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SUPSI

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EVALUATION OF SHOULDER ROTATION AXIS DURING THREE DIFFERENT TASKS

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BACKGROUND AND AIM

The term shoulder instability refers to a clinical condition in which soft-tissue or bony impairments and rotator cuff imbalances may lead the humeral head to a sublux or dislocate from the glenoid fossa.
The rotator cuff and shoulder ligaments stabilizes the glenohumeral joint and limits the humeral head translations They play an important role in maintaining the normal/correct humeral head position in the glenoid fossa especially during abduction and external rotation of the shoulder.
The aim of the present study was to investigate the behaviour of finite helical axis (FHA) during shoulder rotations in three different conditions, and to observe how a mechanical constrain affects the shoulder stability.

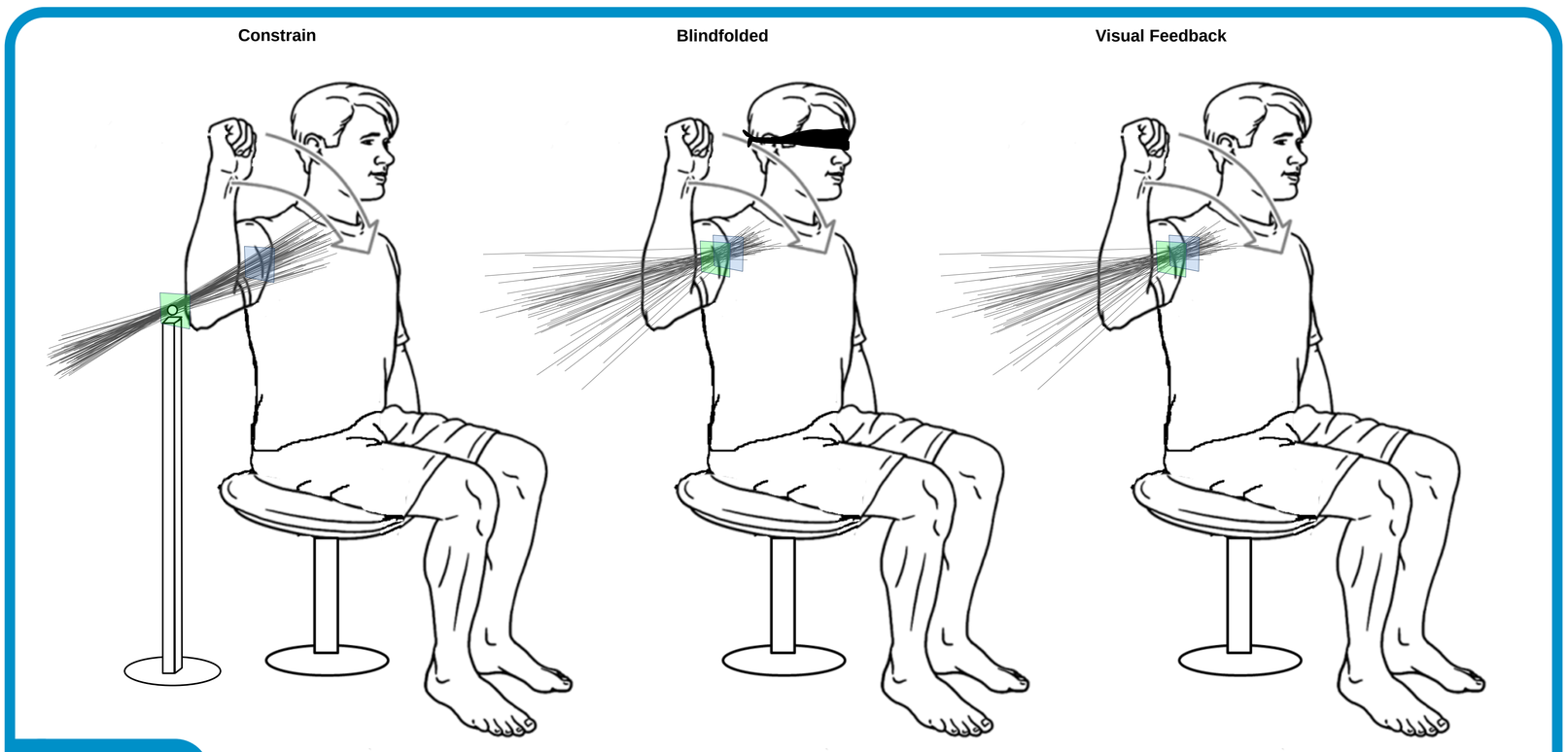

Figure 1 .....

