

# Kirschner Wire Migration after the Treatment of Acromioclavicular Luxation for the Contralateral Shoulder – Case Report\*

## *Migração do fio de Kirschner após o tratamento da luxação acromioclavicular para o ombro contralateral – relato de caso*

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### Abstract

The use of metal wires, called Kirschner wires, is a simple and effective fixation method for the correction of shoulder fractures and of dislocations in orthopedic surgery. Wire migration during the postoperative follow-up is a possible complication of the procedure. The authors present the case of a 48-year-old male patient, a business administrator, who suffered a fall from his own height during a soccer match resulting in right shoulder trauma. The patient was treated at a specialized orthopedics and trauma hospital and was diagnosed with a grade V acromioclavicular dislocation. Four days after the trauma, the acromioclavicular dislocation was surgically treated using ligatures with anchor wires, coracoacromial ligament transfer, and fixation with Kirschner wires from the acromion to the clavicle. At the follow-up, 12 days after the surgical procedure, migration of the Kirschner wire to the acromion edge was identified. The patient was oriented to undergo another surgery to remove the Kirschner wire, due to the possibility of further migration; nonetheless, he refused the surgery. Nine months after the surgical treatment, the patient complained of pain on the left shoulder (contralateral side), difficulty to mobilize the shoulder, ecchymosis, and protrusion. Bilateral radiographs demonstrated that the Kirschner wire, originally from the right shoulder, was on the left side. The patient then underwent a successful surgery to remove the implant.

### Keywords

- ▶ foreign-body migration
- ▶ shoulder dislocation
- ▶ shoulder joint
- ▶ acromioclavicular joint
- ▶ bone wires

### Resumo

O uso dos fios metálicos, denominados fios de Kirschner, é um método de fixação simples e eficaz para a correção de fraturas e luxações do ombro na cirurgia ortopédica. Uma das possíveis complicações é a migração do fio durante o acompanhamento pós-operatório. Os autores apresentam um caso de um paciente masculino de 48 anos,

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**Palavras-chave**

- ▶ migração de corpo estranho
- ▶ luxação do ombro
- ▶ articulação do ombro
- ▶ articulação acromioclavicular
- ▶ fios ortopédicos

administrador, que sofreu uma queda de mesmo nível com trauma em ombro direito durante uma partida de futebol. Atendido em um hospital de referência de ortopedia e traumatologia, foi diagnosticada luxação acromioclavicular grau V. Quatro dias após o trauma, fez-se o tratamento cirúrgico da luxação acromioclavicular com amarrilhos com fios de âncora, transferência do ligamento coracoacromial e fixação com fio de Kirchner do acrômio à clavícula. No retorno, 12 dias após o procedimento cirúrgico, identificou-se a migração do fio de Kirchner do bordo do acrômio. Apesar de orientado a se submeter a cirurgia para remoção do fio, o paciente se recusou. Nove meses após o tratamento cirúrgico, o paciente apresentou dores no ombro esquerdo (lado contralateral), dificuldade para mobilizar o ombro, equimose e saliência. Foram feitas radiografias bilaterais e foi constatado que o fio de Kirchner, originalmente no ombro direito, estava no ombro contralateral. Fez-se então cirurgia para remoção do implante, com sucesso.

**Introduction**

The use of metallic wires for orthopedic surgery was introduced by Martin Kirschner in the early 20<sup>th</sup> century, and it is a simple and effective fixation method for the correction of shoulder fractures and of dislocations in orthopedic surgery. Complications included vascular and nerve damage, tendon rupture, osteomyelitis, loss of fracture or dislocation reduction, superficial infection, and postoperative wire migration.<sup>1-3</sup>

Wire migration can have devastating effects, leading to increased morbidity and mortality. Metallic wires have been found and described in the lungs, in the esophagus, in arteries (aorta, brachiocephalic, subclavian artery), in veins, in the mediastinum, in the heart, in the cervical spinal cord, in the liver, and in the spleen. The mechanism leading to migration is still unknown, although muscle activity is postulated as a possible cause.<sup>2-5</sup>

Thus, the present study aims to report a case in which an acromioclavicular dislocation was treated with metallic wires and ligatures, but with Kirschner wire migration to the contralateral shoulder at the follow-up period.

**Case Report**

A 48-year-old male patient, a business administrator, suffered a fall from his own height resulting in right shoulder trauma during a soccer match. At a specialized orthopedics and trauma hospital, the patient was diagnosed with a grade V acromioclavicular dislocation.

Four days after the trauma (▶ **Fig. 1**), the acromioclavicular dislocation was surgically treated using ligatures with anchor wires, coracoacromial ligament transfer, and fixation with Kirshner wires from the acromion to the clavicle.

At the 12-day follow-up visit, the migration of the Kirschner wire to the acromion was identified. The patient was informed of the need for a more frequent follow-up and that the wire would be removed 45 days after the surgery. At the 20- and 30-day follow-up visits, radiological findings remained similar to the ones observed at the 12-day visit, with no migration progress.

