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Bladder perforation by orthopedic implants 26 years after limb-sparing surgery for left proximal femoral chondrosarcoma: A case report

Jun Iwatsu [a], Munenori Watanuki [b,*], Kouu Hayashi [c], Shinichirou Yoshida [b], Toshihisa Yano [d], Masahito Hatori [e], Masami Hosaka [f], Yoshihiro Hagiwara [b], Eiji Itoi [b]

[a] Department of Orthopedic Surgery, JR Sendai Hospital, 1-1-5 Itsutsubashi, Aoba-ku, Sendai, Japan
[b] Department of Orthopedic Surgery, Tohoku University School of Medicine, 2-1 Seiryo-machi, Aoba-ku, Sendai, Japan
[c] Department of Orthopedic Surgery, Senen Rihu Hospital, 2-2-108, Rihu-cho, Miyagi-gun, Japan
[d] Department of Orthopedic Surgery, Tome City Hospital, 25 Hasama-cho, Tome, Japan
[e] Department of Orthopedic Surgery, Tohoku Kosai Hospital, 2-3-11 Kokubun-cho, Aoba-ku, Sendai, Japan
[f] Department of Orthopedic Surgery, Miyagi Cancer Center, 47-1 Medeshimaazanodayama, Natori, Japan

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ABSTRACT

INTRODUCTION: The need for implant use during orthopedic surgeries has been increasing. Accordingly, increased implant failures have been reported. However, bladder perforation remains a rare complication after orthopedic surgery. Although a few reports have described bladder perforation after total hip arthroplasty, no previous studies have reported the migration of staples into the bladder after limb-sparing surgery.

PRESENTATION OF CASE: A 65-year-old patient underwent limb-sparing surgery to remove a chondrosarcoma in the left proximal thigh. Twenty-six years after surgery, a staple that had been used to fix artificial ligaments to the pubis migrated to perforate the bladder, resulting in painful urination. The staple was removed, and her symptoms improved.

DISCUSSION: In this case, bladder perforation by the staple resulted in painful urination. The bladder perforation was not detected until 26 years after the initial surgery.

CONCLUSION: Our observations emphasize that implant complications may occur even after a long postoperative period, and the possibility of delayed bladder perforation from previous pelvic surgeries should be considered in patients presenting with urinary tract symptoms.

1. Introduction

Implants are very commonly used as a treatment option during orthopedic surgeries such as open reduction and internal fixation, artificial joint replacement, and spine surgery, and the incidence of implant use has been increasing [1]. In orthopedic oncology, although 73% of patients with osteosarcoma underwent limb amputation between 1982 and 1989 [2], limb-sparing surgery for bone sarcoma treatment first emerged as a trend in the late 1980s [3], and only 6% of such patients with osteosarcoma underwent limb amputation between 1997 and 2000 [4]. After a limb-sparing resection of a bone sarcoma, endoprostheses are often used to reconstruct the affected limb or joint and restore function [3].

Many published reports have described the long-term survivorship of implants, including good results in cases of total hip and total knee arthroplasty and anatomical shoulder replacement [5–7]. However, implant failures such as fractures, loosening, and infection have also been reported [8,9]. A few reports have reported bladder injury caused by implants [10–14]. Some reports described intraoperative bladder injuries [10,14], while others mentioned delayed bladder injuries [11–13]. The reported causes of delayed bladder injury were prosthetic acetabulum, bone cement, and Kirschner wire [11–13]. However, no reports describe staple migration into the bladder after limb-sparing surgery. Here, we report a case of implant perforation into the bladder 26 years after the wide excision of a left proximal femoral chondrosarcoma.

This work has been reported in line with the SCARE criteria [15].

Abbreviations: CT, computed tomography.

* Corresponding author at: Department of Orthopedic Surgery, 1-1 Seiryo-machi, Aoba-ku, Sendai, Japan.
E-mail address: mwata@ortho.med.tohoku.ac.jp (M. Watanuki).

