



1



3

Shoulder Instability

Goals of Presentation

- ✓ Is **non-operative treatment effective** for the **elite athlete or recreational athlete** following shoulder dislocation?
- ✓ What's the best treatment approach?
- ✓ Should the shoulder be immobilized?
- What's the natural history?
- Discuss post-operative rehabilitation programs for specific surgeries

What's the best treatment approach

6

Shoulder Instability

Introduction

- ✓ Most commonly dislocated major joint in body (1.7%) general population
- ✓ Higher incidence in athletes/sports
- ✓ Common clinical diagnosis
- ✓ Anterior instability – most common
- ✓ Posterior instability – exists, specific MOI & sport
- ✓ Traumatic shoulder injuries - football

Collision Sports → *Active Sports*

8

Shoulder Instability

Introduction

- ✓ ~ **10%** of all players at NFL Combine had shoulder instability
Brophy et al: MSSE '07
- ✓ **4th most common** procedure seen on FB players at NFL Combine
Brophy et al: MSSE '07
- College players- **2nd most common** shoulder injury in FB players (overall 4th most common procedure performed)
Kaplan et al: AJSM '05

9

10



11



12



13



14




15



16

Shoulder Dislocation
Acute Dislocation

- **Acute Management:**
 - ✓ A) Reduce, sling, no play
 - ✓ B) Reduce, brace, return to play
 - ✓ C) Reduce, no brace, RTP
 - ✓ D) Reduce, immobilize & no RTP play
 - ✓ E) Surgery after injury




17



20

Shoulder Dislocation
Acute Dislocation

- **Acute Management:**
 - ✓ A) Reduce sling no play
 - ✓ B) Reduce brace return to play
 - ✓ C) Reduce no brace RTP
 - ✓ D) Reduce immobilize & no RTP play
 - ✓ E) Surgery immediately



21

Laxity \approx Instability



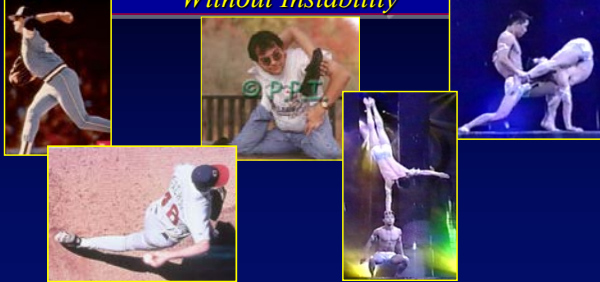
Less Motion - Symptoms



More Motion - No Symptoms

22

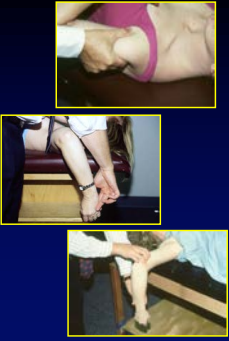
**People Have Loose Shoulders
 Without Instability**



23

Laxity: the ability to translate the humeral head on the glenoid


Instability: Clinical condition in which unwanted translation of the humerus compromises the comfort &/or function of the patients shoulder



24

Rehabilitation of Shoulder Instability
*Treatment Decisions -
 Based on Recognition*

Dislocation ← **Subluxation**



25

DISLOCATION

*Complete separation of
 articular surfaces*

*Spontaneous Reduction
 does not occur*

26

SUBLUXATION

*Complete separation of
 articular surfaces*

*Spontaneous Reduction
 (Transient)*

27

Shoulder Instability
Classification

- ✓ Onset -
- ✓ Degree of laxity -
- ✓ Type of lesion present -
- ✓ Osseous Lesions
- ✓ Frequency -
- ✓ Volition -
- ✓ Direction -
- ✓ Arm dominance -
- ✓ Age -
- ✓ Desired activity level -



28

More Than a Bankart!


**Traumatic
 Unidirectional
 Bankart lesion
 Surgery**



29

Shoulder Instability
Classification

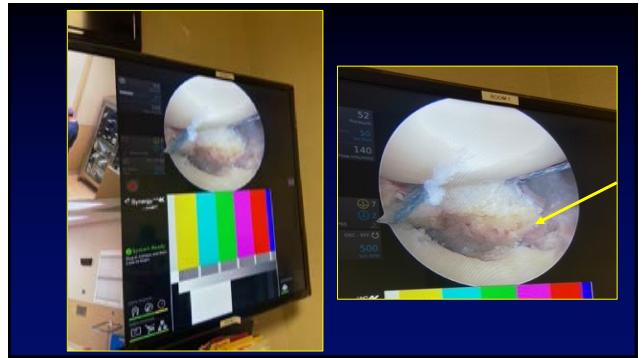
- ✓ **Onset**
 - ✓ traumatic / atraumatic / overuse
- ✓ **Degree**
 - ✓ dislocation / subluxation / silent subluxation



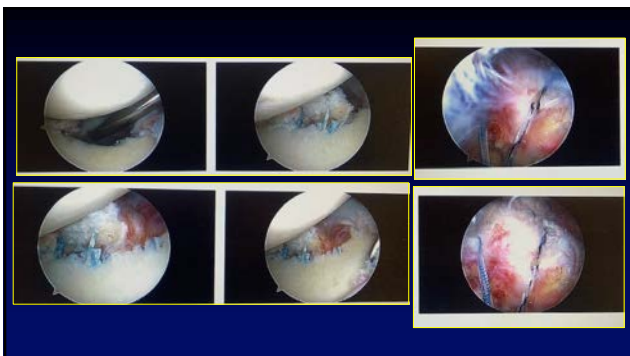
30



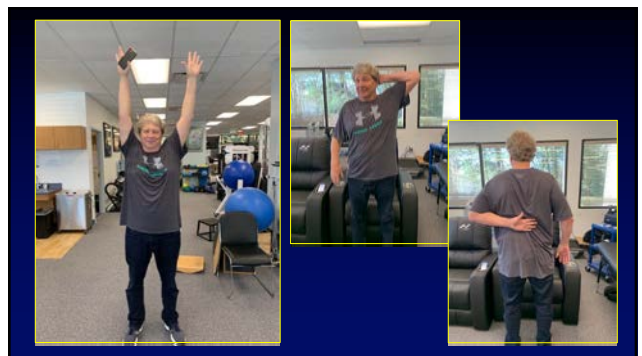
38



39






40



41

Shoulder Instability Classification



- ✓ **Dominance**
 - Dominant vs non-dominant
- ✓ **Age**
 - 19 yrs & younger
 - 19-35 yrs of age
 - 35 yrs & beyond
- ✓ **Activity Level – What Sport:**
- ✓ **Position**
 - Overhead activities
 - Below shoulder level

42

Shoulder Instability Classification

- ✓ **Timing of injury**
 - What time of year was injury sustained?
 - Early or late in season
 - Point in career
 - Year in school
 - Championship year?

