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Dilemma of the Orthopedic Surgeon - What kind of Graft should we use for ACL Reconstruction?

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Introduction

ACL reconstruction is a widely used surgical technique It is a regular question which kind of graft should we use? Are Auto- or allograft tendons better. There is no simple answer to this question. We have to focus on our patient's needs and consider the level of the preinjury activity/sport level (professional high level athlete or just regularly doing exercises), the time that our patient can spend on the rehabilitation and the time period till our patient can return to sport. If we focus on the problem from this aspect we have to keep in mind the pros and contras of both types of grafts.

If we choose autografts, we obtain a safe graft without any foreign infectious agents. Because it is fresh, most of the fibro- and tendocites will survive and the incorporation will be faster than with allograft. However, every autograft has several potential limitations such as donor site morbidities, graft strengths and measure problems. The demand for ACL allografts has increased in the last decade [1], and postoperative results are promising. It is visible in the increase of allografts use from 2% (between 1986-1996) to 14% (between1996-2001), and it further increased around 2007 as its number reached 20%-30% in the US [2]. We certainly do not have to struggle with the problems of the donor site, have to face with other challenges. However, there are risk factors associated with the use of allografts, most notably disease transmission - both bacterial and viral, such as human immunodeficiency virus (HIV) and hepatitis [3] - and in some cases fatal septic complications could be observed [4].

The rises in the number of ACL reconstructions and the increasing use of allografts in such repairs have driven the need for an effective sterilization method that preserves the biomechanical integrity of the allograft [1]. Several efforts were made such as antibiotic soaks or washing of tendons in ethanol solutions among others [5]. The penetration of these liquids into the graft tissue was questionable; the ethylene oxide caused chronic synovitis, delayed incorporation or even dissolution of the grafts [5]. Electron beam irradiation was also a promising technique, but its effect is questionable. E-beam was once reported to severely damage the biomechanical properties of the tendons [6], but its damaging effect on tendons is less than that of gamma irradiation [2]. One of the most accepted procedures to minimize the risk of disease transmission by allograft tissue is gamma irradiation. The pathogen inactivation is dose dependent. Greaves et al. [7] found that lower doses of gamma irradiation (10-15 kGy) had only a bactericide effect.

For complete virucidal sterilization, a radiation dosage of 30-50kGy is required [8]. This method damages the structure of the tendons and decreases their biomechanical properties [5]. Firstly, gamma rays split the polypeptide chains of collagen fibers in a direct manner [9]. Secondly, gamma rays indirectly lead to the radiolysis of water molecules and the consequent release of free radicals which injure the collagen [10]. There is still no consensus on the effect of the gamma irradiation on tendon grafts. Hangody et al. [11] found that we cannot handle all tendon graft in a same manner. The results of this study indicate that different types of tendons react differently to gamma irradiation. Achilles and quadriceps grafts were the most sensitive to gamma irradiation. It seemed that the vulnerability to irradiation of the anterior tibial and slightly of the long peroneal tendons were less than that of the Achilles and quadriceps tendons.

Two systematic reviews found no significant differences between bone-tendon-bone allograft versus autografts for ACL reconstruction [12,13]. Almost similar results were found by Cvetnovich et al. [14]. They carried out a meta-analysis comparing the clinical outcomes of patients undergoing ACL reconstruction with hamstring autografts and those undergoing ACL reconstruction with soft-tissue allograft (tibialis anterior, Achilles without bone blocks, irradiated and fresh frozen hamstrings). The comparison of functional outcome, reoperations, septic complications and arthrofibrosis showed no significant differences. But the incorporation of the allografts is slower than the auto grafts. This results in a longer rehabilitation time.

Surgeons are therefore faced with a dilemma when planning an ACL reconstruction. Which type of graft should be used, allograft or autograft? In my opinion in clinical cases where the

length of rehabilitation is crucial an autograft should be used. All factors have to be taken into consideration (biomechanical properties, donor site morbidity, transmission of diseases, rehabilitation and incorporation time etc.) and discussed with our patient to match their demands.

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