

## The Outcome of Early Balance Exercises and Agility Training in Sports Rehabilitation for Patients Post Anterior Cruciate Ligament (ACL) Reconstruction

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**Abstract :** Introduction: It is generally known that the rehabilitation process is as important as the reconstruction surgery. Several literature has focused on how early the rehabilitation modalities can be initiated after the surgery to ensure a safe return of patients to sports or at least regaining the pre-injury level of function following an ACL reconstruction. Objectives: The main objective is to study and evaluate the outcome of early balance exercises and agility training in sports rehabilitation for patients post ACL reconstruction. To compare between early balance exercises and agility training as intervention and control. (material or non-material). All of them were recruited for material exercise (balance exercises and agility training with strengthening) and strengthening only rehabilitation protocol (non-material). Followed the prospective intervention trial. Materials and Methods: Post-operative ACL reconstruction patients performed in Selayang and Sg Buloh Hospitals from 2012 to 2014 were selected for this study. They were taken from Malaysian Knee Ligament Registry (MKLR) and all patients had single bundle reconstruction with autograft hamstring tendon (semitendinosus and gracilis). ACL injury from any type of sports were included. Subjects performed various type of physical activity for rehabilitation in every 18 week for a different type of rehab activity. All subject attended all 18 sessions of rehabilitation exercises and evaluation was done during the first, 9th and 18th session. Evaluation format were based on clinical assessment (anterior drawer, Lachmann, pivot shift, laxity with rolimeter, the end point and thigh circumference) and scoring (Lysholm Knee scoring and Tegner Activity Level scale). Rehabilitation protocol initiated from 24 week after the surgery. Evaluation format were based on clinical assessment (anterior drawer, Lachmann, pivot shift, laxity with rolimeter, the end point and thigh circumference) and scoring (Lysholm Knee scoring and Tegner Activity Level scale). Results and Discussion: 100 patients were selected of which 94 patients are male and 6 female. Age range is 18 to 54 year with the average of 28 years old for included 100 patients. All patients are evaluated after 24 week after the surgery. 50 of them were recruited for material exercise (balance exercises and agility training with strengthening) and 50 for strengthening only rehabilitation protocol (non-material). Demographically showed 85% suffering sports injury mainly from futsal and football. 39 % of them have abnormal BMI (26 - 38) and involving of the left knee. 100% of patient had the basic radiographic x-ray of knee and 98% had MRI. All patients had negative anterior drawer's, Lachman test and Pivot shift test during the post ACL reconstruction after the complete rehabilitation. There was 95 subject sustained grade I injury, 5 of grade II and 0 of grade III with 90% of them had soft end-point. Overall they scored badly on presentation with 53% of Lysholm score (poor) and Tegner activity score level 3/10. After completing 9 weeks of exercises, of material group 90% had grade I laxity, 75% with firm end-point, Lysholm score 71% (fair) and Tegner activity level 5/10 comparing non-material group who had 62% of grade I laxity, 54% of firm end-point, Lysholm score 62 % (poor) and Tegner activity level 4/10. After completed 18 weeks of exercises, of material group maintained 90% grade I laxity with 100 % with firm end-point, Lysholm score increase 91% (excellent) and Tegner activity level 7/10 comparing non-material group who had 69% of grade I laxity but maintained 54% of firm end-point, Lysholm score 76% (fair) and Tegner activity level 5/10. These showed the improvement were achieved fast on material group who have achieved satisfactory level after 9th cycle of exercises 75% (15/20) comparing non-material group who only achieved 54% (7/13) after completed 18th session. Most of them were grade I. These concepts are consolidated into our approach to prepare patients for return to play including field testing and maintenance training. Conclusions: The basic approach in ACL rehabilitation is to ensure return to sports at post-operative 6 month. Grade I and II laxity has favourable and early satisfactory outcome base on clinical assessment and Lysholm and Tegner scoring point. Reduction of laxity grading indicates satisfactory outcome. Firm end-point showed the adequacy of rehabilitation before starting previous sports game. Material exercise (balance exercises and agility training with strengthening) were beneficial and reliable in order to achieve favourable and early satisfactory outcome comparing strengthening only (non-material). We have identified that rehabilitation protocol varies between different patients. Therefore future post ACL reconstruction rehabilitation guidelines should look into focusing on rehabilitation techniques instead of time.

**Keywords :** post anterior cruciate ligament (ACL) reconstruction, single bundle, hamstring tendon, sports rehabilitation, balance exercises, agility balance

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