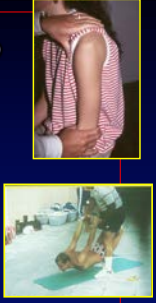
43

Traumatic
Unidirectional
Bankart lesion
Surgery



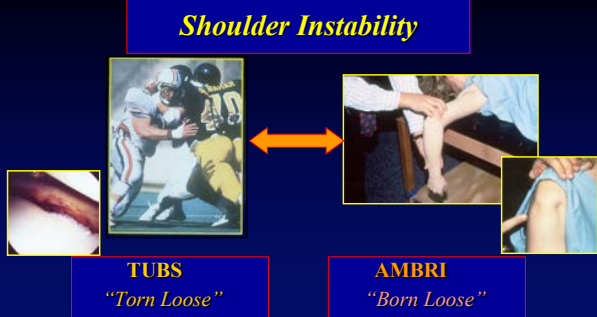
44

Atraumatic (congenital)
Multidirectional
Bilateral
Rehabilitation
Inferior capsular
shift (Plication)



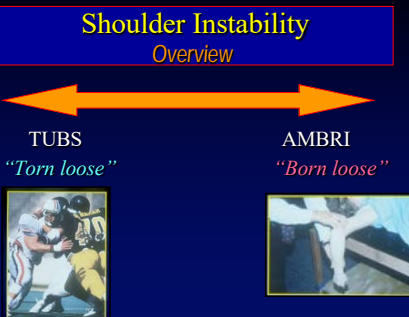
48

Shoulder Instability



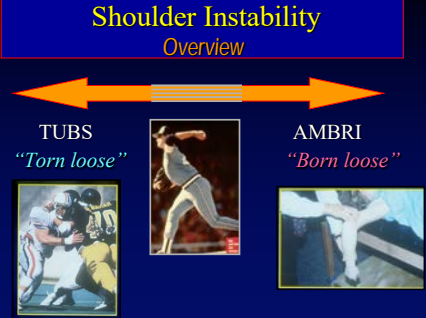
49

Shoulder Instability Overview

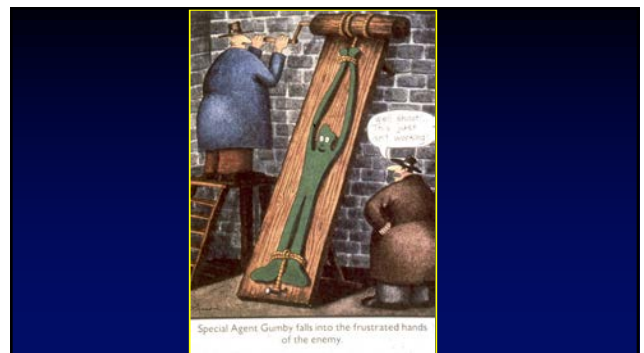


50

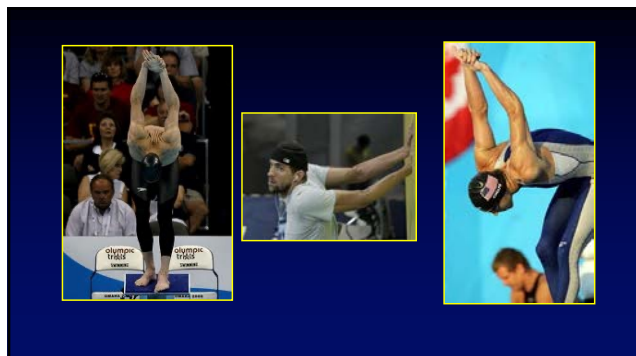
Shoulder Instability Overview



54



55



56

Acquired Instability Patterns

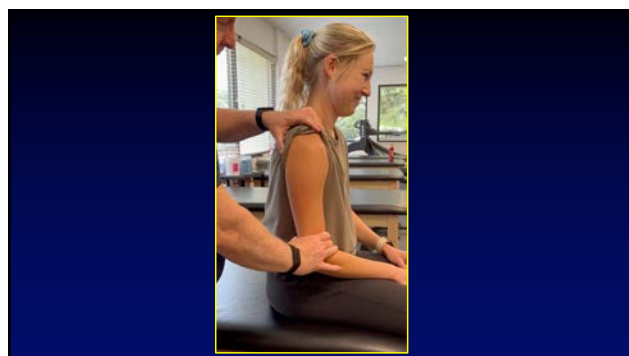
- ✓ *Congenital laxity present:*
- ✓ Ability to perform activities which excessive ROM & movements
- ✓ Repetitive motions near end range may cause laxity to increase

Dr James Andrews

58



59



61

Examination Under Anesthesia

Anterior **MDI** **Posterior**

65

Shoulder Instability

In-Season Injuries

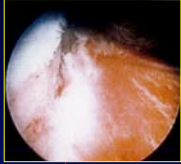
Buss et al: AJSM 2004

- 30 athletes dislocation/subluxation
- Rehab, brace & play
- ✓ 26/30 returned avg. 10 days
- 4 required surgery (in-season)
- 16 surgery @ end of season
- ✓ 20/30 (66%) required season within 6 mos.

