Recurrent Hamstring Injury in Australian Football

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Med Sci Sports Exerc [abstract] 1998, 30 (5):S52.

Objective

To measure the rate of recurrent hamstring strain in the Australian Football League (AFL) and its implication for return-to-play decisions.

Setting

The AFL is the premier competition of Australia's most popular sport. There are 16 teams in the competition who play 22 weekly matches in the regular season. Each game is played continuously for 80 minutes and involves running, sprinting and kicking. Hamstring strain is the most common and prevalent injury (Seward et al., 1993) and is known to have high rates of recurrence. A continuous injury surveillance system has been in place since 1992 which records all causes of players in the AFL missing matches through injury. The injury prevalence (percentage of players missing through injury) at any given time is 15-18%, of which 13% are due to hamstring injuries (Orchard et al., 1997).

Method

All hamstring injuries which resulted in at least one missed game during the regular seasons of 1994, 1995 and 1996 were extracted from the AFL Injury database. This included diagnoses which have an overlap with hamstring strain, such as 'hamstring muscle soreness', 'back-related hamstring', 'hamstring syndrome' and 'hamstring tendonitis'.

The initial injury was not considered to have recovered until the player (who must have missed one match) was selected to play in another match. A recurrence was defined as a subsequent hamstring injury, again resulting in a missed match, which occurred to the same leg later that season. Except for those hamstring injuries occurring late in the season that were season-ending, all injuries, according to the definition of this study either recurred later that season, or allowed a player to play a certain number of matches until the end of the season, without recurrence. Hamstring injuries to the same player on the other leg later that season were examined as a control.

In assessing the return-to-play decisions, no record was available of the criteria used by individual teams to assess their injured players. An analysis was made, considering the objective of minimising 'missed player games' (the total number of games that players are unavailable through injury) as to whether the practice across the league appeared to be overly conservative or aggressive in returning players from hamstring injuries.

Results

There were 31365 matches played by players in the survey period and 318 hamstring injuries were sustained. Therefore, the chance of the average player injuring a hamstring in a week where he played a match was approximately 1%. The average number of matches (weeks) missed from the initial injury was 2.3 (range 1-9, median 2, mode 1).

Players returning from a hamstring injury were at significantly increased risk of re-injuring the hamstring during the first three weeks back from injury. In the first week back (match and subsequent training sessions) the chance of re-injury was 9%. In the second and third weeks back the chances of re-injury was 4% per week. The cumulative risk of re-injury, from the time of return to the end of the season, was 23%. The risk of recurrence was not influenced by the number of weeks originally missed. There was also a slightly increased chance of injuring the hamstring of the opposite leg.

Risk factor	*Relative risk*	*95% confidence range*
Week of first match back from hamstring injury	9.21	6.02 -14.1
2nd & 3rd matches back from hamstring injury	3.97	1.84 -8.47
4th and 5th matches back from hamstring injury	2.07	0.85 -5.03

Table 1. Risk of injury in weeks immediately after returning from injury

There were slightly more injuries noted in the non-dominant leg, but this was not statistically significant. Leg dominance did not affect the propensity for recurrence.

Hamstring injuries were evenly distributed throughout the season and throughout the quarters of each match. Recurrences were more likely to occur early in a match.

Over the course of the 1996 season, players who had a history of hamstring injury in a previous season were more likely to sustain a hamstring injury. Older players were also more likely to be injured and age was an independent risk factor from past history.

Risk factor	*Relative risk*	*95% confidence range*
Hamstring injury in 1994 or 1995	1.71	1.24 -2.34
Age > 23	1.51	1.12 -2.02

Table 2. Risk of injury in 1996 season (effect of injury history)

Discussion

Hamstrings are at increased risk of recurring for at least three weeks after return to AFL competition, despite the best efforts of club medical staff to judge fitness to play. This supports the concept that healing of muscle strain injury is a gradual process, with full strength of the injured tissue taking many weeks to return. Soft tissue healing is known to undergo a remodelling phase, after the repair phase has completed (Medoff, 1987) and players appear to be returning to play during the remodelling phase, with increased risk of re-injury. This is analogous to the known time interval between consolidation and full union of a fracture.

There was no difference in re-injury rate between hamstrings missing only one match and those missing two or more matches. This suggests that many different grades (and possibly different diagnoses) occur under the hamstring injury 'umbrella' and that some of these may be fit to play after only one week, whereas others may take up to nine weeks.

Even though players appear to be returning before healing is complete, the figures presented do not necessarily suggest that management is too aggressive in this population (professional footballers). If all hamstring injuries across the board were kept out for an extra week, then re-injury would be avoided in only 9% of cases. Since the 'cost' of re-injury would average three weeks in these 9% of cases, more games would be missed through injury overall with a more conservative approach. If further study can identify those injuries which will recur, through means such as MRI scanning or isokinetic testing, a more selective approach may be justified. It is important to remember that even those players who have passed the ultimate fitness test (successfully completing a subsequent match) still have an increased chance of re-injury over the next three weeks. The nature of recovery from this injury means that recurrences will sometimes occur under optimal management in the elite population (where early return is a justified goal). It is important that doctors, players, coaches and the media are aware of this.

The risk of re-injury plateaus after the player has completed four matches without re-injury but stays slightly elevated for subsequent seasons. Decreased strength, flexibility, compliance and the presence of scar tissue are likely to be relevant to this increased risk, but only the strength variable has been prospectively validated as a risk factor (Orchard et al., 1997).

References

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