



Migration of a Kirschner Wire Into the Urinary Bladder: A Case Report

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Abstract

Background. Migration of Kirschner wires is a dangerous complication of osteosynthesis, especially when they displace into adjacent anatomical areas. Preventive measures do not eliminate the possibility of this complication.

Aim of the study – to draw physicians' attention to the possibility of asymptomatic migration of a Kirschner wire into the bladder after osteosynthesis of a femoral neck fracture with a bundle of wires

Case presentation. We present a case report of a 70-year-old patient with asymptomatic migration of Kirschner wires into the bladder and hip joint cavity, which occurred 5 years after the primary surgery for the fracture of the left femoral neck. To manage the complication, a combination of endoscopic removal of the foreign body from the bladder and open removal from the hip joint followed by total hip replacement were used simultaneously. The surgical intervention was performed without any complications. The patient began rehabilitation the next day after the surgery.

Conclusion. Osteosynthesis should be supplemented with preventive measures against the fracture of fixator and its migration. The patient must be dynamically followed up during the treatment period with all necessary monitoring methods (X-ray, CT scan, ultrasound, etc.). In case of wire fracture and/or migration, it must be removed immediately. Once the fracture has healed or the period of fixation of the dislocation is over, the wires should also be removed. Preventive measures can avoid the migration of Kirschner wires and related complications.

Keywords: femoral neck osteosynthesis, Kirschner wires, migration of wires, pseudoarthrosis of the femoral neck.

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Миграция спицы Киршнера в мочевой пузырь: клинический случай

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Реферат


Актуальность. Миграция спиц Киршнера является опасным осложнением остеосинтеза, особенно при их смещении в смежные анатомические зоны. Предпринимаемые меры профилактики не исключают возникновения этого осложнения.


Цель исследования — обратить внимание врачей на возможность бессимптомной миграции спицы Киршнера в мочевой пузырь после остеосинтеза перелома шейки бедренной кости пучком спиц.

Описание случая. Мы представляем клинический случай лечения 70-летней пациентки с бессимптомной миграцией спиц Киршнера в мочевой пузырь и полость тазобедренного сустава, наступившей через 5 лет после первичной операции по поводу перелома шейки левой бедренной кости. Для лечения осложнения симультанно использовали комбинацию эндоскопического удаления инородного тела из мочевого пузыря и открытого удаления из тазобедренного сустава с последующим тотальным эндопротезированием. Оперативное вмешательство прошло без осложнений. На следующие сутки после операции пациентка приступила к реабилитационным мероприятиям.

Заключение. Выполнение остеосинтеза необходимо завершать мерами профилактики переломов фиксатора и его миграции. Требуется динамическое наблюдение за пациентом в течение периода лечения с проведением всех необходимых методов контроля (рентгенография, КТ, ультразвуковое исследование и т.д.). В случае перелома спицы и/или ее миграции необходимо незамедлительно удалить спицу. После сращения перелома или окончания сроков фиксации вывиха также спицы следует удалять. Профилактические мероприятия позволяют предупредить миграцию спиц Киршнера и связанные с ней осложнения.

Ключевые слова: остеосинтез шейки бедренной кости, спицы Киршнера, миграция спиц, ложный сустав шейки бедренной кости.

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BACKGROUND

Kirschner wires are widely used in modern trauma surgery for fixation of fractures of various localizations. They are used both as independent fixators and as an auxiliary tool: guide wire, temporary fixation, etc. Due to their technical properties (small diameter and smooth surface), wires are easy to use, but fatigue fractures and migration often occur. Cases of K-wires migration after osteosynthesis of the clavicle [1, 2], humerus [3], sternum [4], femur [5, 6], and reconstruction of the acromioclavicular joint [7, 8, 9, 10, 11] are described in the literature. Localization of displaced fixator varies from the subarachnoid space to the abdominal cavity: migrations to the heart, lungs, mediastinum, aorta, spinal canal, and bladder have been described [12, 13, 14, 15, 16, 17]. Often a displaced foreign body resulted in fatal injuries of internal organs.

