

Comparison Between the Therapeutic Exercise in the Open and Closed Kinetic Chain Post Ligamentoplasty of the Anterior Cruciate Ligament: Approach According Scientific Evidence

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Introduction

The objective of this study is the comparison between the works in the closed kinetic chain (CKC) versus the open kinetic chain (OKC) in ligamentoplasties of the ACL according to the scientific evidence (SE) (Figure 1). One of the main concepts in the treatment after the ligamentoplasty of the anterior cruciate ligament (ACL) is the recovery of the necessary muscular qualities for the socio-professional activities. This muscular work must respect the process of tissue and ligament healing. This is made in base of a combination of suggestions in OKC or in CKC that will follow implantation stages inside the clinical trajectory or guidance according to the different phases of the tendon-ligament transplant maturation respecting the process of the ligament reconstruction [1].

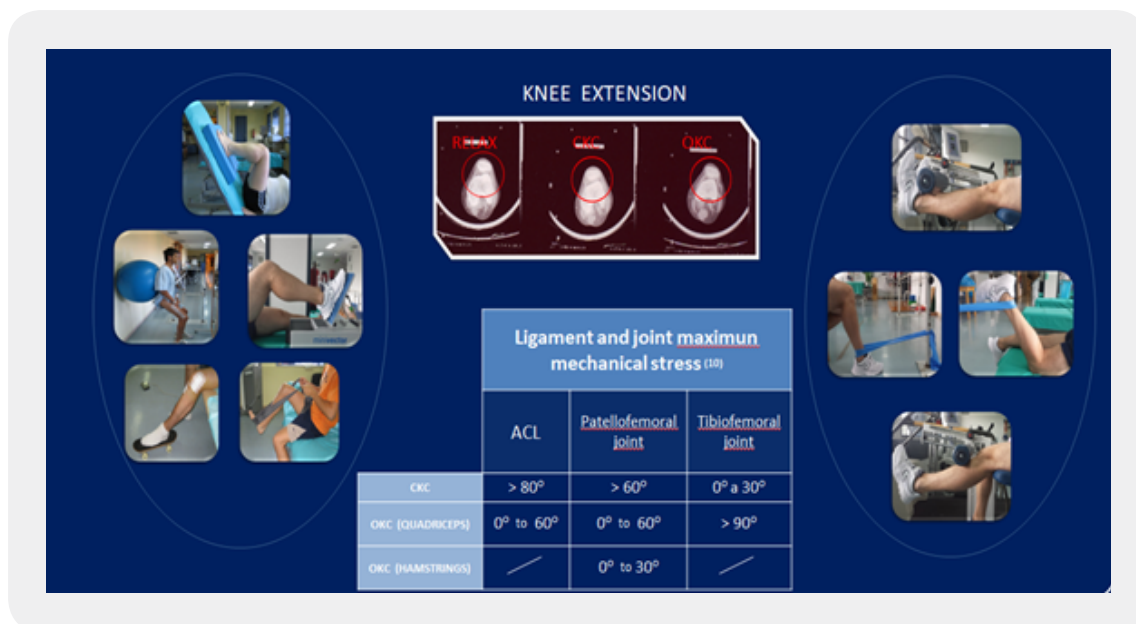


Figure 1: OKC and CKC (Author's own source)

The characteristics of the work in CKC are [2-5]:

- The control in the movement and rotation of the tibia on the femur facilitates the simultaneous work of the hamstrings and the inter-muscular coordination, facilitating a co-contraction of agonists and antagonists.
- A global functional toning without stress is made.
- It is a lot more functional for the lower limbs than OKC.
- The articular stability increases because of the forces of the compression femoro-tibial axially; there is a reduction in the shear and friction articular tensions between the articular area.
- It favors the work of other knee extensors such as the gluteus and the palmar flexors, it makes a neurological motor reprogramming between muscles from the posterior chain (hamstrings, sural triceps) and the anterior chain (quadriceps).

Material and Methods

Bibliographic revision in Data Bases (BBDD) Scopus, Web of Science, Cochrane plus, PubMed, PEDro of 1985-2017 according to terms “open and closed kinetic chain and anterior cruciate ligament reconstruction”.

Results

Authors conclude that ligamentoplasties of the type (bone-tendon-bone) through exercises in CKC produce less knee laxity and less anterior knee pain [6]. Other authors introduce isokinetic exercises in the 6th week in the OKC in articulation range between 90° and 40° not showing differences between the knee laxities but

showing them in the improvement of the quadriceps recovery and the restart of doing Sport [7]. In OKC flexion above 60° and proximal resistance are insignificant in the tensions on the ACL plasty [1]. There will be situations in which the initiation of the monopodal support will have to be postponed and not made before the third month after the ligamentoplasty since they will be situations of tension similar to the ones that the OKC provokes with distal load work favoring the recoil of the condyles on the tibia [8]. These situations are:

- Injuries of the posterior segment in the medial meniscus.
- Morphotypes with an exaggerated tibial slope higher than 10° of inclination.

Conclusion

More studies by means of the surgical donor hamstring tendon technique are needed, and the CKC is prioritized in the first 6 weeks [9,10]. In most of situations the CKC offers mechanical and neuromuscular advantages, existing only contraindications in the one leg support radiologically identifiable to a preoperative level in charge according to everything mentioned previously. The practical modalities of the CKC (foot on the ground or horizontal press) can grant privilege or not in the work of hamstrings, quadriceps and femoral triceps according to the inclination of the trunk and the type of the plantar support. Consequently, the best option is the complementary work in OKC and CKC [11].

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