Can changes in magnetic resonance imaging before and after surgery predict whether nerve conduction velocities improve after carpal tunnel release in chronic hemodialysis-associated carpal tunnel syndrome (HD-CTS)?

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Purpose
The purpose of this study was to investigate the relationship between structural changes in magnetic resonance imaging (MRI) and changes in nerve conduction velocity (NCV) before and after surgery for hemodialysis-associated carpal tunnel syndrome (HD-CTS).

Materials and Methods
Between December 2011 and February 2016, 16 hands of 14 hemodialysis patients who had previously undergone endoscopic carpal tunnel release (ECTR) for HD-CTS were enrolled in the study. Recurrent cases of CTS were excluded.

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<th>Male/Female</th>
<th>8 : 4</th>
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Mean age: 63 years (range, 26–95 years)
Mean duration of hemodialysis: 19.3 years (range, 4.7–28.2 years)

Patients were divided into two groups: those who experienced improvement in NCV (I group) and those who did not experience improvement in NCV (NI group) 2 years after surgery

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<th>Hand</th>
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Mean Duration of Hemodialysis (years) 18.7±6.6 23.5±1.9

Table 1. Clinical data of the patients

MRI of the carpal tunnel was performed prior to and 12 months after surgery. The cross-sectional area of the carpal tunnel and median nerve at the level of the hook of hamate and the distance from the volar side of the carpal bone to the flexor pollicis longus (FPL), flexor digitorum superficialis (FDS), and flexor digitorum profundus (FDP) were measured and compared before and after ECTR. Furthermore, the difference between time points was calculated for each measurement and compared between the study groups.

Discussion
From the results, the cross-sectional areas of the carpal tunnel and median nerve, and the distance from the bone to the tendon were found to have increased significantly in HD-CTS after ECTR. This was the same trend as that in idiopathic carpal tunnel syndrome reported by Momose et al. In the comparison between the NI and I groups, a significant difference in the cross-sectional area of the median nerve was observed. This indicates that the NI group showed poorer changes after surgery than the I group in the cross-sectional area of the median nerve.

The limitations of this study include the small number of cases, the unestablished accuracy of the measurement method, and the non-blinding at the time of measurement.

CTS is the most common complication of dialysis-related amyloidosis in patients receiving long-term dialysis therapy. Open carpal tunnel release is effective for HD-CTS. Some reported that the evaluation of sensory threshold using pressure‐sensitive sensory device (PSSD) is reliable. However, return of sensory deficit after surgery takes more time than pain relief. Therefore, whether the residual sensory disturbance is being recovered or the result of surgery is worse is difficult to distinguish.

Only few papers have been published on MRI before and after surgery in HD-CTS. Several reports indicated that ultrasonography and MRI were useful for evaluating recurring or persisting symptoms in idiopathic CTS. Our study suggests that the lack of change in the nerve cross-sectional area may be a tool for detecting signs of nerve dysfunction following carpal tunnel release for HD-CTS.

Conclusion
Our results suggest that if MRI does not indicate that the cross-sectional area of the median nerve has become sufficiently changed within 12 months of ECTR, the NCV 2 years after surgery is unlikely to have improved.