Quantitative evaluation for muscle tightness of latissimus dorsi; LD angle test

○**Toshihiko Izumi**
National Hospital Organization Miyazaki Hospital/Fujimoto General Hospital
Yasunari Fujii
The Health Service Center, National Institute of Fitness and Sports in Kanoya
Hironori Kakoi
Tenyoukai Chuo hospital
Hideyasu Kaieda
Imamura general hospital

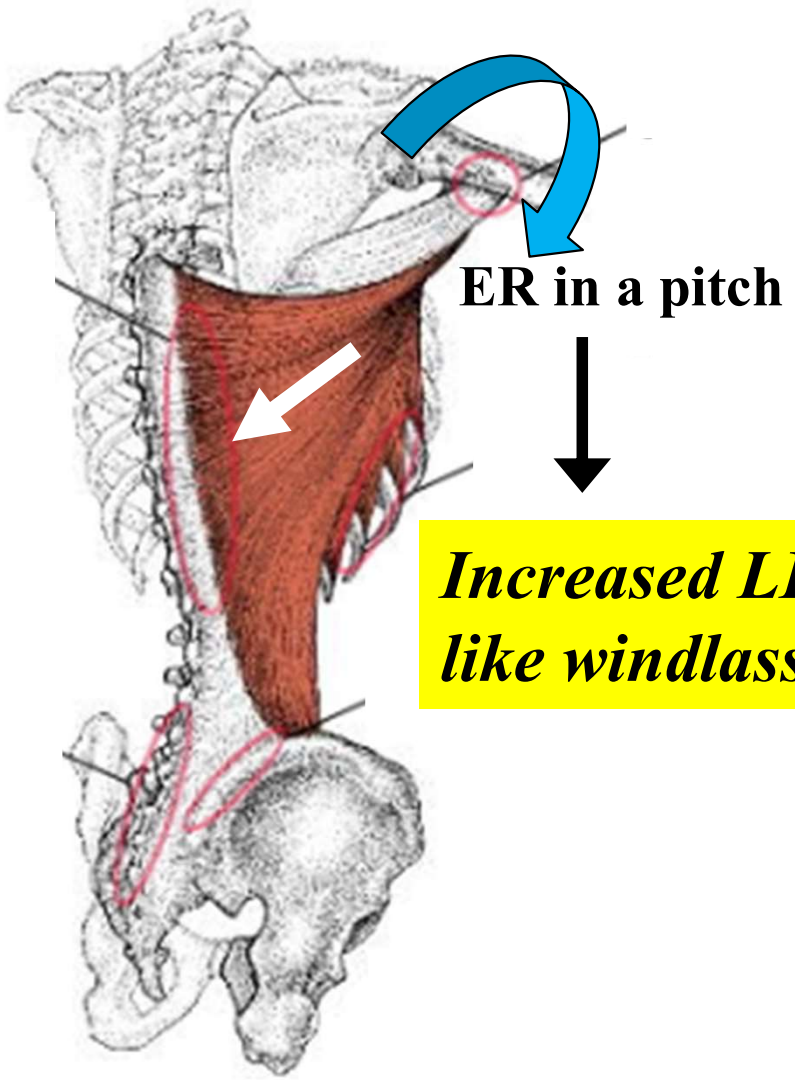
2023 ISAKOS CONGRESS
COI Disclosure Information

Presenter: Toshihiko Izumi

- **I have no financial relationships to disclosure.**

【Background】

Tightness of the latissimus dorsi (LD) and the teres major are contributing factors to a loss of overhead shoulder elevation and cross body abduction



ER in a pitch

Increased LD tightness like windlass mechanism

More stress to shoulder and elbow occurred at full layback position each and every throw in throwing athletes.

【Background】

- **Conventional evaluation of the LD tightness is only a qualitative method.**

Problems

- ✓ **Intra- and inter observer reliability**
- ✓ **Hard to compare difference between throwing and non-throwing side**

【Purpose】

- ✓ **To introduce LD angle test, which we devised, to evaluate the LD tightness quantitatively .**

- ✓ To examine the difference of LD angle between throwing and non-throwing shoulders.