Forty-two days after the surgery, the wire was not protruding; the patient presented with no pain complaints, and the arc of movement of the shoulder was preserved and wide. The patient was strongly advised of the need to remove the Kirschner wire due to its possible migration and, afterwards, to end the treatment; however, he vehemently refused it, but agreed to frequent the outpatient follow-up.

During the 3-, 4- and 5-month follow-up, no evolution was detected at radiographic examinations. The patient had no complaints, presenting grade V muscular strength and wide movements.

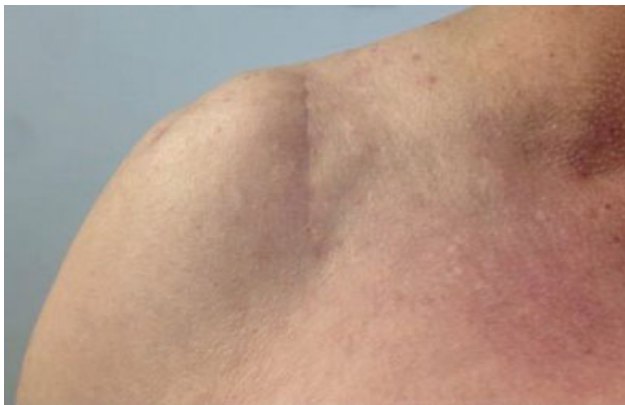
The patient did not show up for his 6-month visit. Nine months after the surgical treatment, the patient started to present with pain on the left shoulder (contralateral side), reduced arc of movement, ecchymosis, and a protrusion (▶ **Figs. 2 and 3**). Bilateral radiographs showed that the Kirschner wire originally from the right shoulder was in the left shoulder (▶ **Figs. 4 and 5**).



**Fig. 1** Fifteen days postsurgery, right shoulder.



**Fig. 2** Hematoma and a small skin protuberance, left shoulder, 9 months after the procedure.



**Fig. 3** Surgical approach, 9 months after the procedure.



**Fig. 4** Nine months postsurgery, left shoulder.

The patient was asked about additional symptoms and he mentioned a discomfort in the posterior cervical region during the previous weeks.

Thus, a new surgical procedure was performed to remove the metallic wire from the left shoulder.



**Fig. 5** Nine months postsurgery, right shoulder.

## Discussion

Acromioclavicular dislocation can be treated using several surgical techniques. The Kirschner wire is a widely accepted option due to its easy and smooth handling. Despite its low morbidity, some complications can occur.<sup>3</sup> Kirschner wire migration is infrequent; in its first case report, by Mazet,<sup>6</sup> the metallic wire migrated to the lung.

According to a review by Ballas et al,<sup>7</sup> 88 cases were described in the literature. This complication was observed mainly in patients with clavicle fracture fixation, followed by sternoclavicular and acromioclavicular dislocation. The most common sites for migration were the thoracic cavities and larger arteries. Migration to the contralateral shoulder was not reported by this review.<sup>7</sup>

The detection period is wide, and, in our case, the migration was observed after 9 months of evolution.

Tan et al<sup>1</sup> reported that 56% of the cases are diagnosed on an average period of 3 months, ranging from hours to years.

The causes for migration remain unclear. Several theories are proposed, including muscle activity, gravitational force, bone resorption, thoracic negative pressure, inadequate surgical technique, respiratory movement, and broad shoulder mobility being described as possible causes; our patient, however, was a business administrator, who performed no manual labor.<sup>8</sup>

The evolution of the migration of the metal wire can be tragic and very severe, leading to complex secondary procedures and, in some cases, to death, especially if the metallic wire migrates to the cardiovascular system.<sup>1</sup> Some studies suggested that the use of metallic wires in orthopedic shoulder surgeries should be contraindicated, since intraaortic migration can be life-threatening.<sup>2,9</sup> Based on the review by Lyons, some recommendations are required during and after fixation procedures with Kirschner wires. These recommendations are the following: use this method with extreme caution; the patient must be oriented to comply with follow-up visits in order to analyze the evolution of the case; the distal end of the wire, closer to the skin, must be folded in an angle of approximately 90°; intraoperatively or

immediately postoperatively, radiographs must always be taken to analyze the position of the wire; the patient must be radiologically and clinically followed-up until the removal of the wire; and lastly, Kirschner wires must be removed at the end of the treatment or if their migration is detected, regardless of the lack of clinical symptoms.<sup>2</sup>

The present case was followed-up with serial radiographs; moreover, the metal wire was folded to difficult its migration, the patient was properly oriented when the metal wire migration was noticed and at the end of the treatment period. However, the fold at the distal end of the wire did not reach the necessary angulation to prevent migration, allowing this complication to occur.

## Conclusion

Kirschner wires are instruments that assist the treatment of acromioclavicular dislocations. However, there is a considerable risk of migration to various locations, even with careful monitoring, and the wires should be removed as soon as the migration is diagnosed.

### Conflicts of Interest

The authors have no conflicts of interest to declare.

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