

Roush J, Manton J C, Min D, Nguyen V, Odorfer C, Lish T.

Physical Therapy Program, A. T. Still University of Health Sciences, Mesa Arizona

Purpose/Hypothesis

The Modified Thomas Test (MTT) is commonly used to determine iliopsoas (IP) and rectus femoris (RF) tightness, which is usually assessed visually and subjectively. The purpose of this project was to determine the reliability when measuring IP tightness and RF tightness using goniometry against digital photography.

Number of Subjects

22 females and 8 males (mean age = 27.40 years; SD = 4.19).

Materials/Methods:

The subjects were assessed by a physical therapist with over 25 years of experience as both a clinician and a researcher for IP and RF tightness while performing the MMT. The subject’s right lower extremity was photographed using a Canon SX20IS digital camera when the MTT was administered. Three measures of hip extension (for iliopsoas tightness) and three measures of knee flexion (for rectus femoris tightness) were then obtained using a standard goniometer. Three weeks after initial data collection, three measures of hip extension and knee flexion were obtained from the photographs using the NIH Image J software package. Means and standard deviations were calculated for hip extension and knee flexion from goniometry measures and measures obtained from the photographs. A t test was calculated to determine differences in measures between the two methods. Intraclass correlation coefficients were calculated and a Bland-Altman plot was constructed to determine agreement between the two methods.

Two subjects were subjectively classified as positive for IP tightness and all 30 subjects were positive for RF tightness using the MMT.