【Subjects】

72 subjects with throwing injury of shoulder or elbow

	cases
Baseball	59
Javelin	9
Tennis	1
Volleyball	1
Badminton	1

Sex: 69 males, 3 females

Average age: 16.1 yrs. (9-32 yrs.)

Playing experience: 6.9 yrs. (1-24 yrs.)

The difference of the LD tightness between throwing and non-throwing side was examined using LD angle test.

【Statistical analysis】

* ***Paired t test*** (Statistical significant lever was 0.05.)

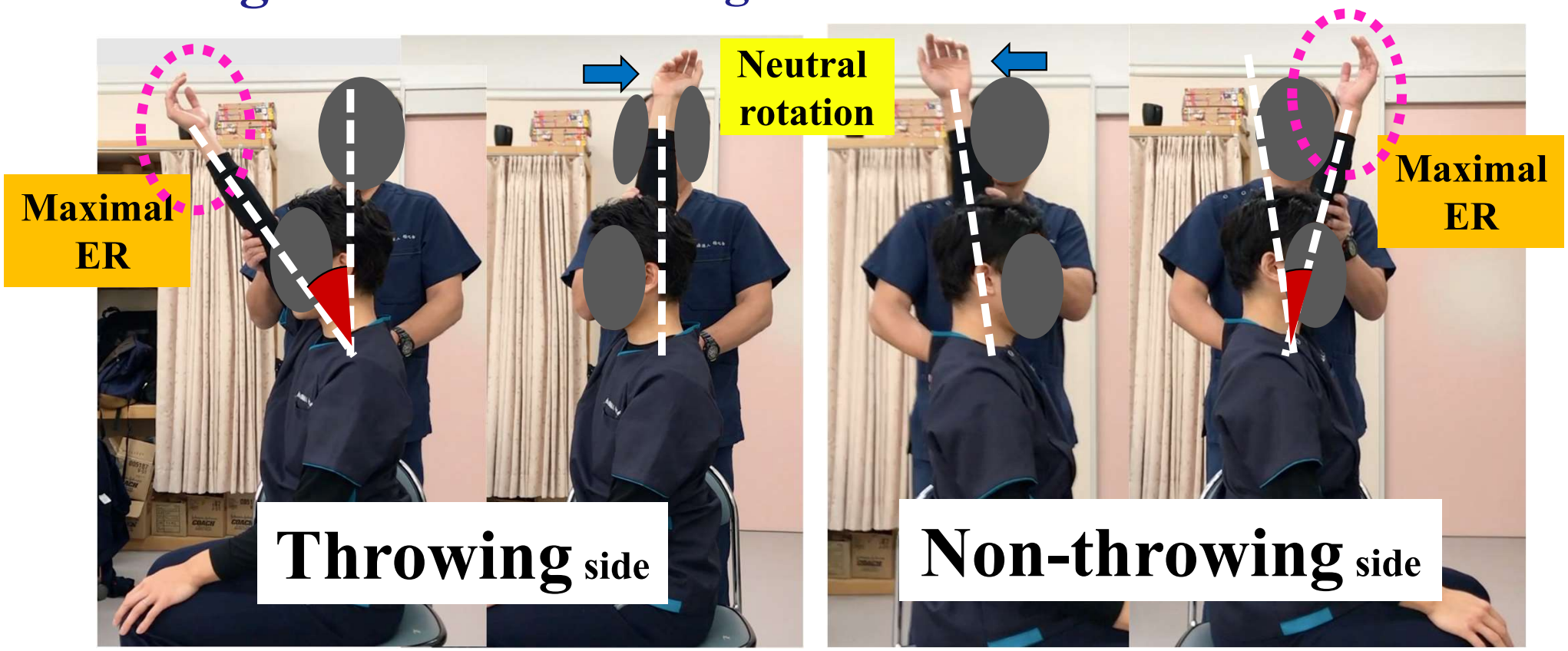
【Method】

LD angle test

#1. At first, passive flexion angle with the maximal ER was measured.

#2. Secondly, after changing the maximal ER position into the neutral rotational position, the increased passive shoulder flexion angle was measured, again.

