

Migration of a Kirschner wire used in fixation of acromioclavicular joint dislocation — case report

Migracja złamanego drutu Kirchnera po zespoleniu zwichniętego stawu barkowo-obojczykowego — opis przypadku

Mateusz Stolarz¹, Jakub Wasilewski¹, Grzegorz Wrzask¹, Marek Hawranek¹, Jakub Hawranek¹

¹ Department of Orthopedics and Traumatology, City Hospital in Zabrze, Zamkowa 4, 41-803 Zabrze, Poland 2. Department of Computer Biomedical Systems, University of Silesia, Institute of Computer Science, Będzińska 39, 41-200 Sosnowiec, PL

Chirurgia

PrzypadkiMedyczne.pl

Streszczenie

Wstęp: Zwichnięcie stawu barkowo obojczykowego jest relatywnie częstym urazem narządu ruchu. W zależności od stopnia uszkodzenia zalecane jest leczenie zachowawcze lub operacyjne. Leczenie zwichnięcia III stopnia wciąż budzi kontrowersje.

Opis przypadku: U 53-letniego pacjenta rozpoznano zwichnięcie III stopnia stawu barkowo obojczykowego. Zwichnięty staw ustabilizowano dwoma drutami Kirschnera. Po dwóch latach, podczas operacji reinsertacji zerwanej głowy długiej prawego mięśnia dwugłowego ramienia usunięto jeden drut Kirschnera. Po niespełna czterech latach od pierwszego zabiegu pacjent zgłosił się do poradni ortopedycznej podając ból okolicy nad prawą łopatką. Rozpoznano pęknięcie pozostałego drutu Kirschnera, z migracją jego części bliższej do tkanek miękkich okolicy nadłopatkowej. W trybie pilnym chirurgicznie usunięto obydwa fragmenty drutu. Po operacji dolegliwości bólowe pacjenta ustąpiły.

Wnioski:

1. Fiksacja drutami Kirschnera zwichnięcia III stopnia stawu barkowo-obojczykowego jest niedrogą metodą, jednak wymagającą dużego doświadczenia chirurga.
2. Z uwagi na powikłania należy rozważyć zastosowanie leczenia zachowawczego, a decydując się na leczenie operacyjne należy stosować nowoczesne metody stabilizacji.

Słowa kluczowe: drut Kirschnera, zwichnięcie, staw barkowo-obojczykowy, operacja rewizyjna

Abstract

Background: Dislocation of the acromioclavicular (AC) joint is a relatively common injury of the musculoskeletal system. Depending on the grade of the injury, conservative or surgical treatment is recommended. The correct treatment of a grade 3 dislocation is a matter of dispute.

Case Report: A 53-year-old patient was diagnosed with a grade III dislocation of the right acromioclavicular joint. The dislocated joint was fixated using 2 Kirschner wires. Two years later, during surgical reinsertion of a torn long head tendon of the bicep muscle, one of the two Kirschner wires was removed. Four years following the first operation, an x-ray of the joint showed a broken Kirschner wire and the migration of one element to the right suprascapular soft tissue. The remaining fragments of the wire were surgically removed.

Conclusions:

1. Fixation of a grade III dislocation of the acromioclavicular joint by Kirschner wires can be a low cost method, however, requires extensive surgical experience.
2. Due to possible complications, conservative treatment of this dislocation should be considered. However, when deciding on surgical treatment, modern methods of stabilization should be used.

Key words: Kirschner wire, acromioclavicular joint, dislocation, revision surgery

Otrzymano: 16-05-2017 → Zaakceptowano: 16-12-2018 → Opublikowano: 18-12-2018

✉ Mateusz, Stolarz, e-mail: ms@mdcse.com, mob. +48 500 793 030 — adres prywatny w dyspozycji Redakcji

Introduction

Dislocation of the acromioclavicular joint refers to complete or partial misalignment of the articular surfaces of the neighboring scapula and clavicle [1]. It is an injury which often occurs in contact sports, such as football, judo, rugby and many more. It is also a relatively common injury in daily activities, as a result of falling during a walk or falling off a chair with impact on the shoulder girdle [2, 3].

