Location of injury site in chronic low back pain patients: an electromyographic and mechanomyographic analysis

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Location of Injury Site in Chronic Low Back Pain Patients: An Electromyographic and Mechanomyographic Analysis

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By

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Acknowledgments

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CERTIFICATION

I, Mark Gorelick, declare that this thesis, submitted in fulfilment of the requirements for
the award of Doctor of Philosophy, in the Department of Biomedical Sciences, University
of Wollongong, is wholly my own work unless otherwise referenced or acknowledged.
The document has not been submitted for qualifications at any other academic institution.

Mark Gorelick

06 April 2006
Abstract

The primary aim of this thesis was to determine if anatomical injury site in chronic low back (CLBP) patients can be identified by two complementary non-invasive diagnostic techniques, surface electromyography (sEMG) and mechanomyography (MMG). The application of these techniques to injury site identification is based upon the hypothesis that muscle tissues surrounding an injured joint are physiologically distinct from those surrounding “healthy” joints. Such changes in muscle physiology, associated with underlying joint pathology, may include alterations in muscle fibre type composition and number with a corresponding change in the muscle’s speed of contraction and its pattern of neuromotor control. These injury-induced changes in muscle function should be readily detected, at least in superficial muscles, by simple kinesiological techniques such as sEMG and/or MMG. Six experimental studies were conducted to validate the diagnostic tools (sEMG and MMG) and to locate injury site in a total of 73 normal and CLBP subjects and a group of 12 Wistar rats. The results of these studies validated the combined sEMG and MMG techniques and concluded that injury site in diagnosed CLBP patients could be accurately identified to within one vertebral segment of the injured zygapophyseal joint through application of the MMG technique. Importantly, the MMG technique appeared to be more sensitive than the sEMG technique to identify the injury site in CLBP patients. Although the sEMG technique could significantly (p<0.05) differentiate between the CLBP and healthy control groups, it was unable detect specific changes in muscle contractile properties associated with underlying joint pathology.
List of Publications

Peer Reviewed Publications


Conference Presentations


Table of Contents

ACKNOWLEDGMENTS ........................................................................................................................................ II
DECLARATION ................................................................................................................................................ III
LIST OF PUBLICATIONS .......................................................................................................................... V
TABLE OF CONTENTS ................................................................................................................................ VI
LIST OF TABLES ........................................................................................................................................ XI
LIST OF FIGURES .................................................................................................................................... XIII
CHAPTER 1. INTRODUCTION .................................................................................................................... 1
1.1. Background ........................................................................................................................................ 1
1.2. Aim and Hypothesis ........................................................................................................................... 4

CHAPTER 2. LITERATURE REVIEW ......................................................................................................... 7
2.1. Aetiology of Low Back Pain ............................................................................................................ 7
2.2. Risk factors for Low Back Pain ....................................................................................................... 12
2.2.1. Genetic risk factors ..................................................................................................................... 13
2.2.2. Psychosocial/behavioural factors .............................................................................................. 14
2.2.3. Physical risk factors .................................................................................................................... 15
2.2.4. Individual risk factors ................................................................................................................ 15
2.3. Pathophysiology of Chronic Low Back Pain .................................................................................. 16
2.3.1. Electromyography ......................................................................................................................... 43
2.3.2. Tensiometry vs. mechanomyography .......................................................................................... 54
2.3.3. Mechanomyography .................................................................................................................... 51
2.3.4. Functional differentiation ............................................................................................................. 48
2.3.5. Spinal Stabilisation ......................................................................................................................... 21

CHAPTER 3. GENERAL METHODS ......................................................................................................... 63
3.1. Surface Electromyography .................................................................................................................. 63
CHAPTER 4. NEUROMUSCULAR COORDINATION OF THE TRUNK MUSCULATURE DURING THE STOOP LIFT

