

Editorial Commentary: Chicken or the Egg? The Ligamentum Teres and Degenerative Hip Disease



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Abstract: The ligamentum teres has traditionally been described as a vestigial remnant or redundant structure with little contribution to hip biomechanics or function. However, interest in the ligamentum teres has been renewed as evidence has emerged that it not only plays a role as a pain generator in the hip but also acts as a secondary stabilizer to supplement the work of the capsular ligaments. Furthermore, an association has been proposed between tearing of the ligamentum teres and the development of degenerative hip disease. However, the question remains, is it a cause-and-effect relationship?

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“Which comes first, the chicken or the egg?”

This question has been the source of great debate since it was first posed by Plutarch in the first century AD in his philosophical essay, “The Symphosiacs.”¹ It encapsulates the philosophical dilemma describing a situation in which it is not clear which of 2 events should be considered the cause and which the effect. This conundrum appears particularly apt in consideration of the subject of the study “The Effect of Complete Tearing of the Ligamentum Teres in Patients Undergoing Primary Hip Arthroscopy for Femoroacetabular Impingement and Labral Tears: A Match Controlled Study”² by Maldonado, Laseter, Perets, Ortiz-Delet, Chen, Lall, and Domb, which explores the relationship between the ligamentum teres (LT) and the development of degenerative hip disease. Nonetheless, are we any closer to unscrambling this dilemma and answering the question, which comes first a torn LT or degenerative hip disease?

These authors found a strong association between complete LT tears and conversion to total hip arthroplasty within 2 years of surgery. The authors

determined from this single-surgeon series that the relative risk of conversion was 3 times that of a matched cohort of patients with similar intra-articular findings but without complete disruption of the LT. These findings add to the growing body of evidence that the LT assumes a role in pain generation in the hip.^{3,4} In their study of 11 cadaveric hip joints with degeneration, Samptachalit et al.⁵ found that the LT shows a spectrum of degenerative changes similar to tendon pathology. The thinnest LT undergoes near complete disruption of the ligament; an intermediate-thickness LT shows fatty replacement with and without fibromatous degeneration, fibromatous degeneration with and without mucoid degeneration, and eosinophilic change; and the thickest LT shows mucoid and fibromatous degeneration with microscopic tears.⁵ However, what is most interesting in the study by Maldonado et al.² is that even though patients were excluded if they had radiographic signs of arthritis, at diagnostic arthroscopy, 38.9% of the 18 patients with complete LT tears were found to have grade IV Outerbridge changes on the acetabular side, and 16.6% had the same grade of changes on the femoral side. Although it seems to be clear that there is an association between LT tears and degenerative hip disease, when and how the association occurs remains uncertain.

What this study has revealed is that pathologic changes to both the LT and the articular cartilage occur at an early stage, predating radiographic evidence of osteoarthritis on plain radiographs. Although this may give us an insight into the natural history of the

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development of hip osteoarthritis, it is also extremely concerning that the mean age of the patient group with complete LT tears was 41.2 years and almost one-third of these patients ended up with total hip arthroplasty within 2 years of the index hip arthroscopy. Also, it is probably not fair to attribute the entirety of the blame for the development of osteoarthritis to damage or rupture of the LT, considering the presence of coexisting pathology and surgery to the labrum and femur. But are we just focusing on the white of the egg and ignoring the yolk? What about the majority of patients who had improved short-term outcomes despite having an absent LT?

The answer probably lies in what we now understand about the histology and function of the LT in terms of nociception and proprioception. It has been proposed that free nerve endings found in the LT are responsible for producing a pain response in patients with degenerative arthritis.^{6,7} Furthermore, it has been established that tears or synovitis of the LT alone, without the presence of any other hip pathology, are capable of causing hip pain.^{3,8,9} However, the proprioceptive role of the LT is less clear cut. Some recent histologic studies have demonstrated that there is a lack of any of the type I to III mechanoreceptors in either the LT or the hip joint capsule.^{10,11} However, in contrast, Moraes et al.¹² found all 4 types of mechanoreceptors in the labrum, capsule, and the LT and an upregulation of these receptors in the setting of arthrosis.¹² The importance of these histologic findings relates to how one treats a torn LT at the time of arthroscopy. As reported in the study by Maldonado et al.,² and supported by the literature, debridement of the LT with electrocautery is effective in reducing pain in the short term.^{8,9} Yet, it is important to consider that electrocautery does not selectively target the nociceptive fibers alone but is likely to also destroy the proprioceptive fibers contained within the ligament. It remains to be discovered whether there is a reduction in proprioception of the hip after LT debridement and whether this loss of proprioception contributes to the progression of osteoarthritis in the short or long term.

It is now clear that the LT is not merely a vestigial remnant in the hip but has an important role. Studies such as the one by Maldonado et al.² are shedding more light on just how important it is. Furthermore, what is also very apparent from this study is that patients with

injury to the LT should be handled with the utmost care. Perhaps early operative intervention may not be the answer for this patient group. After all, the key to the optimal treatment of hip pain is patience. You get the chicken by hatching the egg, not by smashing it.

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