Differential Strain Patterns in the Achilles Tendon may be the Cause For Achilles Tendinopathy Observed In the "Critical Zone": An In vitro Study

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ABSTRACT

Background: Achilles Tendinopathy which is apparent following repetitive tendon microtrauma is a common but complex pathology. The most common site for it to occur, known as the critical zone, has been identified, but the reason for this remains debatable. It is our hypothesis it may be due to differences in strains experienced along the different sections of the tendon when biomechanical load is applied. The place where the highest strain occurs, the critical zone, is where tendinopathy develops. Method: A study was conducted using twelve captive Achilles tendons (n=12) to determine the strains they were being subjected to in different parts of the tendon when loading is applied. Sections were identified by zones which were evenly distributed (approximately 10 mm) along the tendon. A segments were located nearest to the bony insertion i.e. the critical zone, B were at mid-tendon and C close to the muscular insertion. Uniaxial and biaxial strain of 5%, 10%, 15% and 20% were applied and its effects on the different segments recorded by means of a contactless measuring method using image analysis. Results: The highest strains were recorded at segment A for all loading conditions (p<0.05). It was also apparent that strains were lowest in segments furthest from the critical zone (p<0.05). Significant differences between the zones were observed regardless of the loading being applied; e.g. at 10% tensile strain, segments A, B and C were subjected to strains of 25.95±0.03, 34.1±0.01, and 24.1±0.01 respectively. When increasing amounts of mechanical strain were applied, significant correlations were observed between the different segments. Conclusion: Differential strain patterns between the different segments was noted. The segments closest to the tendon insertion were subjected to the highest amount of strain, which corresponds to the "critical zone" site. This finding suggests that the critical zone site was more likely to undergo tendinopathy because of the differences in strain distribution throughout the tendon substance.

Hand & Upper Limb Infections in Patients with Diabetes Mellitus in Malaysia 2008 - 2009

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ABSTRACT

Background: Infections of the extremities in a diabetic most often affect the lower limbs and is associated with chronic complications of diabetes. This is well described in the literature. However, infections of the upper limbs are not as well described in the literature. We present an 18-month prospective study conducted by the National Orthopaedic Registry of Malaysia (NORM) to survey the incidence of limb infections in diabetes in Malaysia. Objective: The objective of this study was to survey hand & upper limb infections in patients with diabetes mellitus in Malaysia between 2008 and 2009. Method: In this study, data from about 1.856 diabetic patients was collected from 18 hospitals in Malaysia between 2008 and 2009. Out of this population, 95 patients had infection affecting the upper extremities. Patients' data on demographics, co-morbidities, current medication and existing complications was collected. Outcomes of infections either resulting in healing or amputation was also looked into. The 95 patients above had an average age of 52.7 years with a slight predominance of urbanites. About 80.6% of the patients presented with a Type 2 diabetes and the average duration of diabetes for this group was 6 years. A majority of patients presented with abscess formation (28.4%) and with cellulitis (26.7%) as the next most common complaint. Swabs were taken from the infected area and results obtained for 77 of the patients. Results: About 49.3% had cultured a single growth and 19.4% cultured a mixed growth. The most common organism cultured was Staphylococcus sp. (15.8%) and followed by Klebsiella sp. (6.3%). In managing these patients, 76.8% chose to undertake one or multiple surgical procedures to hasten the healing process, with an amputation rate of 22.2%. Conclusion: Management of diabetic ulcers of the upper extremity merits aggressive treatment and early surgical intervention should be undertaken in order to minimise morbidity.