

Evaluation of a Novel Push Task for Shoulder Function Assessment in Breast Cancer Survivors After Reconstructive Surgery

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Introduction

On average, over 80 Canadian women are diagnosed with breast cancer every day. Treatment is often followed by reconstructive surgeries, which can lead to longer term musculoskeletal issues. Research has shown that survivors elicit unique upper body muscle activations and kinematics. Typically, ergonomics-related functional tasks are used to assess women who have undergone reconstructive surgery, but lifting is often the only loaded task. A novel functional push task has been developed by the authors, and this study aimed to evaluate this task in comparison to a standard overhead lift in breast cancer survivors. Ten women (Age: 35-68 years), who had previously undergone breast reconstruction surgery more than six months ago and experienced no shoulder pain, were analyzed from a larger dataset. Participants completed a Work-Related and Functional Tasks protocol, which included the standard overhead lift task and the novel horizontal push task from a seated position. Electromyography (EMG) data from the infraspinatus and pectoralis major muscles were recorded from both the dominant and non-dominant

arms along with 3D kinematics of the humerus. Applied force from the push was recorded using a handheld dynamometer. EMG expressed as a percent of maximum voluntary contraction was calculated along with the co-contraction index (CCI) between the muscles. Humeral elevation and rotation were calculated. CCI, EMG and humeral rotation were compared between the lift and push at similar elevation levels using a repeated measures ANOVA with task and arm as factors. The relationships between the variables and load were explored with correlations. Humeral rotation was found to be significantly different ($p < 0.05$) between the tasks, with more internal rotation in the push. CCI were similar between tasks, but absolute muscle activity for both muscles was significantly higher ($p < 0.05$) in the lift task. No between-arm (dominance) effects were observed. CCI, EMG and kinematics were not correlated with load in either the push or the lift tasks. This exploratory study found the addition of the loaded push task could be valuable as it resulted in different kinematic and muscle activation patterns in comparison to the lift. Future work will include other breast cancer survivors who do experience pain and comparisons between participants with different surgery types.

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