CHAPTER 6

DISCUSSION AND CONCLUSION

DISCUSSION

A modified simplified stress radiographic device was developed with intention to help unskilled examiner to document anterior displacement of tibia on radiograph and make decision about ACL condition. Materials that we used in this device could be found in primary care hopitals. Diagnostic properties of this technique were studied. Patients with torn ACL were recruited adequately, more than we calculated. There was a good distribution of spectrum of disease in terms of a difference in anterior knee laxity between two knees of studied subjects. The range of a difference in anterior knee laxity was from 0 to 18 mm. Most of the patients were male this might due to culture and life style in Thailand that men participate in vigorous sports more than women and have higher chance of injuries. Most of them sustained sports injuries. They all were chronic cases because of a long waiting list for surgery or because of initial correct diagnosis were delayed.

According to our device, a leg was pulled anteriorly, a tibia would displace anteriorly without any rotational constraint. There was a chance of couple motion of anterior displacement with internal or external rotation. So we used the radiographic measurement technique that marked on posterior outline of both medial and lateral femoral condyles, and both medial and lateral tibial plateaus. Anterior displacement was measured by the distance between mid point the marks on femoral condyle to the mid point of the marks of the tibial plateau. Our measurement technique was expected to detect an abnormal anterior tibial displacement to diagnose ACL injury, not for follow up measurement to evaluate outcome of treatment. The cut of point at 3 mm anterior displacement was chosen. This would already include a magnification of radiograph into measurement. We expected sensitivity of this technique to be 90%.

According to the results of this study, there were no patients with intact ACL and positive radiographic measurement (no false negative cases), the Wilson's method to calculate 95% confidence interval was used (35). The Wilson's method has the

considerable advantage that it can be used for any data with no restriction with very low or very high observed proportions.

Radiologists and surgeons were blinded to the results of each other's. They all worked independently. The result of this study, sensitivity was only 69%. A subgroup analysis demonstrated that sensitivity was lowest in a group that anterior displacement occurred between 3 to 6 mm. that just above a cut of point. This could happen because of measurement errors from incorrectly marking points on the radiograph, or rulers and pencils were not precise enough, or patients did not relax enough to allow anterior displacement of their legs, or technique of measurement was not good enough to detect these abnormal displacements (Figure 6 to 9).

The inter-rater reliability study between two radiologists showed good agreement, this probably means that radiographic landmarks were clearly exposed and identified.

A subgroup analysis revealed that there was also a false negative in a group that knee laxity was more than 9 mm. When we went back to review these false negative findings (Table 8 and chart 1), we agreed to the results of radiographic measurement. Causes of these false negative cases might be due to inadequate muscle relaxation from awkward positioning or patient incorporation or from radiographs that were too oblique in transverse plane.

To apply this technique in clinical practice, we must be precautious. There were no acute knee injury patients recruited to this study. Patients with acute knee injury have a higher chance of muscle guarding due to acute pain or positioning. Eventhough the sensitivity was 69%, the specificity and positive predictive value were 100%, and sensitivity was not much less than the Lachman test. According to a present health care system in Thailand when the cost of treatment and patient referral are greater concerned, we may use the test to reconfirm diagnosis in primary care unit prior to refer or treatment. A recommendation from this study is that in acute knee injury patients with their history suggest ACL injury but results of physical examination for knee instability are uncertain, clinicians should wait until acute inflammatory process subside, probably 1 or 2 weeks after acute injury then repeat physical examination

again. Skill in performing the Lachman test is very important in order to give a correct diagnosis of a torn ACL. Teaching methods of musculoskeletal examination in medical schools might need improvement. A hands on demonstration of techniques or other learning media such as videotape, compact disc might be methods of teaching. However, medical students and clinicians need enough patients to improve and maintain their skills. If the results of physical examination for knee instability are uncertain according to clinicians' skill, clinicians may try this simplified stress radiography for further investigation. Patient positioning and muscle relaxation must be a great concern in order to get high quality of radiograph. If the results of these stress radiographs show positive results, torn ACL patients will be detected. However, if the results are negative, further investigations are needed.

CONCLUSION

This simplified stress radiography had limited diagnostic properties to screen patients sustained ACL injury. On the contrary, the specificity and positive predictive value were so high that we may use it to confirm the diagnosis. According to a present health care system in Thailand, cost of treatment and patient referral are more concerned, this simplified stress radiography may be used as a tool to confirm diagnosis in primary care setting prior to referral if there are clinical uncertainty due to physical examination skills.