Different changes of quantity due to aging in the psoas major and quadriceps femoris muscles in women

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Abstract

A bone fracture due to an elderly person’s turning over is a big cause of the so-called bedridden state. The prevention of turning over is then an important subject for elderly people. In these days, a kinematical method has been introduced as a countermeasure to the act of turning over.

Strengthening muscular groups of lower limbs, focusing on the quadriceps femoris has been done as a main kinematical method of preventing a fall. Recently, however, the relationship between psoas major muscle (a muscle connecting the thighbone with the backbone) and the act of turning over has attracted attention because it has become clear that the muscle greatly influences walking ability.

This research aimed at explaining the characteristics of the change of the quantity of psoas major muscle due to aging by comparing changes of the cross-section of the muscle to that of quadriceps femoris muscle as a part of the research on the prevention of elderly people’s turning over. Participants in this research included solely women because the danger of female bone fracture due to turning over is approximately 2.5 times greater than that of male one. A total of 210 women who lived in two neighboring cites in the same prefecture, from ages 20 to 79, were divided into 6 age-groups in 10-year increments.

Each age-group contained 35 participants. The cross-sectional areas of psoas major and quadriceps femoris muscles were measured as an estimate of the muscle quantity. A magnetic resonance scanner was used for the measurement. The cross-sectional areas of the psoas major and the quadriceps femoris were compared between each age class. The changing patterns of ratios of the cross sections of psoas major and quadriceps femoris muscle of each age class against those of the 20's were compared.

As the result, there was a big difference in the muscle cross-section’s decline along with aging between the psoas major and the quadriceps femoris. As for psoas major muscle, the peak of the cross-section of muscle was in the 20's. After the peak, it declined...
continuously until the 60’s (the ratio against the 20’s was 0.817, \( p<0.001 \)) and then accelerated to drop in the 70's (the ratio was 0.681, \( p<0.001 \)). The cross-sectional area of psoas major muscle of the 70’s was significantly lower than that of the 60’s (\( p<0.001 \)). On the other hand, the area of quadriceps femoris muscle was preserved until the 40’s (the ratio against the 20’s was 1.000). It did not decline remarkably from the 60’s to 70’s like the psoas major. The ratio against the 20’s for the 60’s (0.857) was not different from that for the 70’s (0.784).

Because the decline of the muscle quantity of the psoas major were suggested to begin earlier than that of the quadriceps femoris, beside daily exercise which is considered to be effective to maintain the quadriceps femoris, additional exercises are suggested to be necessary to prevent psoas major muscle from decreasing in volume. In addition, the muscle amount of the psoas major decreased remarkably after the 60’s, which was not observed for the quadriceps femoris. A specific method to keep the muscle amount of the psoas major was again assumed to be necessary. The additional method specific to psoas major muscle should aim at targeting women before the 40's and also after the 60’s.