66

Taylor, Arciero: AJSM '97


- 116 first time anterior shoulder dislocations in 112 men & 4 women (mean age 19.6 yrs)
 - 53 chose non-op treatment
 - 63 elected to have surgery
- 97% patients surgery complete detachment capsulolabral complex
 - » 1 patient HAGL & 1 interstitial tear capsule intact labrum
- ✓ 53 patients treated non-operatively – 90% developed recurrent instability
 - ✓ 4 weeks immobilization
 - ✓ Supervised rehab & no athletic participation 4 months



67

Hovellius et al.: JBJS '08

- 257 patients (age 12-40 yrs)
 - ✓ Average follow-up 25 yrs
- Prospective multi-center
- ✓ All treated non-operative rehab:
 - ✓ 99 (43%) no recurrence
 - ✓ 17.7% only one occurrence
 - ✓ 50% multiple recurrences
- Surgical stabilization:
 - » 44/115 (38%) ages 12-25
 - » 16/90 (18%) ages 26-40



68

Shoulder Instability
Natural History: Recurrence Rates



Rowe:	<20 yo	94%
McLaughlin:	<20 yo	95%
Henry:	17-23 yo	90%
Simonet:	athletes <30yo	82%
Aciero:	17-24 yo	85%
Marans:	open physes	100%
Postacchini:	adolescents	92%

69

Shoulder Instability
Recurrence-Collision Athletes

Larrin	17-27 yo	94%
Wheeler	17-23 yo	86%
Arciero	17-23 yo	87%
Hovellius	<20 yo	90%
Simonet	<30 yo	82%
Henry	17-23 yo	90%
Taylor	17-22 yo	90%

Overall Recurrence 82-100%


70

Rx Index: ISIS

- In Season
- Post-season
- >6 ~ 70% recurrence rate

The instability severity index score
 A SIMPLE PRE-OPERATIVE SCORE TO SELECT PATIENTS FOR ARTHROSCOPIC OR OPEN SHOULDER STABILISATION

Age <20 Years	2 points
Sport: competitor	2 points
Sport: contact or overhead forced	1 point
Ligamentous laxity (1 inf or ant) passive external rotation >80°	1 point
Hill-Sachs notch > 3 eggs in ant rotation	2 points
Osseous bone loss = on standard R-rays	2 points
Total	10 points



71

Long-term, Prospective, Multicenter Study of Isolated Bankart Repair for a Patient Selection Method Based on the Instability Severity Index Score

Hervé Thomazeau,¹ MD, Prof, Tristan Langlais,¹ MD, Alexandre Hardy,¹ MD, Jonathan Curado,¹ MD, Olivier Herveaux,¹ MD, Jérôme Maubon,¹ MD, Christophe Charrière,¹ MD, Olivier Courage,¹ MD, French Arthroscopy Society, and Geoffrey Nourissat,^{1,11} MD, PhD
 Investigation performed at Rennes University, Clinical Research Unit, Rennes, France

Instability Severity Index Score

- Only significant predictive factor for recurrence was age <20
 - 42% recurrence rate w arthroscopic Bankart
 - ISIS – 10% if <= 2; 35% for 3 or 4

72



73

Non-Operative Rehab Shoulder Instability

Elite Athletes Rehabilitation

- ✓ Immediate light & gradually motion
- ✓ No aggressive stretching (ER)
- ✓ Dynamic stabilization drills
- ✓ More than strengthening
- ✓ Proprioception drills
- ✓ Perturbations drills
- ✓ Sport specific movements
- ✓ Plyometrics
- ✓ Brace if needed & return to play

74

Non-Operative Rehab Shoulder Instability

Weekend Warrior Rehab

- ✓ Immobilization 2-4 wks
- ✓ Conservative rehabilitation
- ✓ Easy motion at 2-4 wks
- ✓ Gradual strengthening program
- ✓ Emphasize scapular control
- ✓ Proprioception drills
- ✓ *What are they going back to?*
- ✓ *Slow the return to high risk activities -*
- ✓ Lower expectations levels

75

Non-Operative Rehab Shoulder Instability

Elite Athlete

HS/Col Athlete

Recreational Athlete

76



82

Non-Operative Treatment for First Time Shoulder Dislocation In the Elite Athlete

95

Non-Op Traumatic Instability Anterior Dislocation

- **Four Phased Approach:**
 - ✓ Acute Phase
 - ✓ Stabilization Phase
 - ✓ Dynamic Stabilization Phase
 - ✓ Return to Activity Phase



96

Non-Operative Rehabilitation Shoulder Instability

- ✓ **Immobilization following shoulder dislocation – subluxation ???**
 - Potential benefits:
 - ✓ Calm inflamed tissue - protection
 - ✓ Diminish pain
 - ✓ Keep people away !!
 - ✓ Scarring/enhance stability ??
 - *Is it effective ????*
 - Potential disadvantage:
 - Diminish proprioception
 - Muscular disuse
 - Atrophy
 - Posture



97

Non-Operative Rehabilitation Shoulder Instability

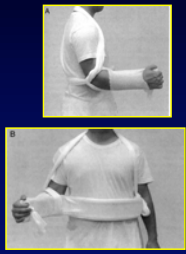
- ✓ **Is Immobilization effective in decreasing the recurrence rate?**
- ✓ **If so, what position of immobilization (IR or ER)**



98

Itoi, Kido, Sato et al: JSES '03

- 40 patients initial anterior dislocation
- Patient avg age 39 (range up to 84)
- 20 immobilized in adduction & IR
- 20 immobilized in slight abduction & ER
- **Recurrence rate at 15.5 mos:**
 - 30% for add IR group
 - 0% for abd ER group