Depending on the grade of the injury, recommended approaches vary from conservative treatment (grade I and II) to surgical treatment (above grade III) [4].

Conservative treatment recommendations are: cooling, painkillers and limb elevation. Surgical treatment consists of surgical stabilisation of the dislocation. There are many techniques and methods to fixate the injury, including: Kirschner wires, using TightRope, double Endobutton, MINAR, Copeland and Kessel, Waver and Dunn or dedicated plates [3, 5].

Case Report

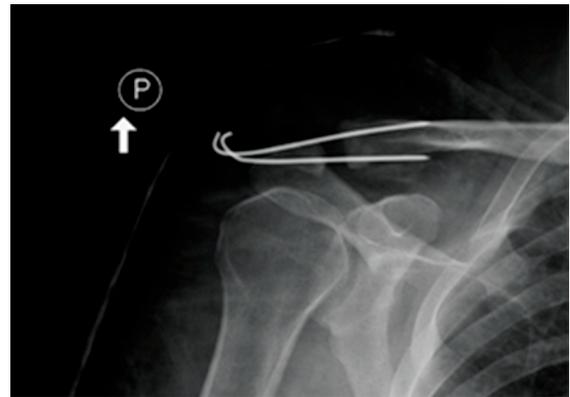
A 53 year old patient was admitted to the Emergency Room at the City Hospital in Zabrze (IX 2010), with acute pain in the right acromioclavicular joint area with a positive distraction test (piano key sign), along with pain limiting the range of active movement in the shoulder joint. Passive movements were fully intact. The patient stated that he fell from the level of his body and felt a sharp pain in the acromioclavicular joint area. Medical history showed no chronic illness or ongoing medical treatments. The patient did not have allergies, smoked around one pack of cigarettes a day and neglected personal hygiene. During orthopaedic examination, pain was located in the right acromioclavicular joint area, and a distraction test was evaluated as (+/-). X-ray showed a grade III dislocation of the examined joint.



Rysunek 1: X-ray of right shoulder joint in AP projection, visible dislocation of the acromioclavicular joint

The patient was qualified for surgical treatment- closed reduction and internal fixation. The dislocated joint was aligned and fixated under X-ray guidance; two Kirschner wires were positioned using the Phemister method. Post operatively, the limb was stabilised using a plaster Dessault dressing.

X-rays taken (Fig. 2) after the surgery, showed improper alignment of the joint. However, the result was considered sufficient. No complications occurred postoperatively.



Rysunek 2: X-ray of right shoulder joint taken one day after surgery. Improper alignment of the joint. However, the result was considered sufficient

Ten days after discharge from hospital, the patient reported to the orthopaedic clinic for a follow-up appointment. The plaster dressing was removed at this time. Despite physician recommendations, the patient did not appear for any further examination.

After two years (V 2012) the patient was admitted to the emergency room with pain in the anterior region of the right shoulder following the lifting of a heavy object. During examination, a subdermalhaematoma, deformation of the soft tissue, along with presence of the Popeye deformation were noted. Full detachment of the long head of the biceps muscle was diagnosed. The patient was treated surgically. An open reattachment of the long head was performed. During the operation, one of the Kirschner wires from the acromioclavicular joint was removed. In the post-operative X-ray, the remaining Kirschner wire, along with degenerative changes of the area surrounding the joint were visible (Fig. 3). In the medical documents, there was no account of why the remaining wire was not removed.



Rysunek 3: X-ray in AP projection of the shoulder joint after surgical reattachment of the long head tendon of the biceps muscle. Visible Kirschner wire, which was not removed during the operation

No post-operative complications were noted.

Two weeks following the surgery, the stitches were removed. The wound was described as healing correctly. Despite

physician recommendations the patient did not show up for any follow-up appointment.

