

통증 및 근골격재활

게시일시 및 장소 : 10 월 18 일(금) 08:30-12:20 Room G(3F)

질의응답 일시 및 장소 : 10 월 18 일(금) 10:00-10:45 Room G(3F)

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The usefulness of the median nerve to ulnar artery cross-sectional area ratio in diagnosing the CTS

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Introduction

Carpal tunnel syndrome (CTS) is the most common entrapment neuropathy. Due to its advantage of non-invasive and painless feature, there has been increasing use of ultrasound sonography in diagnosis of CTS. The ratio between CSA of median nerve at the wrist and the other parameters, for examples, CSA of median nerve at the forearm level (WFR), CSA of ulnar nerve at the wrist (MUR) etc., thought to be the better diagnostic parameter than median CSA only because it has high specificity and sensitivity in diagnosis of CTS, especially the WFR. There has been several studies to identify the usefulness of the median to ulnar nerve CSA ratio (MUR) in diagnosing the CTS. They suggested that it is effective sonographic marker of diagnosing CTS because it is simple compared to WFR measurement, it scans only at the wrist, and it correlates with electrophysiologic severity. However, there are some controversies in MUR; status of CTS can affect the ulnar nerve either in electrodiagnostic manner or physiological aspect, shape and diameter. Therefore, we suggest a new control parameter that is not affected by the circumstance of CTS and can be measured as easily as ulnar nerve, the CSA of ulnar artery. The aim of this study is to identify the usefulness of this parameter as a new stable parameter in diagnosing the CTS

Material and methods

Eighteen patients who newly diagnosed as a CTS were involved in this study. They have no surgical history or treatment history before and are classified into three electrophysiologic stage groups of CTS. We measured the CSA of median nerve in wrist crease and 7cm proximal from it. We also evaluate the CSA of ulnar artery at the moment of fully dilated state in wrist crease level.(Fig.1) We measure the same parameter in the control group, fifteen normal healthy volunteers, too. Using these parameters, we obtain the WFR and MUAR of each group and evaluate the validity and usefulness of the CSA of the ulnar artery and MUAR in diagnosing the CTS.

Result

From the data of Table 1 and 2, we found that there is no statistical difference in the CSA of ulnar artery either between the control and CTS group or between the each severity

groups. This finding suggest that the CSA of the ulnar artery is not affected by the pathophysiologic state of CTS. From the result of Fig.2 and Table 3, we also found that MUAR is as useful as WFR which has been proven in previous studies as a meaningful diagnostic sonographic value of CTS.

Conclusion

In this study, we first proposed the CSA of the ulnar artery as a new sonographic control parameter which is simple for measure and not affected by the pathophysiologic state of CTS. The MUAR was as useful value in diagnosis of CTS as the WFR. It provided a means to overcome the limitation of the MUR, and could be an easy and stable control parameter in diagnosis the CTS by ultrasound sonography.

Table 1. Comparison of sonographic values among two groups

Parameter	Controls (Mean \pm SD)	CTS (Mean \pm SD)	<i>p</i> -Value
Median CSA (mm ²)			
Wrist	8.51 \pm 1.04	15.25 \pm 3.52	<0.001
Forearm	10.30 \pm 1.12	10.52 \pm 0.79	0.61
Ulnar artery (mm ²)	8.11 \pm 0.97	8.49 \pm 0.77	0.32
WFR	1.19 \pm 0.09	1.69 \pm 0.28	<0.001
MUAR	1.27 \pm 0.17	2.16 \pm 0.59	<0.001

CSA = cross sectional area; SD = standard deviation; WFR = wrist to forearm ratio; MUAR = median nerve to ulnar artery ratio

Table 2 Sonographic findings according to the electrophysiologic stage of CTS

	Mild	Moderate	Severe	<i>p</i> -Value
Median CSA (mm ²)	11.84 \pm 0.99	14.24 \pm 0.87	19.66 \pm 1.22	<0.001
Ulnar artery (mm ²)	8.65 \pm 0.61	8.26 \pm 0.76	8.46 \pm 0.99	0.60