- **LD angle = the different angle between #1 and #2**



【Result】

- LD angle of the **throwing** shoulders was **significantly bigger** than that of the **non-throwing** shoulders

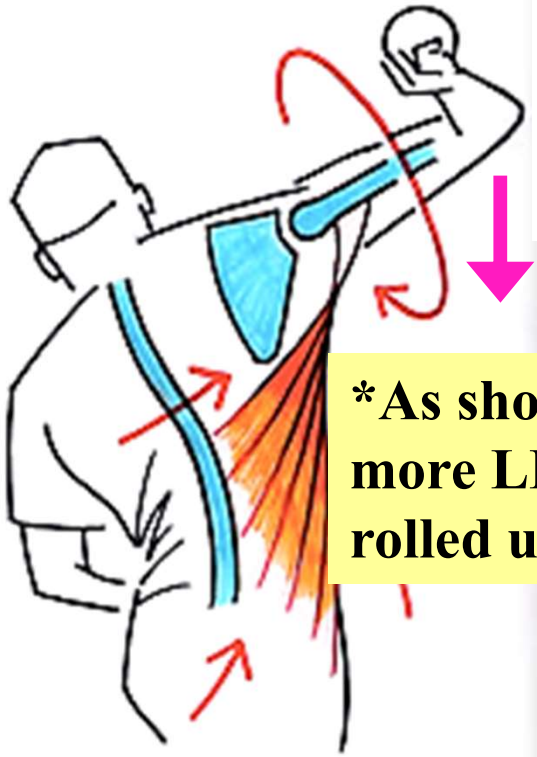
	LD angle
Throwing side	**26.7±9.4 deg.**
Non-throwing side	**15.0±9.8 deg.**

* : $p < .0001$

【Discussion】

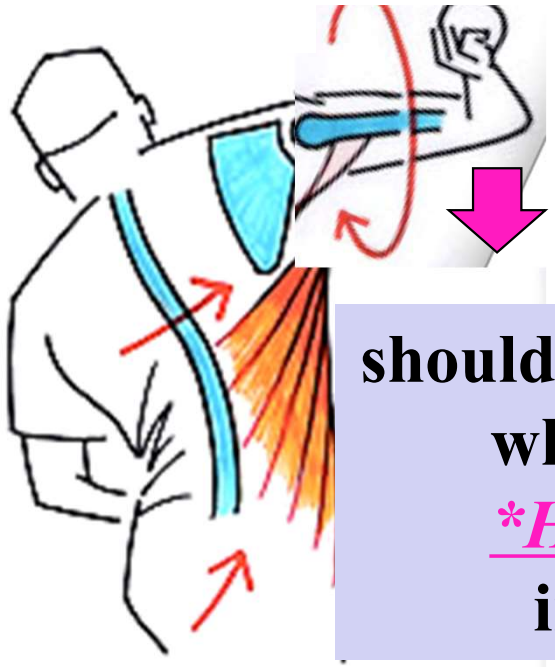
In late-cocking phase

The greater MER causes the enhancement of LD tightness .



***As shoulder ER is increased, more LD and teres major are rolled up by the humerus.**

➢ ***High tightness of the LD due to too many pitches*** **makes**



shoulder abduction less, which is called *HIJISAGARI in Japanese.

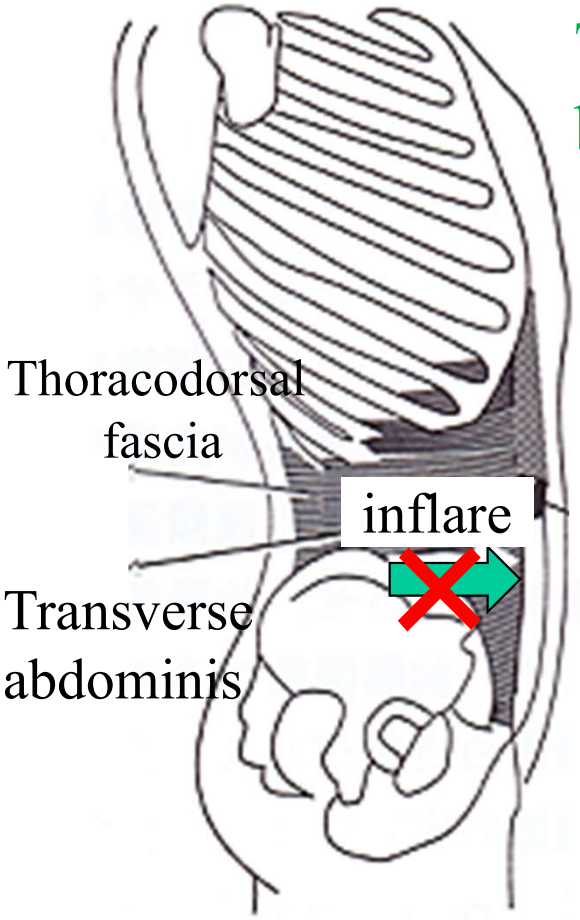
This low abduction of the shoulder during the late-cocking and acceleration phase brings stressful condition to shoulder and elbow .

