

# Non-traumatic rupture of the gluteus medius associated with fluoroquinolone use: a case report

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Fluoroquinolones are commonly prescribed for the treatment of bacterial infections due to their efficacy and broad antimicrobial spectrum. However, their use is associated with rare but serious adverse events, including tendinopathies and atraumatic musculotendinous ruptures.<sup>1,2</sup> Studies indicate that the risk of tendon injury is increased by up to 41.9% within the first 30 days of fluoroquinolone therapy compared with other antimicrobial classes.<sup>3</sup> Although Achilles tendon ruptures are the most frequently reported, accounting for approximately 90% of cases,<sup>4</sup> this case report presents a rare and previously undocumented adverse reaction: a partial rupture of the gluteus medius tendon associated with ciprofloxacin use, with no prior cases identified in the literature to date. This unusual presentation broadens the recognised spectrum of fluoroquinolone-related musculoskeletal injuries and underscores the importance of clinical vigilance for early diagnosis and appropriate management.

## Methods

The present work is characterised as an observational and descriptive study in the form of a case report. This report has been prepared in accordance with the principles of the Consensus-based Clinical Case Reporting (CARE) guidelines.

## Case report

A 41-year-old Brazilian woman, eutrophic, presented with sudden and severe pain in the left sacroiliac and gluteal region, radiating to the posterior thigh, which began on 3 March 2024. The pain was described as an incapacitating “twinge”, not associated with any trauma, fall or physical exertion. The patient also reported associated paresis in the left lower limb and antalgic claudication, with significant functional impairment.

Her medical history included thrombophilia, polycystic ovary syndrome, endometriosis and nephrolithiasis. She denied any allergies, smoking or alcohol consumption. In October 2023, 5 months prior to the current event, she had undergone cervical discectomy and arthrodesis for disc protrusion with radicular compression, treated with corticosteroids and physiotherapy. Crucially, at the time of the gluteal pain onset, she was still in the final phase of her post-operative recovery and had been instructed to avoid physical activities, which reinforces the absence of a mechanical trigger for the injury. The patient denied any personal or family history of primary osteoarticular disorders.

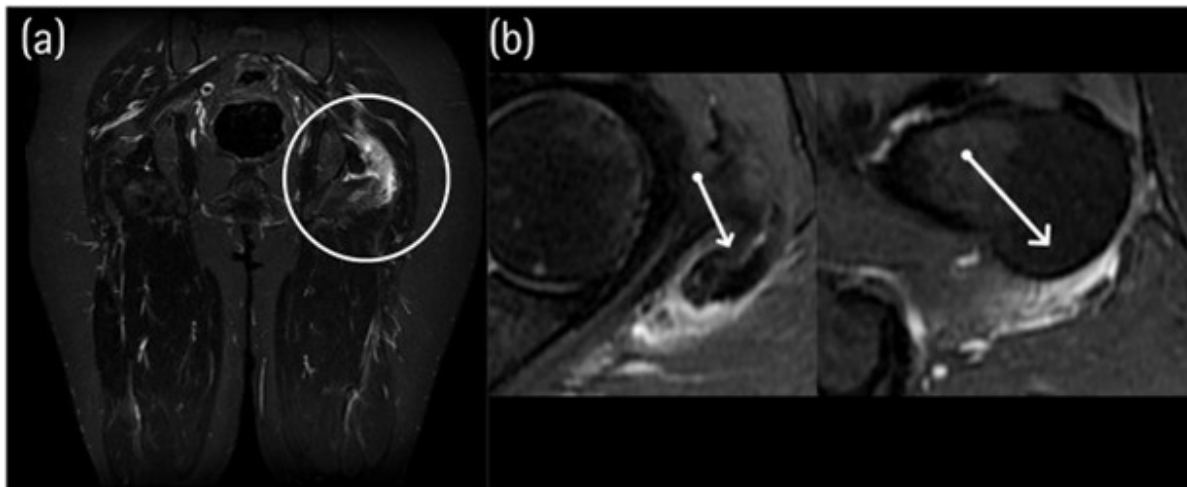
With regard to her recent history, the patient had completed a 5-day course of ciprofloxacin 500mg twice daily on 18 February 2024 for a urinary tract infection. Fourteen days after completing the treatment, the painful condition began.

