DynaROM

Muscle Guarding

vs.

Endpoint ROM

As Presented in the AMA’s Medical Text on Soft Tissue Injury Assessment
Why choose patented DynaROM™ over Endpoint ROM?

40% OF PATIENTS DEMONSTRATE NORMAL ROM WITH MUSCLE GUARDING AND PAIN.

DynaROM is a patented, wireless Class II Diagnostic Device which combines traditional range of motion with EKG Technology.

DynaROM Diagnoses Soft Tissue Injury more accurately, and is a functional test, endpoint ROM is not.

What do the experts have to say about DynaROM?

What did John Gerhardt, MD Author of “The Practical Guide to Range of Motion Assessment” have to say about DynaROM?

“Its integrated use of motion EMG and true wireless dual ROM is brilliant. DynaROM effectively augments ROM by assessing effort and measuring muscle guarding.”

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A review of the literature concluded that the combination of Motion sEMG and ROM increased sensitivity and specificity to low back pain.

A Meta-Analytic Review of Surface Electromyography Among Persons With Low Back Pain and Normal, Healthy Controls

Michael E. Geisser,† Mohammed Ranavaya,† Andrew J. Haig,* Randy S. Roth,* Robert Zucker,† Clara Ambroz,§ and Marianne Caruso†

Abstract: Significant differences in surface electromyography (SEMG) have been reported between persons with low back pain (LBP) and normal, healthy controls. This manuscript presents a systematic meta-analytic review of studies examining SEMG differences between these groups. Forty-four articles were identified using MEDLINE and a review of reference lists in articles. For static SEMG, the largest effect size was observed for SEMG while standing, with subjects having LBP demonstrating higher SEMG. The effect size for flexion/relaxation measures was found to be very high (d = −1.71). Studies examining SEMG during isometric exercise or muscle recovery following exercise produced inconsistent findings. Sensitivity and specificity of SEMG for dynamic SEMG measures averaged 88.8% and 81.3%. Most classification schemes were statistically determined and utilized a combination of measures. Only one published study prospectively validated a classification scheme. SEMG measures of flexion-relaxation appear to distinguish LBP subjects from controls with good accuracy, and the sensitivity and specificity of SEMG can be increased by using multiple measures. Further research is needed to determine the combination of measures that are cost-effective, reliable, valid and discriminate with a high degree of accuracy between healthy persons and those with LBP. Perspective: SEMG is a simple and noninvasive measure of muscle activity. SEMG measures hold promise as an objective marker of LBP.

© 2005 by the American Pain Society

Traditional ROM Provides only the Endpoint Value. Without evaluating the muscle guarding component, it lacks sensitivity to true pain.
Why choose patented DynaROM™ over Endpoint ROM?

With DynaROM, ROM and muscle guarding are graphed throughout motion, improving sensitivity to pain.

DynaROM Graph Details

- Muscle Guarding graphed
- Left Lumbar: Blue Line
- Right Lumbar: Red Line
- Range of Motion graphed: Shows quality of motion
- Legacy endpoint ROM displayed

Example: Lumbar Flexion

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Why choose patented DynaROM™ over Endpoint ROM?

Graphing simultaneous muscle guarding and ROM can prove soft tissue injury even with normal ROM & normal MRI.

**ABNORMAL:** Muscle Guarding establishes pain even when ROM is normal.

*Legacy endpoint ROM Displayed & Normal*

The top graph shows muscle guarding. The bottom graph shows quality of motion and endpoint ROM.
Why choose patented DynaROM™ over Endpoint ROM?

Normal vs. Abnormal DynaROM™

Abnormal: Significant muscle guarding in flexion.

Normal: muscles relax in flexion

Cervical Lateral Flexion

NO PAIN

Left & Right Muscles fire independently

Left Muscles: Blue
Right Muscles: Red

PATIENT IN PAIN

Left & Right muscles fire together.

Upper Graph: Cervical Paraspinals
Middle Graph: SCMs
Bottom Graph: Graphe Range of Motion shows quality of motion.

Difficulty moving

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Why choose patented DynaROM™ over Endpoint ROM?

