ESSA ROADSHOW 2014

Current Concepts in Balance and Postural Stability for Athletic and Clinical Populations

LECTURE NOTES

Presented by

Elite Performance Intl.
Web: http://eliteperformanceintl.com

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Overview: What is Balance and Postural Stability (BAPS)?

Beginnings

*De Motu Animalium*, the vertical of gravity in the human body, Borelli (1679)

BAPS Neurology & Practical Reasoning:

**Sensory Input**
Afferent neurons
Senses to CNS

**Interneurons**
Sensory to Motor

**Movement**
Efferent Neurons
CNS to SkM

Proprioception

Flexibility

Joint Stability
**Functional anatomy related to BAPS and athletic performance**


**Critical thought questions**

**Review of Functional Anatomy**

Lumbo-pelvic-hip complex ↔

Muscular scaffolding ↔ ↔

*Key component:*

![Diagram of lumbo-pelvic-hip complex and muscular scaffolding]

**Three muscle slings:**

- **Self-locking mechanism:**

**Weaknesses usually found in 3 key areas.....**

1.

2.

3.

![Diagram of self-locking mechanism]

**VCP Learning Activity: 1**

**VCP Learning Activity: 2**
**Neuromuscular efficiency**

![Diagram of neuromuscular efficiency]

**Model of Lumbopelvic Stability**

<table>
<thead>
<tr>
<th>Postural Adjustments</th>
<th>External Loads</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lumbopelvic Region</td>
<td>Muscle Activation</td>
</tr>
<tr>
<td>Spinal Ligament Deformation</td>
<td></td>
</tr>
<tr>
<td>Muscle Spindles</td>
<td>Golgi Tendon Organs</td>
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<tr>
<td>Neural Feedback</td>
<td>Stability Requirement</td>
</tr>
</tbody>
</table>


**Lumbopelvic stability and sports performance:**

*Requires efficient transfer of force*

<table>
<thead>
<tr>
<th>Sports where this transfer of forces is critical</th>
<th>Sports where balance between left and right sides is crucial</th>
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<tbody>
<tr>
<td>1.</td>
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<td>2.</td>
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<td>3.</td>
<td>3.</td>
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<tr>
<td>4.</td>
<td>4.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Sports that depend almost exclusively on an athlete’s dynamic balance</th>
<th>Sports that require athletes to stay balanced while moving in relation to a moving object (a ball) or team mates</th>
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<tbody>
<tr>
<td>1.</td>
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<td>2.</td>
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<td>3.</td>
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</tbody>
</table>
What about the Postural environment?

1.

2.

3.

Key considerations

1.

2.

3.

Athletes with smaller multifidus have higher lower limb injury rates

Lumbopelvic muscle size and identification of AFL players at risk of injury

Unit Summary (Think → Pair → Share)

In pairs, discus what are the most important points from this lecture?
Current concepts in the application of BAPS exercises


Critical thought questions

ACL injury involves complex interaction of modifiable and non-modifiable factors:

Balance and Postural Stability (BAPS):
Definition.

BAPS is a integrative neuromuscular training method that develops core stability in a way that contributes to a heightened sense of lumbar spine position and pelvic orientation during dynamic movements, thereby enhancing the ability to regain stability in athletic contexts

BAPS exercise =
**Pre-Elite Youth Athletes**

**What we know:**
- Challenging an athlete's centre of gravity within their base of support may enhance ability to regain stability in athletic context:
  1. heightened sense of lumbar spine position/pelvis orientation during dynamic movements;
  2. enhancing movement preparation and functional strength characteristics
  3. most effective strategy for reducing sports related injuries in young athletes

**Force interplay:** ↔ ↔ ↔

**Elite Athletes**

**Did you know?**

50% of collegiate football players report history of shoulder pain

Laudner (2012). J Strength Cond Res, 26(3), 672-676

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**What is the most effective warm-up protocol in terms of its effect on peak power production?**


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**Motor control training effectively reduces injury rates in AFL players**

Program Design and Progression

Guidelines for BAPS Training

1. Proprioceptively rich program
2. Incorporate multi-sensory environment
3. Activity specific
4. Progressive functional continuum
5. Goal oriented

BAPS– Movement Preparation

VCP Learning Activity: 3

BALANCE AND POSTURAL STABILITY (BAPS)


BAPS: The goal of BAPS exercise is to enhance an athlete’s movement preparation strategy by improving hip/pelvis/trunk stability and coordination in an attempt to control force, maintain balance and posture, and subsequently regenerate force in the desired direction. The ideal BAPS intervention for youth athletes is of shorter duration, containing predominantly dynamic balance exercises to better simulate the challenges faced during training and competition.