In February 2014, the patient came to the hospital with an urgent referral from the regional orthopaedic clinic to remove a broken Kirschner wire. X-rays taken at the clinic showed a broken Kirschner wire with significant translocation to the right suprascapular soft tissue (Fig. 4).



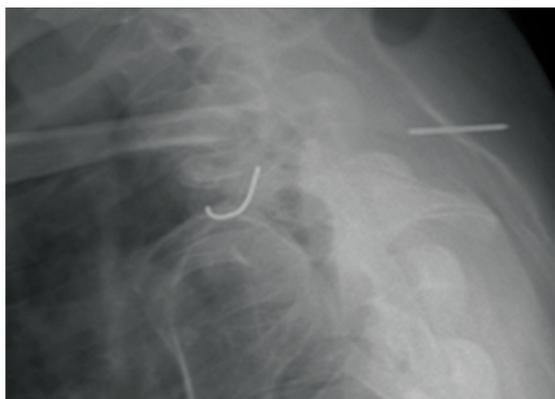
Rysunek 4: X-ray of the right shoulder in AP projection, taken at the regional orthopaedic clinic. Significant translocation of the proximal fraction of the broken Kirschner wire visible

On admission, the patient complained of pain in the right suprascapular region lasting for the past few months, increasing in the last 7 days. The patient did not associate the increase in pain to any injury. Additional X-ray images were performed to determine the exact location of the wire fragments (Fig. 5, 6). The patient was urgently qualified for surgical removal of the wire. Both fragments were removed using separate surgical approaches. No post-operative complications occurred, with pain subsiding within a few days after the surgery.

During a follow-up exam 10 days later, stitches were removed and the wound was described as healing correctly.



Rysunek 5: X-ray in "Y view projection" of the right shoulder joint



Rysunek 6: X-ray in lateral projection of the right shoulder joint

Discussion

Complications arising after procedures using Kirschner wires have been often reported in literature [2, 4, 6, 7]. In some cases the wires migrated to the spinal column [2], in direct proximity of the spinal cord [8], or heart [7], causing numerous instances of damage to nerve structures and blood vessels, or risk of an oedema. That is why it is crucial the Kirschner wire be fitted precisely and secured against migration (e.g. by bending one of the ends), not to mention the necessity of its eventual removal. Unfortunately, in many cases it is impossible to foresee the optimal time to remove the wires.

The result of the first operation was a sprain reposition, but both Kirschner wires were improperly inserted. This resulted in the second displacement of the clavicle due to poor mechanical strength of the anastomosis.

The authors do not know why, during the second operation, only one Kirschner wire was removed. Probably it was related to surgical approach. Leaving a single wire could contribute to the described complication — wire breakage. This condition is a major complication after surgery. In similar cases, we recommend complete removal of the wires.

Nowadays, fixation of dislocations and fractures using Kirschner wires is a relatively inexpensive method, with the outcome depending on the location of the injury. When it comes to dislocations of the acromioclavicular joint it should be extensively considered in light of newer scientifically approved methods (e.g. TightRope, MINAR, Double Endobutton Technique, dedicated plates) [5, 9]. Apart from the plates, these methods offer minimally invasive, stable fixations without the risk of distant migration of the material. However, different complications may arise, e.g. pneumothorax, or the brachial plexus damage. Conservative methods of treatment should be considered instead of the use of Kirschner wires in patients not likely to adhere to physician instructions (especially alcoholics, disabled, individuals who neglect personal hygiene). Without the implementation of proper post-operative behaviour on the part of the patient, high rates of complications are seen.

Conclusions

1. Fixation of a grade III dislocation of the acromioclavicular joint by Kirschner wires can be an low cost method, however, requires extensive surgical experience.
2. Due to possible complications, conservative treatment of this dislocation should be considered. However, when deciding on surgical treatment, modern methods of stabilization should be used.

