MMP-2, MMP-9 and MMP-12 expression in flexor tenosynovium in idiopathic carpal tunnel syndrome

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Introduction: It is well known that main pathologic finding includes proliferative atherosclerotic change in flexor tenosynovium in idiopathic carpal tunnel syndrome. This pathologic change closely relates with decreased elastin within and around vessels (Hirata, et al., 2005; Jinrok, et al., 2004). Elastin can be degraded by MMP-2, 9, 12. However, it is not clear which MMPs are involved to degrade elastin. The purpose of this study is to investigate expression of the MMPs with regard to elastin degradation.

Materials and Methods: The study groups consist of patient group with idiopathic carpal tunnel syndrome and control group with fresh frozen cadavers without known symptoms of carpal tunnel syndrome. The flexor tenosynovium was used as specimens obtained from 11 patients with idiopathic carpal tunnel syndrome and 12 fresh frozen cadavers. All specimens were embedded in paraffin block. Section slides with 5μm thickness were made for staining. Elastin was stained by elastic van Gieson staining. Elastin amount was relatively measured by image analysis using light microscope. MMP-2, 9, 12 expression was evaluated by immunohistochemical staining. The MMP-2, 9 expression rates were calculated with percentage of positive cells (number of positive cells/number of total cells). The MMP-12 expression was measured by image analysis. The data obtained from each group was reported mean + SD and was analyzed with T-test.

Results: MMP-2, 9 is mainly stained at cytoplasm of fibroblasts and entire vessel walls while MMP-12 is stained widely in extracellular matrix and vessels. The staining intensity of MMP-12 is less than that of MMP-2 and MMP-9. The average amount of elastin was 2.00±0.45 in patient group and 3.35±0.75 in control group (p<0.05). The percentage of MMP-2 positive cells was 66±15 percent in patient group and 27±16 percent in control group (p<0.05). The percentage of MMP-9 positive cells was 82±18 percent in patient group and 37±26 percent in control group (p<0.05). The expression rate of MMP-12 was 2.18±0.87 in control group and 1.16±1.11 in patient group (p<0.05).

Discussion: The elastin amount around and within vessels decreased in patient group compared to control group. MMP-2 and MMP-9 were highly expressed in entire wall of vessels in pateint group and control group. However, the expression rates of MMP-2 and MMP-9 in fibroblasts were higher in patient group than in control group. From these, we can infer that every vessel in tenosynovium within carpal tunnel is under a certain stress and is ready to be remodeled regardless of patients or non-patients. Nevertheless, stress of the stress would be higher in patients than in non-patients.

MMP-12 usually produced by macrophage can also degrade elastin. In this study, we could not find macrophages in section slides stained H-E of both groups. Though, MMP-12 was weakly expressed in vessel walls and in extracellular matrix around vessels, but not in fibroblasts. We can't explain why the MMP-12 was expressed. However, the expression of MMP-12 was wider and more intense in patients group than in control group. Even though the MMP-12 is involving degradation of elastin, the degradation activity of it would be weaker that of MMP-2 and MMP-9 because the staining intensity for MMP-12 was weaker than that for MMP-2 and MMP-9.

In conclusion, it is suggested that the elevated expressions of MMP-2, MMP-9 and MMP-12 are related with atherosclerotic changes with regard to elastin degradation in idiopathic carpal tunnel syndrome and might be associated with fibrosis of collagen fibrils changes in tenosynovium.


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