3.1.1 Surface Electromyography Collection Setup................................................................. 64
3.1.2 Signal Amplification ........................................................................................................ 65
3.1.3 Surface Electrodes ........................................................................................................... 65
3.1.4 Electromyography Collection and Analysis Software ..................................................... 66
3.1.4.1 Rectification ................................................................................................................. 68
3.1.4.2 Filtering ......................................................................................................................... 68
3.1.4.3 Fast Fourier Transform .............................................................................................. 69
3.1.4.4 Median Power Frequency ............................................................................................ 70
3.1.4.5 Integration ................................................................................................................... 71
3.1.4.6 Discharge Rate .......................................................................................................... 71
3.1.4.7 Linear Envelope ......................................................................................................... 71
3.1.4.8 Temporal Analysis of Electromyography .................................................................... 72
3.1.5 Maximal Voluntary Contraction ..................................................................................... 74
3.2 Mechanomyography............................................................................................................ 75
3.2.1 MMG experimental procedures........................................................................................ 78
3.2.2 Percutaneous muscle stimulation .................................................................................... 80
3.2.3 MMG calculations of maximal displacement curve ......................................................... 81
3.2.4 MMG collection & analysis software .............................................................................. 82
3.2.5 MMG batch file software ................................................................................................ 83
3.2.6 MMG post analysis software .......................................................................................... 84
3.2.7 MMG slope detector software ........................................................................................ 85
3.2.8 MMG electromyography burst analysis software .............................................................. 86
3.2.9 MMG measure of muscle tone ....................................................................................... 86

CHAPTER 5. IN VITRO ANALYSIS OF MECHAOMYOGRAM AND ITS RESPONSE TO FATIGUE USING AN ANIMAL MODEL
CHAPTER 9. INJURY-SITE IDENTIFICATION IN CHRONIC LOW BACK PAIN PATIENTS.......................................................................................................................... 222

9.1. SUMMARY .................................................................................. 222
9.2. INTRODUCTION........................................................................... 223
9.3. METHODS .................................................................................. 224
9.3.1. Subjects.................................................................................. 225
9.3.2. Identification of surface recording sites................................. 226
9.3.3. Electromyographic procedures ............................................. 227
9.3.4. Electromyographic statistical analysis ................................. 229
9.3.5. Mechanomyographic procedures ....................................... 229
9.3.6. Mechanomyographic statistical analysis......................... 230
9.4. RESULTS ................................................................................ 231
9.4.1. Range of motion ................................................................. 231
9.4.2. Electromyography ............................................................... 231
9.4.2.1. STANDING SYMMETRICAL STOOP LIFT ..................... 232
9.4.2.2. SEATED SYMMETRICAL STOOP LIFT ....................... 236
9.4.2.3. PEAK TEMPORAL ANALYSIS ...................................... 237
9.4.2.4. DISCHARGE RATE ...................................................... 240
9.4.2.5. MEDIAN FREQUENCY ............................................... 241
9.4.3. Mechanomyography ......................................................... 242
9.4.3.1. MAXIMAL DISPLACEMENT (DMAX-V) ....................... 243
9.4.3.2. CONTRACTION TIME (TC) ......................................... 244
9.4.3.3. SUSTAIN TIME (TS) .................................................. 246
9.4.3.4. RELAXATION TIME (TR) ......................................... 247
9.4.3.5. HALF-RELAXATION TIME (½TR) ................................. 249
9.5. DISCUSSION ........................................................................... 250
9.6. LIMITATIONS........................................................................ 257
9.7. FURTHER RESEARCH................................................................. 258
9.8. CONCLUSION.......................................................................... 259

CHAPTER 10. DISCUSSION .......................................................................................................................... 260

CHAPTER 11. CONCLUSION, LIMITATIONS AND RECOMMENDATIONS .......................................................... 269

11.1. CONCLUSION........................................................................ 269
11.2. LIMITATIONS........................................................................ 269
11.3. RECOMMENDATIONS ........................................................................................................... 270

BIBLIOGRAPHY .......................................................................................................................... 271

APPENDIX A .................................................................................................................................. 303
  A.1 ELECTROMYOGRAPHY COLLECTION AND ANALYSIS SOFTWARE .......................... 303
      A.1.1 File selection................................ ................................................................................ 304
      A.1.2 Channel display ............................................................................................................ 306
      A.1.3 FFT and median frequency calculation ................................ ................................. 311
      A.1.4 Integration calculation ................................................................................................ 312
  A.2 MECHANOMYOGRAPHIC SOFTWARE ........................................................................... 314
      A.2.1 MMG and tensiometry collection software ............................................................... 314
      A.2.2 MMG and tensiometry graph viewer ....................................................................... 317
      A.2.3 MMG and tensiometry batch file analysis ................................................................. 320
      A.2.4 MMG and tensiometry slope calculator ................................................................. 322
      A.2.5 MMG sEMG bin analysis ......................................................................................... 324

