INTRODUCTION

Elevated intracarpal tunnel pressure is considered a pathomechanism of carpal tunnel syndrome (CTS).

The non-uniform shape of the carpal tunnel may be responsible for varying intracarpal tunnel pressure.

When conservative treatments fail to relieve CTS symptoms, carpal tunnel release surgery is often performed.

OBJECTIVE

The purpose of this study was to investigate intracarpal tunnel pressure at varying anatomical locations and to examine the pressure change associated with mini-open carpal tunnel release (MOCTR).

We hypothesized that (1) intracarpal tunnel pressure would be dependent on specific anatomical locations within the carpal tunnel, and (2) MOCTR would reduce this pressure in CTS patients.

METHODS

Six patients (7 hands: 3L, 4R; mean age 52.0 yrs)

Patients’ forearms were fully supinated with their hand/wrist resting in a neutral position

Before MOCTR, palpation was performed to identify three standardized pressure measurement locations: hook of hamate (HH), proximal pisiform (PP), and midpoint (MP) between PP and HH

After making a 1.0-1.5 cm palmar incision, a pressure catheter was introduced at the distal end of the carpal tunnel and advanced to the PP (Figure 1)

The catheter was retracted measuring pressure at each location three times (Figure 1)

MOCTR was performed according to standard procedures, and pressure recordings were repeated (Figure 2)

A Wilcoxon signed-rank test and Friedman RMANOVA on ranks analyzed the effects of tunnel location (PP, MP, HH) and surgical release (pre- and post-MOCTR) on intracarpal tunnel pressure

RESULTS

Before MOCTR, the pressure at the HH was the highest at 37.1 (SD 19.3) mm Hg, and the pressure at the PP was the lowest, 23.4 (SD 21.6) mm Hg (Figure 3)

Statistical analyses showed that pressure at the HH and MP were significantly higher than the PP pre-MOCTR (p < 0.05)

The mean intracarpal tunnel pressures were 29.6 (SD 18.9) mm Hg before MOCTR, and significantly decreased to 7.1 (SD 8.2) mm Hg after MOCTR (p < 0.05) (Figure 3)

DISCUSSION

Intracarpal tunnel pressure tended to be the highest at the HH for CTS patients, although more data is needed to confirm statistical significance

This finding suggests that pressure may be greatest where the carpal tunnel is narrowest, at the hook of hamate level

We confirmed that MOCTR reduced elevated intracarpal tunnel pressure to within normal physiological range (<10 mmHg), indicating that MOCTR is an effective surgical approach to treat CTS

Figure 1. A Mikro-Cath catheter (Miller Instruments Inc, Houston Texas, USA) was inserted into the carpal tunnel to measure intracarpal tunnel pressure

Figure 2. A universal carpal tunnel knife guide (Innomed, Savannah, GA, USA) was placed within the carpal tunnel to assist a KnifeLight (Stryker Leibinger GmbH & Co. KG, Freiburg, Germany) in performing the MOCTR

Figure 3. Mean intracarpal tunnel pressure at three locations. Error bars indicate ±1 SD