On 4 March 2024, due to worsening pain and functional limitation, she sought emergency care and was assessed by a neurosurgeon. On physical examination she was haemodynamically stable and scored 15 on the Glasgow Coma Scale. Localised pain was noted in the left gluteal region and posterior thigh, with no signs of radicular compression on the Lasègue manoeuvre.

Magnetic resonance imaging (MRI) of the left hip was requested, revealing a partial tear at the insertion of the gluteus medius tendon at the greater trochanter, associated with trochanteric bursitis (Figure 1).

Based on the clear temporal correlation with the antibiotic use, the absence of other evident causes and the MRI findings, a diagnosis of fluoroquinolone-induced tendinopathy (FIT) was established. The causal relationship between ciprofloxacin use and the development of tendinopathy was supported by the Naranjo Adverse Drug Reaction Probability Scale,<sup>5</sup> a validated tool

**Figure 1:** Magnetic resonance imaging (MRI). a) Coronal slice, short tau inversion recovery (STIR) weighted sequence, showing hyperintensity in the gluteal region (as marked), predominantly involving the gluteus medius and minimus muscles, with extension to adjacent musculature. b) Axial T2-weighted sequence, demonstrating hyperintensity and partial discontinuity of the tendinous fibres at the trochanteric insertion of the posterosuperior portion of the gluteus medius tendon (indicated by the arrow), associated with trochanteric bursitis.



**Table 1:** Naranjo Adverse Drug Reaction Probability Scale.<sup>5</sup>

Naranjo score				
	Yes	No	Do not know	Patient score
1. Are there previous conclusive reports on this reaction?	+1	0	0	+1
2. Did the adverse event appear after the suspected drug was administered?	+2	-1	0	+2
3. Did the adverse reaction improve when the drug was discontinued or a specific antagonist was administered?	+1	0	0	0
4. Did the adverse reaction reappear when the drug was readministered?	+2	-1	0	0
5. Are there alternative causes (other than the drug) that could on their own have caused the reaction?	-1	+2	0	+2
6. Did the reaction reappear when a placebo was given?	-1	+1	0	0
7. Was the drug detected in the blood (or other fluids) in concentrations known to be toxic?	+1	0	0	0
8. Was the reaction more severe when the dose was increased, or less severe when the dose was decreased?	+1	0	0	0
9. Did the patient have a similar reaction to the same or similar drugs in any previous exposure?	+1	0	0	0
10. Was the adverse event confirmed by any objective evidence?	+1	0	0	+1
Total score				6

used to assess the likelihood of an adverse drug reaction compared with alternative explanations (Table 1). In this case, the calculated score was 6, indicating that the adverse reaction was considered probable.

On 5 March 2024, the patient was assessed by an orthopaedic specialist, and complementary laboratory investigations revealed no significant abnormalities. Treatment included analgesics, anti-inflammatory medication, the use of a supportive orthosis for 1 week and physiotherapy aimed at pain relief and functional recovery. The patient demonstrated good adherence to the prescribed regimen, which contributed to significant clinical improvement, with progressive pain reduction and full restoration of strength and mobility. She was able to resume her daily activities without limitations or recurrence of symptoms.

## Discussion

FIT was one of the first adverse effects identified following the administration of this class of antimicrobials. It is characterised by acute tendon injury or rupture, most commonly affecting the Achilles tendon. This condition may lead to severe and permanent disability, representing a significant clinical challenge.<sup>6–8</sup> Since its initial description in 1983 as a rheumatic disorder induced by norfloxacin,<sup>9</sup> FIT has been extensively studied and has drawn regulatory attention from agencies such as the United States Food and Drug Administration (FDA).<sup>10,11</sup>

FIT should be considered in any patient presenting with new musculoskeletal symptoms and a history of fluoroquinolone use within the preceding 6 months.<sup>12</sup> These antimicrobials increase the risk of acute tendinopathy by a factor of two to four, with an incidence of up to 2% among patients aged  $\geq 65$  years. For Achilles tendon involvement specifically, the incidence is estimated at three to four cases per 100,000 people.<sup>6,13</sup>

