



Do Not Forget Proximal Hamstring Avulsions

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Proximal hamstring avulsions (PHA) are rare lesions that can cause permanent functional alterations and a very high risk of re-tear (12% to 31%) [1]. They are present in 9 - 12% of all lesions in this muscle group [2] and most often occur in athletes who require rapid acceleration (running, hurdling) or "ballistic" movements (skiing, skating, weight lifting) [3,4].

Proximal hamstrings comprise 3 tendons: the semitendinosus, the long head of the biceps femori and the semimembranosus (the latter 2, merged at their origin by the conjoined tendon). The mechanism of injury corresponds to eccentric contraction of the PH when trying to resist a fall, with the hip in flexion and the knee in extension. Acute pain is usually reported in the posterior thigh, sometimes accompanied by an audible pop and in some occasions with numbness and tingling in the sciatic nerve distribution [5].

On physical examination the patient may have an ecchymosis in the posterior thigh, with an altered gait, avoiding simultaneous flexion of the hip and extension of the knee ("hurdler's position") [5]. It is also important to assess the neurological state in the sciatic nerve territory. Among the most common tests are:

- Bowstring sign: Absence of palpable tension in the distal part of the hamstring with the patient prone and the knee flexed 90°.
- Popliteal angle: In the supine position, with the hip and knee flexed 90°, the knee is gently extended; then the knee flexion is measured and compared with the unaffected side (affected side having a greater angle).

- Active shoe removal sign: Patients will have more difficulty removing the shoe on the affected side.
- Hip extension test: In the prone position, the patient may not be able to extend the hip on the affected side.

Imaging begins with a plain radiography of the pelvis and affected hip which is most often negative, unless an avulsion fracture from the ischial tuberosity occurs in skeletally immature patients. Ultrasonography is readily available and may provide with valuable information, although the MRI is considered the gold standard since it can differentiate between partial or complete avulsion, acute and chronic injuries, number of tendons involved, tendon retraction and muscle quality (fatty infiltration and atrophy). MRI could also show structural alteration of the sciatic nerve or some compression due to a mass effect [6].

Treatment for PHA may be conservative or surgical, depending on the patient's age, level of activity and imaging characteristics of the lesion. In general, the current studies published are of low quality, with case series that include only patients treated surgically [7,8] and only a few comparative studies in which most of the patients included were operated on [9], therefore surgical indications may be debatable. However, the current recommendation based on published studies is to reserve surgery for young, active patients with either a 2-tendon tear/avulsion with more than 2 cm retraction or those with complete 3-tendon tears [4,10] or conservative treatment failure, whether due to major functional impairment, pain, or sciatic nerve involvement. Acute repair (< 4 weeks)

has better functional results, greater sports return and fewer complications than late surgeries [3,11].

Surgical treatment is usually performed openly, although there are successful reports using endoscopic and mini open techniques, as shown by the studies of Factor [12], Domb [13] and Laskovski, *et al* [14]. However, the current recommendation is to implement it in an open manner, especially in groups that do not have extensive experience in this field. Fixation has also evolved over time, from old techniques with transosseous fixation to now repairing with anchors. The number of anchors is also a subject of debate, with groups using 3 anchors [5] and others with 5 anchors [15].

Rehabilitation protocols usually include an initial non-weight period, avoiding knee extension over 30 degrees (some groups recommend higher degrees of knee block) and hip extension to protect the fixation. The return to normal activities of daily living normally occurs at 2 - 3 months, with a progressive return to sports activities between 6 - 9 months.

Conclusion

PHA are rare and difficult lesions to manage, which can leave serious functional sequelae. A high level of suspicion is mandatory, MRI should be part of the study and referral may be considered for eventual surgical fixation in some cases. An active return to sports is achievable, which usually occurs between 6 - 9 months.

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