

## STUDY OF OSTEOPOROTIC FRACTURES (V5)

### Grip Strength Testing Protocol

#### GRIP STRENGTH WITH DYNAMOMETER

##### 1. Description:

Grip strength is a measure of hand muscle strength that also is a good representation of upper body muscle strength. It is one of the most widely used measures of strength because of its simplicity and ease of measurement.

##### 2. Equipment:

Preston Grip Dynamometer, Jackson MI (Takei Kiki Kogyo; "Smedley" Lightweight Hand Dynamometer) or the dynamometer from baseline (TEC). The handle should be adjusted so that the individual holds the dynamometer comfortably.

The grip dynamometer should be calibrated weekly by hanging at least 2 different weights (5 lb, 10 lb, 15 lb, etc) from the handle and recording the measure. The weights can be attached using velcro or any other means that works. Record the weight used and the result in a log book. Deviations of more than  $\pm 2$  kg should be reported to the Coordinating Center and the company should be called for repair.

##### 3. Measurement Procedure:

a) Grip strength will be measured in both arms unless the participant has had a recent flare-up of extreme arthritis or recent surgery. If the participant has had a stroke or injury causing weakness, still measure BOTH sides.

- For each hand, determine if the subject has an acute flare-up of arthritis in the hand, or surgery in the hand or wrist in the past 3 months (12 weeks). If the subject has had an acute flare-up of arthritis or is less than 13 weeks post fusion, arthroplasty, tendon repair, synovectomy, etc. then do not test grip on the affected side.

"Have you had a recent worsening of pain or arthritis in your hands, or have you had surgery on your hands in the past 3 months (12 weeks)?"

If yes, test grip strength in unaffected side only. Mark "weakened" on the form for the affected side only.

"This device measures your arm and upper body strength. I will demonstrate how it is done. Bend your elbow at a 90° angle, with your forearm parallel to the floor. Don't let your arm touch the side of your body. Lower the device slowly, taking about 3 seconds, squeezing as hard as you can. Once your arm is fully extended, release your grip."

b) Place the dynamometer in the right hand with the dial facing the palm. The arm should be flexed 90° at the elbow and the forearm parallel to the floor. As you demonstrate, instruct the individual to squeeze the hand maximally while simultaneously lowering the arm on a three second count. The grip should be released when the arm is completely extended, hanging straight at the side.

c) Allow one submaximal practice trial using the right arm.

"Does that feel like a comfortable grip?"

Adjust the handgrip, if necessary.

"Now try it once just to get the feel of it. For this practice, just squeeze gently. Don't let your arm touch the side of your body. One, two, three."

d) Perform two trials on the right side.

"Good. Now this time it counts. We'll repeat this twice on the right side and then twice on the left side. Be sure to squeeze as hard as you can.

Ready? Ok. Squeeze as hard as you can! One, two, three  
(count out loud for the participant as she lowers her arm) "

Record the kilograms from the dial to the nearest 1 kg. Reset the dial. Perform the second trial.

e) Repeat the procedure for the left arm. No practice trial is needed for the left, but ask the subject if the grip is comfortable.

Precautions: The arm should not contact the body. The gripping action should be a slow sustained squeeze rather than an explosive jerk.

f) On the scoring form, there should either be a value for strength attained OR one of the three boxes - refused, unable, or weakened, should be checked (this will automatically put the correct special values for this participant in the field). The weakened box should only be checked if the participant has had recent arthritis or surgery on that side. (Weakened = 6's. Refused = 7's. Unable (unable to test) = 8's.)

g) **If the participant has trouble standing, this exam can be performed sitting or lying down. Make a note of these instances in the comments section of the exam form.**