



Are Computers Friends or Foes? Pediatric Guyon Canal Syndrome Due to Prolonged Mouse Use: A case report

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Abstract

Ulnar nerve entrapment neuropathies, which are the second most common entrapment neuropathies after carpal tunnel syndrome, are most common in the elbow region. Entrapment of the ulnar nerve at the wrist level is rare. Guyon's canal, located medial to the wrist, is a tunnel-shaped fibroosseous structure through which the ulnar artery and ulnar nerve pass. Guyon's canal syndrome refers to the entrapment of the ulnar nerve at the level of the wrist. In etiology; Besides professional habits, many etiological factors such as ganglion, lipoma, bone fracture and AVMs have been reported. It is rare to trap the ulnar nerve at a level that matches the Guyon canal due to mouse use. In this article, we presented a case of ulnar nerve entrapment in the pediatric age group due to prolonged mouse use.

Keywords: Guyon's canal, Trap neuropathy, Mouse use, Ulnar nerve

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Introduction

The ulnar artery passes along with the ulnar nerve through the guyon canal described by Felix Guyon

in 1861⁽¹⁾. Before the ulnar nerve reaches the guyon canal, it is located lateral to the flexor carpi ulnaris tendon and medial to the ulnar artery. The tunnel, which is a fibroosseous structure, gives localization from the entrance of the hypotenar region. The causes of ulnar nerve entrapment in Guyon's canal may be intrinsic and extrinsic factors. Among the intrinsic causes, ganglion cyst is the

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most common. Abductor digiti minimi or anatomical variation of the flexor carpi ulnaris tendon and lipomas are other intrinsic causes.

Extrinsic factors include chronic microtrauma, overuse occupational diseases, pisiform or hamate bone fractures (2,3,4,5). In the Guyon canal, the ulnar nerve can be trapped at 3 points: a) As a result of entrapment at the entrance of the guyon canal, motor and sensory deficits develop in the hand muscles stimulated by the ulnar nerve. b) Entrapment in the distal of the canal results in only motor deficit, c) compression of the deep terminal branch results in sensory deficit (2, 3, 6, 7). In this study, we aimed to present a patient in the pediatric age group who developed motor and sensory deficits in which the ulnar nerve was affected as a result of entrapment at the guyon canal entrance.

Case

A 14-year-old male patient was admitted to our outpatient clinic with pain, numbness and weakness in his right hand fingers. He stated that her complaints had been for 2 months and that they had increased in the last 2 weeks. The mother of the patient stated that her son uses a computer for an average of 8 hours a day and mostly controls it with a mouse. The patient has no history of drug use. In his neurological examination; right hand fingers abduction and adduction 1/5 strength, Hypoesthesia matching the ulnar nerve trace and atrophy of the lumbric muscles was observed in the 4th and 5th fingers of the right hand. There was no claw hand image. In the electromyography (EMG) examination, it was reported as a total lesion of the right ulnar nerve due to entrapment in the guyon canal (Table 1).

Table 1. In the EMG examination, the right ulnar nerve was reported as a total lesion due to entrapment in the guyon canal.

Sensory NCS					
Nerve / Sites	Rec. Site	Latency ms	Peak Ampl µV	Distance cm	Velocity m/s
R MEDIAN - Digit II					
Wrist	II	2,70	22,0	17	63,0
L MEDIAN - Digit II					
Wrist	II	2,75	23,9	16	58,2
R ULNAR - Digit V					
Wrist	V	9,85			
L ULNAR - Digit V					
Wrist	V	2,35	20,2	14	59,6
R ULNAR - Dorsal					
Wrist	Dorsum of Hand	1,35	11,1	7	51,9
R ULNAR - Mixed Ortho					
Palm-Wrist	Wrist			7	
Palm-Elbow	Elbow	1,10	13,2		
L ULNAR - vs Median Dig IV					
Ulnar	IV	2,40	11,8	14	58,3
Median	IV	2,60	11,3	14	53,8