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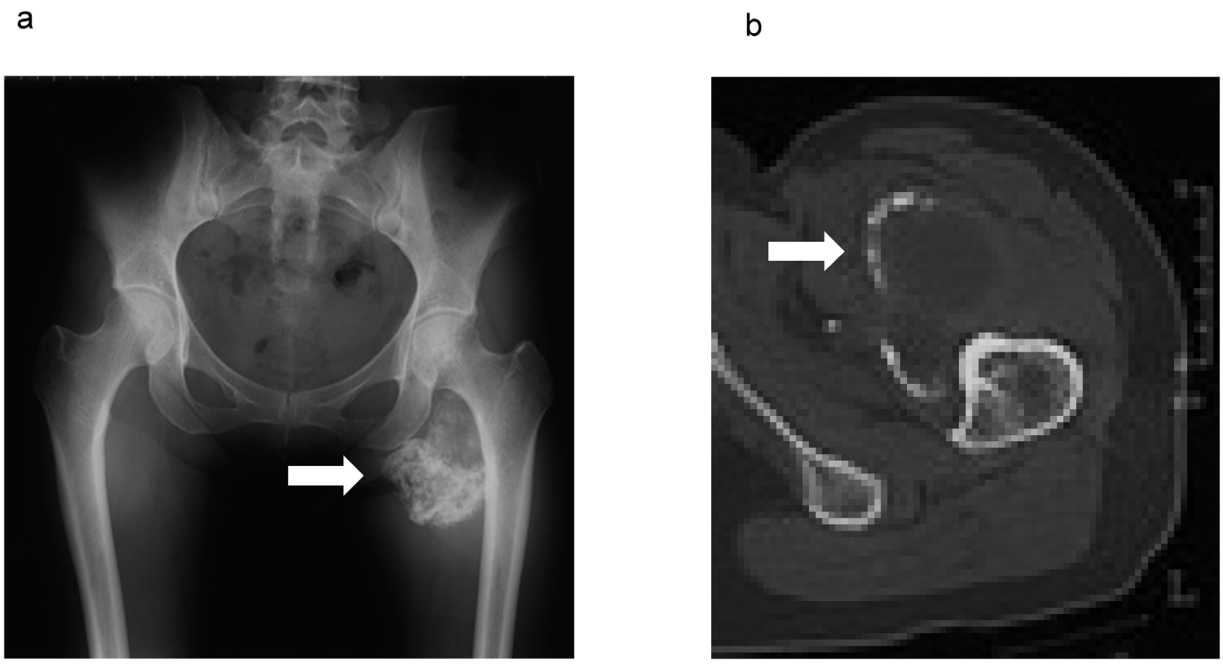

Fig. 1. Plain radiographic and plain computed tomography images of the tumor.
A plain radiograph shows the tumor with calcification in the left proximal thigh (a). Computed tomography reveals an intramuscular low-density area representing the tumor with surrounding calcification in the medial compartment of the proximal thigh (b). Arrows indicate the location of the tumor.

2. Presentation of case

In 1993, a 65-year-old female patient noticed a mass on her left proximal thigh that gradually increased in size. She visited a nearby hospital and was referred to our hospital with a suspicion of a soft tissue tumor. Plain radiographs demonstrated a soft tissue mass with calcification without endosteal scalloping (Fig. 1a). Computed tomography (CT) revealed a low-density intramuscular tumor with surrounding calcification in the medial compartment of the left proximal thigh (Fig. 1b). Magnetic resonance imaging showed low T1 signal intensity and partial high T2 signal intensity without invasion of the femur. The tumor was well-circumscribed, with no peritumoral enhancement. The tumor was 85 mm in length, 75 mm in width, and 75 mm in thickness (Fig. 2a-d). From these findings, the differential diagnosis was chondrosarcoma, osteosarcoma, and osteoma. Following a core needle biopsy, the pathological diagnosis was well-differentiated synovial chondrosarcoma. Wide resection of the tumor, bipolar hip arthroplasty, and pasteurized autogenous bone grafting were scheduled in 1993. We resected the tumor and the left proximal femur and diaphysis of the femur. The bone was pasteurized at a temperature of 60 °C for 30 min and used as pasteurized autogenous bone. We inserted a bipolar hip prosthesis (Zimmer Biomet, Warsaw, IN), which was cemented with the normal distal femur. We reconstructed the soft tissue around the left hip joint and used staples to fix the Leeds–Keio artificial ligament to the pubis (Fig. 3a).

