

# Case Resolution

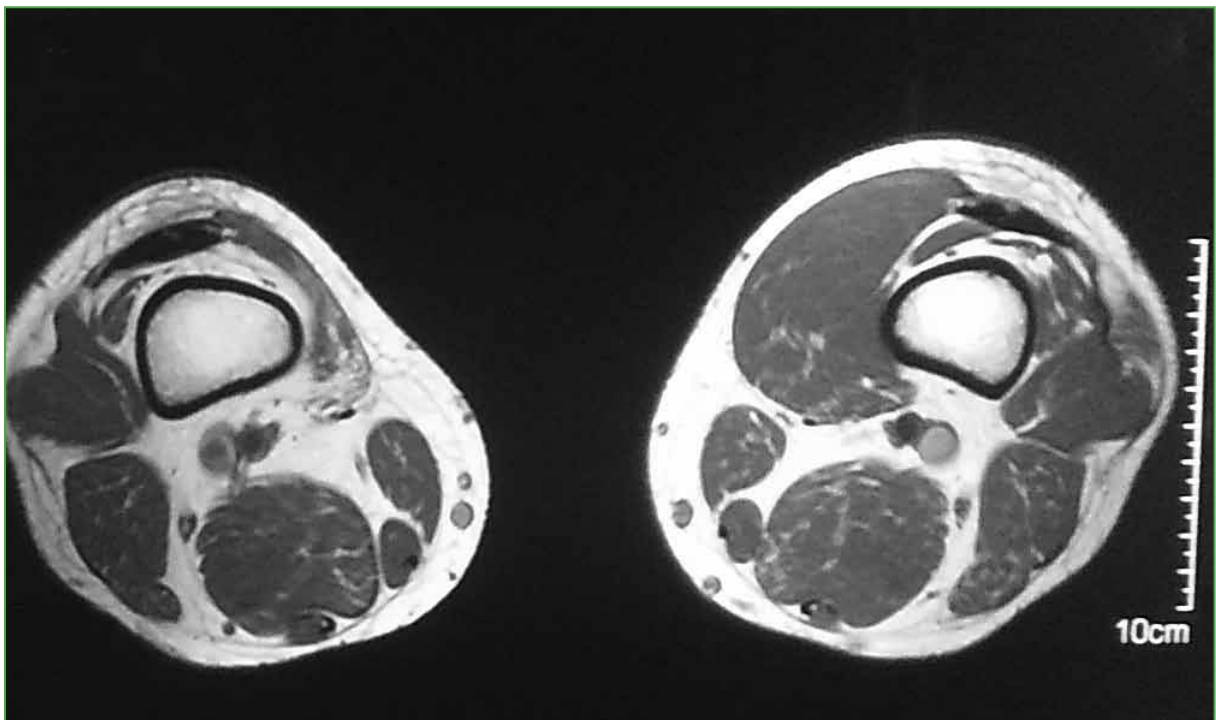
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*Case presentation on page 616.*

**DIAGNOSIS:** Vastus medialis obliquus agenesis.

The gold standard study is nuclear magnetic resonance, which reported a complete absence of the vastus medialis obliquus muscle (VMO) and a presumptive diagnosis of complete agenesis of this muscle in axial, sagittal, and coronal slices in the T1 and T2 sequences (Figures 4 to 8). Coronal slices at different comparative heights of both thighs in the region of the distal middle third. (Figures 5 to 8).



