

Research article

SHORT COMMUNICATION ON THE INFLUENCE OF POSITION ON ANTERIOR CRUCIATE LIGAMENT INJURY AND RECONSTRUCTION IN RECREATIONAL RUGBY FOOTBALL UNION PARTICIPANTS

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ABSTRACT

The different player positions in rugby union may place varying demands on a reconstructed anterior cruciate ligament (ACL) in regards to 'cutting manoeuvres', this in turn may effect performance. In order to investigate sporting performance post reconstruction, a questionnaire was sent to amateur rugby clubs affiliated to the Oxfordshire Rugby Football Union (R.F.U). From the returned questionnaires player positions were placed into categories based on similar 'cutting manoeuvre' demands. Seventy five percent of Individuals playing in the category 1 (low 'cutting manoeuvre' demands at slow running speeds) could play a full game with a damaged ACL and post-reconstruction the majority returned to play at a higher level. Fifty percent of ACL injuries occurred on category 2 (high 'cutting manoeuvre' demands at medium running speeds) suggesting they may be more prone to ACL injury than other positions. The majority of individuals playing in category 3 (high 'cutting manoeuvre' demands at fast speeds) played at a lower level of rugby post reconstruction. Positional demands may influence ACL injury and post reconstruction sporting performance. However, more research is needed.

KEY WORDS: Anterior cruciate ligament reconstruction; rugby football; player position.

INTRODUCTION

The modern game of rugby union places high physical stresses on the knee joint e.g. Garraway et al (2000) reported that in Scotland's border region 26% of all injuries (in senior amateur clubs) were sustained by the knee. Ligament damage is the most common type of knee injury pathology (Webb and Corry, 2000) and of the intra-articular knee ligaments the anterior cruciate ligament (ACL) is most frequently injured (Johnson, 1983; Steele, 1999). In rugby union the ACL injury rate has been determined at 0.07 per 1000 'exposures' for men and 0.36 per 1000 'exposures' for women (Levy et al., 1997). With an estimated 500,000 adults playing each week in England alone (The Rugby Football Union, 2001) a substantial amount of ACL injuries will be sustained during the course of a season.

The ACL provides 86% of the resistance to anterior displacement and 30% of the resistance to medial displacement of the tibial condyles (Palistanga et al., 1998). It also limits hyperextension and acts as a restraint to varus or valgus angulation, and when the knee is near full extension, internal and external rotation (Webb and Corry, 2000). Therefore, ACL deficient knees are more prone to 'giving way' when performing 'cutting maneuvers' whereby there is a rapid change in direction, usually at speed (e.g. a side-step). Rugby is classed as a high-risk (level 1) activity and participation is discouraged for ACL deficient individuals (Webb and Corry, 2000). Subsequently after an ACL rupture a reconstruction is generally required in order to return to competitive participation. Different player positions in rugby union may place different demands on the ACL as

regards to these ‘cutting maneuvers’. For instance the stresses may be greater for a member of the back line who tend to perform ‘cutting maneuvers’ at higher running speeds compared with front row players. To date, there is little research investigating the demands of a sport on the functional stability of the ACL deficient knee and the implications after reconstructive surgery.

METHODS

Procedure

The study received local ethical committee approval and a questionnaire piloted on players at a local rugby club. A modified questionnaire was distributed to 21 amateur clubs affiliated to the Oxfordshire Rugby Football Union. The questionnaire itself concentrated on what factors may affect the success of an ACL reconstruction and was analysed empirically. (The questionnaire required either the ticking of a box, a Yes/No answer or a short written answer - with an opportunity to comment). After distribution the questionnaire was followed up with both E-mail and telephone correspondence. All data was collected anonymously via the secretary of each club.

Participants

In total sixteen completed questionnaires were returned (all unilateral ACL reconstructions). Of the 21 clubs contacted, 9 reported that they presently had no members with reconstructed ACL's and 2 clubs reported members pending a reconstruction (3 individuals) or in the early stages of rehabilitation (1 individual) and therefore not suitable for the questionnaire. The age of the individuals (all men) at the time of completing the questionnaire ranged from 21 to 61 years with a median age of 28 years. The median age of the individuals at the time of the ACL injury was 21 years and ranged from 15 to 39 years. The bone-patella tendon-bone autograph (44%) and hamstring autographs (50%) were the most popular procedures used to reconstruct the ACL.

RESULTS

Positions on the field of play were divided into 3 categories (see below) based on similar physical demands of player positions.