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Code</th>
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<tbody>
<tr>
<td>Walking lunge with rotation</td>
<td>06209</td>
</tr>
<tr>
<td>Arabesque rotation</td>
<td>00476</td>
</tr>
<tr>
<td>Supine rotation</td>
<td>02082</td>
</tr>
<tr>
<td>Single leg bridge</td>
<td>06219</td>
</tr>
<tr>
<td>Stability disc deep squat</td>
<td>04137</td>
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<tr>
<td>Stability disc lunge</td>
<td>01022</td>
</tr>
<tr>
<td>Side prone stabilization</td>
<td>00953</td>
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visualcoachingpro®

The Future In Exercise Software...
Unit Summary (Think → Pair → Share)

In pairs, discuss what are the most important points from this lecture?

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Integrating BAPS for use in athletic and clinical rehabilitation


Who do we prescribe BAPS for? _______________________

Case Study 1.
Describe 3 functional neuro/anatomical implications of this patient due to the mechanism of injury:
1. ____________________________________________
2. ____________________________________________
3. ____________________________________________

How does the implementation of the BAPS exercises demonstrated enhance the neuro/anatomical areas you have identified demands of the injured worker’s physical tasks?
1. __________________________________________________________________________
   __________________________________________________________________________
   __________________________________________________________________________
2. __________________________________________________________________________
   __________________________________________________________________________
   __________________________________________________________________________
3. __________________________________________________________________________
   __________________________________________________________________________
Case Study 2.
Identify 2 obvious areas of performance improvement from this Olympic athlete’s profile:

1. __________________________________________
2. __________________________________________

Describe how BAPS exercises assisted in enhancing the sport-specific performance markers you identified for improvement in this Olympic athlete?

1. __________________________________________________________________________________________________________
   __________________________________________________________________________________________________________
   __________________________________________________________________________________________________________

2. __________________________________________________________________________________________________________
   __________________________________________________________________________________________________________
   __________________________________________________________________________________________________________

Discuss

“Power training is to an athlete, as an _____ is to the race car, while ________________ training to the athlete is as the suspension to the race car.

___________ is limited unless force is directed __________ through the structure during dynamic motion, in the most _________ and _________ of postures.”
Unit Summary (Think → Pair → Share)

In pairs, discuss what are the most important points from this lecture?

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Graded BAPS corrective exercise prescription


Critical thought questions

What must precede the initial design of your first exercise design? ______________________________________________________________

Why?
____________________________________________________________
____________________________________________________________
____________________________________________________________
____________________________________________________________

... Here

There...
Key aspects in BAPS program design

When to Initiate Integrative Neuromuscular Training to Reduce Sports-Related Injuries and Enhance Health in Youth?

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An Exercise Sequence for Progression in Balance Training

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¹Institute of Sport Science, Friedrich-Schiller-University Jena, Jena, Germany; and ²Institute of Exercise and Health Sciences, University of Basel, Basel, Switzerland
Unit Summary (Think → Pair → Share)

In pairs, discuss what are the most important points from this lecture?

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Interactive Learning Activities (VisualPRO)

**Learning Activity 1**
Using VisualPRO identify the 6 muscle groups above:

**Learning Activity 2**
Using the VCP anatomy tab find 5 of the muscle groups above. Develop a corrective exercise list, 1 exercise for each of the 3 key areas of weakness.

**Learning Activity 3**
Using VisualPRO find the 8 BAPS movement preparation exercises:

**Learning Activity 4**
Select a design and add two progressions and two regressions for each exercise.

**Learning Activity 5**
Select a design and divide the prepared exercises into Phase 1, Phase 2 & Phase 3 designs.
Reference List