We also have some experience in managing this complication. In our case report, migrated wire has not disturbed the patient for many years and has been detected accidentally.

Aim of study — to draw physicians' attention to the possibility of asymptomatic migration of a Kirschner wire into the bladder after osteosynthesis of the femoral neck fracture with a bundle of wires.

Case presentation

A 70-year-old patient presented to the Ural Clinical Therapeutic and Rehabilitation Center named after V.V. Tetyukhin (Nizhnii Tagil) with complaints of pain and limited movements in the left hip joint. Her medical history showed that

five years ago she had undergone osteosynthesis of the neck of the left femur with a bundle of wires at the local central district hospital in Perm region. Three years later, a progressive pain syndrome in the area of intervention occurred. On presentation to the health care facility where the primary surgery had been performed, femoral neck pseudarthrosis and K-wire fracture and migration were diagnosed. Patient was admitted to the hospital, and elective surgery for removal of fixators was performed. However, the broken wire could not be removed for technical reasons. Wound having been healed, the patient was discharged for outpatient treatment. During the next two years, a mild pain syndrome persisted, but the patient was not followed up by an orthopedic traumatologist. Over the past 6 months, the pain increased, which was the reason for the patient's reapplication for medical care. Plain X-ray of the pelvis was performed and showed wire migration into the abdominal cavity (Fig. 1 a). At the time of examination, there was no evidence of abdominal organ damage. The patient was urgently referred to the admission department of the Ural Clinical Therapeutic and Rehabilitation Center named after V.V. Tetyukhin, where a CT scan of the abdomen was performed and the localization of the foreign body was determined (Fig. 1b). The wire was located in the bladder. After preoperative planning, it was decided to perform a two-stage surgery to remove two foreign bodies simultaneously: the first stage was cystoscopy and removal of the wire fragment from the bladder; the second stage was K-wire removal from the hip joint and total hip arthroplasty.