Motor NCS				
Nerve / Sites	Latency ms	Ampl mV	Distance cm	Velocity m/s
R MEDIAN - APB				
Wrist	2,95	11,0	7	
Elbow	6,55	10,1	22	61,1
L MEDIAN - APB				
Wrist	3,10	11,4	7	
Elbow	6,75	11,3	22	60,3
L ULNAR - ADM				
Wrist	2,75	7,2	6	
B.Elbow	6,00	6,6	21	64,6
A.Elbow	7,40	6,4	10	71,4
R ULNAR - ADM				
Wrist	4,30	0,8	7	
B.Elbow	6,80	0,8	20	80,0
A.Elbow	9,30	0,8	10	40,0
R ULNAR - ADM 2				
Site 1	3,80	0,9		
Site 2	7,60	0,8		
Site 3	7,75	0,7		
Site 4	7,95	0,8		
Site 5	8,05	0,8		
6	7,65	0,8		
7	7,90	0,9		

EMG Summary Table									
	Spontaneous				MUAP			Recruitment	
	IA	Fib	PSW	Fasc	H.F.	Amp	Dur.	PPP	Pattern
R. FIRST D INTEROSS	N	2+	2+	None	None	2+	2+	N	Discrete
R.ABD DIG MIN (UL)	N	None	3+	None	None	N	N	N	No Activity
R.FLEX CARPI ULN	N	None	None	None	None	N	N	N	N

Figure 1a, b. By planning the incision in the area where surgery was performed (a), the ulnar nerve was completely decompressed (white arrow) (b).

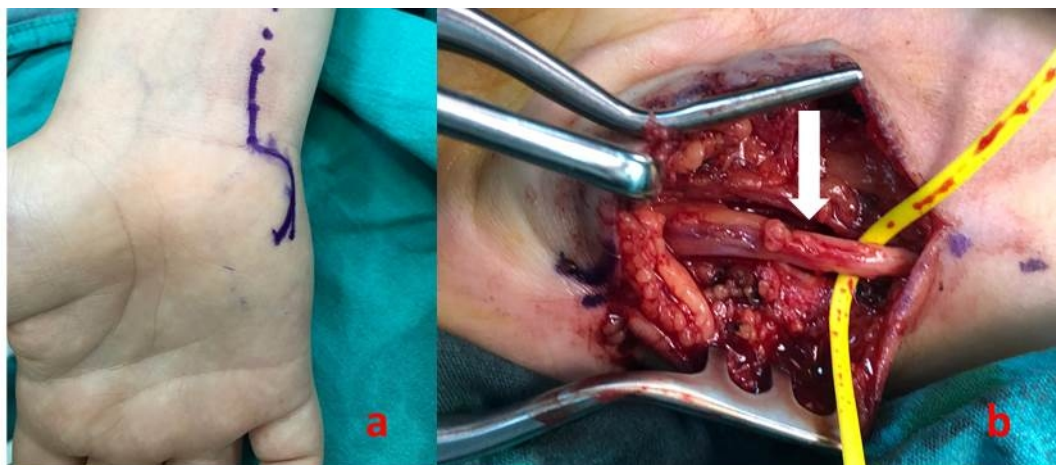


Table-2: Post. The EMG result taken in the second month of op. Was reported as almost complete recovery of the right ulnar nerve.

Sensory NCS						Motor NCS				
Nerve / Sites	Rec. Site	Latency ms	Peak Ampl μ V	Distance cm	Velocity m/s	Nerve / Sites	Latency ms	Ampl mV	Distance cm	Velocity m/s
L MEDIAN - Digit II						R MEDIAN - APB				
Wrist	II	2,90	20,7	16	55,2	Wrist	3,05	12,1	7	
R MEDIAN - Digit II						Elbow	6,80	11,2	24	64,0
Wrist	II	2,70	23,4	16	59,3	L MEDIAN - APB				
L ULNAR - Digit V						Wrist	3,05	11,6	7	
Wrist	V	2,20	26,6	14	63,6	Elbow	6,55	10,8	22	62,9
R ULNAR - Digit V						R ULNAR - ADM				
Wrist	V	2,70	15,7	13	48,1	Wrist	2,65	7,0	7	
L ULNAR - vs Median Dig IV						B Elbow	6,55	6,7	21	53,8
Ulnar	IV	2,55	10,8	15	58,8	A.Elbow	7,95	6,9	9	64,3
Median	IV	2,75	11,6	15	54,5	L ULNAR - ADM				
R ULNAR - vs Median Dig IV						Wrist	2,30	8,9	5	
Ulnar	IV	3,05	10,0	16	52,5	B.Elbow	5,60	8,3	22	66,7
Median	IV	2,80	11,2	16	57,1	A.Elbow	6,75	8,0	8	69,6