APPENDIX B .................................................................................................................................. 326
  B.1 Chapter 8-ANOVA and post hoc analysis of control data .............................................. 326
      B.1.1 All stoop lift ANOVA onset and offset (CP1 & CP2) analysis ................................... 326
      B.1.2 Discharge rate during isometric fatigue ANOVA tables (CP1 &CP2) ....................... 331
      B.1.3 Median frequency during isometric fatigue ANOVA tables (CP1 &CP2) ............... 331
      B.1.4 MMG ANOVA analysis data tables ................................................................. 331
  B.2 Chapter 9-ANOVA and post hoc analysis of CLBP data .............................................. 334
      B.2.1 Discharge rate comparison ANOVA tables ............................................................ 334
      B.2.2 Median frequency comparison ANOVA tables .................................................... 335
      B.2.3 MMG ANOVA analysis data tables ....................................................................... 337
List of Tables

Table 2.1: Differential diagnosis of low back pain............................................................. 8
Table 2.2: Clinical guidelines: recommendations regarding diagnosis of LBP............... 11
Table 2.3: Local Vs. Global Stabilising Muscles ............................................................ 29
Table 2.4: Surface vs. Indwelling Electromyography ...................................................... 46
Table 3.1: MMG curve calculation parameters ............................................................... 81
Table 4.1: Means and Standard Errors for timing of muscle activation for all protocols 105
Table 4.2: Comparison of heart rate and RPE between the rowing- and back extension-fatigue protocols .............................................................................................................. 105
Table 5.1: Raw pre and post tensiometry measurements sorted by diet ....................... 121
Table 5.2: Pre and post-tensiometry t-test and pearson correlations: diet A vs. B ......... 122
Table 5.3: Raw Pre and post MMG measurements sorted by group .............................. 123
Table 5.4: Pre and Post MMG Means and Standard Deviations: Group A vs. B ......... 124
Table 5.5: Pre and Post MMG T-test and Pearson Correlations: Group A vs. B ........... 124
Table 5.6: Pre and Post Tensiometry Measurements Sorted by Fatigue. Individual rat data ......................................................................................................................................... 125
Table 5.7: Statistical evaluation of pre and post fatigue tensiometry data: One-Way RM ANOVA .......................................................................................................................... 126
Table 5.8: Effect of fatigue on MMG variables. Individual rat data ................................. 127
Table 5.9: Statistical evaluation of the effect of fatigue on the MMG curves: one-way RM ANOVA .......................................................................................................................... 128
Table 5.10: Pre-Fatigue tensiometry vs. MMG .................................................................. 131
Table 5.11: Post-fatigue tensiometry vs. MMG............................................................... 131
Table 5.12: Tensiometry and MMG peak comparison ................................................... 133
Table 6.1: Raw means and standard errors for MMG variables ..................................... 148
Table 6.2: Two-way ANOVA Muscle Segment Comparison for all MMG variables ... 149
Table 7.1: Treatment arm two way repeated measures ANOVA (two factor repetition) 170
Table 7.2: Treatment vs. control comparison-two way repeated measures ANOVA ... 171
Table 7.3: Baseline descriptive data for treatment and control arm (mean±SE) ............ 172
Table 7.4: Electromyography spectral changes pre- vs. post-fatigue (means and SE) ... 175
Table 7.5: Correlation comparing visual analogue scores to mechanomyography variables ......................................................................................................................................... 176
Table 7.6: Repeated measures ANOVA comparison of MMG control arm data during all days ................................................................................................................................. 177
Table 7.7: Intraclass correlation of MMG control data by day ...................................... 177