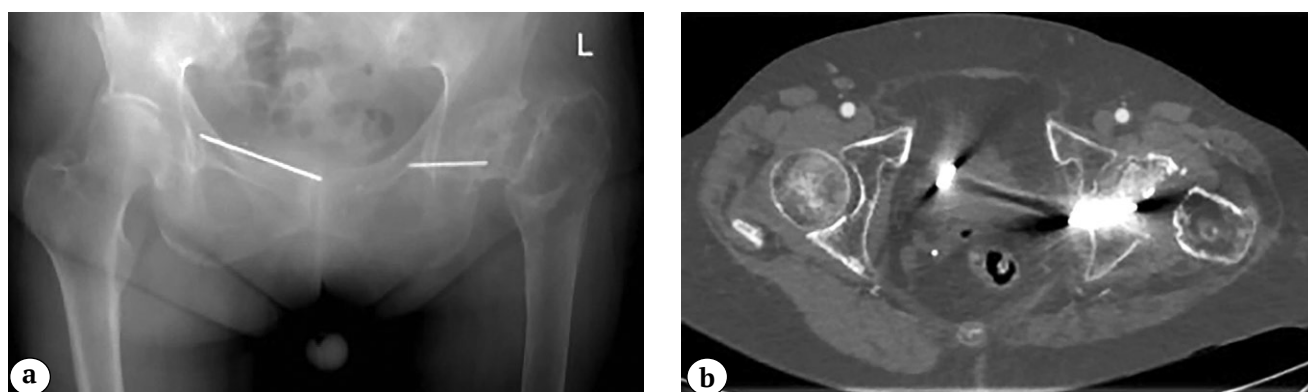
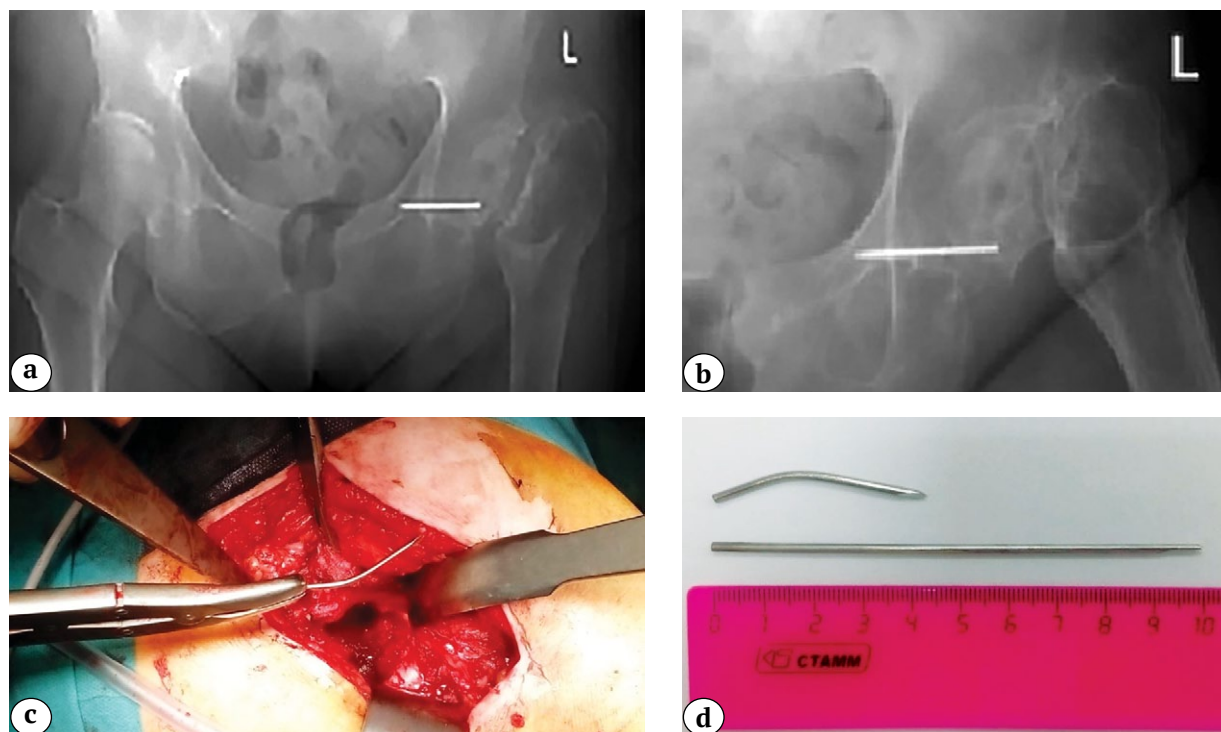
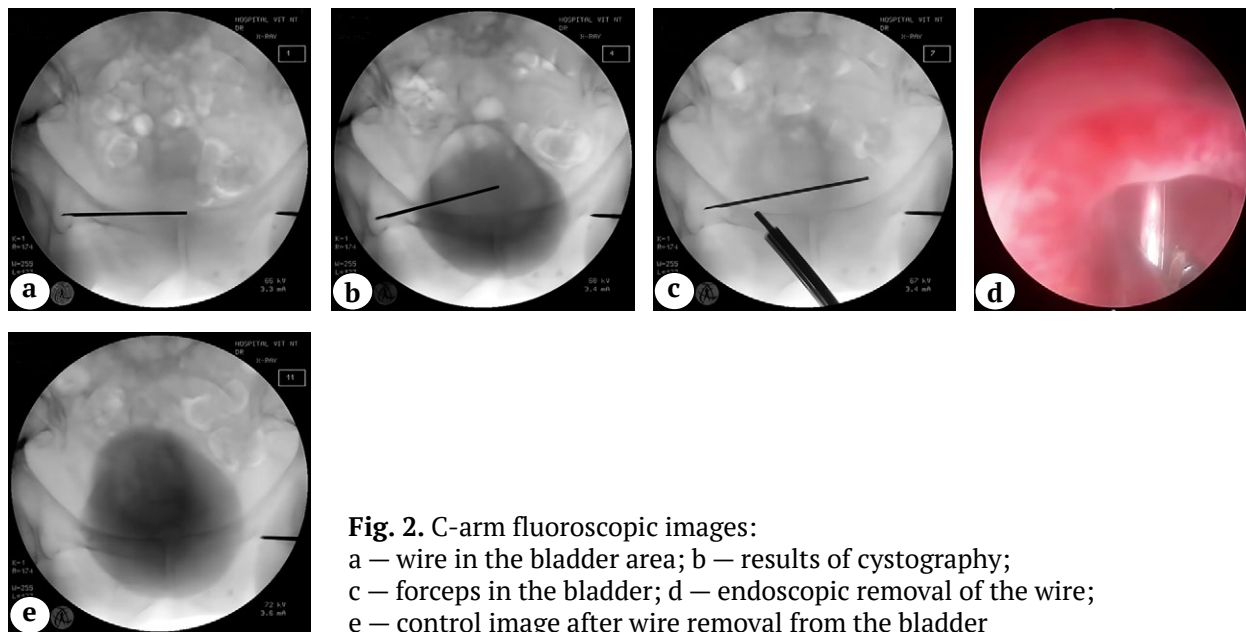


