin) since the age of 10 years.

On physical examination he demonstrated a motor exam with normal tone, bulk, and power, and was graded at 5/5 proximally and distally in both the upper and lower extremities. There was no evidence of thenar or intrinsic wasting. Sensory exam showed normal sensation to light touch and two-point discrimination. Tinel’s and Phalen’s test at the wrists were positive bilaterally. Electromyographic and nerve conduction studies were obtained; these demonstrated prolonged latencies bilaterally of the median nerves at the wrist an EMG finding consistent with mild bilateral carpal tunnel syndrome. The patient was given bilateral cock-up wrist splints and ergonomic counseling for posture when typing. Over the next six months his symptoms gradually abated.

Discussion
Carpal tunnel syndrome in children and adolescents is rare. It is most commonly seen following fractures, electrical burns, and crush injuries.8 In those without a history of trauma injury, the causes may be: 1. idiopathic, 2. a result of an increase in athletic activity, 3. a genetic or metabolic disorder, 4. a space occupying lesion within the carpal tunnel, 5. hemophilia, or 6. a result of other congenital anomalies.7 There are no reports in the orthopaedic literature of CTS resulting from growth hormone therapy.

A review of the general medical literature demonstrated CTS associated with growth hormone replacement therapy to be extremely rare in children and adolescents.9 The National Cooperative Growth Study collected data from more than 19,000 children who were taking recombinant deoxyribonucleic acid derived growth hormone. Only five children were found to have carpal tunnel syndrome. These children presented with CTS at times varying from 3 months to 5.5 years after initiation of growth hormone treatment. It is unclear if this incidence varies from that of the general population of children.10
In contrast, carpal tunnel syndrome is not an uncommon side effect of growth hormone therapy in the adult patient. There is an average occurrence of 8% to 50%. Four clinical trials using human growth hormone (hGH) in adults, each lasting six months or longer, have been previously reported.\textsuperscript{1,11-13} In a clinical trial using hGH in elderly males aged 60 and older, Cohn and colleagues\textsuperscript{1} reported a 24% occurrence of carpal tunnel syndrome during the first 12 months of treatment. Aloia’s clinical trial, also of elderly subjects, found a 50% 12-month incidence of carpal tunnel syndrome.\textsuperscript{11} Christiansen and associates\textsuperscript{12} published the only study involving younger adults who were undergoing growth hormone therapy; they did not report any incidents of CTS. It is unclear why there is an age-related increased incidence of carpal tunnel syndrome in patients on growth hormone replacement therapy. Cohn has postulated that in elderly patients structures such as connective tissue or cartilage may be more sensitive to hGH than in younger patients.\textsuperscript{1}

The link between carpal tunnel syndrome and growth hormone replacement therapy and acromegaly remains unclear. Information obtained in patients with acromegaly has demonstrated that median nerve compression may be secondary to: 1. decrease in carpal tunnel size due to encroachment by bone and soft tissue, 2. increased sodium and water retention in the extracellular fluid of the carpal tunnel, and/or 3. changes in median nerve metabolism.\textsuperscript{1,16}

In the United States, recombinant growth hormone (rhGH) is approved for use in children for growth hormone deficiency, Turner syndrome, and chronic renal insufficiency before transplantation. The availability of rhGH has increased the number of children who can potentially be treated with growth hormone therapy. There has also been a broadening of the indications for GH treatment, such as idiopathic short stature. The rise in the number of children receiving GH therapy potentially may increase the incidence of CTS in children and adolescents.

The treatment for carpal tunnel syndrome in the child or adolescent is similar to that of an adult: nonsteroidal anti-inflammatories, activity modification, and wrist splints. For those patients with persistent symptoms after a trial of nonoperative management, carpal tunnel release is indicated.\textsuperscript{14} For those patients presenting with carpal tunnel syndrome while on growth hormone replacement therapy it has been suggested that first line management should include cessation of growth hormone until symptoms improve, at which time growth hormone therapy may be restarted at a lower dose.\textsuperscript{10}

The case report presented demonstrates the development of bilateral carpal tunnel syndrome in an adolescent receiving growth hormone replacement therapy. While we cannot be certain that the bilateral carpal tunnel syndrome in this case was directly caused by growth hormone replacement we believe that a definite association does exist.

References