99

Methods of Immobilization Following Shoulder Dislocation

Author	Yr	N=	Position	Duration	F/U
• Hovelius '83		257	IR	(1,3, mixed Rx)	2 yrs
• Hovelius '87		256	IR	(1,3, mixed Rx)	5 yrs
• Hovelius '96		247	IR	(1,3, mixed Rx)	10 yr
• Hovelius '08		229	IR	(1,3, mixed Rx)	25 yr
• Robinson '06		252	IR	4 weeks	4-9 yr
• Itoi '03		40	ERvIR	3 weeks	15 mo
• Itoi '07		198	ERvIR	3 weeks	2 yr
• Finestone '09		51	ERvIR	4 weeks	2.8 yr
• Livaag '11		188	ERvIR	4 weeks	2 yr

103

Non-Operative Rehabilitation Shoulder Instability

Patterson, Throckmorton, Koester, Azar, Kuhn: JBJS 2010

- **Systematic review & Meta Analysis**
- **All Level I & II studies included (6 studies)**
- ✓ **No benefit for immobilization for longer than 1 week in younger patients**
- ✓ **Age less than 30 yrs high recurrence rate**
- ✓ **ER brace no significant difference in recurrence rates**



104

**Non-Operative Rehabilitation
Shoulder Instability**
 Rehabilitation Guidelines: Age
 Immobilization or early motion

Elite Athlete Scholastic Athlete Rec Athlete

107

Hovelius et al: JBJS '96

- Prospective study to evaluate the results of treatment of primary anterior dislocation (27 hospitals)
- 247 first time dislocations (younger than 40 yrs)
- 10 year follow-up
- ✓ Group I: 3-4 weeks of immobilization
- ✓ Group II: sling until comfortable & then motion
- ✓ No difference in recurrent dislocation b/t groups
- Recurrent dislocations requiring surgery 23%
- ✓ Recurrence rate: 19 yrs & younger - 70%
- 25 to 20 yrs - 60%
- 33 to 26 yrs - 30%
- 34 yrs or older - 10%

108

**Non-Operative Rehabilitation
Shoulder Instability**

I. Early controlled motion

- ✓ Motion to tolerance
- ✓ Neuromodulation of pain
- ✓ proprioception benefits
- ✓ Do Not stretch (esp ER)
- ✓ Motion NOT Stretching
- ✓ Caution regarding direction & degree of motion

Easy Motion Let it Happen Slowly

109

**Non-Operative Rehabilitation
Shoulder Instability**

Ib. Calm Inflamed Tissue Down

- ✓ Motion reduces pain & spasms
- ✓ Cryotherapy
- ✓ Laser
- ✓ Progress to heat
- ✓ Other modalities

Reduce Pain Spasm – Restore Motion

110

**Non-Operative Rehabilitation
Shoulder Instability**

I. Early controlled motion ★

- ✓ Motion to tolerance
- ✓ Move proximal segment on distal

111

**Non-Operative Rehabilitation
Shoulder Instability**

I. No Early motion

- ✓ No motion (~2 weeks) – calm it down
- ✓ Maybe some capsular healing
- ✓ Immobilization may be beneficial
- ✓ Control stresses for 2-4 wks
- ✓ Sleep in sling/brace
- ✓ Minimal benefit to early motion

No Early Motion

Weekend Warrior

112

**Non-Operative Rehabilitation
Shoulder Instability**

2. Reestablish Static/Dynamic Stability

- ✓ *Static stabilization*
 - Hold stationary position
 - Low level control drill
- ✓ *Dynamic stabilization*
 - Ability to move through space
 - Then stabilize
 - Moderate level control drill

It's all about capturing/controlling HH



113

Shoulder Dynamic Stabilization
Rhythmic Stabilization ER/IR



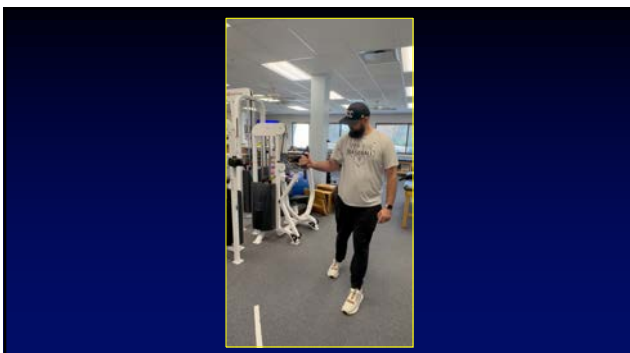

114



116



117




118

**Non-Operative Rehabilitation
Shoulder Instability**

3. Restoration of Proprioception

- ✓ *Awareness of joint position*
- ✓ *Eyes open & closed*
- ✓ *Performed static/dynamically*
- ✓ *Levels of proprioception*
 - *Progression through stages*

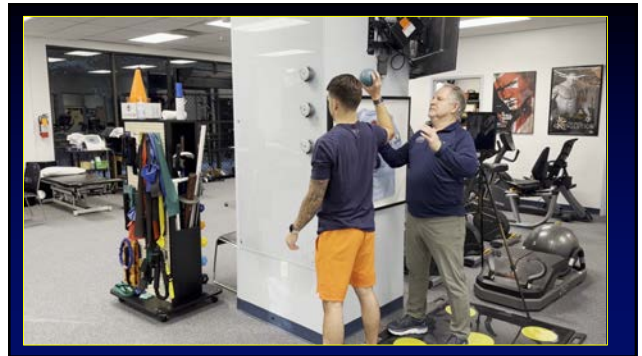
Apprehension to Controlled Apprehension ★



119



121



122



123



124



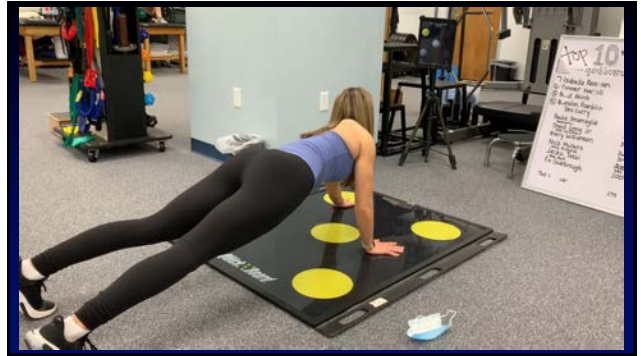
125



126



127



128





129



130

Shoulder Injuries & Proprioception
Deficits Occur Following Injury

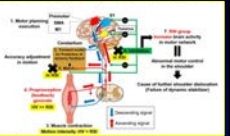
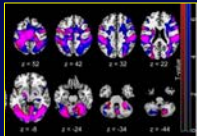
- Following Glenohumeral Joint Injury
- GH Joint Dislocations
- ✓ Proprioception Deficits Occur
Lephart et al: JSES '94
Zuckerman JSES '03
- ✓ Occurs alterations in CNS – feedback loop may be altered in some cases
Warren et al: CORR '96
Lephart et JSES '94