Why the negative Response to sEMG? Two different tests: Similar Names

Less Research: Static sEMG

Over 9000 published research studies on motion sEMG

Established: DynaROM Motion sEMG

Difference between Traditional Endpoint ROM and DynaROM Motion sEMG

<table>
<thead>
<tr>
<th>Features</th>
<th>Traditional Endpoint ROM</th>
<th>DynaROM sEMG</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurements Obtained:</td>
<td>Single Value ROM in Degrees</td>
<td>Simultaneously Graphs ROM and Muscle Guarding, as measured by Attached Electrode Surface EMG</td>
<td></td>
</tr>
<tr>
<td>CPT Code for PI</td>
<td>95851</td>
<td>96002 (test), 96004 (report)</td>
<td></td>
</tr>
<tr>
<td>Amount billed</td>
<td>$55.00</td>
<td>$250.00</td>
<td></td>
</tr>
<tr>
<td>Reproducibility</td>
<td>Same</td>
<td>Same</td>
<td></td>
</tr>
<tr>
<td>Shows endpoint ROM value</td>
<td>YES</td>
<td>YES</td>
<td>Muscle guarding is a 5-8% impairment per AMA Guides, 5th Edition.</td>
</tr>
<tr>
<td>Documents Muscle Guarding, a critical component of soft tissue injury</td>
<td>NO</td>
<td>YES</td>
<td>Easily measures ROM while simultaneously graphing Muscle Guarding</td>
</tr>
<tr>
<td>Time required to perform test</td>
<td>10 minutes</td>
<td>10 minutes, plus the time needed to attach electrodes</td>
<td></td>
</tr>
<tr>
<td>Shows quality of motion</td>
<td>NO: Endpoint value only</td>
<td>YES: Graphs ROM while revealing the “ratcheting” motion of Muscle Guarding</td>
<td></td>
</tr>
<tr>
<td>Recognized by AMA</td>
<td>YES</td>
<td>YES</td>
<td>“The Practical Guide to ROM Assessment”.</td>
</tr>
</tbody>
</table>

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Why choose patented DynaROM™ over Endpoint ROM?

<table>
<thead>
<tr>
<th>Sensitivity for detecting injury</th>
<th>Approximately 40% of those in pain have normal ROM with concurrent muscle guarding</th>
<th>Shows both ROM measurements and muscle guarding. Offers significantly higher testing sensitivity than ROM measures alone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research proven?</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

Is Surface EMG as good as Needle EMG? Which is better?

These are really two different procedures with different applications, making comparisons somewhat inappropriate. Nonetheless, you’ve probably heard some of the “Needle vs Surface EMG” debates. Much of this discourse is propagated by insurers to dissuade you from utilizing Surface EMG, which is safe, accessible and affordable - and can clearly establish soft tissue injury.

Some of those seeking to discredit Surface EMG have relied on a position paper produced by the American Academy of Electrodiagnostic Medicine, which explains that Needle EMG is not replaced by Surface EMG for many applications. Basically, you can’t do Needle EMG with Surface EMG. No one says you can. You also can’t measure heart rhythm with a glucose monitor. The article’s intent was not to discredit Surface EMG but it was widely used for that purpose.

The actual language of the position paper can be seen below: (Exhibit 10, Page 1, Column 1, PP 3 and column 2, pp1)

Direct your attention to the second column, text underlined in red.

**Technology Review: The Use of Surface EMG in the Diagnosis and Treatment of Nerve and Muscle Disorders**

American Association of Electrodiagnostic Medicine
American Academy of Physical Medicine and Rehabilitation

This technology review discusses the use of SEMG in the diagnosis of disorders of nerve and muscle. For the purposes of this review, disorders of nerve or muscle include neuropathies, radiculopathies, plexopathies, neuromuscular junction disorders, and myopathies. This review does not comment on the use of SEMG in the diagnosis of central nervous system disorders, problems with coordination, fatigue, psychological disorders, or pain as an entity independent of nerve damage.

If one reads this position paper, it is clear that they EXCLUDE use of Surface EMG in diagnosis of “pain as an entity independent of nerve damage. **CONCLUSION:** The AAEM paper which is referenced to deny the value of Surface EMG actually says nothing about the topic at all. Again, they hope you are not reading it.

Has any research been conducted to compare Surface EMG with Needle EMG?

In search of comparative data, a group of medical researchers investigated the differences between Needle and Surface EMG for evaluating back pain. They published the following paper:
Electric Behavior of Low Back Muscles During Lumbar Pelvic Rhythm in Low Back Pain Patients and Healthy Controls

Tero Silvonen, MD, Janahu Partanen, MD, PhD, Osmo Hanninen, MD, PhD, Seppo Soimakallio, MD, PhD