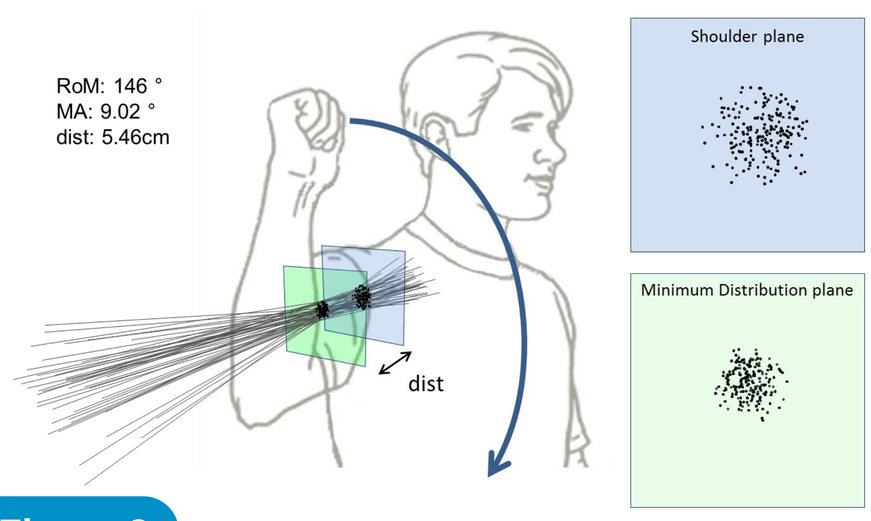

Figure 2 .....

MATERIALS AND METHODS

Nineteen healthy subjects (7 males, 12 females, age: 23.2±2.7 years) participated in the experiment. Shoulder kinematics was measured by means of an optoelectric motion capture system (Optitrack) including six infrared cameras. An additional videocamera was positioned behind the subject and used to provide a visual feedback of arm position. The subjects were sitting on a chair with arm abducted 90 degrees laterally and (see figure). The arm was fixed in a light wooden frame with velcro straps in order to keep the elbow angle at 90 degrees flexion. The subjects were asked to perform three series of ten shoulder inward and outward full range rotations. The three series of movements were performed in the following conditions: 1) blindfolded 2) visual feedback of the camera showed on a screen in front of the subjects 3) arm frame locked to a spherical joint on a wooden support. The protocol was repeated for both arms in randomized order. 3D data were sampled at 120 Hz.

RESULTS

The shoulder rotations were analysed with the FHA technique, using angles of 10 degrees to compute each FHA. The dispersion of the FHA for each of the four conditions was computed using the minimum convex hull (CH) and mean angle (MA). In addition the range of movement (RoM) of the shoulder was measured for each of the three conditions.
The comparison between dominant and non-dominant arm showed slightly although not significant lower CH area and lower mean angles for the dominant arm. The visual feedback condition showed no difference compared to the condition with eyes closed in both arms. A slightly significant higher CH area and significant lower mean angle (1-way ANOVA, P<0.01) were observed in the condition with constrain compared to the other conditions for both arms.