Table 8.1: Anthropometric Descriptive Data .................................................................. 190
Table 8.2: Means and SE for zygapophyseal joint locations ........................................... 192
Table 8.3: Critical point offset and onsets (ms, mean & SE) ........................................... 203
Table 8.4: Median frequency and discharge rates results during isometric back extension (MVC) ................................................................................................................................. 209
Table 8.5: Mechanomyographic calculations for left side segments L1 to M2 ............ 211
Table 8.6: Mechanomyographic calculations for right side segments L1 to M2 ......... 212
Table 9.1: Anthropometric Descriptive Data .................................................................. 225
Table 9.2: Peak Temporal Data - Controls vs. CLBP ..................................................... 237
Table 9.3: Discharge Rate Data - Controls vs. CLBP ..................................................... 241
Table 9.4: Median Frequency Data - Controls vs. CLBP ............................................... 242
Table 9.5: Dmax-v calculations for all segments L1 to M2 - Control vs. CLBP ........... 243
Table 9.6: Tc calculations for all segments L1 to M2 - Control vs. CLBP .................... 245
Table 9.7: Ts calculations for all segments L1 to M2 - Control vs. CLBP .................... 246
Table 9.8: Tr calculations for all segments L1 to M2 - Control vs. CLBP ..................... 248
Table 9.9: ½Tr calculations for all segments L1 to M2 - Control vs. CLBP..................... 249
Table B.1: All stoop lift univariate ANOVA analysis data table (CP1: Onset) .......... 326
Table B.2: Standing symmetrical stoop lift univariate ANOVA analysis data table (CP2: Offset) ............................................................................................................................. 326
Table B.3: Standing symmetrical stoop lift univariate tukey post hoc analysis data table (CP1 & CP2) ................................................................................................................................ 327
Table B.4: Seated symmetrical stoop lift univariate tukey post hoc analysis data table (CP1 & CP2) ................................................................................................................................ 328
Table B.5: Standing twist stoop lift univariate tukey post hoc analysis data table (CP1 & CP2) ................................................................................................................................ 329
Table B.6: Seated twist stoop lift univariate tukey post hoc analysis data table (CP1 & CP2) ................................................................................................................................ 330
Table B.7: Two-way ANOVA pre- post-comparison of discharge rate during isometric fatigue test ....................................................................................................................... 331
Table B.8: Two-way ANOVA pre- post-comparison of median frequency during isometric fatigue test ....................................................................................................................... 331
Table B.9: MMG univariate ANOVA analysis data table (factor: side) ......................... 331
Table B.10: Dmax-v and Tc MMG multiple comparisons ANOVA analysis data tables ......................................................................................................................................... 332
Table B.11: Ts and Tr MMG multiple comparisons ANOVA analysis data tables ...... 333
Table B.12: ½Tr MMG multiple comparisons ANOVA analysis data tables ............... 333
Table B.13: Two-way ANOVA control vs. CLBP comparison of discharge rate ........ 334
Table B.14: Standing and seated symmetrical discharge rate post hoc comparisons analysis data tables ....................................................................................................................... 335
Table B.15: Two-way ANOVA control vs. CLBP comparison of median frequency ... 335
Table B.16: Standing and seated symmetrical median frequency post hoc comparisons analysis data tables ....................................................................................................................... 336
Table B.17: MMG univariate ANOVA analysis data table (factor: left-side) .......... 337
Table B.18: MMG univariate ANOVA analysis data table (factor: right-side) .......... 337
Table B.19: MMG ANOVA post hoc analysis data tables ............................................. 338
List of Figures

