Motion Browser: Visualizing and Understanding Complex Upper Limb Movement Under Obstetrical Brachial Plexus Injuries

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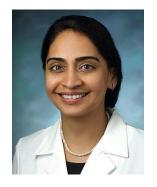
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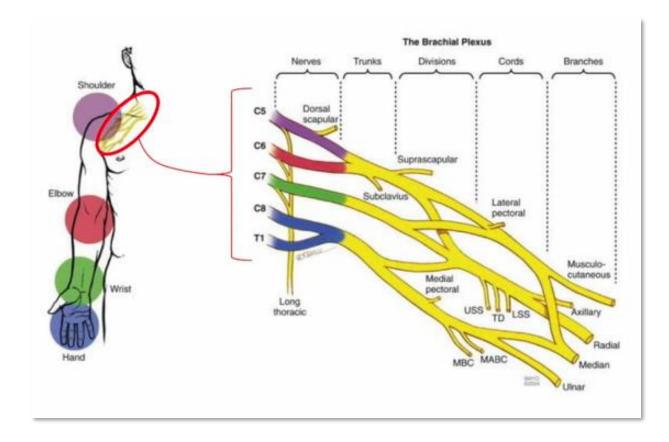
Development of Novel Technology and New Treatments for Muscle Stiffness, Emotional Regulation and its Interaction with Recovery



Viswanath Aluru, University Of Illinois Hospital Health & Science Center

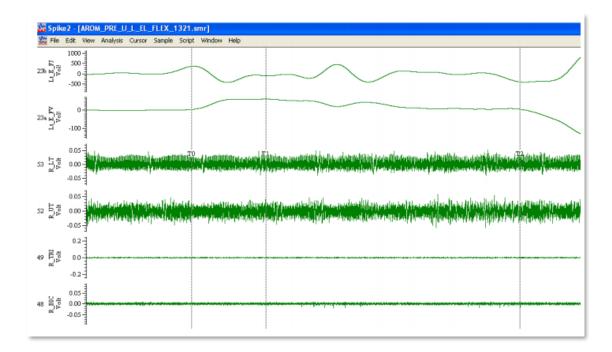
Introduction

Obstetrical Brachial Plexus Injuries



Introduction

Current Tools





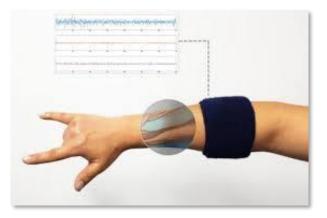
(b)

Introduction

Active Range of Motion Assessment



Electromyography(EMG) signals of muscle activations





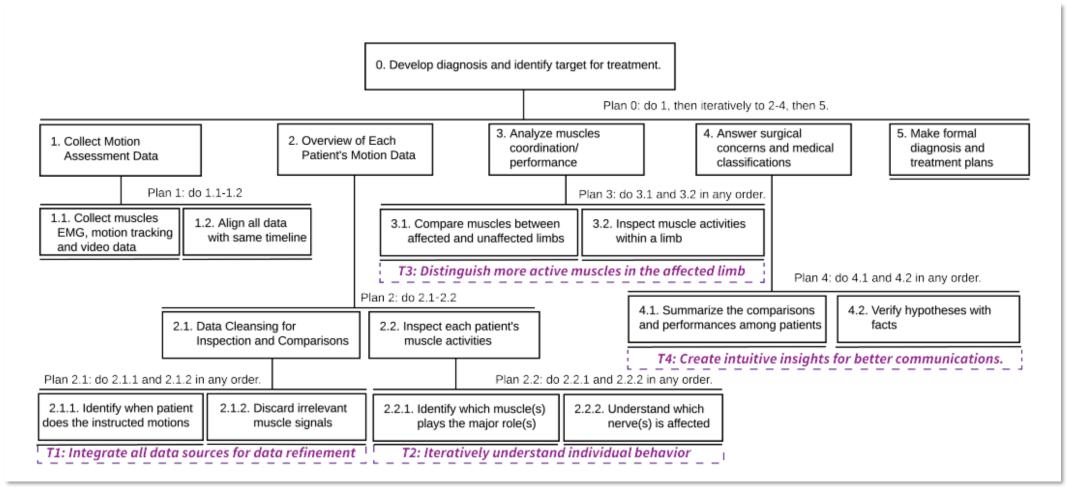
Motion sensors recording limb displacement