Since the patient's complaints continued for 2 months and the loss of abduction-adduction strength in the right hand fingers was severe, surgery was recommended to the patient. Operation was recommended to the patient. Decompression + internal neurolysis surgery was performed for ulnar nerve compression in the Guyon canal (Figure-1a, b). He stated that pain in his hand and numbness in the 4th and 5th fingers of the right hand passed in the postoperative period. The abduction and adduction of the right hand fingers of the patient was 5/5 at 2 months postoperatively. Control EMG performed in the postoperative 2nd month was reported as almost complete recovery of the right ulnar nerve (Table2).

Discussion

The 4 cm anatomical structure through which the ulnar nerve and ulnar artery passes distal to the wrist is called the Guyon canal (8, 9). It was first described by Felix Guyon in 1861 and is also called the Ulnar carpal tunnel ⁽¹⁾.

Although ulnar nerve entrapment in the Guyon canal is uncommon, recurrent traumas, muscle-bone anomalies, and space-occupying lesions are included in the etiology ^(3, 8, 10). When the etiology was investigated in our case, the wrist was under chronic compression of the guyon canal and therefore the ulnar nerve due to the use of a mouse. Although clinical complaints of patients suggest ulnar nerve compression, a definitive diagnosis (EMG and Wrist Magnetic Resonance Imaging (MRI)) can be established. While nerve conduction velocities are measured with EMG examination, MRI of the wrist can diagnose nerve

compression due to fibrosis and space-occupying lesion in the tendon and surrounding connective tissue. In our case, EMG revealed that there was motor and sensory involvement due to compression at the entrance of the ulnar nerve guyon canal⁽³⁾. We performed soft tissue USG examination instead of MRI. We found that there was no space-occupying lesion on USG.

The entrapment of the ulnar nerve in the guyon canal is divided into 3 subgroups according to the area it is involved in. In type 1, the ulnar nerve is trapped at the entrance of the canal. There is motor and sensory involvement. Type 2 has only motor involvement. The involvement is between the hamatum and the pisiform bones. Type 3 is the least loud group, with sensory branch involvement and compression is distal to the canal ^(2, 6). In our case, the hand part that was exposed to compression was at the entrance of the ulnar nerve to the inguyon canal. There was both motor and sensory involvement due to ulnar nerve type-1 entrapment.

Erkin et al. Reported that, in a 74-year-old female patient with numbness in the 4th and 5th fingers, USG and MRI detected lipoma compressing the ulnar nerve in the guyon canal, and that the symptoms were relieved after surgical decompression ⁽¹⁾. Padua et al. Reported that the patient developed numbness and burning in the 4th and 5th fingers after 6 hours of cycling and that his complaints disappeared as a result of surgical decompression ⁽⁶⁾. Vasu et al. reported that they operated due to neurological deficit in ulnar nerve entrapment due to vascular malformation compression in Guyon's canal ⁽¹¹⁾. Our patient had

type-1 ulnar nerve entrapment neuropathy, and motor and sensory deficits improved almost completely in the first month after surgery. Kalaci et al. reported Guyon's canal syndrome due to hypertrophic tissue healing after flexor carpi ulnaris tendon repair. They reported that nearly complete motor and sensory deficits developed in their 8-year-old patient, the nerve was completely intact in the ulnar nerve decompression surgery, and nearly complete motor and sensory deficit improved 2 months after surgery ⁽¹²⁾. In our case, similarly, in the pediatric age group, the neurological deficit was almost complete. In our case, the ulnar nerve integrity was complete in surgery. The ulnar nerve damage after decompression resolved almost completely in the 2nd month after surgery. Here, we think that the integrity of the compressed nerve and the improvement of the blood flow feeding the nerve after the surgery provide almost complete recovery.

Ulnar nerve entrapment in the Guyon canal is rare in the pediatric age group. It is very difficult to diagnose. In patients with suspected ulnar nerve entrapment in the Guyon canal, EMG examination and USG examination performed after anamnesis and physical examination are necessary to diagnose and determine the type of entrapment. Surgery should be considered in cases that do not respond to conservative treatment. With good anatomy knowledge in surgery, the results are satisfactory with adequate decompression of the trapped ulnar nerve and its branches.

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