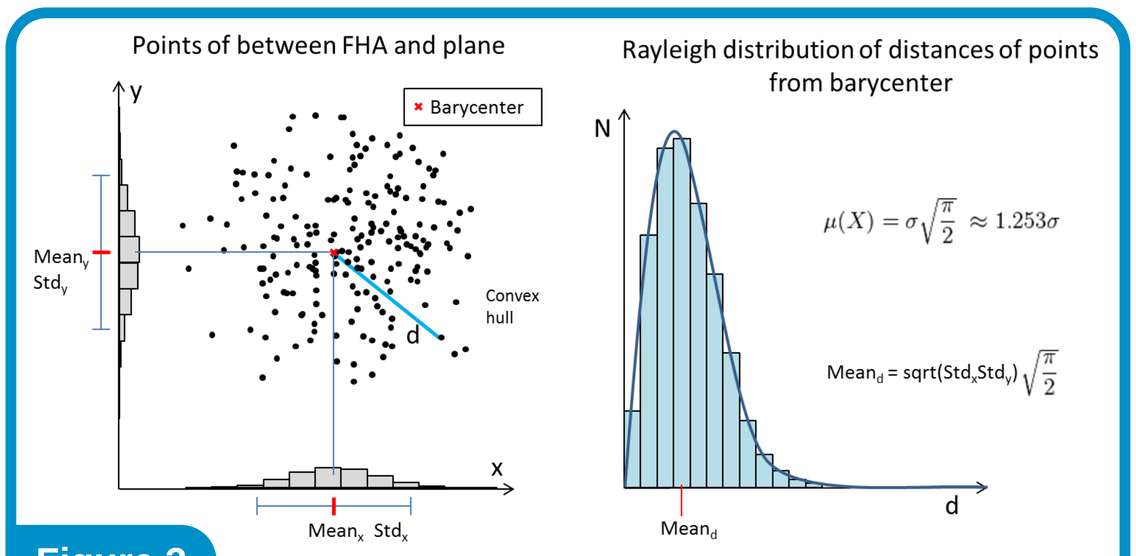

Figure 3 .....

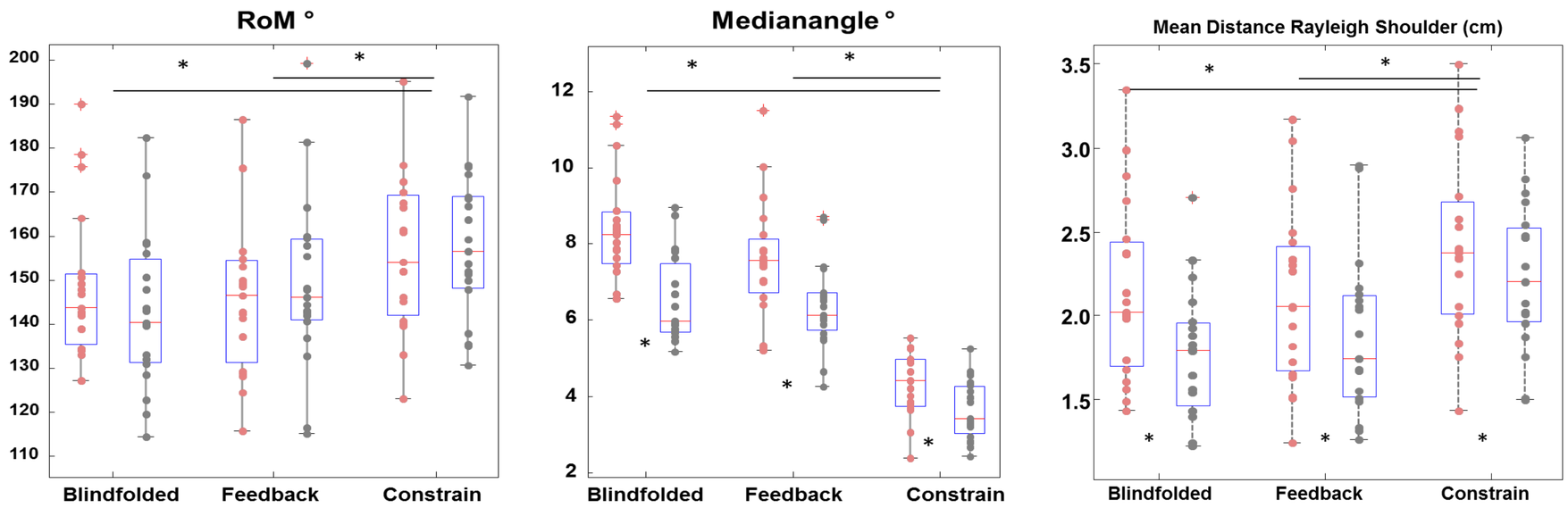

Figure 4 .....

CONCLUSIONS

The FHA technique can be used to quantify the stability of shoulder during internal and external rotations.

Further research to explore the association between the helical axis dispersion and the clinical features of shoulder instability is needed

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