Bibliography

1. Tadeusz A.G., Gaździk Sz., Bożek M. *et al.* *Ortopedia i traumatologia*. Wydawnictwo Lekarskie PZWL, 3. wydanie, 2010. ISBN 9788320041651.
2. Liberski J. i Ficek K. *Kirschner wire migration from the clavicle to the cervical spine*. *International Journal of Case Reports and Images*, 2013. 4(6):308–11. doi:10.5348/ijcri-2013-06-319-CR-4.
3. Cooper G. i Herrera J.E. *Manual of Musculoskeletal Medicine*. Lippincott Williams & Wilkins, 1. wydanie, 2015. ISBN 978-0781779197.
4. Smith T.O., Chester R., Pearse E.O. *et al.* *Operative versus non-operative management following Rockwood grade III acromioclavicular separation: a meta-analysis of the current evidence base*. *J Orthop Traumatol*, styczeń 2011. strony 19–27. doi:10.1007/s10195-011-0127-1.
5. Struhl S. *Double Endobutton Technique for Repair of Complete Acromioclavicular Joint Dislocations*. *Techniques in Shoulder and Elbow Surgery*, grudzień 2007. strony 175–179. doi:10.1097/BTE.0b013e31815907a3.
6. Gulcan O., Sezgin A.T., Bolat B. *et al.* *Right ventricular penetration and cardiac tamponade as a late complication of Kirschner wire placement in the sternoclavicular joint*. *Interact. Cardiovasc. Thorac. Surg*, sierpień 2005. strony 295–6. doi:10.1510/icvts.2005.107896.
7. Durpekt R., Vojáček J., Lischke R. *et al.* *Kirschner wire migration from the right sternoclavicular joint to the heart: a case report*. *Heart Surg. Forum*, 2006. strona E840–2. doi:10.1532/HSF98.20061086.
8. Leppilahti J. i Jalovaara P. *Migration of Kirschner wires following fixation of the clavicle — a report of 2 cases*. *Acta Orthop. Scand*, 1999. strony 517–9. doi:PMID:10622489.
9. Petersen W., Wellmann M., Rosslenbroich S. *et al.* *Minimalinvasive Akromioklavikulargelenkreonstruktion (MINAR)*. *Oper. Orthop. Traumatol*, 2010. strony 52–61. doi:10.1007/s00064-010-3004-4.

Wkład autorów/authors' contribution: Mateusz Stolarz – redakcja wstępu, redakcja dyskusji, zebranie materiału, zebranie bibliografii; Jakub Wasilewski – korekta artykułu, redakcja opisu przypadku, zebranie materiału; Grzegorz Wrzask – redakcja wstępu, korekta artykułu, redakcja dyskusji; Marek Hawranek – redakcja dyskusji, opracowanie wniosków, korekta artykułu; Jakub Hawranek – redakcja wstępu, zebranie materiału, zebranie bibliografii

Komentarz:

Recenzowany artykuł to kolejne doniesienie świadczące o wysokim ryzyku zastosowania grotów Kirschnera w celu stabilizacji zwichnięcia stawu barkowo-obojczykowego. Przegląd literatury świadczy o potencjalnie niebezpiecznych i wcale nie tak rzadkich konsekwencjach migracji uszkodzonego materiału zespalającego. Wobec powyższego słuszny wydaje się wniosek postawiony przez autorów artykułu o względnych wskazaniach do stabilizacji wspomnianą metodą w zwichnięciu III stopnia stawu barkowo-obojczykowego. Wnioskiem większości autorów publikujących na ten temat jest przewaga nowszych metod zaopatrzenia tego urazu polegająca na odtworzeniu ciągłości i augmentacji więzadeł kruczo-obojczykowych. W mojej opinii jedynie sportowcy uprawiający sporty rzutowe powinni być bezwzględnie leczeni operacyjnie, w przypadku pozostałych pacjentów należy rozważyć leczenie zachowawcze.

lek. Jakub Liberski