齒顎矯正治療時之咬肌活性變化以及與矯正疼痛之關係

Changes in Masseter Muscle Activity and their Correlations with Orthodontic Pain during Orthodontic Treatment

中文摘要

齒顎矯正治療所引起的牙齒移動，往往會造成牙齒疼痛以及咬合改變，使得病人怕痛不敢咬而影響咀嚼功能。本研究之目的是要探討矯正治療初期平齊化過程咬肌活性之變化以及矯正疼痛對咬肌活性之影響。使用可攜帶型肌電圖系統(portable EMG)，記錄 6 名受測者矯正治療前、治療第 1 至 6 天，以及第 15、29 天左右兩側連續 12 小時日常生活之咬肌肌電圖，以比較矯正期間咬肌活性之變化。並配合視覺類比尺度(VAS)記錄受測者疼痛程度，以研究矯正疼痛對咬肌活性之影響。肌電圖資料之分析是先用多頻道調頻錄音機將多頻錄音磁帶再生，經過類比數位轉換，再經平滑濾波器做波形處理，即可於電腦上做波形處理計算及統計分析。結果發現受測者之疼痛從矯正施力後第 4 小時開始漸增，第 2 天晚上達高峰而後漸減，約持續到第 5~6 天。且矯正疼痛有日夜差異的傾向，夜晚比白天疼痛，即疼痛程度(VAS 值)於 22:00>18:00>14:00>10:00。然而，疼痛的反應全憑個人主觀，且疼痛閾值及持續時間因人而異；矯正疼痛的程度與個人疼痛忍受度的閾值有關，與牙弓長度不足量無關。初期平齊化前後咬肌活性的變化，在短程肌電記錄方面：最大緊咬時之最大放電量由大快速變小再緩慢回升到治療前的程度；咬口香糖時之咀嚼頻率也由高快速變低再緩慢回升，而咀嚼週期則是由短快速變長再緩慢降回到治療前的程度。長程肌電記錄方面：初期平齊化前後單位時間內咬肌活動持續時間之變化，呈現由長快速變短再緩慢回升的情況，以日常生活時段 level1 單位時間之 burst duration 爲例，平齊化第 1 天降爲平齊化前的 52.27%，第 2 天降到最低點爲 40.96%，爾後開始回升到治療前的程度；初期平齊化前後單位時間內咬肌活動次數之變化，亦呈現由多快速變少再緩慢回升的情況，以日常生活時段 level1 單位時間之 burst number爲例，平齊化第 1 天降爲平齊化前的 86.96%，第 2 天降爲 74.89%，第 3 天降爲 73.07%，第 4 天降爲 72.23%，第 5 天降到最低點爲 71.81%，爾後開始回升到治療前的程度。經「Wilcoxon 配對檢定」，不論是短程或長程肌電記錄，皆顯示初期平期齊化前後之咬肌活性有統計上顯著差異($p<0.05$)。矯正疼痛對咬肌活性的影響，經「Wilcoxon 配對檢定」，長程肌電記錄日常生活時段的咬肌活性受初期平齊化影響最大，進食時段次之，終日時段再次之，對於睡眠時段的咬肌活性影響最小。「Wilcoxon 配對檢定」，亦顯示矯正治療前後之咬肌活性有顯著差異($p<0.05$)。經「Spearman 等級相關」檢定，顯示咬肌活性與牙齒矯正疼痛程度(VAS 值)呈負相關，即矯正疼痛增加，則咬肌之肌電活性減少，但隨著疼痛之消失，咬肌活性亦慢慢的隨之恢復。綜合以上所述，齒顎矯正治療會產生矯正疼痛，而此種矯正疼痛是造成疼痛過程咬肌活性降低的原

因。

英文摘要

Changes in masseter muscle activity during orthodontic treatment were probably due to discomfort or pain or alterations in the occlusal relationship produced by tooth movement. This study was conducted to investigate changes in masseter muscle activity and their correlations with orthodontic pain produced by tooth movement during orthodontic treatment. Six volunteers participated in this study. Data were collected using a portable electromyogram system, and bursts of bilateral masseter muscle activity were counted over 12-hour periods before and during 1st~6th, 15th, 29th day of orthodontic treatment in order to investigate changes in masseter muscle activity. The pain response was assessed by visual analogue scale (VAS) in order to investigate the influence of orthodontic pain on masseter muscle activity. The recorded EMG data on recording tape were then reproduced by a multichannel record reproducer, transformed through a smoothing filter, converted to digital data using an analogue-digital converter, and finally analyzed on a personal computer.

The results showed orthodontic pain increased since 4th hour and peaked in the next night after the placement of the arch wire, then gradually tailed off toward the 5th or 6th day. Overall a diurnal variation was found with a tendency to an increase in pain in the nights, that is VAS value tended to be worse at 22:00 > 18:00 > 14:00 > 10:00. However, the pain response was found to be highly and consistently subjective, and the pain threshold and persistent time both showed great individual variation. In addition, the degree of orthodontic pain correlated with pain threshold, not related to the arch length discrepancy. Comparing the masseter muscle activity about the loading test before and after orthodontic treatment, the maximal discharge voltage of maximal clenching showed decreasing quickly then recovering slowly to the original pretreatment level as well as the chewing frequency of chewing gum, but the chewing cycle of chewing gum showed increasing quickly then recovering slowly to the original pretreatment level. As to the long-term EMG recording, burst durations showed decreasing quickly then recovering slowly to original pretreatment levels during the initial leveling. For example, level 1 burst duration per minute of daytime period decreased to 52.27% of the original pretreatment level at leveling day 1, 40.96% at leveling day 2, then recovered to the original pretreatment level. During the initial leveling, burst numbers also showed decreasing quickly then recovering slowly to original pretreatment levels. For instance, level 1 burst number per minute of daytime period decreased to 86.96% of the original pretreatment level at leveling day 1, 74.89% at leveling day 2, 73.07% at leveling day 3, 72.23% at leveling day 4, 71.81% at leveling day 5, then recovered to the original pretreatment level. According

to the “Wilcoxon matched paired test”, both of the short-term and long-term masseter muscle activity before and after initial leveling showered significant differences ($p<0.05$). According to the “Wilcoxon matched paired test”, the influence of long-term masseter muscle activity due to initial leveling tended to be great during daytime > meals > whole day > sleep period. In addition, the results tested by “spearman rank correlation” showed negative correlation between masseter muscle activity and orthodontic pain. In other word, when orthodontic pain increased, the masseter muscle activity decreased, and following the pain relieved, the masseter muscle activity recovered gradually. It was concluded that orthodontic pain produced by orthodontic treatment was the reason that reduced the masseter muscle activity during the pain period.