Strength, Muscle Quality and Functional Capacity in Liver Transplanted Familial Amiloidotic Polineuropathy Patients.

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Introduction

Liver transplantation is the unique treatment for several end-stage diseases.

Familial Amiloidotic Polineuropathy (FAP) is a neurodegenerative disease related with systemic deposition of amyloidal fiber mainly on peripheral nervous system, clinically translated by an autonomous sensitive-motor neuropathy with severe functional limitations in some cases. The unique treatment for FAP disease is a liver transplant with a very aggressive medication to muscle metabolism and force production(1).

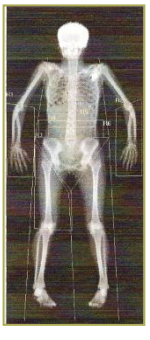
To our knowledge there are no quantitative characterizations of body composition, strength or functional capacity in this population

Purpose

The purpose of this study was to compare levels of specific strength (isometric strength adjusted by lean mass or muscle quality) and functional capacity (meters in 6 minutes walk test) between FAP patients after a liver transplant (4.1 2 months after transplant surgery) (FAPTx) and a healthy group (HG).

Methods

Sixty-four subjects where assigned in 2 groups: 46 patients FAPTx (27 males, 32±8 yrs and 19 females, 37±5 yrs) and eighteen HG (9 males, 34±7 yrs and 9 female, 36±8 yrs).



•Isometric strength of quadriceps was measured using an isokinetic dynamometer (Biodex) (2)

•Body composition was determined by measuring lean mass of dominant lower extremity in a region of interest (thigh) by dual-energy x-ray absorptiometry (QDR-explorer – Hologic, Waltham, MA; Fan bean mode) (3).

• Muscle quality was ascertained by taking the ratio of strength to muscle mass (4).

• Functional capacity was determined by the number of meters walked on 6MWT(5)

Results and Discussion

HG showed significant higher values than FAPTx pàtients for (table 1):

•Peak torque (66.3N 25.2N) vs 40.2N 17.6N respectively p=.000)

•Muscle quality (11.8 2.6 vs 7.9 2.7 respectively, p=.000

•Functional capacity (675.9 109.1m vs 511.4 139.1m respectively, p=.000)

There are no differences between HG and FAPTx for (table 1):

• BMI (23.8 2.2 kg/m2 vs 22.0 3.8 kg/m2 respectively, p=.07)

•Thigh muscle mass (5.5kg 1.2kg vs 5.04kg 1.1kg respectively p=.14)

Negative correlations were observed for FAPTx patients but not for HG between age and peak torque (p=.013; r= -.363) and age and thigh muscle mass (p=.011; r= -.373)(fig.1)

Table 1 – Body composition variables, strength, muscle quality and functional capacity (Mean sd; Min-Máx; p-value for t-test)

Variables	Group FAPTx (n=46)		Group HG (n=18)		
	Mean±sd	Min-Max	Mean±sd	Min-Max	p-value
Age	34±7	23-59	35±7	21-46	0.681
Weight (kg)	62,9±12,5	35,6-101,2	65,6±9,0	54,1-79,7	0.406
Height (m)	1,69±0,08	1,53-1,85	1,66±0,08	1,53-1,80	0.185
Body Mass Index (kg/m2)	22,03±3,85	15,2-30,9	23,8±2,2	20,7-27,5	0.074
Functional Capacity (m)	511,43±139,12	163,5-708,9	675,85±109,08	525,7-971,2	0.000*
Peak Torque (N-M)	40,22±17,65	10,0-94,5	66,31±25,21	35,20-122,70	0.000*
Total lean mass (kg)	45,41±8,08	28,23-66,38	45,9±9,08	33,36-60,53	0.834
% total fat mass	22,50±9,23	9,70-42,3	26,62±7,96	11,82-39,42	0.102
Thigh muscle mass (kg)	5,04±1,11	2,61-8,18	5,52±1,23	3,92-7,56	0.138
muscle quality	7,92±2,74	3,84-14,99	11,77±2,61	8,03-16,24	0.000*

* Differences between the means of both groups (p<0,05)

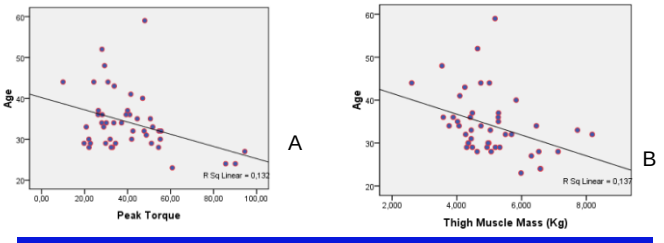


Fig 1- Scatterplot for correlations between age and peak torque (A) and age and thigh muscle mass (B) for FAPTx group

Conclusions

• FAPT patients have lower functional capacity, strength and muscle quality than HG.

• The differences between groups for muscle quality and peak torque but not thigh muscle mass seems highlight the importance of the neural component of the disease and show also the importance of training the process of force production specially the sensoriomotor component in FAP patients and probably the importance of a strengthening exercise program.

•Further studies are needed to explore training effects on function after transplantation.

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