The onset of symptoms most commonly occurs within the first month following exposure to the antimicrobial, with a median latency period of 6 to 14 days,<sup>11,14</sup> as observed in our patient (14 days), reinforcing the temporal association. However, symptoms may also emerge weeks to months after treatment discontinuation.<sup>4,8</sup>

Risk factors associated with an increased incidence of FIT include concomitant corticosteroid use (associated with up to a 14-fold increased

risk),<sup>15,16</sup> age over 60 years, renal insufficiency, cardiovascular disease, solid organ transplantation, rheumatic disorders, diabetes mellitus, hyperparathyroidism, obesity, lipid metabolism disorders, participation in sports, hypothyroidism, duration of fluoroquinolone therapy and high dosages.<sup>17,18</sup>

However, our case did not involve any classic risk factors, which highlights the importance of considering FIT even in patients without comorbidities. Although the patient had previously received corticosteroids, their discontinuation prior to symptom onset reduces the likelihood of a direct contribution—despite their known impact on collagen synthesis and tendon regeneration in the long term. Furthermore, our case supports existing literature indicating a higher prevalence of FIT among biological females.<sup>8,16,19</sup> Regarding risk factors, it is noteworthy that the patient had a history of corticosteroid use 5 months prior. Although not concomitant, prior exposure to corticosteroids is known to alter collagen synthesis and tendon structure, which could have acted as a predisposing factor, synergistically increasing the patient's susceptibility to the fluoroquinolone's toxic effects.<sup>8,16,19</sup>

Although 90% of cases involve the Achilles tendon, other tendons may also be affected.<sup>4,6,10</sup> While there are reports of gluteus medius tendinopathy associated with ciprofloxacin use,<sup>7,12</sup> an extensive literature review suggests that rupture of the gluteus medius tendon has not previously been described, as observed in our patient. This may be attributed to insufficient recognition or under-reporting of FIT cases.

Fluoroquinolones exhibit favourable pharmacokinetics, with good oral absorption and wide tissue distribution owing to low plasma protein binding. These properties enable the drugs to reach high concentrations in muscle and tendon tissues, particularly via the myotendinous junction, resulting in substantial exposure of tendinous structures to elevated antimicrobial levels.<sup>2</sup>

The exact pathogenesis of FIT remains unclear. However, five main mechanisms have been proposed: inhibition of tendon cell proliferation through cell cycle arrest at the G2/M phase; reduced tenocyte migration due to decreased phosphorylation of focal adhesion kinase; diminished type I collagen production as a result of increased matrix metalloproteinases; iron chelation impairing collagen synthesis; and oxidative stress induced by reactive oxygen species.<sup>4,6,14,20,21</sup>

Typical symptoms of FIT include sudden and acute pain, localised tenderness and pain on movement of the affected area, often accompanied by functional impairment and loss of strength. Inflammatory signs may also be present.<sup>18,21,22</sup> In our case, the patient presented with abrupt, severe pain, associated with strength loss and worsening during movement of the affected limb, without any identifiable triggering factors such as previous trauma.

The diagnosis of tendinopathy is primarily clinical but can be supported by imaging studies such as ultrasound or MRI. As in our patient's case, MRI can reveal findings consistent with tendinopathy or musculotendinous avulsion, such as T2 hyperintensity, tendon thickening and architectural distortion, indicating a recent inflammatory process compatible with an acute injury. Furthermore, the absence of signs of chronicity on the imaging—such as tendon retraction, muscle atrophy or calcifications—reinforces the hypothesis of a recent and acute event.<sup>23,24</sup>

The main diagnostic challenge in this case lies in distinguishing an acute drug-induced injury from a pre-existing chronic rupture of the gluteus medius tendon. While partial-thickness tears of the gluteus medius are more prevalent in middle-aged and older women, they are predominantly symptomatic, with asymptomatic cases being relatively rare. In a large cross-sectional MRI-based study, only 1.7% of asymptomatic hips presented with partial-thickness tears, and no full-thickness tears were identified without symptoms. Moreover, most under-surface partial-thickness tears are difficult to detect clinically and radiologically, often requiring direct visualisation through advanced endoscopic techniques. These findings, combined with the acute onset and clinical course in our case, argue against a chronic degenerative process and instead support the hypothesis of an acute adverse event potentially associated with fluoroquinolone exposure.<sup>25,26</sup>

First, the sudden onset of intense pain and the presence of significant functional impairment are not typical features of chronic degenerative tendinopathy and are more consistent with an acute rupture. Second, the absence of mechanical triggers—such as trauma or intense physical exertion—further supports this interpretation. Additionally, the patient had no history of musculoskeletal comorbidities, no previous locomotor deficits in the affected region and no prior episodes of hip pain. Lastly, symptom onset occurred exactly 14 days

after the completion of ciprofloxacin therapy—a latency period consistent with that described in the literature for FIT—which increases the plausibility of a drug-related aetiology in this case.

