Inflammation Is Present In De Quervain’s Disease- a Correlation Study Between Biochemical And Histopathological Evaluation

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Disclosures: 

Introduction: De Quervain’s disease, or stenosing tenosynovitis of the first dorsal compartment of the wrist, is common wrist pathology. Nonsurgical management, consisting of anti-inflammatory drugs (NSAIDs) or corticosteroid injections are usually conservative treatment. Previous studies consistently reported that the pathological change of de Quervain’s disease is thought to be primarily an extensor retinaculum thickened by fibrosis and fibrocortilaginous metaplasia instead of inflammation. The histological appearance confirmed thickening of the fibrous tendon sheath. The central part of the fibrous sheath showed some proliferation of the small blood vessels and sparse macrophages; while the inner part, adjacent to the synovium, demonstrated myoid degeneration. Most studies indicated there was no significant acute or chronic inflammation in de Quervain’s disease. There has been agreement for over a century that, whatever the aetiology of de Quervain’s tenosynovitis might be, it is not an inflammatory process despite the use of the “-itis” suffix which usually denotes inflammation. Contradictorily, the conservative treatment for de Quervain’s disease is anti-inflammatory medication. It has recently been argued that the definition of inflammation should be reappraised, since inflammatory mediators can be produced by a variety of cell types, and not just by infiltrating leukocytes. With the advancement of molecular biology researching, recent studies showed those diseases, which are as similar as tendinopathy of upper limb, present inflammation in early or intermediate stages and imply the possibility of neurogenic inflammation as a cause of the perceived pain. Although the presence of an inflammatory component has not been identified by all investigators, increased inflammatory molecules, for example, PGE2, have been found in tenosynovium of patients diagnosed with carpal tunnel syndrome (CTS). Other mediator such as inducible cyclooxygenase (COX-2) and interleukin-1β increase expression in patellar tendinosis suggests some involvement of inflammatory response in chronic tendinopathy. The neurochemical substance P is associated with chronic pain mediation and has also been identified in tendons of patients with chronic tendinopathies. The inflammatory and neurochemical tendon changes are related to decline in grip strength. The inflammatory response may be also involved in de Quervain’s disease. However, there is no present study directly evidencing whether the inflammatory responses play a prominent role in the disease process. Tissue studies conducted via immunohistochemical and histopathological analysis of de Quervain’s disease has yet to be elucidated clearly.

Methods: We collected and analyzed 16 patients who were diagnosed with de Quervain’s disease and received surgery in the department of Orthopedics at National Cheng Kung University Hospital. Three normal samples were obtained from fresh cadavers as the control group. Patients suffering from systemic inflammatory disorders, and patients had previous trauma or operation on dorsal compartments of wrist were excluded from the study since these factors may influence the occurrence of inflammation. Ethical approval was provided by the Human Experiment and Ethics Committee of the National Cheng Kung University Hospital.

Results: The study recruited 16 patients (2 men, 14 women). The average age is 55 years (range, 42-68 years). The distribution of the involved side was 9 left and 7 right. (Table 1). All patients had complete relief of symptoms post-operatively with no triggering, recurrence or volar subluxation of the APL and EPB tendons. There were two postoperative complications, including one superficial wound infection due to the retained stich, and cured after removal of it; and one patient complained of transient paraesthesia in the distribution of the superficial radial nerve, and resolved one month after.

On H&E staining, the histological appearance of de Quervain’s disease specimen revealed a highly thickening of the fibrous tendon sheath (Figure 1). The specimens were classified into 3 categories according to the ECM status. In grade I de Quervain’s disease, slightly degraded collagen structure with slight waviness and minimal splitting between contiguous fiber bundles (Figure 2A). Grade II de Quervain’s disease showed moderately degraded collagen structure with some separation between bundles, increased cell population and angiogenesis (Figure 2B). Grade III de Quervain’s disease represented severely degraded collagen structure with disorganized collagen structure and decreased cell population (Figure 2C). The neutrophil elastase staining showed a dramatically increased level in grade II (Figure 3B) and III (Figure 3C) (5.9 ± 4.2 % vs 69.9 ± 12.8 %, p<0.001; 5.9 ± 4.2 % vs 73.4 ± 21.5 %, p<0.001, respectively) (Figure 3D). In the immunohistochemistry staining of COX-2, we found that increase of COX-2 expression in de Quervain’s disease is dependent on the severity of disease. Specifically, 93.9 ± 5.7 % and 86.6 ± 7.9 % of COX positive cell rate by grade II (p<0.001) (Figure 4B) and grade III (p<0.001) (Figure 4C), respectively, compared to the grade I (Figure 4A).

Discussion: The results of the staining justified the role of inflammation in the pathogenesis of de Quervain’s disease. Interestingly, in response of inflammatory and angiogenic change during the progress of disease, MAC-387 expression was
nearly absent in the grade I de Quervain’s disease (Fig. 5A). Therefore, MAC-positive cell appeared additively increased in the grade II de Quervain’s disease by 14.1 ± 6.7 % (p<0.05) (Fig. 5B). Finally, the MAC-387 expression was decreased in the grade III de Quervain’s disease by 2.9 ± 3.1 % (Fig. 5C) compared to grade II (p<0.01) (Fig. 5D). The pattern of macrophage expression is compatible to the ECM structure. Grade II de Quervain’s disease showed compared to grade I and III de Quervain’s disease abundant vessel density.

**Significance:** To our knowledge, this is the first study to demonstrate and verify the role of inflammation in the de Quervain’s disease. The significant increase of inflammatory response demonstrate that inflammation play an essential role in de Quervain’s disease.

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