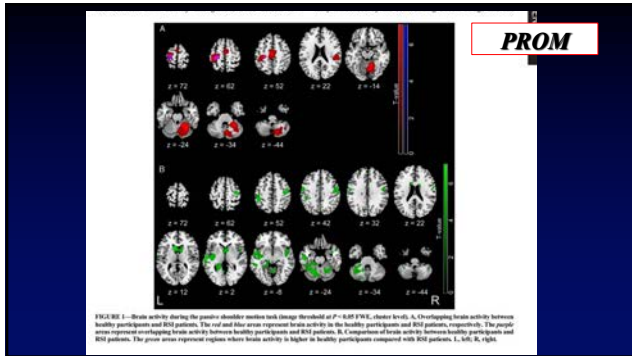
131

Shitara et al: Med Sci Sports Ex '22

- Neuroplasticity Caused by Shoulder Injury
- MRI Brain Scan – during shoulder PROM & Voluntary Muscle Contraction
- Subjects: RSI n=13, Healthy n=12
- ✓ Difference in Brain Activity b/t grps
- ✓ Abnormal motor control & activation in RSI group

132



133



134



135

Non-Operative Rehabilitation Shoulder Instability

4. *Stable Base of Support*

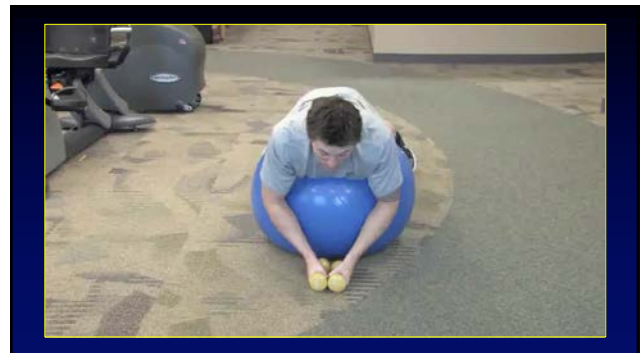
- » Scapular orientation – effect on humeral displacement
- » Scapular muscular strength
- » Scapular mobility
- » Neuromuscular control – proprioception

Critical element to GH function

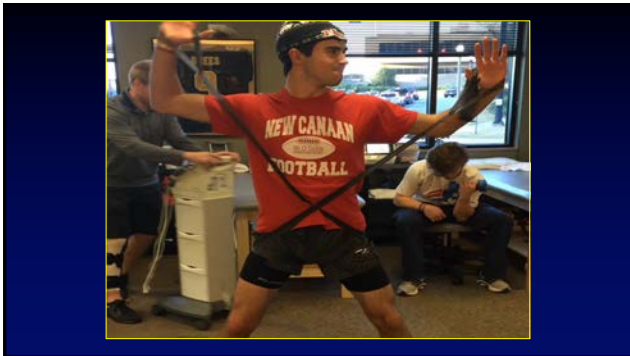
136



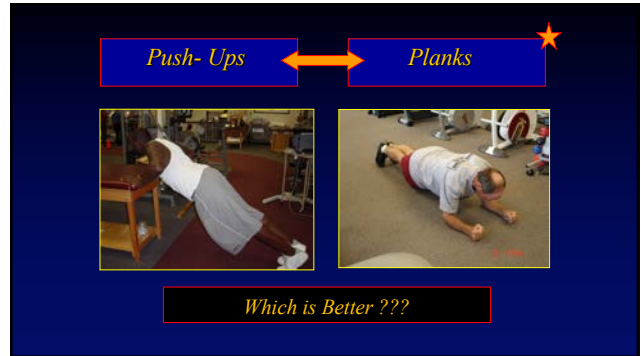
137



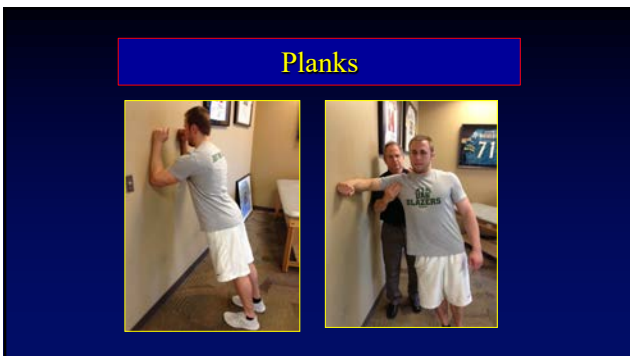
138



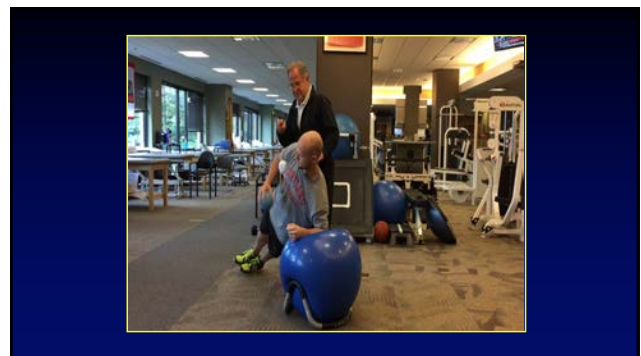
139



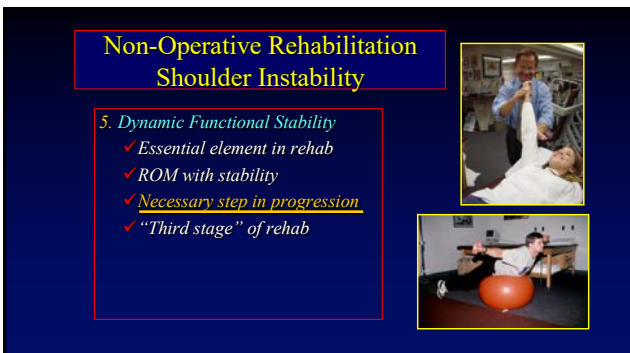
140



141



144



145



147

Dynamic Stabilization Exercises



148



149

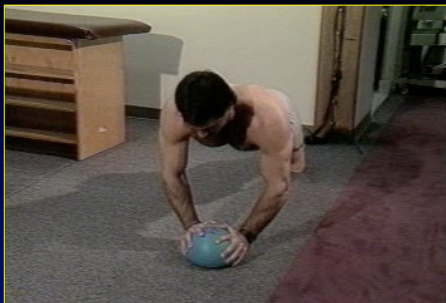
Push-Ups w/ Stabilization



150



153



154



155

**Non-Operative Rehabilitation
Shoulder Instability**

6. Perturbation training

- ✓ End range stability
- ✓ Postural/positional disturbance
- ✓ Critical rehab goal
- ✓ Necessary component allowing athletes to return to overhead sports

Critical Skill to Return to Sports



156

**Non-Operative Rehabilitation
Shoulder Instability**

6. Perturbation training

Create apprehension

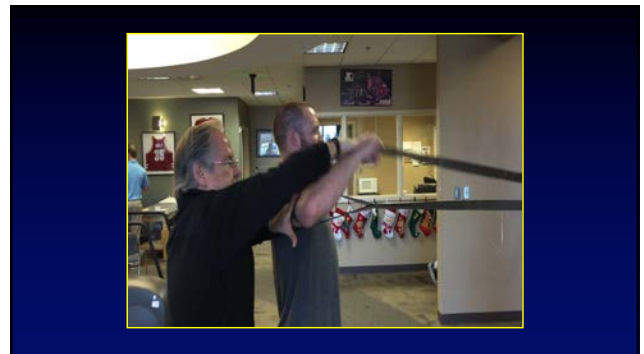
Apprehension is good !!!