Figure 2.1: Risk factor classification for low back pain ................................................... 13
Figure 2.2: Comparison of risk factors for low back pain ................................................ 16
Figure 2.3: Structural components of the spine .............................................................. 23
Figure 2.4: Spinal Ligaments (Eidelson 2002) ................................................................ 26
Figure 2.5: Sacral Biomechanics .................................................................................... 27
Figure 2.6: Anatomy of the Erector Spinae .................................................................. 30
Figure 2.7: Longissimus Thoracis pars thoracis ............................................................. 31
Figure 2.8: Longissimus Thoracis pars lumborum ......................................................... 32
Figure 2.9: Iliocostalis lumborum pars lumborum ......................................................... 33
Figure 2.10: Multifidus Segments ................................................................................... 34
Figure 2.11: Multifidus Moment Vectors ....................................................................... 35
Figure 2.12: Possible mechanisms for pain to affect motor control ............................... 42
Figure 2.13: A schematic representation of the decomposition of the sEMG signal into its constituent motor unit action potential trains ......................................................... 44
Figure 2.14: Typical MMG curve .................................................................................... 53
Figure 2.15: Schematic of the relationship between MMG, sEMG and tensiometry during fatigue ................................................................................................................. 56
Figure 2.16: Postulated series of events leading to muscle damage from eccentric exercise ........................................................................................................................................... 59
Figure 2.17: Longitudinal electron micrographs of rabbit tibialis anterior .................... 60
Figure 3.1: Electromyography collection setup ............................................................. 64
Figure 3.2: Surface electrode design .............................................................................. 66
Figure 3.3: Electromyography data collection and analysis software ............................ 67
Figure 3.4: Electromyography rectification ................................................................... 68
Figure 3.5: Electromyography Butterworth band-pass filtering .................................... 69
Figure 3.6: Fast Fourier Transform ................................................................................ 70
Figure 3.7: Electromyography Integration ...................................................................... 71
Figure 3.8: The phases of the symmetrical stoop-lift ..................................................... 73
Figure 3.9: Temporal analysis of rectified filtered electromyogram ............................... 73
Figure 3.10: Seated maximal voluntary contraction ....................................................... 74
Figure 3.11: TMG-BMC® Device for whole muscle mechanomyography ..................... 75
Figure 3.12: MMG Experimental Set-up ........................................................................ 77
Figure 3.13: Typical MMG Curve .................................................................................. 77
Figure 3.14: MMG setup for the Biceps Brachii ............................................................. 79
Figure 3.15: DC Offset .................................................................................................. 79
Figure 3.16: Relationship between MMG maximal displacement and progressive increases in percutaneous muscle stimulation voltage ................................................. 80
Figure 3.17: MMG curve calculation parameters ............................................................ 81
Figure 3.18: MMG Collection & Analysis Software ....................................................... 83
Figure 3.19: MMG Batch file software .......................................................................... 84
Figure 3.20: MMG Post Analysis Software .................................................................... 84
Figure 3.21: MMG Slope Detector Software .................................................................. 85
Figure 3.22: MMG Electromyography Burst Analysis Software .................................... 86
Figure 7.12: Ts for eccentric biceps fatigue ................................................................. 181
Figure 7.13: Tr pre- and post- the eccentric fatigue protocol ...................................... 182
Figure 7.14: ½Tr for eccentric biceps fatigue ............................................................... 183
Figure 8.1: Anatomical recording sites for sEMG and MMG analysis .......................... 193
Figure 8.2: The stoop-lifts ......................................................................................... 194
Figure 8.3: sEMG experimental protocol .................................................................... 195
Figure 8.4: Pelvic tilt restraint chair .......................................................................... 195
Figure 8.5: Isometric back extension fatigue task ....................................................... 196
Figure 8.6: MMG experimental setup for measurement of LT and MT ...................... 197
Figure 8.7: Temporal analysis of a raw electromyogram ............................................ 199
Figure 8.8: Raw electromyographic waveforms for the left segments of L1 to M2 during
the symmetrical standing stoop-lift ........................................................................... 200
Figure 8.9: Raw electromyographic waveforms for the right segments L1-M2 during
symmetrical standing stoop-lift .................................................................................. 201
Figure 8.10: Temporal patterns of muscle activation during the standing symmetrical
stoop-lift (group mean & SE) ...................................................................................... 204
Figure 8.11: Temporal patterns of muscle activation during the seated symmetrical stoop-
lift (group mean & SE) ............................................................................................ 206
Figure 8.12: Temporal patterns of muscle activation during the standing twist stoop-lift
(group mean & SE) ..................................................................................................... 207
Figure 8.13: Temporal patterns of muscle activation during the seated twist stoop-lift
(group mean & SE) ..................................................................................................... 208
Figure 8.14: Discharge rate pre- and post-fatigue ....................................................... 210
Figure 8.15: Median frequency results pre- and post-fatigue ...................................... 210
Figure 8.16: Dmax-v for back muscle segments L1 to M2 (mean & SE) ....................... 213
Figure 8.17: Tc for back muscle segments L1 to M2 (mean & SE) ............................... 214
Figure 8.18: Ts for back muscle segments L1 to M2 (mean & SE) ............................... 214
Figure 8.19: Tr for back muscle segments L1-M2 (mean & SE) ................................... 215
Figure 8.20: ½Tr for ES muscle segments L1-M2 (mean & SE) .................................... 216
Figure 9.1: Electromyography and mechanomyography recording sites ..................... 226
Figure 9.2: Stoop-lift utilised in testing ...................................................................... 228
Figure 9.3: Experimental setup .................................................................................. 230
Figure 9.4: Stoop-lift critical period temporal analysis ............................................... 232
Figure 9.5: Control subject raw electromyographic waveforms for segments L1-M2
during symmetrical standing .................................................................................... 234
Figure 9.6: CLBP subject raw electromyographic waveforms for segments L1-M2 during
symmetrical standing ............................................................................................... 235
Figure 9.7: CLBP subject raw electromyographic waveforms for segments L1-M2 during
symmetrical seated lift ............................................................................................. 236
Figure 9.8: Control symmetrical standing peak temporal analysis .............................. 238
Figure 9.9: Control symmetrical seated peak temporal analysis ................................ 238
Figure 9.10: CLBP symmetrical standing peak temporal analysis ............................. 239
Figure 9.11: CLBP symmetrical seated peak temporal analysis .................................... 239
Figure 9.12: Dmax-v for the back muscle segments L1 to M2 .................................... 244
Figure 9.13: Tc for the back muscle segments L1 to M2 ............................................. 245
Figure 9.14: Ts for the back muscle segments L1 to M2 ............................................. 247