

[Infographic]

Hamstring Strains: Classification and Management

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The hamstring muscle complex (HMC) includes the semimembranosus, semitendinosus, and biceps femoris (BF) short and long heads, all of which act to extend the hip and flex the knee.^{4,5} A primary function of the HMC is deceleration of the lower limb via eccentric contraction during running and kicking movements, placing the muscles under high strain while at high stretch.^{2,6,8} Accordingly, most hamstring strain injuries (HSIs) are “sprint-type,” occurring during high-speed running. They typically affect the proximal long head of the BF at the musculotendinous junction and/or intramuscular belly.^{1-4,6,8-10} “Stretch-type” HSIs may also occur with end-range hip flexion and knee extension, as might be seen in dancing and kicking, and typically involve the proximal semimembranosus tendon.^{1,2,4,9,10} HSIs are commonly graded as follows: Grade I - microscopic tearing with minor swelling and discomfort and little to no loss of strength; Grade II - gross partial tear with clear weakness; Grade III - complete rupture with total loss of function.^{2,6-8} Grade III HSIs are often traumatic injuries, such as might occur during water-skiing when there is forceful hip flexion while the knee is in full extension.^{2,5,6,9,10} Grade I and II HSIs can be treated nonoperatively with a 3-phase protocol. Phase I (~0-4 weeks) seeks to prevent scar formation while minimizing atrophy. It focuses on low-impact and isometric exercises with limits on range of motion and resistance. Phase II (~2-6 weeks) encourages gradual return to full range of motion (but not end-range lengthening) with an emphasis on submaximal eccentric strengthening, trunk stabilization, and agility. Phase III (~4-8+ weeks) incorporates sport-specific drills and further agility and trunk-stabilization exercises. Eccentric strengthening is advanced to maximal effort and range of motion, with return to sport when these can be achieved without pain.^{2,10} Grade III HSIs may require open or endoscopic surgical repair, with a goal of returning to sport ~4 to 6 months postoperatively.^{2,5,6,7,9,10}

Keywords: hamstring; strain; sports medicine; rehabilitation

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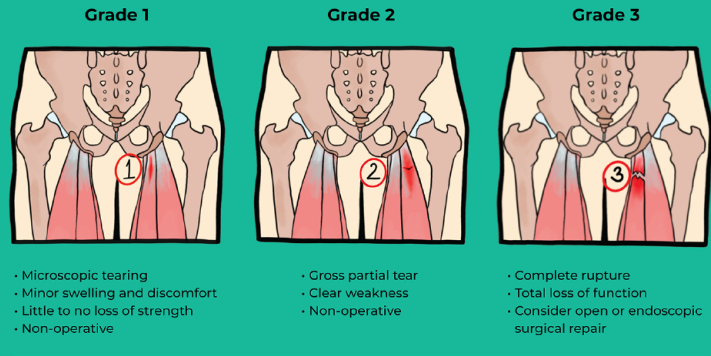
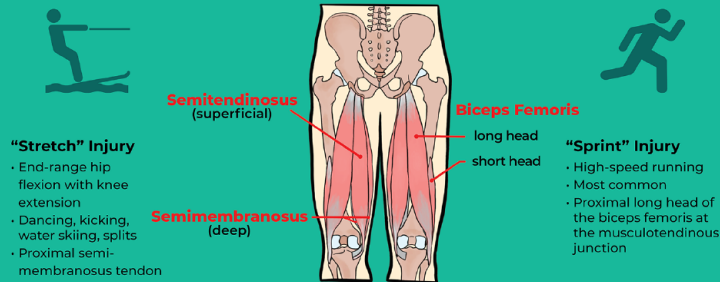
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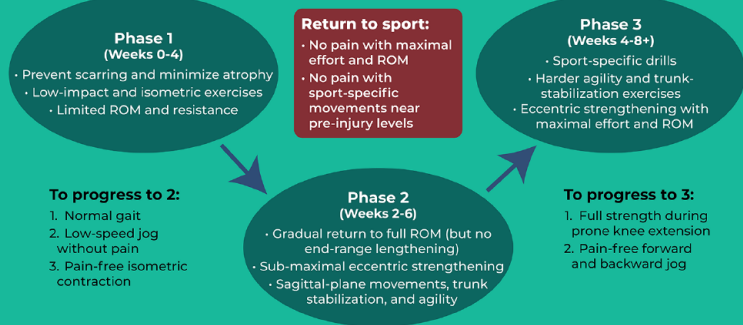
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