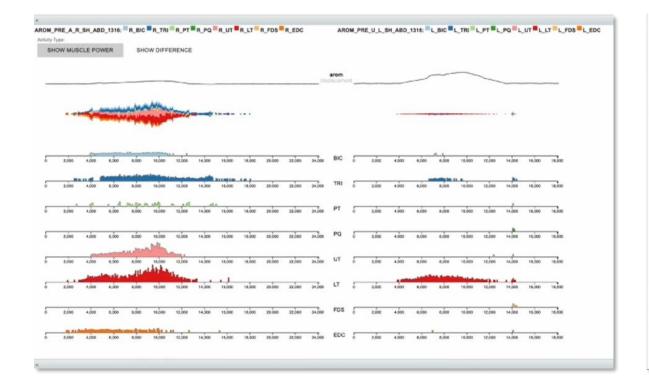
Video recordings



Task Abstraction



Task and Design Task2: Overview of Each Patient's Motion Data



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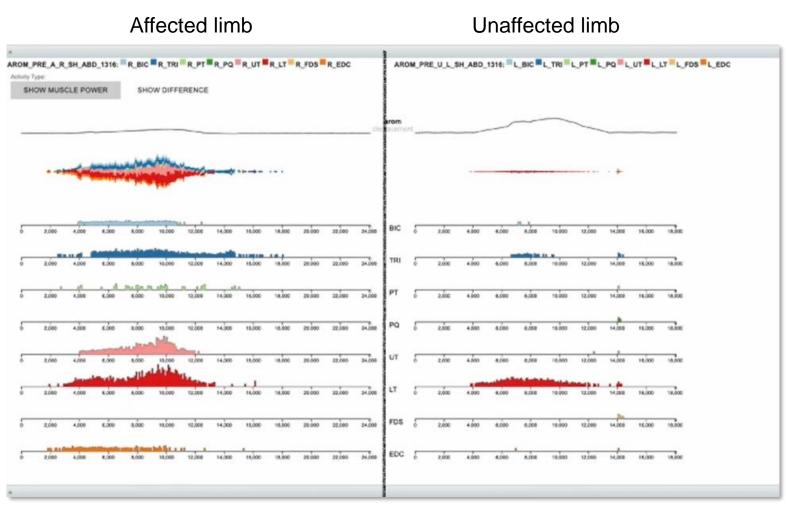
 (a) Patient A
 (b) Patient B

 Image: BIC, TRI (二头肌)
 Image: UT, LT (斜方肌)

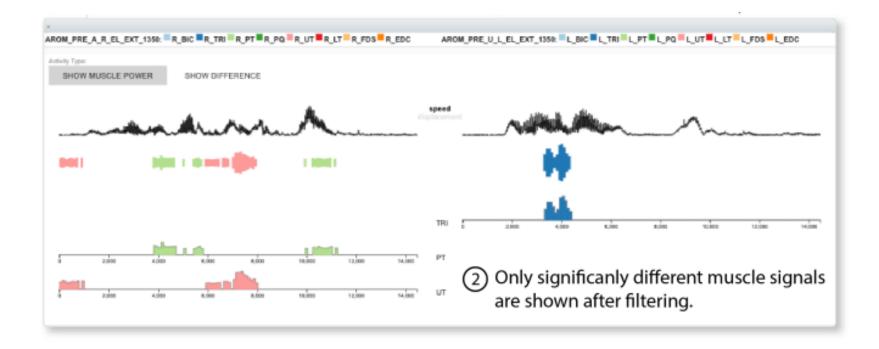
 Image: BIC, TRI (二头肌)
 Image: DT, PQ (旋前方肌)

 Image: BIC, TRI (二头肌)
 Image: DT, PQ (旋前方肌)

