Clinical and morphological changes following 2 rehabilitation programs for acute hamstring strain injuries: a randomized clinical trial.

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Aim

To investigate differences between two rehabilitation programmes (progressive running and eccentric training [PRES] and progressive agility and trunk stabilization training [PATS]) on clinical and morphological recovery following acute hamstring injury.

Methods

A double-blind, randomised clinical trial was used. Twenty-nine participants (23 males, 6 females) aged 16-46 (mean 24.0, SD 9.2) years, with a history of hamstring injury within the past 10 days were randomly allocated to either the PRES (n=13) or PATS (n=16) group. Primary outcome measures were time to return-to-sport (days) and the craniocaudal length of injury (measured with magnetic resonance imaging [MRI]). Various secondary outcomes based on physical examination (e.g. measures of pain, range of motion and strength) and MRI were measured at the beginning and the end of rehabilitation. Periodic follow-up was carried out through emails or phone calls at 2 weeks and 3, 6, 9 and 12 months following return-to-sport. Data were analysed on an intention to treat basis.

Results

Twenty-five participants completed the trial. There were no significant differences between groups in the mean time required to return-to-sport, the initial and final physical examination tests, the initial MRI measurements, and the magnitude of improvement based on physical examination at the end of rehabilitation. However, the mean improvement in the craniocaudal length of injury for the PRES group was less than the PATS group (p = .035). Despite the absence of clinical symptoms at the time of return-to-sport, all the participants in both groups showed signs of incomplete resolution of injury on MRI.

Conclusion

The extent of clinical and morphological changes in acutely injured hamstrings was similar in both groups at the end of rehabilitation. However, signs of muscle healing persisted on MRI for all participants at the time of return-to-sport.

Commentary

Hamstring injuries are common amongst people participating in various sports that involve running and/or kicking. The chance of hamstring injury recurrence can be as high as 26% in sports like the Australian Football League (Orchard et al 2013), and could be due to premature return to play without complete healing of the injury (Connell et al 2004). Therefore, effective treatment of acute hamstring injury with an appropriate rehabilitation programme prior to returning to sports is recommended. Eccentric hamstring training has been shown to be a promising approach to minimising hamstring injury incidence or recurrence (Petersen et al 2011). A recent systematic review documented that lumbopelvic exercises decrease the incidence of lower limb muscle strain by two and a half times when compared to other interventions (Perrott et al 2013). Specific to the hamstrings, progressive agility and trunk stabilisation (PATS) training (Sherry and Best 2004) has been documented to reduce re-injury rate.

The current study is interesting because it compares the outcomes of a progressive running and eccentric strength (PRES) training and a modified PATS programme on acute hamstring injury via a randomised clinical trial. This study is of high quality according to the PEDro scale rating, meaning the risk of bias associated with its findings is negligible.

Both groups were similar in the initial and final physical examination tests and the initial MRI measurements (craniocaudal length of injury, cross-sectional area of injury (%) and parameters indicative of oedema). There was a disagreement between MRI and clinical examination diagnosis of the muscle injured (medial or lateral hamstrings) for nine participants. Among them, MRI did not show any signs of injury for three participants. Moreover, clinicians should be aware that a diagnosis based on physical examination may not accurately detect the muscle injured (medial or lateral hamstrings) and minor hamstring injuries (grade1) may not always be discernible using MRI.

The magnitude of improvement based on symptoms at the end of rehabilitation and the mean time required to return-to-sport was not significantly different between groups. However, the mean improvement in the craniocaudal length of injury was significantly different between groups indicating that the PATS group improved to a greater extent compared to the PRES group. The craniocaudal length of injury appears to be an important prognostic indicator to estimate the time of return-to-sport, as a longer defect viewed on MRI correlated to a proportionately longer lay-off time.

All the participants showed signs of hamstring healing with many having early scar tissue formation at the time of return-to-sport. Three athletes in the PRES group and one in the PATS group sustained hamstring re-injury (at the same site as the previous injury) during the study. This might be due to premature return-to-sport without complete resolution of hamstring injury as evident in MRI. As MRI is not routinely available, clinicians need to rely on physical examination to assess pain, range of motion and strength bilaterally for diagnosis and follow-up.

Though most of the exercises in the PRES programme involved only the injured limb as opposed to the PATS programme that involved both limbs, both groups demonstrated improvement in muscle recovery to a similar extent at the time of return-to-sport. The authors acknowledge that the small sample size of this study precludes definitive conclusions on the effectiveness of either the PRES or PATS programme at reducing the risk of injury recurrence, which warrants further investigation with a larger sample size. However, one important implication for clinicians is that hamstring healing continues, as noticed on MRI, even after resolution of clinical signs and symptoms and return to sports participation. Therefore, periodic follow-up assessments and individually tailored ongoing training of individuals after they return-to-sport may be important.

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