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Return to Throwing Exercises

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What is the purpose of a **PRE**-throwing exercise program?



- Gradually get healing tissue accustomed to stresses of throwing.
 - During the acceleration phase of throwing, peak angular velocity can reach >7000°/s with medial shear force of 300N and compressive force of 900 N. (Fleisig, et al, AJSM, 1995)
- Prepare the legs, hips, trunk/core to share the load.
 - Kibler, 1995 reported that 54% of the total force generated in a tennis serve was created by the lower legs, hip, and trunk.



Purposes of **Pre**-Throwing Program

- Maintain flexibility and ROM as new stresses are applied to healing tissues.
 - Key areas include:
 - posterior shoulder/cuff
 - pec. minor
 - neural mobility
 - hip IR/ER, hip extension

* Tippet, JOSPT, 1986.





Purposes continued...

- Initiate exercises & drills that will:
 - Enhance power & endurance i.e. Plyometrics
 - Perform functional patterns
 - Begin aggressive strengthening
 - Begin throwing activities


When to begin a **PRE** throwing program

- Adequate ROM at shoulder: GIRD $\leq 20^\circ$
- Non-painful, full ROM at any post-surgical joint
- Good strength (at least 4/5) of UE
- (-) impingement tests: ABER, Hawkins-Kennedy, Neer
- Appropriate rehabilitation progress
 - Typically, the athlete will have approximately 4-6 weeks of "foundation strengthening" pre-throwing exercises.



Importance of Core/Hips/Legs

- Tippet (JOSPT) studied LE strength and AROM in Collegiate baseball players and compared STANCE leg vs. KICK leg.
- ROM findings: Kick leg = greater hip flexion; Stance leg = greater IR, PF, and hip extension
- Strength findings: Kick leg = greater hamstring strength; Stance leg = greater hip ER strength



Active Warm-up

- Jogging, high knees, butt kicks, multiplaner lunges.
- Kettlebell-engages the UE, LE, and trunk
 - Squat to reach
 - Trunk rotations
 - Woodchops

Stretching/ROM

Wilk et al, 2009 (Sports Health, Mar/Apr)



Forearm flexors stretch



Sleeper stretch




Lunge with trunk rotation-good for hip IR and core stability.



Pec minor stretch

Aggressive Strengthening

- Utilize closed chain and open chain exercises.
- Serratus Anterior
- Lower Trapezius
- Middle Trapezius
- Rotator Cuff-remember this muscle group is NOT designed for power...it's primary function is to centralize the humeral head in the glenoid.
- Eccentric training to bicep and cuff; concentric training to tricep, f/a flexors



Aggressive Strengthening




Serratus Anterior




Lower Trapezius
Reinold et al, 2009

- Serratus anterior can effectively be trained with closed chain exercises i.e. prone planks (in protracted position), pushup plus. Open chain option: serratus punch to 120°.
- Lower trapezius-prone Y on physioball, prone ER at 90° abd, tubing "W".


Aggressive Strengthening-Isotonics




Prone "T"



Prone "Y"



Physioball "W"



2-arm High

Functional Patterns: Isolate then Integrate

- Try to recruit whole-body motor patterns that work together to allow motion at one body part, while maintaining stability at other parts
 - Alter base of support (sitting, standing, unilateral balance)
 - Unstable surfaces (physioball, foam)
- The normal pattern of throwing can be reproduced by using diagonal patterns, involving trunk rotation, centered over a stable leg (Kibler et al, 2008).

Isolate then Integrate...

Combo Flexion-Extension

SQUAT TO "W" (step 1)

SQUAT TO "W" (step 2)

Isolate then Integrate

Single leg-1 arm row (step 1)

Single leg-1 arm row (step 2)

Single Leg Throwing Motion

Core/LE diagonal patterns

The normal pattern of throwing can be reproduced by using diagonal patterns, involving trunk rotation, centered over a stable leg (Kibler et al, 2008).

Closed chain exercises for scapula and trunk

- Protraction/Retraction
- Work core stability as well as scapular strength and neuromuscular control.

Endurance and stabilization of trunk and hips

- Ekstrom et al, 2007 found the following exercises to produce at least 45% max. voluntary isometric contraction (using surface EMG): bridging, SL bridge, side plank, prone plank, quadriped arm/leg lift.


Scapular protractors, serratus ant, external obliques and gluteus medius

Plyometrics


- A fast, powerful movement utilizing a pre-stretch of the muscle followed by a shortening, concentric muscle contraction (Wilk, et al 1993).
- Several studies have shown plyometrics to be beneficial to enhancing power production leading to improved performance in overhead sports (Schulte-Edelmann, et al 2005).
- TIME FRAMES: Both Swanik et al and Fortun et al, reported improvements in UE function after a 6 and 8 week plyometric programs, respectively.

Plyometrics: Two handed


Soccer throw




High Side Oblique Throw



Side to Side Throw



Low Side Oblique Throw




Why we MUST include endurance drills in our program


- Lyman et al (AJSM 2002) reported a higher incidence of shoulder injuries in pitchers who complained of muscle fatigue while pitching.
- Humeral head migrates superiorly with arm elevation when cuff muscles are fatigued (Chen, et al 1995).
- Examples include:
 - Plyoball: wall dribbling, wall arcs, wrist flips, etc
 - Upper body cycle
 - Isotonics using light weights with 5 second hold (I,T,Y's)

1- handed Endurance Drills


Wall Dribble




Wall Arcs




Wrist flips



Wrist flips



ER/IR w/ rebounder



Example

- 19 y/o RHP
- Diagnosis: Internal Impingement, IRD = 40 degrees, with intermittent neural symptoms, scapular dysfunction.
- Athlete had 8 weeks of physical therapy and active rest from pitching.
- Has been cleared to begin PRE-Throwing program.

Joe Smith's program

■ Active warm-up:

- Kettlebell
 - Squat & reach 3x10
 - Horizontal rotation 3x10
 - Woodchops each way 3x10

■ ROM/stretches:

- Sleeper stretch
- Manual IR stretch
- Median nerve glides at wall (1 set of 25)
- Walking lunges with trunk rotation

Joe Smith's program continued...

- Plyometrics:
 - 2-handed:
 - Chest pass
 - Side to side toss to rebounder
 - Overhead toss
 - Wrist flips with plyoball (reverse flips)
 - Eccentric ball catch-n-release in 1/2 kneeling.
- Isotonic "foundation" program (some use Thrower's Ten)
 - Tubing/bands: squat to low row, squat to "W", step with ER, Single leg 1 arm row, lawnmower with ER @ 90 deg.
 - Closed chain/core protraction/retraction, side planks, SL bridge up
 - Physioball W, T, Y
 - 2-3x10 with 5 second hold
 - 0-3 lb weight

Program advancement

- Move from 2 handed to 1 handed
- Perform plyos at middle to end of program to work on endurance
- Add repetitions, sets, weight to ball
- Perform ex's on physioball or foam for added core/trunk control
- Add exercises to work on explosiveness/power, but be sure to **incorporate trunk and legs** i.e. Keiser machine

**Tailor the PRE-
Throwing program to
your athlete's needs.**

THANK YOU