**Figure 4.** Axial slice.

**Figures 5 to 8.** Coronal slices at different comparative heights.

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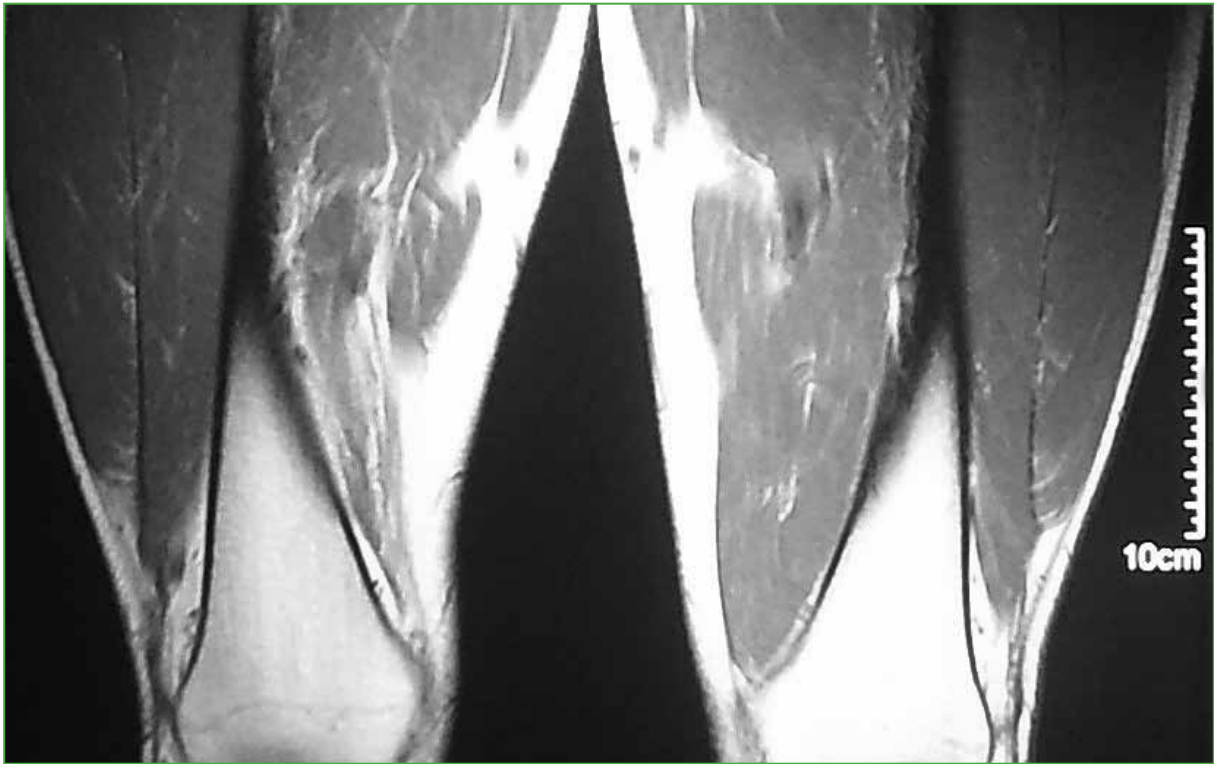


