

SCIENTIFIC BASES IN ACCELERATED PHYSIOTHERAPY IN THE RECONSTRUCTION OF LCA WITH PLASTIA H-T-H. SECTION I

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• INTRODUCTION

We will study the scientific bases of functional re-education applied to LCA reconstruction with autological plasty.

Surgeons always remind us that physiotherapy has an equivalent role to the surgical act, in the final functional result.

An incorrectly driven physiotherapy is half-way responsible for the bad results achieved. There may be complications as the following:

- 1) Residual laxity
- 2) Cartilage destruction
- 3) Joint stiffness
- 4) Muscle atrophy.

All these complications are in direct relationship to physiotherapy.

-The priority objectives of physiotherapy are the recovery of: 1) Joint mobility
2) Muscle strength (without plasty distension)

-Despite all the experimental data we have nowadays, physiotherapy has 2 ideas:

- 1) We don't know with certainty which are the transferred tensions to the transplant in the re-education and in the different physical activities.
- 2) None of the experimental additions allows us to know which is the correct tension that the plasty must receive, in order to allow the transplant to solicitate (without it meaning a risk) to accelerate its maturation without being exposed to distensions or ruptures.

• BIOMECHANICAL DATA

-The LCA normal value in a young subject is of 1725 Newton for **(Noyes)** and of 2160 N for **Woo**.

-The resistance of 1/3 medium of the knee tendon represents 121% of the LCA normal resistance **(Noyes)**.

-Cooper y Warren : They checked that there was a mechanical resistance of 2977 N for a 10 Mm transplant of 1/3 medium knee tendon. This fact represents 174% of normal LCA of Noyes study results and 138% of the **Woo's study results**, besides the fact that they indicate a 30% increase in the mechanical rotation when the plasty is at 90°.

-The attachment through interference, according to **Kurosaka**, ensures a resistance of 476 +/- 192N.

-But it is after the surgery that the transplant becomes very solid, because the mechanical resistance of the plasty reduces in the months after surgery, according to the conclusions obtained by the experimental data (Table 1):

TABLE 1

		Months	% normal LCA
ALM	1974	6	50
CABAUD	1979	8	52
CLANCY	1981	12	52
Mc PHERSON	1985	6	38
NOYES	1984	4	50
JACKSON	1993	6	62

-These studies must be thought of with caution because they are made on animals and they are not to extrapolate directly onto a human being.

-In the study done by **Clancy** (done with animals) he verified that the first transplant had an initial mechanical

resistance of 50% of normal LCA, while for human being is a 174% of normal LCA.

-In the human being, the transplant goes through different stages after surgery:

1) From 0 - 2 months : REGENERATING STAGE :

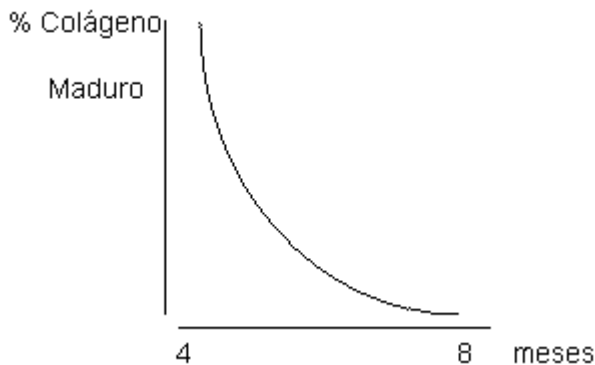
-The neoligament revascularization is assured by the adipose ligament and the bone tunnels.

-Revascularization seems to be quick because in 3 weeks in man it is already seen a transplant surface revascularization (in case of 1/3 medium knee tendon). In this stage, it will appear an important increase in neovessels and in cellularity (inflammatory cells, fibroblasts) and of metabolism.

-This revascularization stage comes along together with a decrease in the mechanical properties around almost the first 6 weeks and it is forwarded by a progressive resistance increase stage (Arnocsky,1997).

2) From 2nd to 12th month: REMODELLING STAGE:

-During this period, the neovascularization loses importance. Cellularity increases up a maximum of 4 months post-operatively with increase in the percentage of the metabolically active fibroblasts. The mature collagen percentage is minimum between the 4th and 8th month:



-An appropriate mechanical stimulation seems to be the key to keep the necessary mechanical properties of the transplant for the remodelling process. The LCA reconstruction should be the more anatomical, the better (Jackson,1991).

3) From 1 to 3 years : MATURATION STAGE :

-The number of fibroblasts and vascularization are reduced. The collagen maturation is complete.

4) After 3 years :

-The neoligament has a normal LCA aspect.

The attachment of the bone grafts doesn't seem to be the weak point on the plasty, due to the fact that its resistance increases after surgery because of the bone consolidation with the tunnel.

-The different studies done on animals show a rupture of the transplant on its body and not for avulsion of the bone block.

-The technique of the 4 fasciculi using semitendinous and inner rectus will achieve a resistance of 238% of normal LCA, but its resistance is lower because the fasciculi aren't tensed in an equivalent way.

-Rodeo y Arnocsky : They studied with dogs the resistance to rupture of an extensor tendon attached to the tibial tunnel bone. They do not find any tearing at the tunnel level after 2 months.

-Jhonson : He did plasty biopsies in man in different stages of post-operative, demonstrating a transplant maturation after the 3rd month the patient had undergone surgery.