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Pathological Classification of Idiopathic Carpal Tunnel Syndrome Based on Transthyretin Amyloid Deposition in the Synovium

Introduction

This study aimed to clarify the differences in the pathogenesis of CTS among middle-aged women, elderly women, and elderly men who are at the peak of CTS incidence, with a focus on the presence of transthyretin amyloid deposition.

Methods

Intraoperative intracarpal tunnel synovium was obtained from patients who underwent surgery for idiopathic CTS, and the presence of TTR deposition in the synovium was evaluated by immunohistochemical staining. Fibroblasts were extracted from the remaining intracarpal synovium and divided into three groups: TTR-negative middle-aged women, TTR-positive elderly women, and TTR-positive elderly men, with 10 subjects in each group. The expression of fibrosis-related genes such as Col1a1, Col1a2, Col3a1, TGF- β 1, and α SMA in fibroblasts collected from the intracarpal tunnel synovium was compared among the three groups using real-time PCR. In addition, BCTQ scores were compared preoperatively and 3 months postoperatively for clinical evaluation.

Results

Col1a1, Col1a2, Col3a1 and TGF- β 1 were significantly upregulated in the TTR-positive elderly women compared to those in the TTR-negative middle-aged women and TTR-positive elderly men. In the TTR-negative middle-aged women, the BCTQ-SS significantly improved at 3 months postoperatively compared to that preoperatively.

Conclusion

This study identifies synovial fibrosis as a key factor in CTS among TTR-positive elderly females, exhibiting no enhancement in BCTQ scores post-operatively, suggesting TTR-associated neuropathy. Conversely, TTR-negative middle-aged females, demonstrating absence of fibrosis yet presenting improved BCTQ scores post-surgery, imply that elements such as synovial edema could contribute to compression.

Keywords

Idiopathic Carpal Tunnel Syndrome, Transthyretin Amyloid, Pathological Classification

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Biography

I am an orthopedic surgeon specializing in hand surgery and upper-limb disorders at the University of Occupational and Environmental Health, Japan. My clinical and research interests focus on musculoskeletal fibrosis, including capsular fibrosis in joint contracture, tenosynovial fibrosis in carpal tunnel syndrome, and palmar aponeurosis fibrosis in Dupuytren disease. I have published extensively in these fields and received several academic awards. I am also actively engaged in international collaborations and conference presentations, aiming to advance translational research and improve the understanding and treatment of upper-limb pathologies.