Sports Medicine Update -- Part II

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Last month, we reviewed a number of sports-related articles published in 1997. This month, we continue with several other noteworthy articles.


This article examines the usefulness of computed tomography scans with traditional cuts and reverse-gantry angled cuts in the evaluation of lumbar spondylolysis. The article re-emphasizes that pars interarticularis fractures are often the result of repetitive hyperextension in young athletes. A study that diagnosed 100 cases of low back pain (patients under 18 years) at a hospital in New England was reviewed. Forty-seven percent of patients who were sport’s active had a diagnosis of spondylolysis.

In the current article, patients who had a diagnosis of spondylolysis using a bone scan as the evaluation tool were compared with evaluation using CT (standard and reverse-gantry). This study indicated a false positive rate of 15% for bone scans. Interestingly, out of the 40 patients included in this study, 45% had chronic, non-healed fractures. Although oblique lumbar films are traditionally used for pars fracture, 18 of the subjects in this study had normal films even though they were found to be positive on CT. According to this study, the traditional approach of 6 to 8 weeks of avoiding hyperextension activities, aggressive physical therapy, and slow return to activity allowed healing of acute fractures in 48% of cases.


This study examined 36 competitive swimmers who had shoulder pain (unilateral and bilateral: total of 49 painful shoulders). They attempted to determine how many had clinical indicators of instability and/or impingement. The criteria for instability was based on both local indicators from the drawer test (excessive translation of the humeral head with passive movement), and also took into consideration any global indicators of instability (i.e. hyperextension of knees, elbows, fingers, etc.). The criteria for generalized joint laxity was based on that of Carter and Wilkinson.\(^1\) The criteria for abnormal translation on the drawer test was based on Alzchek et al.\(^2\) Thirty-nine of 49 painful shoulders had a positive impingement finding on
Athletes were also tested with the Neer test, Hawkin’s test, and painful arc for impingement. One interesting finding (supported for many of us clinically) is that the Neer test is not as sensitive as the Hawkin’s test for subacromial impingement. Specificity of the Neer test was quite high, though. Based on the Jobe and Glousman\(^3\) classification, 12 shoulders (out of 49) were classified as group 1 (impingement only), 25 were group 2 (impingement secondary to underlying instability), 8 were group 3 (impingement with generalized joint laxity), and 4 were group 4 (anterior instability without impingement).


Backward walking and running are becoming increasingly utilized in rehabilitation programs for the knee and by the general public in search of a "new" way to exercise. Previous studies have shown an increase in both quadriceps strength and power. This specific study measured oxygen uptake, expired ventilation, heart rate, and perceived exertion with seventeen volunteer males. The study indicates that with a given elevation (0% to 5% elevation of the treadmill), backward walking resulted in greater cardiorespiratory, metabolic, and perceived exertion responses than did forward walking and that backward walking at 5% elevation (3.5 mph) is sufficient to maintain cardiorespiratory fitness. Interesting references in this article call attention to the differences in backward walking from forward walking on the quadriceps. With backward walking, the quadriceps work isometrically as a knee stabilizer while firing concentrically as an accelerator. The authors also feel that backward walking may be an excellent rehabilitation strategy following anterior cruciate reconstruction due to the closed chain aspect and the observation that knee flexion is gradually increased with an increase in treadmill elevation.


This article reviews the concepts of shoulder impingement and makes some interesting inferences. The first is that with abduction of the arm with internal rotation, the arm can be abducted to only about 75 degrees (if you eliminate scapular rotation or "shrugging" effects). With external rotation, the 45 degree angle between the axis of the humeral head and that of the axis of the shaft is moved out of the coronal plane, automatically straightening the angle and adding the 45 degree angulation to the existing 75 degrees accomplishing a sleight of hand. In other words, it appears that the arm has been elevated to 120 degrees of abduction when in fact it is due to the elimination of the angle between the humeral head and shaft.
Jobe also points out that to avoid impingement, the greater tuberosity must clear the glenoid rather than the acromion. He feels that "impingement" may occur more as superior glenoid and labrum contact with the internal fibers of the rotator cuff and greater tuberosity. This occurs in shoulders with and without indicators of instability. Jobe describes several structures at risk of injury:

1. the internal fibers of the rotator cuff;
2. the superior labrum and biceps origin;
3. the greater tuberosity and posterosuperior glenoid; and
4. tension on the inferior glenohumeral ligament and labrum complex.

It is also interesting to note that a similar theory is used to explain why patients experience relief with the relocation test (pain felt initially on a supine apprehension test). In other words, the anterior to posterior pressure used in the relocation test removes posterior impingement by repositioning the humeral head in relation to the glenoid.


This retrospective study evaluated the long-term effects of three forms of nonoperative management of primary patellar dislocation. In general, it was found that a posterior splint was the most effective approach as compared to a plaster cast or patellar bandages or braces. The patients who had the most restrictions in knee joint movement following treatment were those treated with plaster casts. There were fewer recurrent dislocations and fewer reports of patellofemoral pain or subluxation in those treated with a posterior splint. Redislocators did better with surgery than those treated conservatively.


The authors attempted to determine if EMG activity changed with changes in knee flexion and also with external rotation of 30 degrees while performing a squat. Using 25 healthy, untrained subjects, surface EMG and motion analysis were used to measure any significant changes. Generally, they found no difference in EMG activity when subjects performed with the lower extremity turned out 30 degrees. They did find that peak activity in the vastus lateralis, vastus medialis, and biceps femoris groups occurred between the 50-60
degree and 60-50 degree arc of knee flexion during descending and ascending phases respectively. The most activity was during the ascending phase. Peak activity of the semimembranosus and semitendinosus occurred during the ascending phase during the 20-10 degree arc of motion. Their results demonstrated lower muscle activity of the quadriceps during the descending (eccentric) phase compared to the ascending (concentric).


Although there are numerous studies that have evaluated concentric muscle strength of the shoulder, this study attempts to determine the ratio of strength between internal and external shoulder rotators. Realizing that muscles function together in an agonist/antagonist or eccentric/concentric couple, the authors wanted to determine the ratio of strength in this balance; in particular, at end range. Generally, they found that at end range (60-90 degrees) for medial rotators (contracting eccentrically) and lateral rotators (contracting concentrically) the ratios were 2.39:1 and 2.15:1 for the dominant and nondominant shoulders respectively. Ratios for lateral rotators contracting eccentrically and medial rotators contracting concentrically at end range (10 degrees of lateral rotation-20 degrees of medial rotation) were 1.08:1 and 1.05:1 for dominant and nondominant shoulders respectively.

This data is important for two reasons. First, it emphasizes the need for eccentric training, especially for the medial rotators during external rotation. Secondly, it may help to establish baseline normals that could be used for the standard for pre-participation screening or post-injury rehabilitation determinations of return-to-play criteria.

References