Figure 5

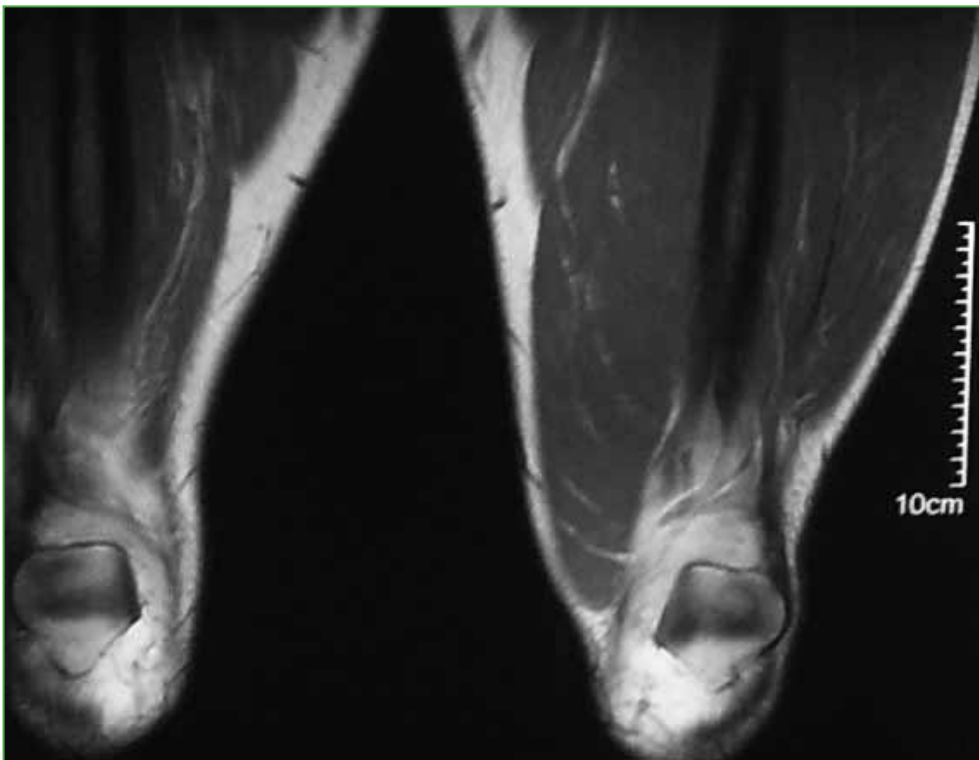


Figure 6

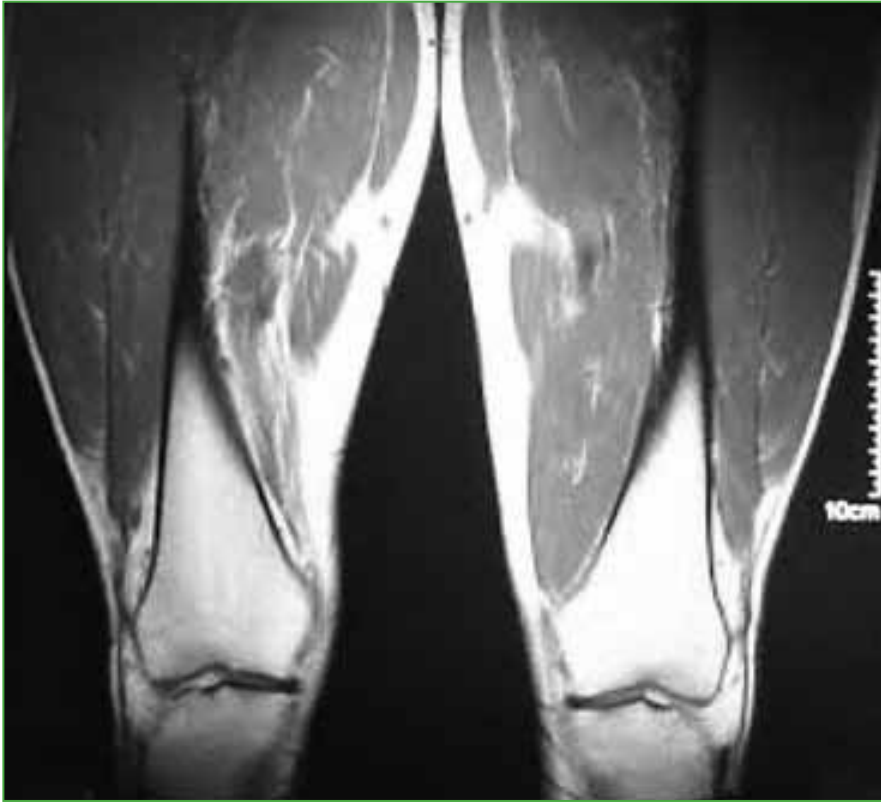


Figure 7

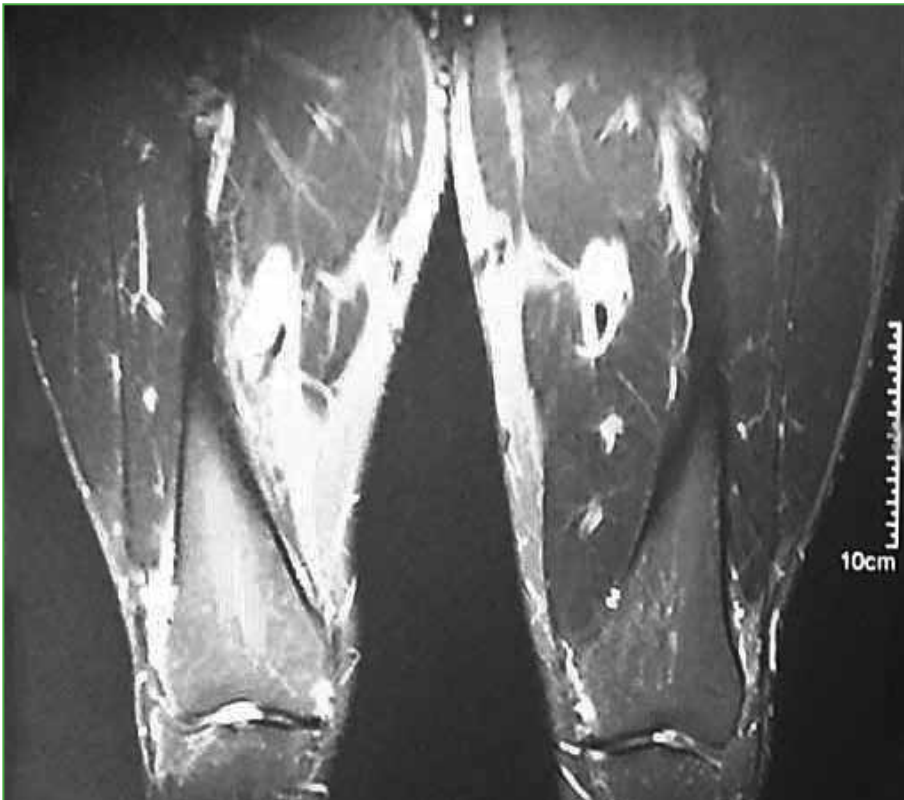


Figure 8

The usual representation of the right vastus medialis muscle is entirely missing, suggesting severe hypotrophy/muscle agenesis. Preserved right vastus intermedius, vastus lateralis, and rectus anterior in thickness and resonance signal. No alterations in muscle trophism were identified, nor was there a sign of resolution of the muscles of the right medial and posterior group, or at the level of the left thigh. No lesions or alterations of the femoral vascular package are observed. The asymmetry in the muscle mass of the inner thigh is striking; the vastus medialis muscle is not identified and there are no signs of edema, collections, or alterations of fatty planes.

## DISCUSSION

VMO muscle atrophy is one of the most frequent causes of patellofemoral pain in young athletes. The congenital absence of the vastus medialis obliquus muscle is a rare alteration, although it is the most common of all congenital muscle anomalies of the quadriceps. There are not many publications that refer to complete or incomplete agenesis of the VMO muscle.

Vastus medialis obliquus hypotrophy is common in patients with patellofemoral syndrome (PFS). In addition, the VMO is the weakest and most vulnerable muscle of the extensor apparatus, to the detriment of the vastus lateralis (VL), which shows greater activity on electromyography. These patients often show reduced electromyographic activity of the vastus medialis obliquus in the symptomatic knee, compared with the contralateral healthy knee. It has also been observed that the VMO/VL ratio is lower in PFS patients than in healthy individuals. The lower activity of the vastus medialis and the higher activity of the vastus lateralis could lead to an imbalance between the two muscles.

Some authors postulate that the VMO, compared to the VL, needs time to develop the necessary strength for optimal patellar displacement. It has been shown that the activation time of the VMO is usually altered in patients with PFS. In their systematic review, Chester et al. suggested that there is a slight tendency to delay the activation of the VMO compared to the VL in patients with patellofemoral