- **Category 1:** ‘The Front 6’ (2 prop forwards, hooker, 2 second row, and number 8), low ‘cutting manoeuvre’ demands at slow running speeds.

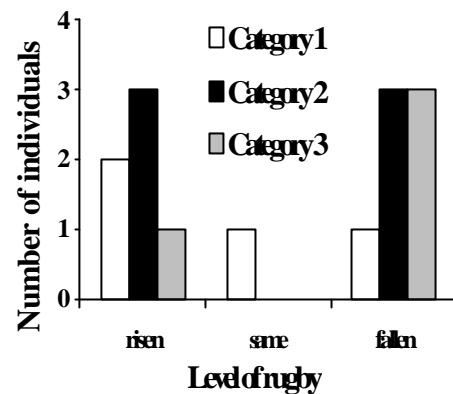


Figure 1. Level of rugby at which the individuals participated post-reconstruction (compared with pre-injury).

- **Category 2:** ‘Centres/Flankers’ (2 centres and 2 flankers), high ‘cutting manoeuvre’ demands at medium running speeds.
- **Category 3:** ‘Half backs/back 3’ (scrum half, fly half, 2 wing players and fullback), high ‘cutting manoeuvre’ demands at fast running speeds.

When the distribution of ACL injuries were related to the 3 categories (above), 50% of all injuries were sustained by ‘category 2’ players with ‘category 1’ and ‘category 3’ groups each sustaining 25% of the remainder. After ACL injury, but prior to reconstruction, 75% of individuals in ‘category 1’ were able to play a full game of rugby union, but only 12.5% of the individuals in ‘category 2’ and none from ‘category 3’.

All individuals in ‘category 1’ and ‘category 3’ and 75% in ‘category 2’ had returned to competitive playing post ACL reconstruction. However, those that had not yet returned to competitive rugby union commented they planned to return or they had not returned due to age and fear of injury rather than problems associated with knee function. From the individuals that participated in rugby post ACL reconstruction the results shown in Figures 1 and 2 were obtained.

DISCUSSION

The findings of the present study suggest that positional demands in competitive rugby union may influence the incidence of ACL rupture and the success of a subsequent reconstruction. No earlier research has been published on the effect of player position on the outcome of ACL rupture. However, Webb (1998) postulated that in his experience as an orthopaedic surgeon some rugby players were able to play with ACL deficient knees and that these tended to be ‘muscular squat players with a high

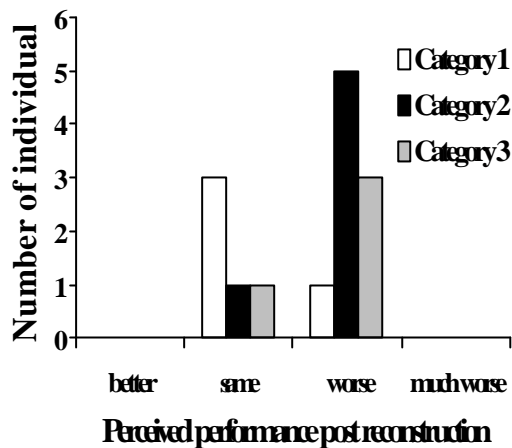


Figure 2. Perceived playing performance post-reconstruction (compared with pre-injury)

power to weight ratio. Their relatively short lever arms and powerful muscles would favour any muscle driven protective reflex and might be an important part of the jigsaw that makes up the picture of a functional stable knee.' The players he described tend to play the front row positions (part of 'category 1'). Such players may return to a higher competitive level of rugby and perceive better performance of the knee following ACL reconstruction (Figure 1 and 2), as the positional demands of 'category 1', together with their muscular build possibly place less stress on the ACL.

The positional demands associated with 'category 2' may make the ACL more prone to injury than in any other position, as 'category 2' players sustained 50% of the total number of injuries (present study) and is also the smallest category (4 out of the 15 player positions). The ACL reconstruction may not be adequate to meet the physical demands of 'category 3' players. Although reconstruction enabled these individuals to return to playing rugby, the majority played at a lower competitive level post-reconstruction (Figure 1).

CONCLUSION

The findings of the present study suggest that player position may affect ACL injury and the success of its reconstruction in terms of the competitive level of rugby played, and perceived playing performance post-reconstruction. Better understanding of the needs of player position may aid in planning appropriate rehabilitation strategies. However, the present study utilised only a small sample size, all of whom were able to return to playing the sport. Future research should investigate, in a larger

sample size, the effect of both positional demands and body morphology on the incidence of ACL injury and on those recovering from ACL injury.

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