1)Setoguchi, et al, 2010 2) Burkhart SS, et al.2003

The LD tightness is greatly related to function of the core muscle.

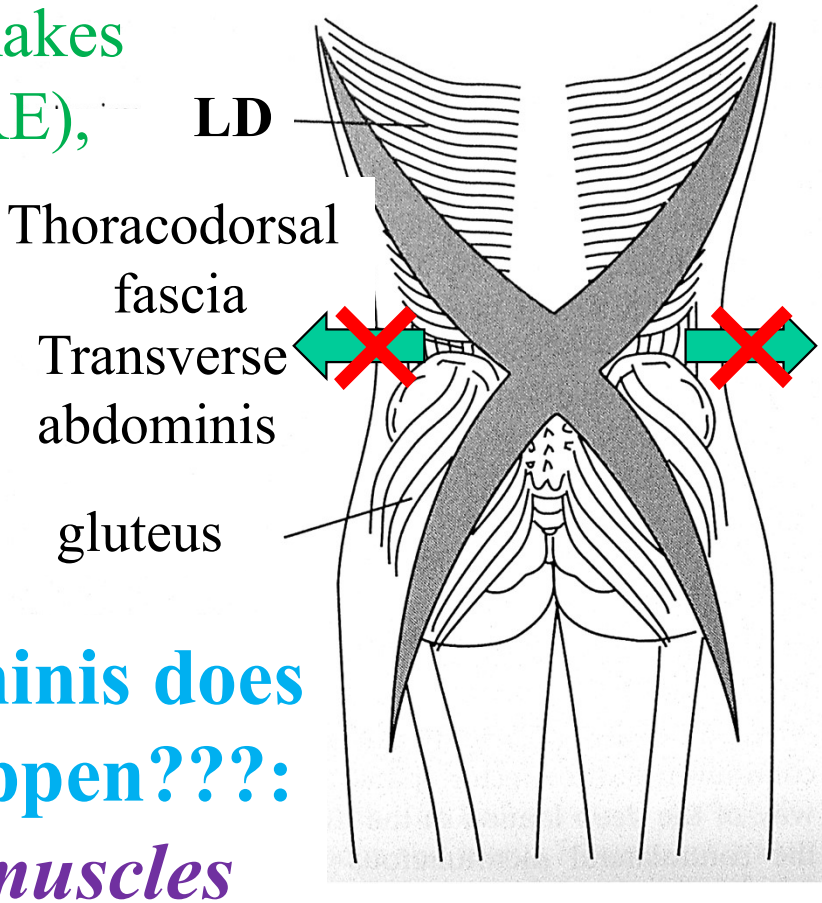
It is essential to keep the intraabdominal pressure and the tension of thoracodorsal fascia using the core muscle such as transverse abdominis in order to maintain the trunk stability.

2) Hodges. PW, 1999



The transverse abdominalis makes bil. iliums adducted (INFLARE),

1. to control the abdominal pressure, and
2. to keep the tension of the thoracolumbar fascia.