syndrome during different activities, such as getting up from a chair, going up or down stairs, etc. This arose from all the works published until 2007 on the specific analysis of the electromyographic activity of both vastus. Boling and Cowan demonstrated a significant delay in VMO activation before rehabilitation in patients with patellofemoral syndrome. After achieving pain remission with treatment, early activation of the VMO to normal levels was observed and optimal patellar displacement returned.

Most authors believe that the primary role of the VMO is to increase the stability of the patella within the patellofemoral joint and to prevent lateral subluxation of the patella by bringing it medially during knee extension and flexion.

The VMO plays a fundamental role in the stability of the patellofemoral joint, both in the control of displacement and patellar tilt, by performing an eccentric control of the force required to move it laterally. According to the conclusions of Pal et al., any VMO exercise plan, whether closed chain or open chain, should emphasize the eccentric phase of the exercise.

Other authors found that, in healthy individuals, the degree of electromyographic activity in both the vastus medialis and the vastus lateralis is similar and more pronounced during the last 30° of knee extension.

Most healthy individuals have higher electromyographic activity of the vastus lateralis compared to the vastus medialis, but some individuals have higher activity of the vastus medialis than the vastus lateralis. Finally, there is a third group of healthy individuals who show approximately the same electromyographic activity in both vastus. Few studies compare the activity of the VMO and the VL between patients with PFS and control groups. Pattyn E. made the comparative measurement between VMO and VL in patients with PFS and a control group. No significant differences were found between both groups of patients.

One of the critical factors for developing anterior knee pain is the delayed activation of the VMO compared to the VL during functional activity. Neptune et al. suggested an activation difference of 5 milliseconds.

Selective atrophy of the VMO is bound to occur in patients with PFS; the rehabilitation of these individuals requires a specialized exercise plan.