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A DEGRADABLE AUGMENTATION DEVICE IN ACL RECONSTRUCTION IN HIGH LEVEL FOOTBALL PLAYERS: RESULTS AT 5 YEARS

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Introduction

The Polyuretane Urea (PUUR), a new class of synthetic polymers, has proved to be well tolerated by the human body and may constitute a suitable material for Anterior Cruciate Reconstruction (ACL) (1). Artelon Tissue Reinforcement band (Artimplant, Biomet Sport Medicine) is designed for ingrowth and incorporation to support the ACL reconstruction; the biomaterial degrades through hydrolysis (50% after 24 months in vivo) but at the same time the band maintains strength during repair and remodeling and after four years it still retains 50% of its strength. The objective of the present study was to evaluate the feasibility of augmentation device in ACL reconstruction consisting of an accelerated rehabilitation and less autologus tissue sacrificing in patients with a high level of physical activity (football players).

Methods

For the present study, ACL reconstruction (arthoscopic unitunnel technique) with a double autologus Semitendinosus (ST) sutured on the augmentation device, has been performed on 62 patients (58 Male and 4 Female) with isolated ACL injury from January 2011 to December 2012. Mean age at surgery was 24,6 years (16 – 34years) and mean injury to surgery time was 5.2 months (2 – 12). All patients were football players (any role) at semi or pro level. The patients were evaluated with standard knee score (Tegner and Marx activity rating scales, KT-1000 arthrometer,Medmetric Corporation San Diego, California, USA) and functional strength test (Lysholm Knee Form, IKDC Score) knee X-Rays and MRI. We reported the clinical and functional results at 60 months.

Results

Up to present (60 months f.u.), the clinical result have been good with full restoration of function and stability and no residual pain in the donor-site; no major adverse effects have occurred during observation time such as bone tunnel widening, or instability, cartilage damage, joint reaction or macroscopic inflammation (pathological synovitis). The mean KT-1000 arthrometer laxity measurement was 1.5 ± 1.8 mm. The mean Lysholm score was 90,9%± 1,8%; the mean subjective IKDC score was 93,4 ± 2,5; the mean Tegner score was 9,0 ± 1,0. All patients returned to football activity in an average time of 5,5 months (about 80% at the same level). One patient with ACL re-rupture (1.6%) at 3 years during a game contrast (valgus – E.R.) lost during F.U. (interview by phone).

Variable	Mean ± SD
Sex (M:F)	(58:4)
Age at surgery	24.6 (16-34) y.o.
Average return to football activity	5.5 months (80% at the same level)

Scores	Mean ± SD (60 months)
KT-1000	1.5 ± 1.8 mm
Lysholm score	90.9% ± 1.8%
IKDC subjective score	93.4 ± 2.5
Tegner score	9.0 ± 1.0

Conclusions

Earlier augmentation devices, degradable or non-degradable, have a rigid texture and thus not the mechanical properties of a normal ACL or a tendon graft; the rigidity directs most of the loading to the augmentation device, with failure due to stress-shielding or fatigue of the device as a consequence. The novel PUUR band has a similar elasto-mechanical loading profile like a human ACL tested post-mortem, with no relaxation or fatigue after cyclic test (2). A degradable and biocomatible augmentation device can be used in conjunction with the tendon graft to provide resistance to the mechanical load during the time for revascularization and reorganization of the tissue. Human clinical trials with ACL reconstruction using the PUUR band are in progress but in our opinion this material shows interesting properties for future clinical ACL allowing an accelerated rehabilitation program in athletes without sacrificing too much autologus tissue and reducing the donor-site morbidity.

References

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