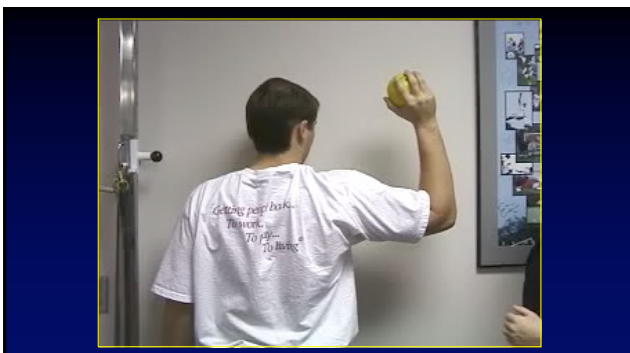
157



158



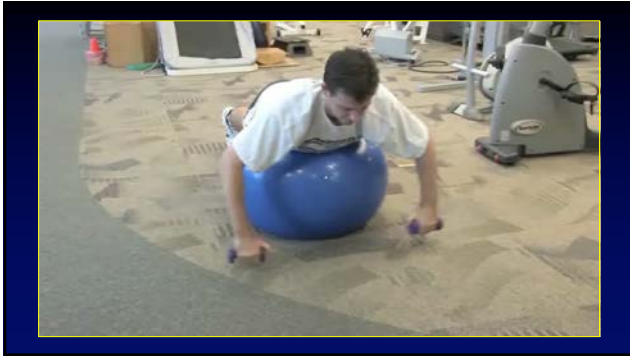
159



161



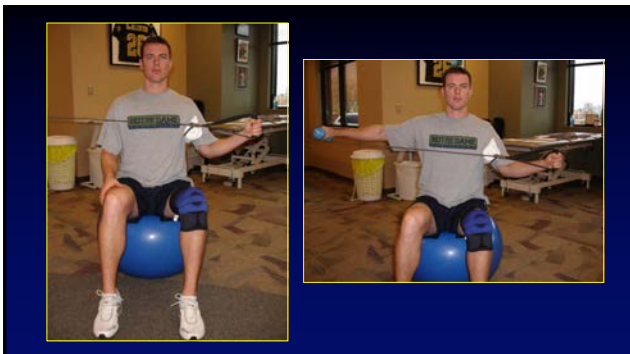
162



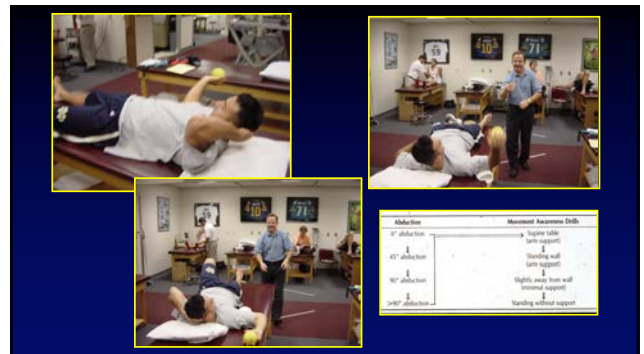
164



165



166



168



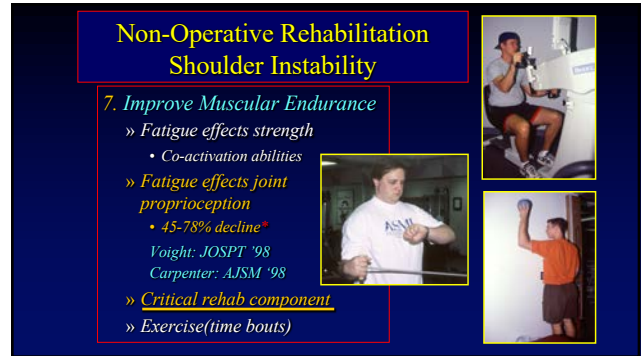
169



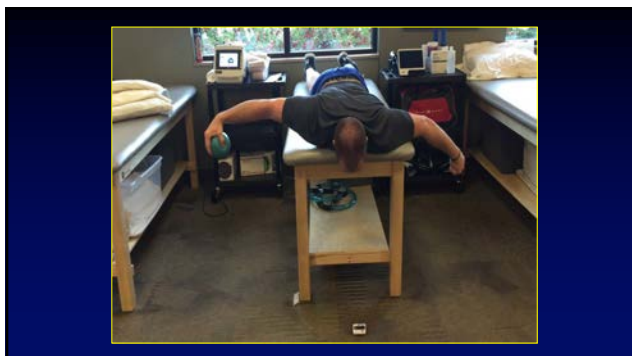
170



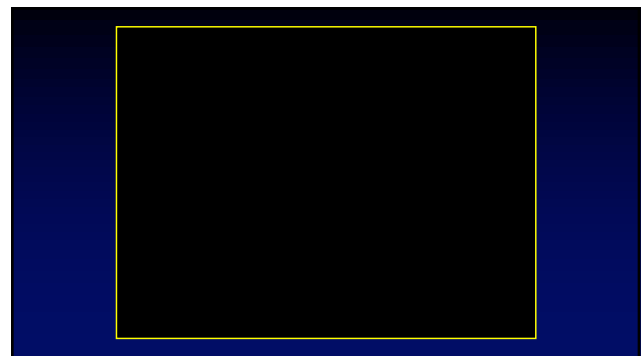
171



172



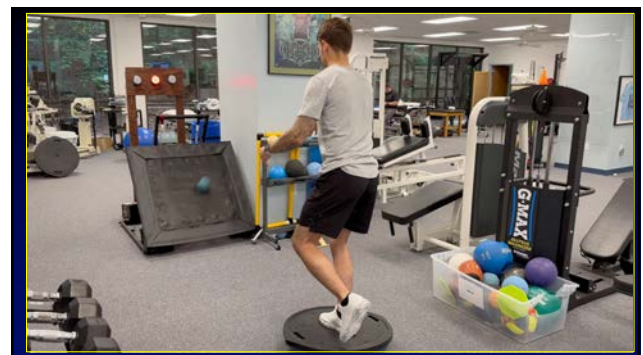
173



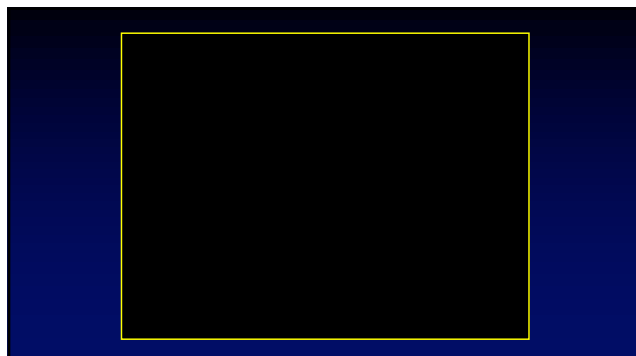
174



175



176



177



178

Non-Operative Rehabilitation Shoulder Instability

8. Functional Sport Specific Drills

- » *Plyometrics*
- » *Sport specific drills*
- » *Gradual progression*
- » *Two hand drills* → *one hand drills*
 - *mid-range drills – full/end range drills*

179

Functional Shoulder Braces

180

Non-Operative Rehab Shoulder Instability

Elite Athletes Rehabilitation	Weekend Warrior Rehab
<ul style="list-style-type: none"> • Immediate light & gradually motion • No aggressive stretching • Dynamic stabilization drills • More than strengthening • Proprioception drills • Perturbations drills • Plyometrics • Brace if needed & return to play 	<ul style="list-style-type: none"> • Immobilization 2-4 wks • Conservative rehabilitation • Gradual strengthening program • Emphasize scapular control • Proprioception drills • What are they going back to • Lower expectations levels

182

Rehab Shoulder Instability

Key Points

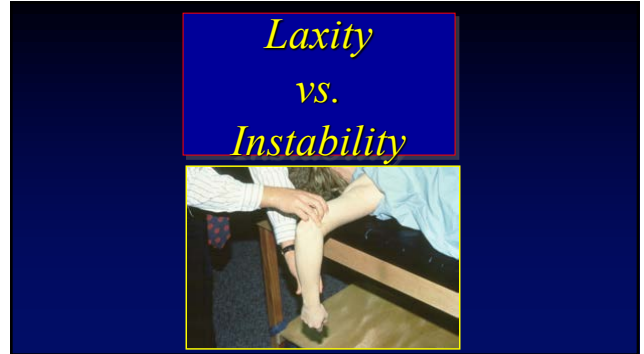
- Common pathology in athletes
- Significant differences:
 - » *Anterior v posterior Dislocation v subluxation*
- Anterior dislocation: high rate of recurrence 70-95%
- Treatment options:
 - » *Immediate surgery* ↔ *Non-op rehab*
- Non-Operative rehab approach:
 - » Immobilization, arm position, guarded immediate motion, proprioception, scapular cuff control... gradual return to sports

