Volleyball Spike

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Objectives of a Volleyball Swing

- Achieve maximum vertical height through the approach to the net
- Swing at highest contact point
- Generate as much arm swing as possible driving through the ball after hitting contact point
- After achieving highest contact point, hit the ball over the net and over the block to desired location
Facts

- Men spike record: 82.02 mph
- College men average spike: 50 – 60 mph
- Women spike record: 64 mph
- College women average spike: 45-55 mph
- Highest vertical jump: 50 inches Leonel Marshall
- An elite college volleyball player will perform 40,000 or more hits in one year
Characteristics of a Volleyball Spike

- The approach
- Take-off
- Arm swing
- Timing/placement of hit from set
- Velocity of different hits
Real Life Volleyball Swing
Steps to Hitting the Ball

1. 1st Step: Approach
2. 2nd Step: Take off / Arm swing
3. 3rd Step: Takeoff / vertical jump
4. 4th Step: The Spike
Step 1: Approach

- **Muscles used:**
  - **Lower Body**
    - Knee extenders (Quadriceps, hamstrings), knee joint, ankle joint, gluteus maximus, hip flexors, calf, anterior tibial
  - **Upper Body**
    - Shoulder joint, shoulder girdle, latissimus dorsi, elbow, trapezius, anterior/posterior deltoids, triceps
Step 1 Continued…

- Forces Used
  - Knee flexion and extension
  - Elbow flexion and extension
  - Shoulder abduction
  - Hip flexion
Step 2: Take off

- **Muscles used:**
  - **Lower Body:**
    - Knee extenders (Quads, hamstrings), hip flexors, gluteus maximus, calf, anterior tibial
  - **Upper Body:**
    - Shoulder joint, shoulder girdle, latissimus dorsi, elbow, trapezius, anterior/posterior deltoids, triceps
Step 2 Continued…

- Forces used:
  - Trunk flexion with forward rotation
  - Upper body forward rotation
  - Shoulder forward rotation
  - Elbow extension
Step 3: Load

- Muscles used:
  - Upper Body:
    - Shoulder joint, shoulder girdle, elbow, anterior/posterior deltoids, biceps, triceps, latissimus dorsi
Step 3 Continued…

- Forces Used
  - Shoulder abduction
  - Elbow flexion
  - Shoulder girdle downward rotation
Step 4: Follow Through

• Muscles used:
• Upper Body:
  • Shoulder joint, shoulder girdle, elbow, anterior/posterior deltoids, biceps, triceps, latissimus dorsi, pectoralis major, rectus abdominis, external oblique
Step 4 Continued…

- Forces used
  - Abdominal contraction
  - Shoulder adduction
  - Elbow extension
Step 5: Landing

- Muscles used:
  - Lower Body:
    - Knee extenders (Quads, hamstrings), hip flexors, gluteus maximus, calf, anterior tibial
Step 5 Continued…

- **Forces used:**
  - Hip flexion
  - Knee flexion
  - Plantar flexion
Angles

- **Shoulder external rotation**: 163°

- **Arm acceleration phase**:
  - Maximum elbow extension angular velocity: 1666 °/s
  - Maximum shoulder internal rotation angular velocity: 2594 °/s

- **Ball contact phase**
  - Shoulder abduction: 130°
  - Elbow flexion angle: 34°
Slow Motion Volleyball Swing

- https://www.youtube.com/watch?v=FMtUqoxfR50
Movements of Swing

- Extension movement of volleyball players in the backswing step is more vertical
- The acceleration of a volleyball player during a spike is on the transverse plane
- Angular width and acceleration levels are high in volleyball players
- External rotation is the most frequently used movement in the backswing phase of an overarm movement
- Volleyball players use vertical flexion more often to gain velocity for a spike
Resources

- http://web.a.ebscohost.com/ehost/detail/detail?vid=5&sid=dc7b8051-4df5-4130-9826-0d0881de0bd5%40sessionmgr4002&hid=4106&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#db=sph&AN=43581708

- http://web.a.ebscohost.com/ehost/detail/detail?vid=8&sid=dc7b8051-4df5-4130-9826-0d0881de0bd5%40sessionmgr4002&hid=4106&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#db=sph&AN=47910484

- http://web.a.ebscohost.com/ehost/detail/detail?vid=9&sid=dc7b8051-4df5-4130-9826-0d0881de0bd5%40sessionmgr4002&hid=4106&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#db=sph&AN=36968139

- http://web.b.ebscohost.com/ehost/detail/detail?vid=6&sid=a107b091-b9f6-4590-8c56-027be2a00b9d%40sessionmgr113&hid=105&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#db=aph&AN=94883542