The patient was discharged from our hospital 3 months postoperatively and was ambulatory with crutches. She visited our hospital for follow-up X-ray evaluations every 2–6 months. After 2005, she underwent X-ray imaging at our hospital once a year. In 2019, 26 years after the initial surgery, she began to experience painful urination. She visited a local urology clinic and was suspected of having cystitis. However, antibiotic drug therapy did not improve her symptoms. A subsequent plain CT scan revealed that the staples in the pubic region were no longer inserted into the pubis and had perforated into the bladder wall (Fig. 3b). The patient underwent cystoscopy and was diagnosed by the urologist with staple perforation of the bladder (Fig. 4a). She was referred to our department. Upon visiting our department, she reported painful urination without hematuria nor peritonitis.

A comparison of the plain radiographs over time revealed that the staples had migrated slightly into the pelvic cavity (Fig. 3c and d). Implant removal was scheduled. A skin incision was made just above the staples, which we approached with caution. Intraoperative findings indicated that the staples were located deeper than the suprapubic branch and were not fixed to the pubis (Fig. 4b and c). There was no bleeding or urine leakage after removing the staples, and no bleeding was seen in the bladder catheter. Therefore, the bladder wall was not sutured. The patient's pain during urination improved on the day after surgery. There were no postoperative complications.

3. Discussion

Similar to other orthopedic surgeries, the reported major postoperative complications of musculoskeletal tumor surgeries include infection, dislocation, fracture, and mechanical failures [16–19]. A few reports have described delayed bladder perforation after total hip arthroplasty [11–13]. In those cases, the interval from the first surgery to the bladder perforation was approximately 2–12 years [11–13]. In this case, bladder perforation occurred 26 years after the initial surgery. Although the patient was no longer undergoing regular post-surgical follow-up evaluations, this incident emphasizes the need for orthopedic surgeons to consider the surrounding implants in addition to the resected tumor.