Fig. 1. Plain X-ray of the pelvis (a) and CT scan (b) at admission to hospital: fracture and K-wire migration

With the patient in supine position under endotracheal anesthesia, the operative field was treated with antiseptic solutions. No leakage of the contrast agent from the bladder cavity was registered (Fig. 2 a, b). Cystoscopy revealed migrated K-wire in the bladder cavity. The foreign

body was removed using endoscopic forceps (Fig. 2 c, d). Control contrast-enhanced fluorography showed no contrast leakage (Fig. 2 e). Control X-ray was performed, in which a remainder of the wire was visible in the hip joint area (Fig. 3 a, b).



The patient was put on the right side, the operative field was treated, and Harding approach to the left hip joint was performed. After removal of the femoral head, the wire fragment was found in the joint cavity and was removed (Fig. 3 c, d). Cemented left hip arthroplasty was performed (Fig. 4).

Rehabilitation procedures started on the second day after the surgery. The wound healed with primary intention, and there were no complaints at the time of discharge. At 3-month follow-up examination and subsequent check-ups the patient could walk without additional support and had no complaints.

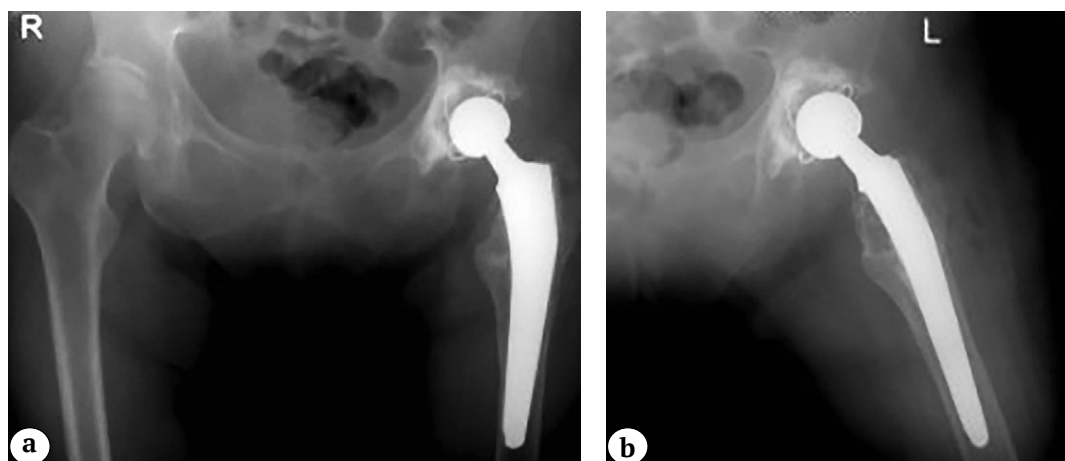


Fig. 4. X-rays of the pelvis in AP (a) and axial (b) views after wire removal and total left hip replacement

DISCUSSION

Despite a large number of modern implants, Kirschner wires are still widely used in trauma surgery for fracture fixation. This is primarily due to their ease of use, no need for special instruments, and low cost of implants. However, this apparent simplicity hides serious complications. H. Matsumoto et al. reported on the damage of the intestine caused by a K-wire located in the pelvic cavity [13]. The literature also presents data on bladder and ureter perforation [14], perforation of abdominal aorta and iliac arteries [15], of descending vena cava [16, 17], as well as heart [18], lung [19] and spinal cord [20] damage.