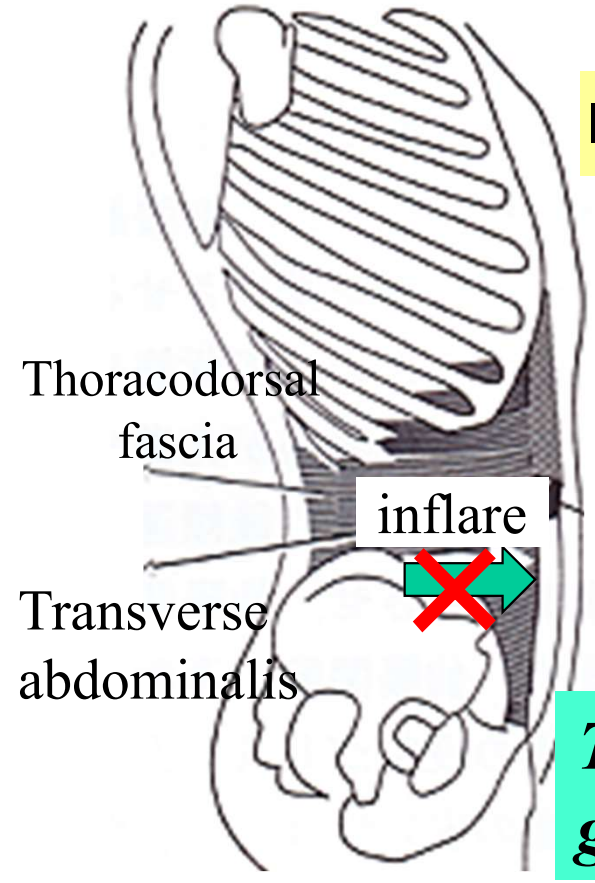
If the transverse abdominis does not work well, what happen???:

⇒ ***Dysfunction of core muscles***

The LD tightness is greatly related to function of the core muscle.

➢ ***To compensate for function of the transverse abdominis,***

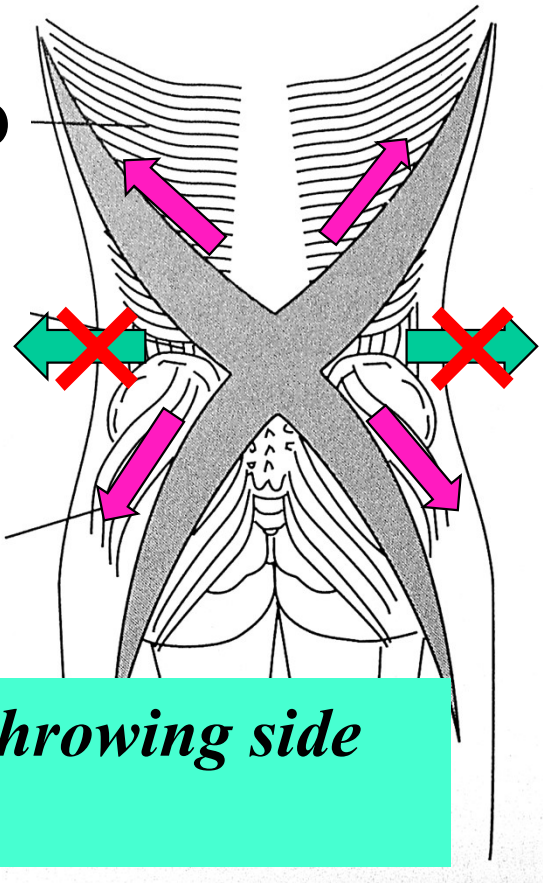
the LD controls the tension of the thoracolumbar fascia by *contracting from proximal to distal*.



■ **Bil. LD tightness are increased.**

In this study,

the LD tightness at throwing side is significantly higher than that at non-throwing side.



Through too many pitches. The LD at throwing side get fatigue and increased its tightness.

【Conclusion】

- **We devised the quantitative method to evaluate the LD tightness, called LD angle.**

- **Our study proved that the LD tightness at throwing side was significantly higher than that at non-throwing side, using LD angle test .**

【Reference】

1)Throwing plane concept. Setoguchi, et al, J Clin Sports Med , 2010; Sugaya, et al, 2011

2) Burkhart SS, Morgan CD, Kibler WB. The disabled throwing shoulder: spectrum of pathology part III: the SICK scapula, scapular dyskinesis, the kinetic chain, and rehabilitation. Arthroscopy 2003, 19(6), 641-661

3)PW Hodges. Is there a role for transversus abdominis in lumbo-pelvic stability? Man Ther. 1999 May;4(2):74-86.