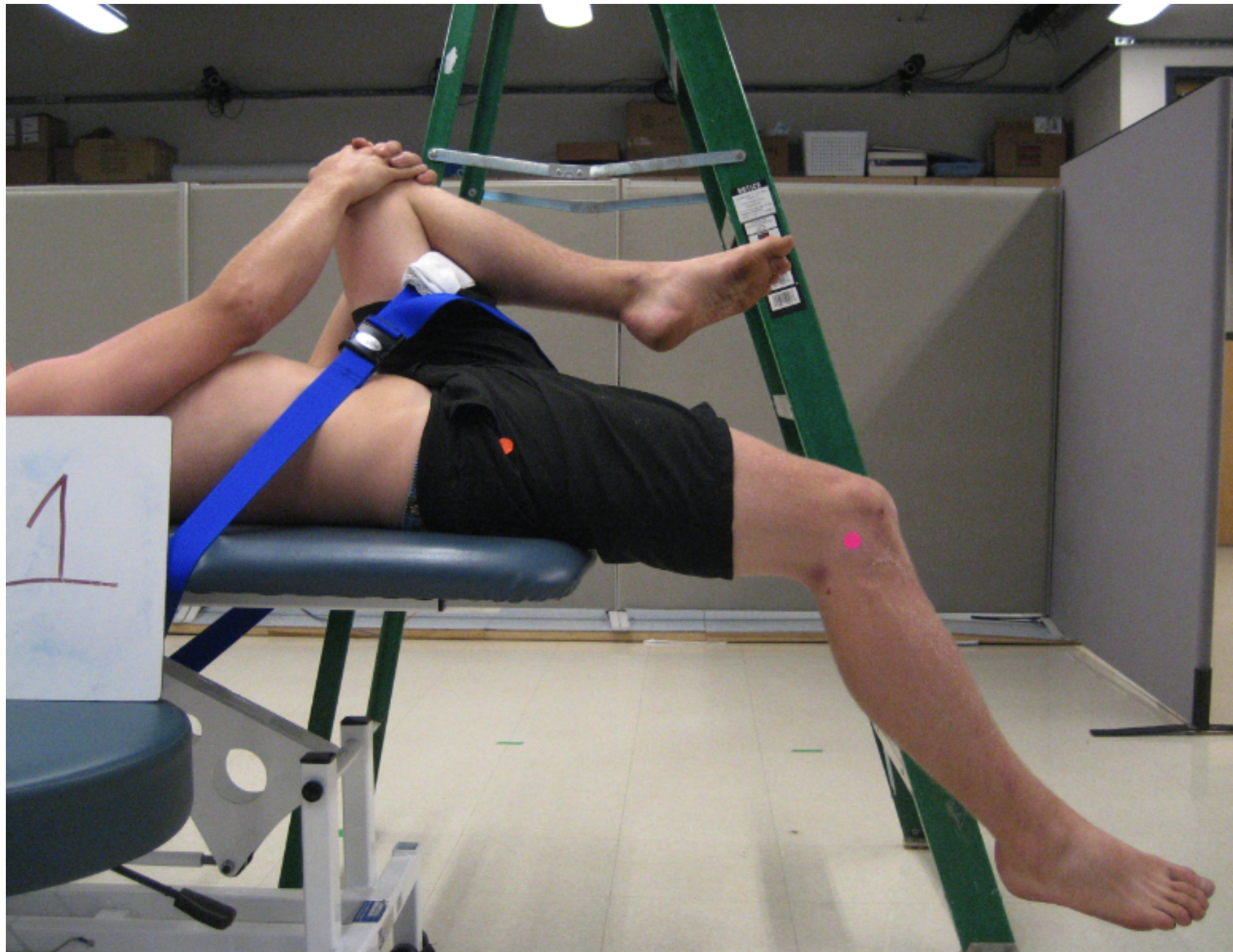


FIGURE 1. Set up For measuring Hip Extension and Knee Flexion during the Modified Thomas Test

Interpreting the Bland-Altman results.

Bland-Altman plots are generally interpreted informally.

- Ask yourself these questions
 - How big is the average discrepancy between methods (the bias)?
 - You need to do this clinically.
 - Inspect the bias line (the line for the differences between measures). How far is that line from zero?
 - Is that discrepancy large enough to be important? (Again, this is a clinical question and not a statistical one.)
 - Is there a trend? Does the difference between the methods or raters get larger (or smaller) as the average increases?
 - Is the variability consistent across the graph?
 - We use 2 standard deviations to help us to see the range around the bias line.
 - Does the scatter around the bias line get larger as the average increases?

Reference:

