
# ABOVE AND BEYOND BICEP FEMORIS:

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**Introduction and Purpose**

The most commonly injured hamstring, bicep femoris (BF) receives the greatest focus within return to play strategies. Yet, assessment and subsequent training of its synergists, located in regions above, below and within the hamstring group itself, questions standard protocol. This case study considers how multi-joint movement assessment, informing on synergistic interactions related to BF, can support return to play interventions.

**Methods**

Whilst BF remains a principle cause of hamstring related time loss, 'silent partner', synergistic musculature deserve attention during return to play. In line with this premise, 1 week following a grade 2, BF strain, an academy level midfielder, based at a professional club (age: 16; height: 183cm; mass: 68 kg) was assessed using a multi-joint, multi-intensity movement analysis tool, The Performance Matrix (TPM). Testing cognitive movement control, reliability literature for this tool has recently been published (2). Informing on the relative contribution of multiple synergists, TPM reports the site, direction and recruitment threshold of related movement deficits, in addition to returning a score; a score of 0 out of 50 is deemed optimal. Additionally, hip flexion range of motion was assessed with a straight leg raise to $70^0$ and hip extension with a Thomas test. Based on the findings of week 1, a training plan focussed on enhancing the movement control deficits associated with BF synergists, was delivered. Testing was repeated 6 weeks post injury.

**Results**

Table 1 displays results of most relevance to BF injury

| Site, direction & threshold of uncontrolled movement | Week 1 | Week 6 |
|---|---|---|
| Hip flexion, low threshold | Uncontrolled | Controlled |
| Lumbar extension, high threshold | Uncontrolled | Controlled |

Table 1 shows part of the movement screen results for lumbo-pelvic & hip region performed at week 1 & 6

Testing score fell from 28 to 19 out of 50. Additionally, positive tests of bilateral restrictions of rectus femoris and hamstrings, present in week 1, were negative by week 6.

**Discussion**

6 weeks post-injury, the player was again available for selection. Whilst achieving the principle aim of any return to play strategy, the targeting of synergists highlighted as inefficient during testing, was seen to be followed by successful resolution of hamstring and rectus femoris restrictions, and the control issues of both

lumbar extension and hip flexion. These factors have been associated with an anterior pelvic tilt (APT) alignment, a marker related to both hamstring injury, and poor recruitment efficiency of BF synergists, the gluteals (3). If gluteal recruitment proves ineffective in managing eccentric challenges elicited by APT moments, such as hip flexion and lumbar extension, BF may substitute for this deficit. APT is also associated with lack of extensibility of hip flexor musculature; hip flexor restriction is also seen to impact gluteal recruitment. A lack of hip extension range in footballers, accompanied by 60% deficit in EMG activity of gluteus maximus but a 15% increase in BF during squatting has been seen (1).

**Conclusions**

Assessment of synergistic contribution, may inform training strategies during the return to play phase. If conducted on those regions interacting with BF, interventions may then address synergistic balance existent between BF and its synergists. If a return to play focus only adheres to predictable length or strength deficits within BF, synergistic interactions, associated to this outcome, may remain unresolved. Multi-regional assessment, including those directly interacting with BF, draws focus to 'silent partner synergists', rather than just the overt outcome of deficits.

**References;**


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