Weight Training Modifications for the Individual With Anterior Shoulder Instability

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SUMMARY

THE FITNESS BENEFITS ASSIGNED TO WEIGHT TRAINING (WT) ARE WELL KNOWN; HOWEVER, PARTICIPATION IS NOT WITHOUT RISK. COMMON WT EXERCISES OFTEN PLACE THE SHOULDER IN UNFAVORABLE POSITIONS SUCH AS END-RANGE EXTERNAL ROTATION (HIGH-FIVE POSITION), PREDISPOSING THE SHOULDER TO ANTERIOR INSTABILITY. THIS COLUMN PRESENTS WT EXERCISE MODIFICATIONS DESIGNED TO MITIGATE ANTERIOR SHOULDER INSTABILITY.

INTRODUCTION

The popularity of weight training (WT) is evident by more than 45 million Americans who engage in strength training regularly (3). The Centers for Disease Control analyzed data from the National Health Interview Survey and estimated that nearly 20% of adults aged 18–65 years participate in some form of resistance training 2 or more times a week (5). WT has been advocated as a means of developing musculoskeletal strength for sports, for rehabilitation of injuries (2), and for various health and fitness benefits (1,4). The health and fitness benefits ascribed to WT are well known; however, when considering the shoulder joint complex, these benefits are not obtained without risk. A survey of 60 recreational WT participants revealed that 60% had reported shoulder pain during the course of WT in the past year, whereas 28% had pain during WT in the past 3 days (9). Research indicates that up to 36% of WT-related injuries and disorders occur at the shoulder joint complex (6,8,10) with anterior shoulder instability often described as a causative diagnosis (7,11).

SHOULDER INSTABILITY

Shoulder instability may be defined as “an inability to maintain the humeral head centered in the glenoid fossa” (13). Thus, anterior shoulder (glenohumeral joint) instability is described as excessive translation (movement) of the humeral head anteriorly (forward) on the glenoid fossa. The etiology of anterior instability is multifactorial and includes a number of entities that may present alone or in combination. Examples include traumatic external rotation, muscle imbalances, and permanent elongation of the soft tissue (ligaments and capsule) that functions to maintain the joints position (12). The susceptibility of the shoulder joint complex to anterior instability is in part because of unfavorable positioning required during execution of common WT exercises. Specifically, the abducted and externally rotated “high-five” position (Figure 1) places stress on the anterior shoulder capsule, potentially leading to anterior shoulder hyperlaxity (excessive movement) and, over time, anterior shoulder instability (5,7,11,14). Common exercises such as behind the neck military press, dumbbell press, pectoral flies using certain seated machines (Figure 1), back squats, and behind the neck pull-downs require assumption of the high-five position. Additionally, certain stretching exercises for the pectoral muscles (Figure 2a) may produce a similar strain of the anterior shoulder capsule leading to hyperlaxity and anterior instability.

REVIEW OF THE LITERATURE

Previous research studies have investigated both risk factors and the presence of anterior shoulder instability among...
WT participants. Lestos et al. (11) reported 25 cases of occult anterior shoulder instability in recreational weightlifters during a 1-year period. All 25 patients reported pain in the "high-five" position. Gross et al. (7) identified anterior shoulder instability in weightlifters and postulated that the high-five position frequently assumed during exercise was a contributing factor. In the aforementioned investigation, all the subjects reported pain when assuming the "high-five" position and particularly during WT activities such as chest flies and bench press. Kolber et al. (9) investigated anterior shoulder hyperlaxity and instability in a group of 60 WT participants and identified anterior shoulder hyperlaxity in 77% of WT participants compared with 23% in control group. Additionally, 22% of the WT participants had positive clinical testing for anterior shoulder instability.

**EXERCISE MODIFICATIONS**

The ability of clinicians and strength and conditioning professionals to recognize "at-risk" training patterns requires an awareness of documented injury trends and risk factors. Addressing modifiable risk factors, such as the high-five position commonly assumed during upper extremity exercises, may serve to prevent and/or minimize symptoms resulting from anterior shoulder instability. Modifications for some of the more common exercises traditionally requiring the high-five position, such as the pectoral stretch, behind the neck pull-down, military press, and the back squat, are illustrated.

**PECTORAL STRETCH MODIFICATION**

The pectoral stretch is often performed in the high-five position (Figure 2a). The modification recommended (Figure 2b) requires the participant to make contact with a stable surface, with the elbow extended, while rotating the body toward the opposite shoulder until a stretch is felt in the pectoral region. Participants are requested to keep their arm below shoulder height to further decrease strain on the anterior shoulder capsule.

**BEHIND THE NECK PULL-DOWN**

The behind the neck pull-down exercise (Figure 3a) places the shoulder directly in the high-five position. The modification recommended is a pull-down to the front (Figure 3b), which would minimize the unfavorable end-range position. Although one may recognize that this could be considered a different exercise, the balance between performance and injury prevention must be distinguished in the population with shoulder instability.

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Behind the neck military presses (Figure 4a) places the shoulder in the high-five position. Performance of this exercise to the front (Figure 4b) would minimize unfavorable end-range positioning and is therefore recommended. Although one may postulate that this
could be considered a different exercise and may emphasize different muscle groups, our efforts are to distinguish the balance between performance and injury prevention in the population with shoulder instability.

**SQUAT**

Execution of the rear squat (Figure 5a) requires the high-five position, thus may provoke symptoms in the individual with anterior instability. Additionally, the back squat may produce an excessive stretch to the anterior shoulder capsule. It is recommended that individuals with anterior shoulder instability use the front squat technique (Figure 5b) to avoid unfavorable shoulder positioning.

**DISCUSSION**

Individuals participating in WT are at risk for anterior shoulder instability (7,9,11). WT programs are often performance based as opposed to injury prevention based, thus predisposing both the competitive and recreational participant to increased injury risk. Improper attention to exercise technique, biased exercise selection, and unfavorable shoulder positioning required for the more common upper extremity exercises increases the likelihood of injury. Although the precise etiology of anterior instability may be uncertain, evidence is available to suggest that exercises requiring the high-five position may predispose one to anterior instability (7,11). The modifications recommended in this column may serve to mitigate symptoms associated with anterior shoulder instability.

**CONCLUSION**

The professions involved in both the prescription of exercise and the evaluation and treatment of musculoskeletal disorders must develop guidelines that optimize safety, reduce injury risk, and prevent musculoskeletal dysfunction in the WT population. Injury risk may be mitigated through changes in exercise prescription and technique. However, future investigations are needed to ensure that performance is not
compromised and to determine the true longitudinal benefit from such modifications.

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REFERENCES


