

EVALUATING FUNCTION/ IMPAIRMENT OF LOW BACK PAIN USING SEMG

Recent advances in the use of surface electromyography (SEMG) have proved useful in the evaluation of movement, gait, postural, and functional disturbances in low back pain patients.

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Electrodiagnostic evaluations, with one type being electromyography (EMG), are commonly performed in diagnosing nerve and muscle pain disorders. Conventional EMG assessment is usually referred to as “needle EMG,” where a fine concentric or monopolar needle electrode is inserted into a particular muscle. Quantitative analyses are then conducted on needle insertion-generated activity, as well as motor unit action potential waveforms. Another less intrusive form of EMG evaluation is surface EMG (SEMG). Rather than inserting needles, which many patients complain of as being painful and too invasive, electrodes are placed on the skin using simple adhesive collars and overlying the muscle(s) being studied. One drawback of SEMG, as compared to needle EMG, is that only superficial muscle activity can be recorded. Nevertheless, as will be reviewed, SEMG has been found to be useful in evaluating movement, gait, postural, and functional disturbances.

In this present article, we will focus on the use of SEMG in evaluating the degree of physical impairment in low back pain (LBP). Indeed, whenever one evaluates

painful spinal disorders such as LBP—especially in workers’ compensation or personal injury populations—as recently reviewed by Gatchel, Ricard et al,¹ the degree of potential physical impairment needs to be considered for employment/injury compensation issues. *Impairment* refers to the alteration of a person’s usual health status due to anatomic or pathologic abnormalities. For back pain, it is frequently evaluated by measuring strength, lifting capacity, range-of-motion, aerobic capacity, as well as measures of human performance.² A traditional problem, though, has been the lack of universal agreement about what measure(s) should be used in impairment evaluations. The American Medical Association identified only range-of-motion in earlier versions of its *Guides to the Evaluation of Permanent Impairment*, but it is no longer included in the most recent 6th Edition. There are growing annual costs associated with the diagnoses and care of musculoskeletal disorders such as LBP, amounting to tens of billions of dollars in the United States alone.³ In fact, in a most recent survey of expenditures among adults with back and neck problems, Martin et al reported a 65%

increase (adjusted for inflation) of expenditures from 1997 to 2005, which was a more rapid increase than overall health expenditures.⁴ Thus, there is a great need to develop valid measures to objectively quantify physical function in patients with these disorders. Such objective measures would aid in assessing both physical impairment needed to address compensation issues, as well as use in determining a therapeutic endpoint following treatment.

At the outset, it should also be kept in mind that a traditional problem faced by evaluators attempting to objectively measure musculoskeletal disorders such as LBP—where there is often primarily soft tissue involvement—is that psychosocial factors frequently influence the experience/reporting of pain.^{1,3} Some examples of such psychosocial factors are neuromuscular inhibition due to fear-avoidance of movement, secondary gain, etc.^{5,6} Nevertheless, there is still an urgent need for the ability to quantify physical function with appropriate validity criteria in place, in order to help evaluate both impairment and a therapeutic endpoint following treatment.¹ SEMG may fill this need.