Treatment based on classification system

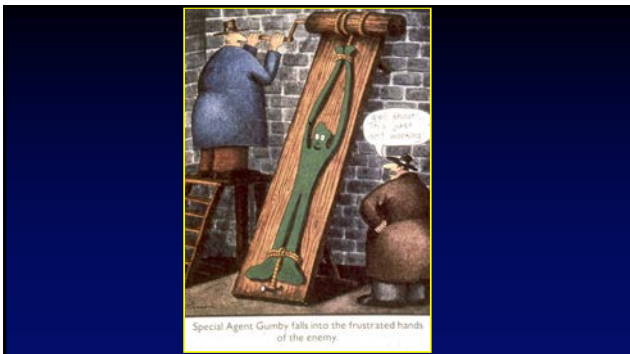
183



185



186



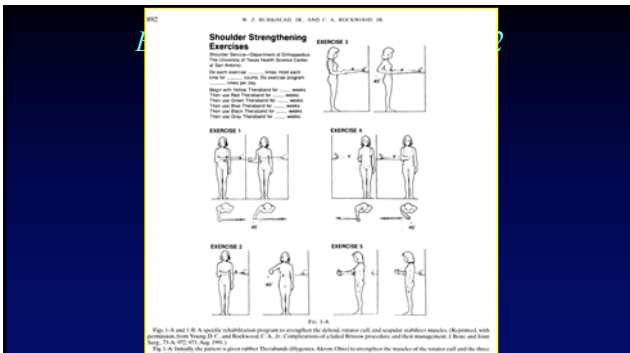
187

Burkhead, Rockwood: JBJS '92

- 140 shoulders (in 115 patients) diagnosed with instability
- All treated with "specific set of strengthening exercises"
- 16% (12/76) traumatic injured shoulder patients
- ✓ 80% (53/66) atraumatic patients exhibited a good to excellent result
- Identification of the etiology of the instability key

We believe that it is important that the orthopaedist instruct the patient and direct the rehabilitation program; hence, we call this an **orthotherapy rehabilitation program**.

190



191

Why Are Congenital Lax People's Shoulder Capsule Hypermobile?

- *It's a tissue issue...*

Rodeo, Warren, et al: AJSM '98


- Analyzed collagen in 25 pts
- Group I: unidirectional instability
- Group II: MDI, primary surgery
- Group III: MDI, revision surgery
- Group IV: no history of instability
- ✓ Results: Grp III: smaller diameter collagen, decreased collagen fibril density, increased density of elastin...skin diff in grp 2&3 from grp 1

193

Rehab Congenital Unstable Shoulder

Acute phase

- CKC/axial compression exercises – stationary drills first
- Manual resistance RS drills
- Scapular muscle training
- Rotator cuff strengthening
 - » Reestablish unilateral muscle balance
- Proprioception drills
- Postural exercises – shirt ??
- Assess capsular laxity patterns
 - » Asymmetrical capsular laxity



194



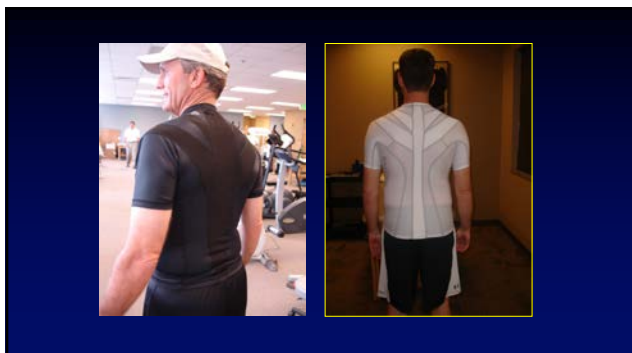
195



196




197



198

Axial Compression



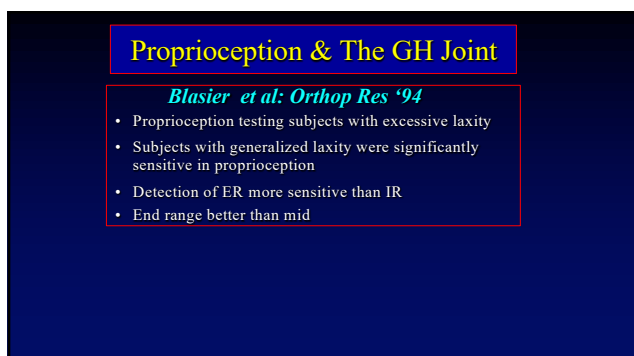
199



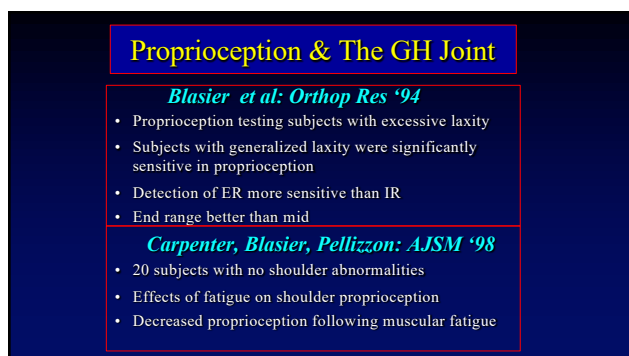
200



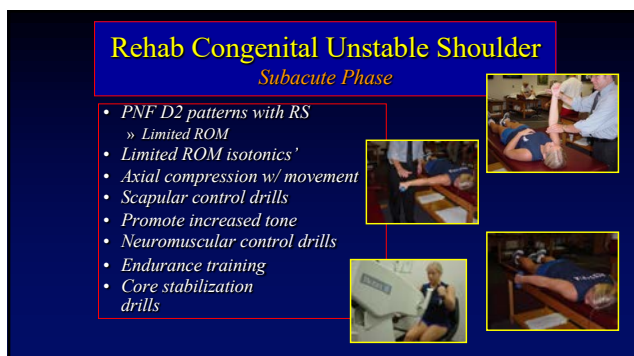
201



202



203




204



205

Non-Operative Rehabilitation Shoulder Instability *Rehabilitation Guidelines*


- *Phase 1 – Baseline core strengthening*
 - » *Proximal stability/strength*
 - » Upper abdominals
 - » Lower abdominals
 - » Obliques
 - » Erector Spinae



206

Rehab of Congenital Unstable Shoulder *Keys to Treatment*

- *Improve dynamic stabilization*
- *Activation of rotator cuff muscles*
- *Reestablish unilateral muscular balance*
- *Improve proprioception*
- *Enhance scapular strength & control*
- *Improve NM control*
- *Stable base – core stabilization*
- *Improve endurance*
- *Return to SAFE activities*



207



208