CSA = cross sectional area; CTS: carpal tunnel syndrome

Table 3 Values in Receiver Operating Characteristic Curve for WFR and MUAR in the CTS group

	Cut-off value	AUC	Sensitivity	Specificity
WFR	1.34	0.96	81%	81%
MUAR	1.52	0.97	91%	91%

AUC = area under curve, WFR = wrist to forearm ratio; MUAR = median nerve to ulnar artery ratio

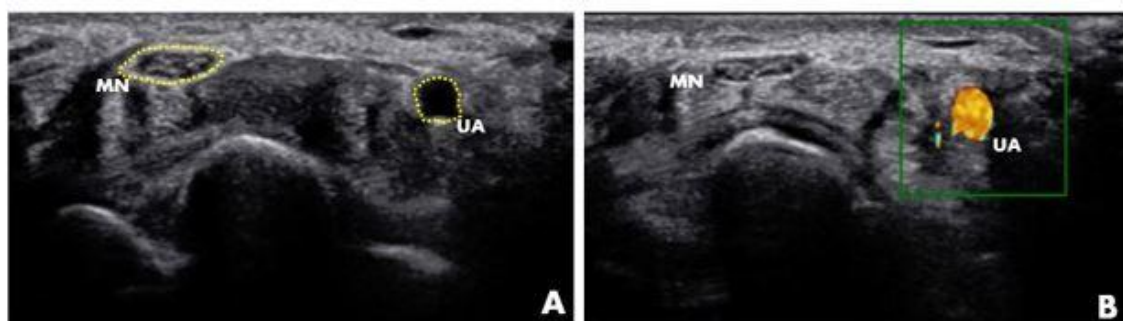


Fig 1. Sonographic view of median nerve and ulnar artery at the wrist crease. A: CSA measurement of MN and UA B: color Doppler image of UA CSA = cross sectional area; MN = median nerve; UA = ulnar artery

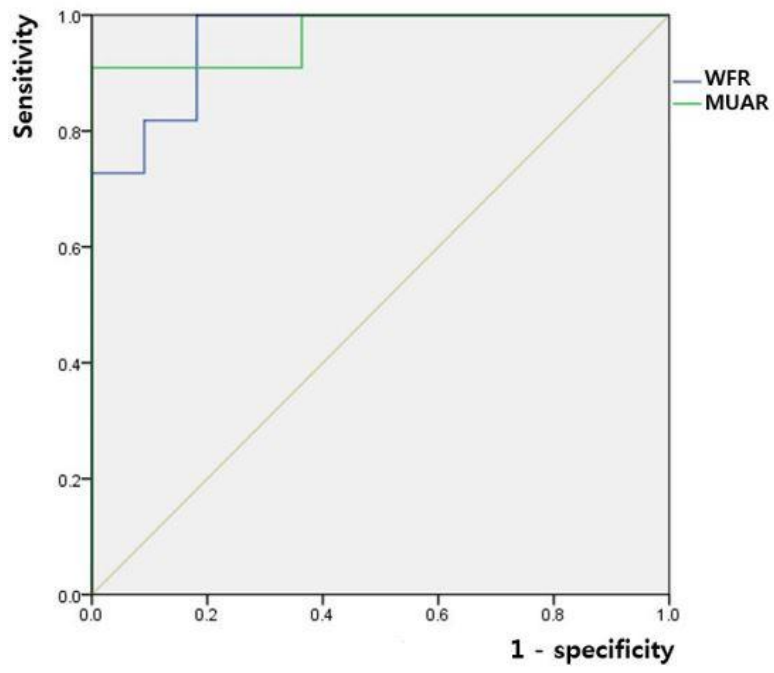


Fig 2. Receiver operating characteristic curve WFR = wrist to forearm ratio; MUAR = median nerve to ulnar artery ratio