The functioning of low back muscles of back pain patients following flexion and retraction has not been properly investigated. In this study, we analyzed rectified, averaged electric activity (RMS EMG) and corresponding raw intramuscular EMG from lumbar paraspinal muscles to quantify the activity level during static bending cycles in LT back pain patients compared to 35 able-bodied controls. The results: All functional phases seen in raw EMG were also shown in surface RMS EMG. Surface RMS EMG pattern seems to yield more information from activity level than IM EMG pattern. The RMS EMG patterns of back pain patients differed from those of controls as follows: (1) There was clearly noticeable activity during standing in back pain patients. (2) There was only a partial decrease of EMG activity after flexion in back pain patients with current pain. (3) The ratio of mean reached at maximal activity level during flexion and extension was less in patients (1.8, SD=0.5, p<0.01) than able-bodied controls (3.2, SD=0.8). (4) Segmental differences were observed in IM EMG activities in patients having hypermobility in bending x-ray. (5) Large peak potentials occurred during movements in patients having segmental hypermobility. The results indicate that averaged surface recording is a valuable tool in the investigation of dynamic joint functions in back pain patients.

Conclusion: When evaluating for back pain, both Needle and Surface readings correlated highly with back pain, but Surface EMG is non-invasive.

Table of Difference between Needle and Surface Electromyography

<table>
<thead>
<tr>
<th>Features</th>
<th>Needle EMG</th>
<th>Surface EMG</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Studies on Pubmed</td>
<td>2,390</td>
<td>9,731</td>
<td></td>
</tr>
<tr>
<td>Purpose</td>
<td>Evaluate for nerve damage</td>
<td>Evaluate for muscle guarding and patterns of activity associated with soft tissue injury</td>
<td>Due to difficulty placing needle electrode beneath skin 2 x in a row?, reproducibility of needle EMG is not as good as surface EMG.</td>
</tr>
<tr>
<td>Reproducibility</td>
<td>0.22 - 0.62</td>
<td>0.65-0.97</td>
<td></td>
</tr>
<tr>
<td>Performance During Motion Studies</td>
<td>Poor. Needles are displaced during movement and lose their positioning</td>
<td>Excellent. Surface electrodes do not displace during movement and remain positioned near the source of muscular electrical activity</td>
<td></td>
</tr>
<tr>
<td>Pain Induced by Testing</td>
<td>High. Reserved for nerve damage studies. Discomfort of testing negates its use for evaluating muscle guarding</td>
<td>None. Suitable for evaluating patients with cervical, thoracic or lumbar pain, and measures muscle guarding</td>
<td></td>
</tr>
</tbody>
</table>

CONCLUSION: Needle EMG is used to evaluate nerve damage. Surface EMG is used to measure muscle activity as a response to pain and injury.

Both are valid tools for their intended purposes. One is not better or worse than the other. Needle EMG is painful, and cannot be used for evaluating muscle guarding. Also, needles move in relation to muscle fibers during motion testing.

Why do insurers refer only to “paraspinal scanning sEMG in their policies?”

Insurers are well aware that there are two tools with very similar names. Paraspinal Surface EMG is a Chiropractic tool with less research associated with it. DynaROM Motion sEMG on the other hand uses attached electrodes, and is extremely well researched. They speak only of Static sEMG because it is then easier to make negatives statements due to less research on the test. It is still a valid measure, but not as well researched as motion sEMG.
<table>
<thead>
<tr>
<th>Paraspinal Surface EMG (Static sEMG)</th>
<th>DynaROM Motion sEMG. (Established as valid)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured in the neutral posture using handheld electrodes as like a stethoscope for muscle activity.</td>
<td>Measured in motion with attached electrodes.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Track patient progress, quick “photo” of muscle tension patterns</td>
</tr>
<tr>
<td>Instrument differences? Handheld vs. attached electrode. Standing Neutral vs. in Motion.</td>
<td></td>
</tr>
<tr>
<td>Graphic Output: Static shows bars which demonstrate levels of muscle tension along the spine. DynaROM: shows graph of muscles firing as patient moves along with Range of Motion (also graphed).</td>
<td>Static is like a photograph. Dynamic is like a Video. Dynamic is a more functional test.</td>
</tr>
<tr>
<td>Sensitivity to user error</td>
<td>Moderate</td>
</tr>
<tr>
<td>Terms used to describe</td>
<td>Paraspinal sEMG, Static sEMG, Paraspinal Scanning sEMG. Scanning SEMG.</td>
</tr>
<tr>
<td>Research studies (approximate)</td>
<td>150</td>
</tr>
<tr>
<td>Trick used by insurers to discredit</td>
<td>They hope you don’t know the difference between these two.</td>
</tr>
<tr>
<td>Value</td>
<td>Excellent as an electronic form of palpation. Great for tracking progress over time.</td>
</tr>
</tbody>
</table>

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