Task3: Analyze muscles coordination



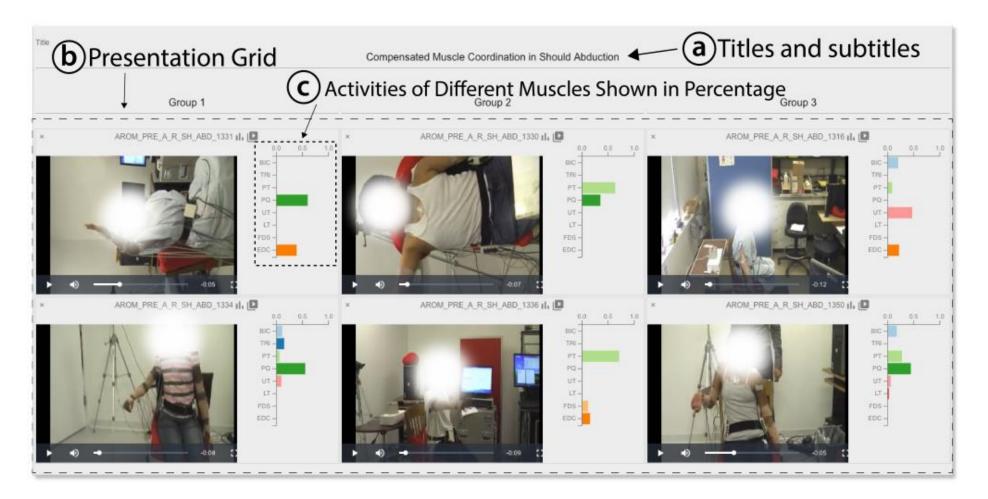
Task3: Analyze muscles coordination



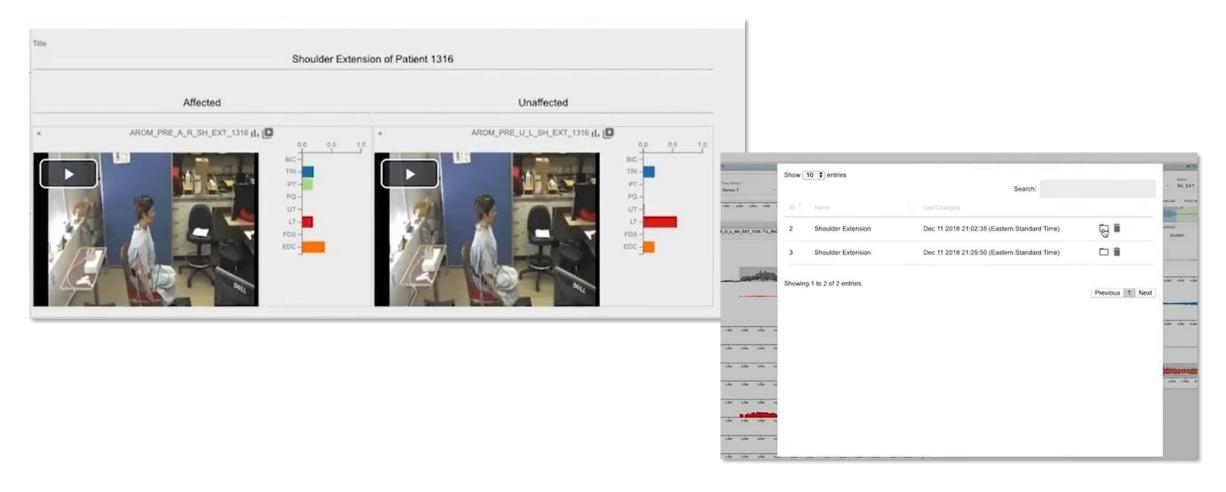
Task4: Verify hypotheses with facts



Task5: Summariza the comparisons among patients



Task6: Better Communications



Case Study

Usefulness of Trapezius Muscles (pink and red) on Shoulder Motion



Case Study

Usefulness of Trapezius Muscles on Shoulder Motion



Patients not using trapezius muscles

Case Study

Usefulness of Trapezius Muscles on Shoulder Motion



Patients using trapezius muscles

Pros

1. Shortening physicians' cycles of analyzing each patient.

2. It can be easily adapted for othersimilar problems, such as adult motion analysis or sports injury analysis.

Cons

- 1. It is unrealistic to attach hundreds of sensors to the patient.
- 2. Perception of noticeable differences between colored signals will

diminish when there are more than 12 lines.

Thanks!