

6 Summary

Motivation to conduct this study was the increased application of bone-free hamstring tendons for the use of anterior cruciate ligament (ACL) reconstructions in the recent years. Additionally, more frequent revision surgery has led to a higher demand of allogenic material. Therefore we used a highly regarded sheep model to transplant 54 bone free tendons taken from the flexor digitorum superficialis muscle. Half of these transplants were of allogenic origin. After 6, 12 and 52 weeks the animals were sacrificed and tissue samples had been extracted, followed by thorough histological and immunohistological analysis. Through a complicated process it was possible for the first time to depict myofibroblasts for comparing autologous and allogenic ACL-transplant properties. These specialised fibroblasts decisively influence the remodeling process due to their secretory and contractile attributes.

The results of our studies were able to clarify the still incomplete and contradictory picture concerning the comparison of autologous and allogenic transplants for the use of ACL reconstructions. The considerable amount of animals and the standardized procedure enabled a statistical analysis for the first time. After 6 weeks, we were able to show a significant difference of the total number of cells. Also, significant differences in myofibroblast-density and collagen crimp formation were found after 12 weeks. At these early stages, the progress of remodeling in the autografts was more advanced toward the central areas than in the allografts respective areas. The tissue structure appeared to be less orderly in the allogenic transplants. One year after the operation the appearance of both groups transplants returned to an ACL-similar structure again. At this point especially the crimp formation showed no significant difference to the ACLs anymore. However, the total number of the allogenic transplant cells again was significantly higher than that of the original ACLs. Biomechanically the autografts proved to be just slightly more superior during the first year – however, this difference became significant after one year. Thus the different remodeling-dynamic at the early stages had an impact on the transplants tensile strength after one year's time.

Despite increasing application of allogenic ACL-transplants, especially in the United States, our results do not justify an overly enthusiastic use them. In case of a lack of sufficient autologous material due to complex ligament injuries or revision surgery the following treatment after surgery should be conducted more cautiously and delayed.