http://www.graphpad.com/help/prism5/prism5help.html?bland_altman_results.htm

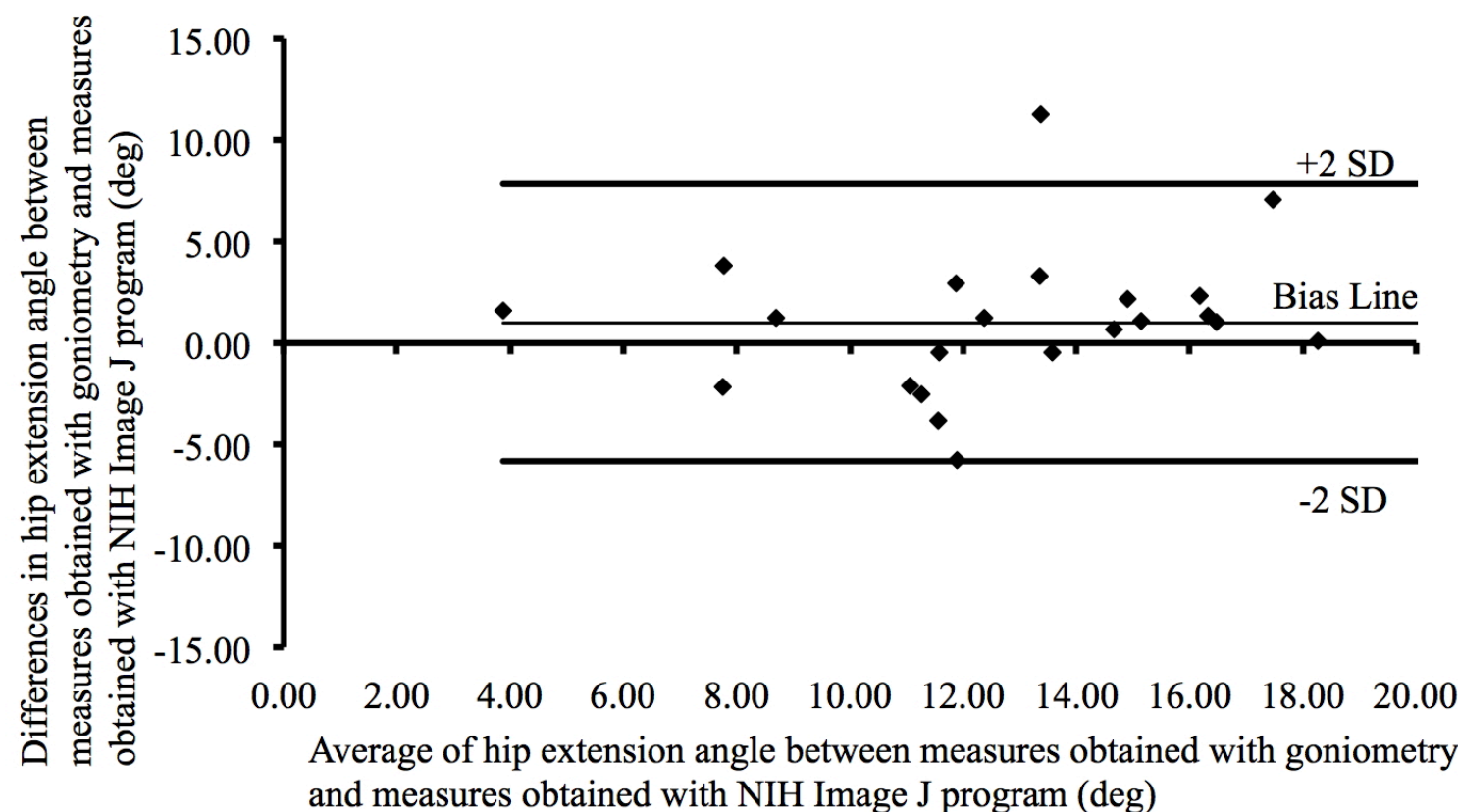


FIGURE 2. Bland-Altman Plot of agreement between measures obtained with goniometry and measures obtained with NIN Image J program for Hip Extension