The likelihood of an adverse drug reaction and the causal relationship between fluoroquinolone use and the development of tendinopathy can be evaluated using the Naranjo Adverse Drug Reaction Probability Scale.<sup>5</sup> In the present case, this tool yielded a score of 6, classifying the event as a “probable” adverse reaction. This score was derived from the positive identification of FIT as a previously documented reaction (+1), the correct temporal sequence between drug administration and symptom onset (+2) and objective confirmation of the tendon tear by MRI (+1).

A crucial score of +2 was assigned for the absence of alternative aetiologies (question 5), a determination based on a thorough clinical assessment. Specifically, we identified no alternative cause that could, on its own, explain the event due to: 1) the hyperacute, non-traumatic onset of debilitating pain; 2) the patient's explicit lack of physical exertion, as she was in a post-operative recovery period from cervical surgery; and 3) the absence of pre-existing musculoskeletal comorbidities or prior history of hip pain. While acknowledging the prevalence of asymptomatic degenerative tears in this demographic, the combination of a plausible pharmacological trigger acting within a known latency period and the lack of any identifiable mechanical cause renders FIT the most compelling and parsimonious diagnosis.

When symptoms such as pain and tendon inflammation arise, it is crucial to discontinue the antimicrobial and avoid physical activity involving the affected limb for a period of 2–6 weeks.<sup>27</sup> Non-surgical treatments, including analgesics, physiotherapy, immobilisation, orthoses and rest, should be tailored to the severity of the injury.<sup>28</sup> Surgical repair is a viable option for appropriately selected candidates.<sup>29</sup> In our case, the patient, no longer exposed to the antimicrobial, was treated with analgesics, anti-inflammatory medication, orthoses and physiotherapy, achieving full recovery. This typically occurs within a mean period of 1–2 months, although long-term sequelae have been reported in approximately 10% of patients.<sup>18</sup> To prevent recurrence, we advised lifelong avoidance of fluoroquinolones, as recurrent cases have been documented.<sup>30</sup>

Our case underscores the need to consider FIT as a differential diagnosis in patients presenting with musculoskeletal complaints and a history

of fluoroquinolone use within the preceding 6 months. It also highlights a previously undocumented complication: partial rupture of the gluteus medius tendon.

### **Conclusion**

FIT is a serious adverse reaction associated with considerable morbidity and functional impairment. This case report presents a novel instance of gluteus medius tendon rupture, thereby expanding the recognised spectrum of

musculoskeletal injuries attributed to this class of antimicrobials, which are traditionally associated with Achilles tendon rupture. The objective is to underscore the importance of clinical vigilance and prompt diagnosis, considering FIT as a differential diagnosis in patients presenting with musculoskeletal symptoms and recent fluoroquinolone exposure. Recognising the potential involvement of less commonly affected structures is essential for optimising management and preventing further complications.

**COMPETING INTERESTS**

The authors declare that they have no conflicts of interest related to the content of this manuscript.

**ACKNOWLEDGEMENTS**

Ethical approval to report this case was obtained from the Research Ethics Committee of the University Centre for the Development of the Alto Vale do Itajaí (UNIDAVI), under protocol number 7.034.154, on 27 August 2024. The patient provided written informed consent for the use of her medical data and imaging in this case report. No identifiable information has been included in the submitted manuscript. All efforts were made to ensure the patient's privacy and anonymity, and no data or images that could compromise her identity have been presented.

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<https://nzmj.org.nz/journal/vol-138-no-1626/non-traumatic-rupture-of-the-gluteus-medi-um-associated-with-fluoroquinolone-use-a-case-report>

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