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Anterior cruciate ligament injury rehabilitation in athletes. Biomechanical considerations.

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Postoperative rehabilitation is a major factor in the success of an anterior cruciate ligament (ACL) reconstruction procedure. Clinical investigations of patients after ACL reconstruction have shown that immobilisation of the knee, or restricted motion without muscle contraction, leads to undesired outcomes for the articular, ligamentous, and musculature structures that surround the knee. Early joint motion is beneficial for; reducing pain, capsular contractions, articular cartilage, and for minimising scar formation that limit joint motion. These findings, combined with graft materials that have biomechanical properties similar to the normal ACL, and adequate fixation strength, have led many to recommend aggressive rehabilitation programmes that involve contraction of the dominant quadriceps muscles. Recently, a prospective, randomised study of rehabilitation following ACL reconstruction has presented evidence that a closed kinetic chain exercise programme (foot fixed against a resistance) results in anterior-posterior knee laxity values that are similar to the contralateral normal knee. Also, open kinetic chain exercises (foot not fixed against a resistance) result in increased anterior-posterior knee laxity compared with the normal knee. Criteria must be observed because the relationship between rehabilitation exercises and the healing response of an ACL graft is unknown at present. Biomechanical studies of healing ACL grafts performed in animals have shown that the graft requires a long time to revascularise and heal, and that the biomechanical behaviour of the graft never returns to normal. Functional knee braces provide a protective strain-shielding effect on the ACL when anterior shear loads and internal torques are applied to the knee in the non-weight-bearing condition. However, the strain shielding effect of functional braces decrease as the magnitude of anterior shear and internal torque applied to the knee increase. Future studies should strive to determine the actual loads transmitted across the knee and ACL graft strain during various rehabilitation exercises and relate these to the healing response of the knee and graft.

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