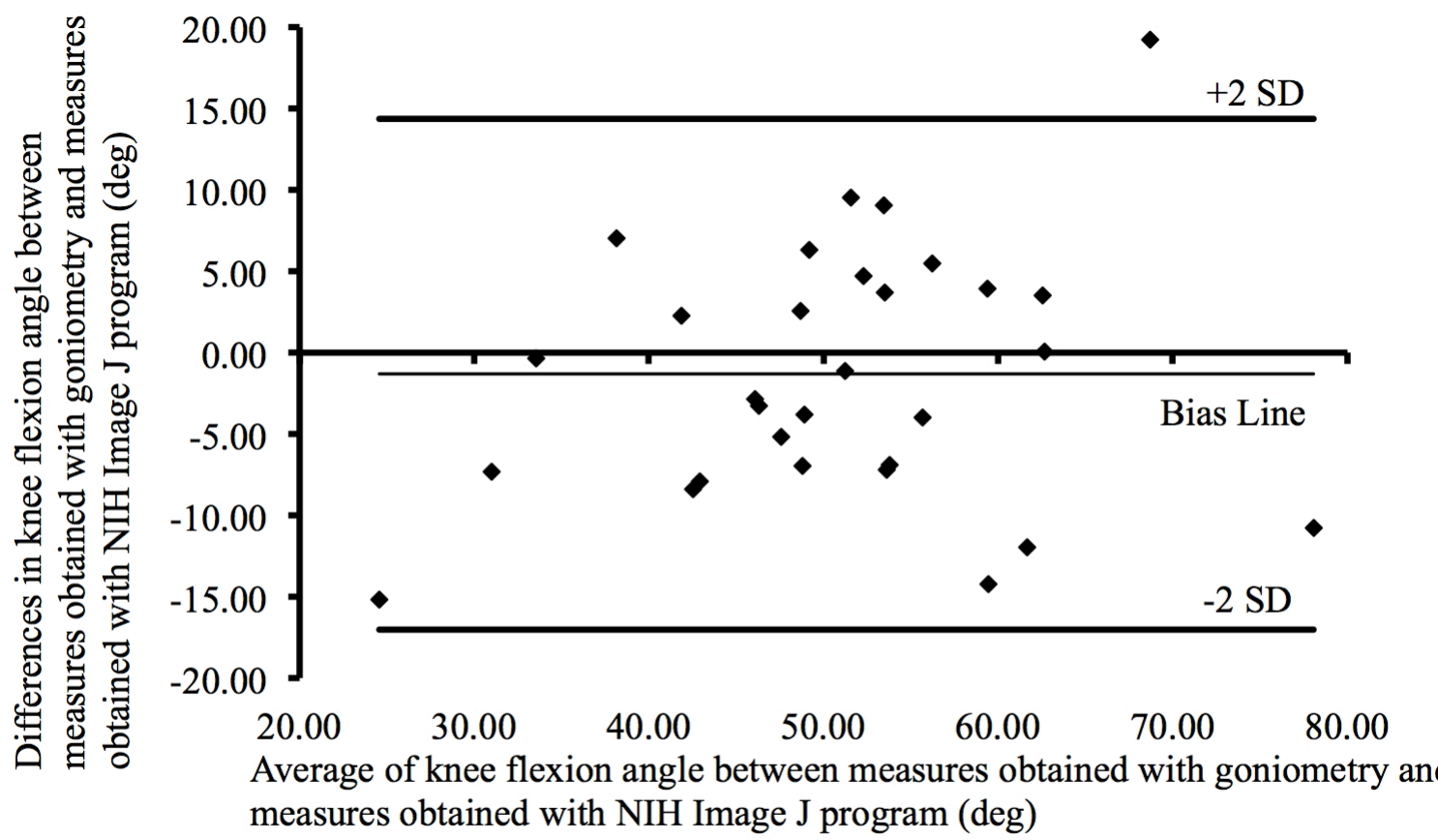


FIGURE 3. Bland-Altman Plot of agreement between measures obtained with goniometry and measures obtained with NIN Image J program for Knee Flexion

Results

Iliopsoas (Hip Extension)

The mean for IP tightness during the MMT using goniometry was 15.84 deg. (SD = 5.81); when using photography, the mean was 14.85 deg. (SD = 5.69). The mean difference between the two techniques was 0.99 deg. There were no significant differences in means between the two methods (t = 1.59; df = 29; *p* = .12). The ICC (3,2) for the within-measures when using goniometry was .98 (95% CI = .97 - .99); for photography, the ICC (3,2) was .96 (95% CI = .94 - .98). The ICC (2,2) for agreement between goniometry and photography was .97 (95% CI = .95 - .98). From the Bland-Altman plots, there was no bias between measures obtained using the two measurement methods, and any differences between methods were not clinically important.

Rectus Femoris (Knee Flexion)

The mean for RF tightness during the MMT using goniometry was 50.13 deg. (SD = 12.42); when using photography, 51.46 deg. (SD = 10.90). The mean difference between the two techniques was 1.33 deg. There were no significant differences in means between the two methods (t = 0.93; df = 29; *p* = .36). The ICC (3,2) for the within-measures agreement using the goniometer was .99 (95% CI = .98 - .99); for photography, the ICC (3,2) was .97 (95% CI = .95 - .98). The ICC (2,2) for agreement between goniometry and photography was .97 (95% CI = .95 - .98). From the Bland-Altman plots, there was no bias between measures obtained using the two measurement methods, and any differences between methods were not clinically important.

Shrout's adjectives for strength of an ICC (1998)

0.00 to 0.10	Virtually None
0.11 to 0.40	Slight
0.41 to 0.60	Fair
0.61 to 0.80	Moderate
0.81 to 1.0	Substantial

Conclusions

There was substantial within-measures agreement for both goniometry and digital photography, and there was substantial between-measures agreement between the two methods when assessing IP and RF tightness. Any differences between goniometry and photography were not considered clinically important.

Clinical Relevance

Clinicians may consider goniometry or digital photography as more objective methods than visual inspection for assessing IP and RF tightness when administering the MTT.