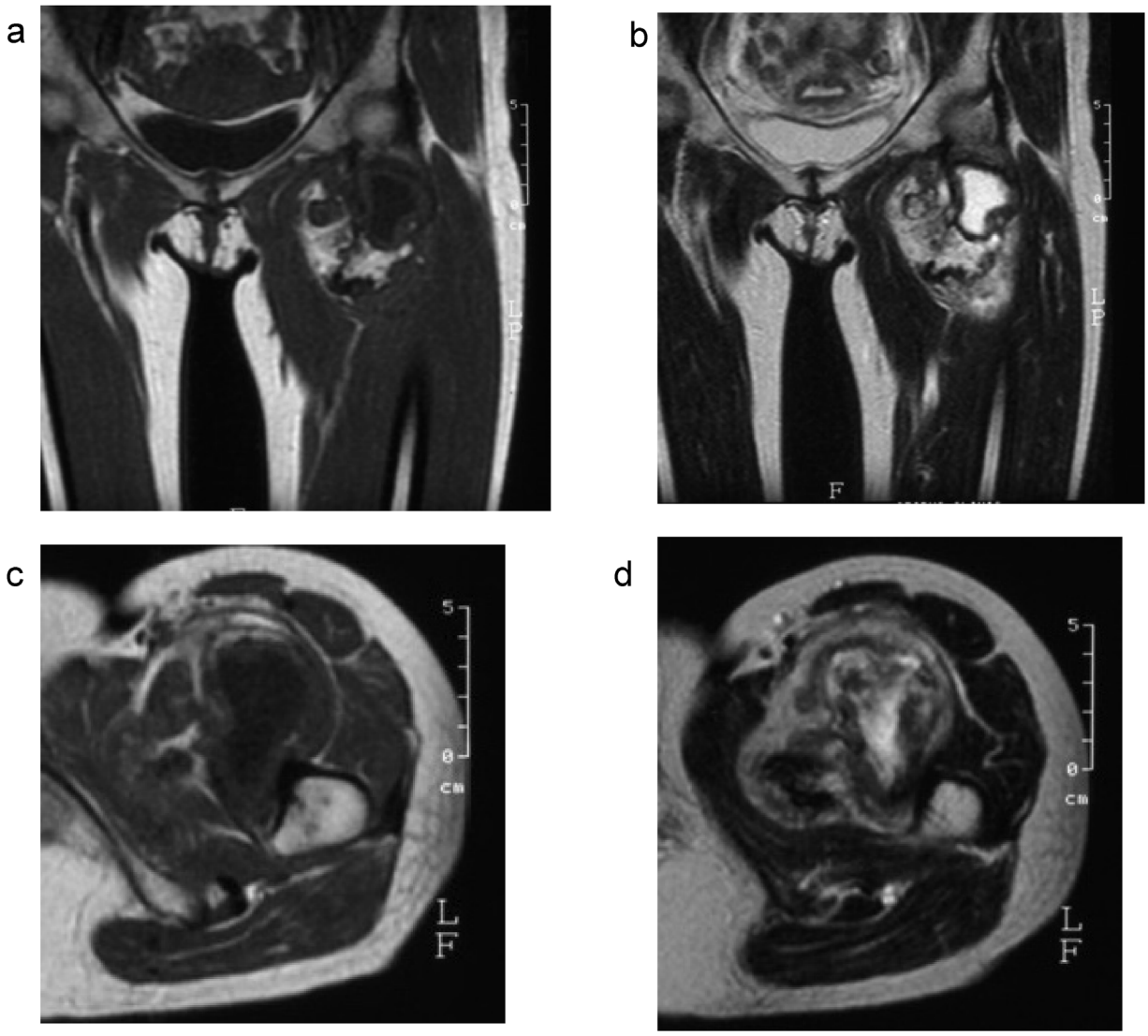

Fig. 2. Plain magnetic resonance imaging of the tumor.
Magnetic resonance imaging (MRI) shows a well-circumscribed lesion without a reactive zone around the tumor. The tumor is located near the femur, but no invasion was detected. Coronal view MRI: T1-weighted image (a), T2-weighted image (b). Axial view MRI: T1-weighted image (c), T2-weighted image (d).

Complications associated with staple implants, such as loosening, breaking, and migration, have been reported [20,21]. Bernard et al. described the case of an epiphysiodesis staple that migrated into the knee joint and suggested that careful attention should be taken to confirm intraoperatively that staples are fixed securely and that the shape of the staple may enable loosening [20]. In our case, it is likely that the staples were not fixed firmly to the pubis during the initial surgery. Regarding the shape, the staples have barbs that could cause migration into the pelvic cavity without return.

The major symptoms of a delayed bladder injury are hematuria and pain, which are similar to cystitis and lower urinary tract infection [11–13]. O'Sullivan et al. reported that a delayed diagnosis of bladder perforation may arise because the patient's initial symptoms are similar to urinary tract infection [12], as in our case. Because the bladder perforation in this case was very small, no bleeding was observed in the Foley catheter. The possibility of bladder injury should be considered in patients with symptoms of urinary tract who have a history of surgery around the pelvis.

In this case, plain radiography, rather than CT, was used postoperatively to confirm the condition of the implant. Therefore, we could not accurately determine the staples' positions after the initial surgery. In addition, the positions of the staples on a plain radiograph change depending on the incidence angle. Therefore, it is unknown when the staples started to migrate.

4. Conclusion

This case report describes a rare case of delayed perforation of the bladder by orthopedic staples 26 years after the initial implantation surgery. Orthopedic surgeons should remain mindful that implant complications may occur even after a long postoperative period and should consider the possibility of a delayed perforation of the bladder wall.

