



Research Project Proposal

Academic year 2019-2020

Project Nº 55

Title: *The added value of Trabecular Bone Score to DXA for fracture prediction in liver transplant patients*

Department/ Laboratory *Nuclear Medicine Department, CUN.*

Director 1 *Macarena Rodríguez Fraile (if there will be two co-directors indicate both)*

Contact: *mrodriguez@unav.es*

Codirector: *Javier Arbizu Lostao*

Contact: *jarbizu@unav.es*

Summary *Short summary of the project with a **maximum extension of 250 words**, including the goals and the methodology that will be used.*

In the first year after a liver transplant (LT), between 24-65% of patients present with bone fractures, being the ribs and vertebrae the most frequent locations. This situation significantly affects the quality of life of patients. The origin of these fractures is the presence of osteoporosis, a metabolic bone disease conditioned by a decrease in bone mineral density (BMD), usually measured by bone densitometry (DXA). However, the origin of osteoporosis is not only a decrease in BMD but also the alteration in trabecular architecture. The inability of DXA to determine the quality of the trabecular bone is the cause of up to 50% of patients suffering from an osteoporotic fracture presenting BMD values above the defined limit for the diagnosis of osteoporosis.

The development of a specific software for the measurement of trabecular bone from the densitometric image has therefore meant an important advance in the management of osteoporosis. The TBS iNsight® software, based on the densitometric study and without a dose of radiation or an additional examination, determines the bone texture (an index related to bone microarchitecture), expressing the result as Trabecular Bone Score (TBS). From this value it calculates the risk of fracture also taking into account the value of BMD. A study¹ conducted in Canada on 29,407 patients followed for an average time of 5 years, showed that the joint use of the value of TBS with BMD obtained in DXA increases the prediction of fracture risk in postmenopausal patients. This benefit has been shown to be even more decisive in patients presenting with pathologies associated with an increase in bone fragility due to alteration of the trabecular architecture and in which therefore DXA was not effective enough. This is the case of patients treated with corticosteroids for a long period of time, patients with renal insufficiency (RI) and patients with diabetes mellitus (DM) 1 and 2, among others. In all of them, the measurement of TBS has shown 2-4 to be more sensitive than BMD to define the risk of fracture.

So far it has not been published if the measurement of TBS can be a benefit in the control of the risk of fracture in patients who have had a LT. It is especially interesting, since one of the factors involved in the appearance of bone fragility in these patients is the treatment with glucocorticoids and other immunosuppressive drugs, since both preferentially affect the trabecular bone. Considering that the measurement of the TBS is made from the densitometric image, retrospective analyzes of patients studied with DXA can be made. Therefore, the DXA of the patients studied in our center can be analyzed again and determine if the TBS measured in the follow-up, allows to discriminate more



effectively those patients who will end up suffering an osteoporotic fracture, following their clinical evolution.

Goals

To determine whether the joint use of TBS and DXA allows a more accurate prediction of the probability of bone fracture in liver transplant patients.

Methodology

Patients undergoing liver transplantation in the 2006-2016 period, who have had at least one DXA study during their follow-up, will be analyzed. BMD and TBS values as well as their fracture risk classification according to the WHO and FRAX criteria, will be determined. The clinical or subclinical fractures (determined in imaging tests) that may have suffered during the follow-up time will also be studied. Analytical values of liver and renal function at the time (s) of DXA, long stay in bed after transplantation, time of taking glucocorticoids or immunosuppressants and presence of other concomitant diseases associated with increased fracture frequency, as DM or RI, will be determined. First, it will be studied which fracture prediction method: DXA, the FRAX criteria, WHO, TBS and TBS + DXA, more accurately predicts the clinical evolution of these patients. Secondly, it will be studied which clinical, analytical or therapeutic situation, determines the development of bone fractures after LT. The data will be collected in a SPSS data base and will be statistically analyzed.

yes		Does the project include the possibility of supervised animal manipulation to complete the training for animal manipulator?
no	x	