In 1977, M. Cohen et al. reported on the treatment of a 57-year-old man with bladder perforation with a Knowles pin after osteosynthesis of the femoral neck fracture. Similarly to our case, the patient had no clinical manifestations, but there was microhematuria in the common urine analysis. Laparotomy, cystotomy, bladder revision, verification and removal of the broken pin were performed under endo-

tracheal anesthesia. Postoperative period was without complications [5].

Hardware migration can lead to severe complications, up to lethal outcome [21], and occur years after the surgical treatment [21, 22, 23]. S.V. Sivakon' et al. observed a case of iatrogenic foreign body migration 12 years after the surgery [24].

There is a large number of theories of wire migration. M.D. Romanov et al. consider the lack of reliable fixation of the distal part of a wire, as well as untimely fixator removal to be the main causes of wire migration [2]. Some authors associate the development of complications with constant movements in the joints and muscle work; others associate it with bone resorption [20, 25].

To determine the localization of migrated wire fragment, the most frequently used radiological methods are X-ray and CT, including contrast-enhanced [1, 14, 17, 23]. Once the localization of displaced wire is determined, the problem of its removal arises. In most cases, both open [2, 5, 9] and endoscopic interventions were equally used [26]. Thus, M. Cohen

et al. used laparotomic approach to remove a wire from the bladder [5]. A number of authors discuss in their studies the advantages of endoscopic methods [14, 26, 27].

The possibility of K-wire migration, as well as its severe consequences, prompted us to study this complication and the ways of its prevention [2, 6, 9]. First of all, it is necessary to limit the use of Kirschner wires as a definitive fixation method and give preference to modern implants with minimal probability of migration. In cases when the wires are indispensable to perform the surgery, it is necessary to use threaded ones [26], or bend their end, which will significantly decrease the possibility of migration [1]. D.B. Tuliaganov et al. consider that in the postoperative period it is obligatory to use external immobilization to reduce joint mobility [20]. When the time of bone union is reached and the fracture consolidation is confirmed radiologically, K-wires must be removed [3, 7]. According to W. Mamane et al., periodic radiological monitoring enables early detection of fixator migration and, if this occurs, its immediate removal [28]. B. Zacharia et al. also emphasize that if migration of wire is revealed, it must be removed immediately even if there are no clinical manifestations [29].

In our study, the patient suffered only from the hip joint pain, and the wire migration was diagnosed during elective preoperative examination. We used a combination of open and endoscopic methods to remove the migrated fixators depending on their localization and planned surgical volume.

CONCLUSION

This case has taught us to be cautious when performing osteosynthesis of bone fractures with K-wires due to their frequent fatigue fractures and migration. Osteosynthesis should be supplemented with preventive measures against fractures and migration of fixators. The patient must be dynamically followed up during the treatment period using all necessary monitoring methods (X-ray, CT, ultrasound, etc.). In case of wire fracture and/or migration, it must be removed immediately. Once the fracture has healed or the fixation period of the dislocation is over, the wires should also be removed. Preventive measures allow to avoid migration of K-wires and associated complications.

DISCLAIMERS

Author contribution

All authors made equal contributions to the study and the publication.

All authors have read and approved the final version of the manuscript of the article. All authors agree to bear responsibility for all aspects of the study to ensure proper consideration and resolution of all possible issues related to the correctness and reliability of any part of the work.

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Ethics approval. Not applicable.

Consent for publication. Written consent was obtained from the patient for publication of relevant medical information and all of accompanying images within the manuscript.

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