

The PalpationMeter (PALM)

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Abstract: The PalpationMeter (PALM) is a caliper-inclinometer combination instrument with palpation tips that lock to the fingers of an examiner while he or she palpates landmarks during the evaluation of bony structure or joint mobility. The instrument, the advantages of palpation controlled instrument - body interfacing, PALM measurements of pelvic tilt angles and leg length discrepancies, the need for anthropometric data on pelvic structure and the need for a validating x-ray comparison study are described.

Key Words: Leg Length Discrepancy, Pelvic Tilt, Palpation, Measurement, Inclinometer, Caliper.

The PalpationMeter (PALM)*¹, was designed to combine the ease and accuracy of landmark-palpation with the objectivity of millimeters and degrees. It consists of a caliper-inclinometer combination instrument and palpation tips that lock to the fingers of an examiner while he or she palpates landmarks during the evaluation of bony structure or joint mobility. The distance and inclination between the palpated landmarks are displayed on the caliper and inclinometer dials of the PALM, while the difference in height is displayed after lining up the distance and inclination readings on the PALM slide-rule-calculator.

Two different pairs of palpation tips allow for palpation with the tip (e.g. for PSIS-ASIS palpation/ Fig. 1) or the radial/volar aspect of the index fingers (e.g. when

palpating the iliac crests/ Fig. 2).

A third pair of regular pointed tips can be used to contact easily visible marks when the proprioceptive guidance of palpation is not necessary.

The proprioceptive guidance offered by the palpation tip method assures proper contact with the landmarks in rest and during movement. When for example the ASIS and PSIS of one ilium are contacted (Fig. 1)², the fingers of the examiner can stay in contact with these landmarks, while the patient moves through a pelvic tilt. Other than saving time, this method also avoids the potentially inconsistent relocation of the landmarks at the end of the range or slippage of skin markers relative to the underlying bony landmarks as may occur with other conventional measurement techniques³.

The PALM procedure for leg length discrepancy (LLD) measurement using the iliac crests as landmarks is as follows:

- The PALM is suspended around the neck of the examiner by a cord to free the hands for palpation.

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- L-shaped (viewed from the front) palpation tips at the end of the measurement arms are held between the extended index and middle fingers of each hand while the index fingers palpate the iliac crests of a standing patient (Fig. 2).

- The inches/centimeters of LLD are displayed on the PALM slide-rule-calculator after lining up the inclination reading from the inclinometer dial and the distance between the centres of the femoral heads (FHD), without the need for a time consuming approximation of leg length discrepancy via the insertion of footboards.

In the average adult with an approximate femoral head distance (FHD) of 20 cm⁴, not even the PALM calculator is required, because given a 20 cm FHD, LLDs < 6 cm simply equal the degrees of inclination times 3.5 mm. An inclination reading of 2° for example would indicate a 7 mm LLD. Changing the 20 cm mean FHD by the maximum 1.3 cm deviation found by Gofton and Truman⁴ amongst

67 x-rayed adults, would change the resulting LLD by only 1.3/20. Applied to the 7 mm LLD example, this would result in a maximum deviation of 0.5 mm, making the 20 cm FHD figure a reasonably accurate base for the calculation of LLDs in adults with an average pelvic built.

For adults with unusually wide or narrow frontal diameters of the pelvis or children however, a method to determine their FHD in absence of imaging techniques still needs to be developed. For this purpose, the author is intending to conduct an anthropometric study based on frontal x-ray views of the pelvis and femoral heads. He hopes a steady ratio between the FHD and the easily measurable distance between the ASISs will emerge. Clinicians could then just measure the ASIS distance and deduce the FHD.

Finally, a PALM X-ray comparison study is needed to validate the PALM method as a measure of LLD. Anyone interested in this type of study or the development of a clinical measure of FHD is invited to contact the author. ■

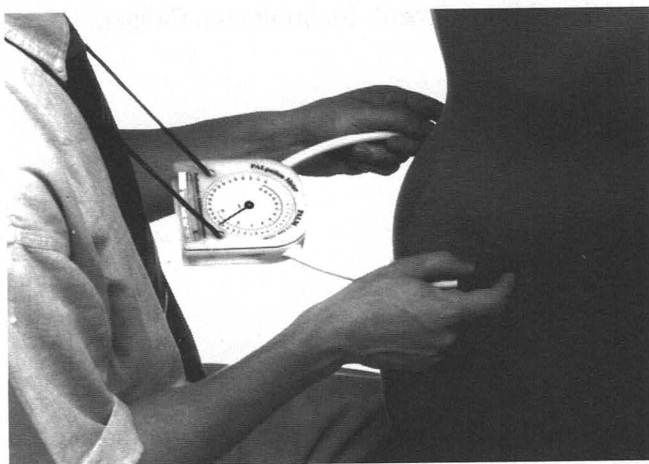


Fig.1: Measuring PSIS-ASIS inclination with O-shaped palpation tips.

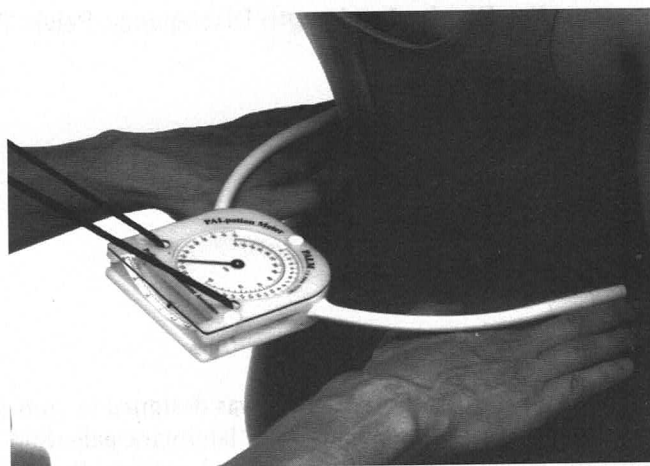


Fig.2: Measuring relative iliac crest height with L-shaped palpation tips.

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