ABSTRACT INTRODUCTION:
It is well known that pre-existing degenerative processes in association with microtrauma are responsible for rotator cuff tendons tears. The incidence of these changes in staining qualities and tendon structure are age-related (1). Several anatomical and surgical investigations have been done with histological sections in order to clarify the pathogenesis of the rotator cuff tears. Histopathological characteristics were classified as thinning and disorientation of the collagen fibers (collagen fragmentation), myxoid and hyaline degeneration, vascular proliferation, fatty infiltration, chondroid metaplasia and calcification into the three layers (superficial, middle and deeper) of the cuff tendons. The first six features are early degenerative processes instead of the last two may be chronic pathologic changes (1-2). Disorientation and thinning of the collagen fibers are the main findings and are more frequent in the deeper layers of the tendons where are present splited longitudinally. The major component of tendons is type I collagen, with increasing amounts of type III collagen in pathologic tissues. During tendons repair, type III collagen occurs initially, forming small-diameter collagen fibrils in the initial stabilization of the extracellular collagen meshwork. On the other hand, type I collagen forms larger-diameter fibrils and is probably more important in the establishment of the long-term matrix properties, in that way replaces gradually type III collagen, providing increased tensile strength. It is very important for the repaired tissue adjacent to the tear side to be viable to afford repair, to have sufficient vascularity at the site of the tear, to suggest viable active local fibroblasts and an adequate synthesis of type I procollagen (3-4). The cellular events leading to pathogenesis as well as to healing of rotator cuff tears still remain elusive.

METHODS:
We performed biopsy in 40 shoulders treated for chronic rotator cuff tears by mini open or deltoid-on approach, mapping the excised samples at the site of tear (four zones) with careful attention given to orientation of the tendon fibers. All patients were examined by X-rays, Ultrasound and MRI (3-D Analyze Mayo Clinic). Surgical repair was performed with anchors and sutures. Histological analysis was achieved via tissue fixation in paraffin blocks, staining with Hematoxylin-Eosin and microscopy. Samples from forty patients (study group) were analyzed for determination of hydroxyproline percentage to the newly synthesized collagen. Hydroxyproline was determined according to Reddy and Enwemeka (1996) and collagen assay was performed with Sircol Soluble Collagen Assay Kit (BIOCOLOR) (5). Four patients with no histological and biochemical findings were used as a control group.

RESULTS SECTION:
Histological evaluation showed collagen fragmentation and thinning (80% of patients examined), disorientation of their fibers (Fig. 1) associated with myxoid change and hyaline degeneration. Accordingly, 28 patients found with fibrocartilage-like change, Hydroxyproline was under-represented in newly synthesized collagen, in 32 patients (ratio ranging from 4-10 %) indicating a possible dysfunction in collagen fibers assembly (Fig. 2). Interestingly, the majority of the patients showing low hydroxyproline to collagen ratio appeared also with histological findings that show collagen disorientation, fragmentation and thinning.

DISCUSSION:
Histological findings like collagen degeneration and fibrocartilage-like change may explain the quality of tendon. Taken into account the abnormal hydroxyproline/collagen ratio may represent in to the future important diagnostic tools in repair and healing of torn rotator cuff tendons. In our study we examined the presence of hydroxyproline into newly synthesized collagen from human tissue samples of rotator cuff tendons. Hydroxyproline is an essential posttranslational modification found in collagen and it correlates with the overall quality of this macromolecule that might be associated with pathological histological findings. Our study focuses on correlating samples where hydroxyproline is under-represented in collagen with histological observations in the same patients showing collagen fiber abnormalities. It is the first experimental approach in human that potentially correlates the quality of tendon to the quality of the produced collagen and will potentially provide a reliable post-surgical prognosis.

REFERENCES: