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Response to Beaudreuil and Orcel regarding: "Increased co-contraction of arm adductors is associated with a favorable course in subacromial pain syndrome"☆

In reply:

We thank Beaudreuil and Orcel for their letter to the editor and their thoughtful analysis of our recent article on the association between co-contraction of arm adductors and the course of complaints in subacromial pain syndrome (SAPS).[7] In agreement with our findings, the authors state that co-contraction of arm adductors should be considered in physical therapy for SAPS and support this statement with 2 of their own clinical studies that showed a beneficial effect of dynamic humeral centering exercise therapy.[1,2] Using electromyography (EMG), we showed that increased co-contraction of the teres major and latissimus dorsi (ie, humeral depressors) was associated with a favorable course of complaints in SAPS whereas co-contraction of the pectoralis was not.[7] Beaudreuil and Orcel suggest that the modality of assessment could have explained why no association was found for the pectoralis major. They secondly note that it also would have been interesting to review the selective activation of adductors during abduction, next to the presented activation ratios. To this end, we would like to refer the authors to the raw data of agonistic and antagonistic activity presented in the original article.[7]

We would like to briefly elaborate on why co-contraction was presented using activation ratios. Analyzing the magnitude of out-phase EMG amplitude severely hampers comparability between patients, and therefore, it is preferable to normalize EMG output. This may be done using the maximum voluntary contraction; however, previous studies have shown that this standardization in patients is limited as well, for example, because of its unpredictability when pain is present.[6] To circumvent this, we expressed the muscle's antagonistic activation (co-contraction) relative to the same muscle's degree of agonistic activation, which is proved reliable.[3,4,8] The assumption underlying this calculation that the adductors' agonistic activation remains unchanged—and thus that lower activation ratios indicate more antagonistic activation—was confirmed by also analyzing the raw antagonistic EMG signals, as presented in the original article.[7]

Beaudreuil and Orcel remark that if the EMG assessments were performed with the arm in internal rotation, instead of external rotation, a positive association between pectoralis major co-contraction and the course of complaints could have been found. In their previous study, they have shown a positive effect of exercising pectoralis major co-contraction in patients with SAPS, although this was not verified with EMG assessment.[1] As discussed in our article, the negative findings on co-contraction of the pectoralis major may have been explained by the testing position with the arm at the side.[7] Indeed, as has been shown before, assessment of pectoralis major co-contraction is limited in this position because the pectoralis major hardly has any depressor capacity, in contrast to an assessment with the arm elevated.[5,8] It is interesting that Beaudreuil and Orcel suggest that not the testing position with the arm at the side but rather the external rotation of the arm may have explained why no co-contraction of the pectoralis was found, because, as they state, this is not the rotation associated with SAPS. Irrespective of the rotation of the arm, with the arm at the side, the force vector of the pectoralis major is directed medially, instead of mediocaudally, and therefore, we do not think that the rotation of the arm is most relevant here.

We again thank Beaudreuil and Orcel for their interest and their previous studies on the effect of humeral depressors in SAPS, in which they provided clinical prove for humeral depressor exercises.[1,2] We hope that future studies with EMG-guided exercises of humeral

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depressors will provide more insight into the clinical usefulness of increasing co-contraction of humeral adductors.

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