TRIAL FOR DEVELOPING A NEW INDICATOR FOR PREDICTING OVERUSE KNEE EXTENSOR MECHANISM DISORDERS IN ADOLESCENT ATHLETES USING A TISSUE HARDNESS METER: A COMPARISON WITH CONVENTIONAL FLEXIBILITY TEST.

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Introduction
Overuse knee extensor mechanism disorders in adolescent athletes, such as Osgood-Schlatter's disease, are said to be related to decreased flexibility in the knee extensor mechanism, which is elongated by rapid skeletal growth during the growth spurt period. Although it is important to check the flexibility of the knee extensor mechanism for the prediction of the disorders, a simple and quantitative measurement has yet to be established. In the previous study, we investigated the relation between knee extensor mechanism tissue hardness and the occurrence of knee extensor mechanism disorders. In the current study, we compared the tissue hardness test with the conventional flexibility test for the prediction of the disorders.

Methods
A total of 184 legs from 92 adolescent male soccer players [9 to 17 years old, which includes the growth spurt period; mean age (SD): 13.1 (2.5) years] were examined in the study. We investigated the tissue hardness and used the conventional flexibility test (Ely test) of the knee extensor mechanism in the medical check-up, and prospectively observed the occurrence of overuse knee extensor mechanism disorders for one year. Players were measured for the tissue hardness of their knee extensor mechanism (at the midpoint of the knee extensor mechanism in anterior thigh) using a tissue hardness meter, Muscle Meter PEK-1 (Imoto Machinery Co. Ltd.: arbitrary unit), in both supine and knee extended positions.

Results
During the observation period, knee extensor mechanism disorders occurred in six legs from four players, which included Osgood-Schlatter’s disease (five legs from three players) and jumper’s knee (one leg from one player). The mean value (SD) of tissue hardness of the knee extensor mechanism was 57.3 (2.5) for legs in which overuse knee extensor mechanism disorders had occurred (N=6) and 54.8 (3.0) for legs in which no disorder had occurred (N=178). Our findings showed that the knee extensor mechanism tissue hardness of legs in which overuse knee extensor mechanism disorders had occurred was significantly higher than that of legs in which no disorder had occurred (p<0.05). On the other hand, a positive Ely test was seen only in one leg in which overuse knee extensor mechanism disorder had occurred (sensitivity 16.7 %), and a negative Ely test was seen in 104 legs in which no disorder had occurred (specificity 58.4 %).

Discussion/Conclusion
The tissue hardness of the knee extensor mechanism was significantly higher among the legs in which knee extensor mechanism disorders occurred than that of legs in which no disorder had occurred. On the other hand, the conventional knee extensor mechanism flexibility test was not useful for predicting the occurrence of the disorders. In conclusion, evaluation of the tissue hardness of the knee extensor mechanism can be used as a predictive index for the occurrence of the disorders in adolescent athletes.

References

Keywords: Prevention, Sports Injuries, Knee