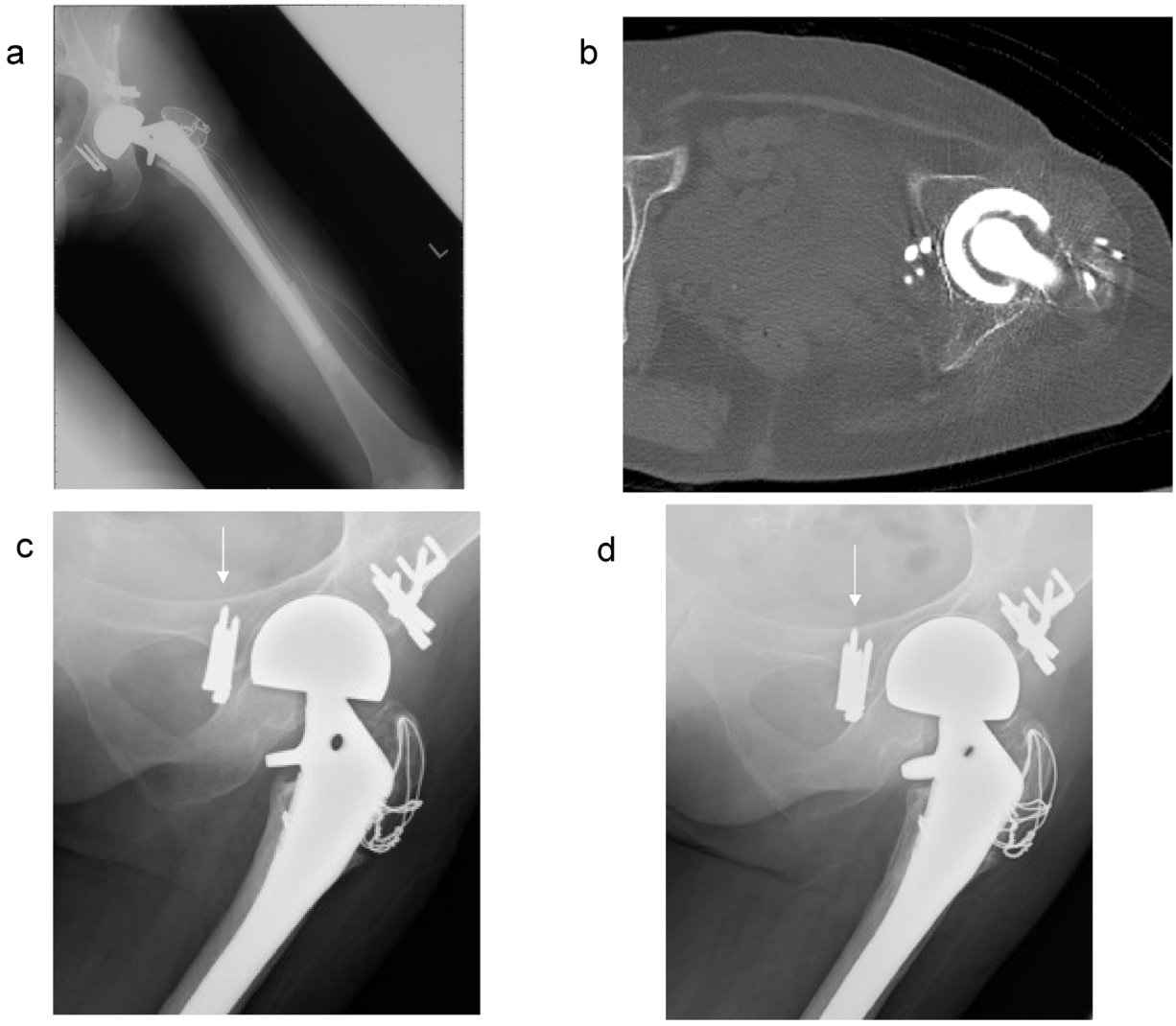

Fig. 3. Plain radiographs and computed tomography after surgery.
Plain radiographs of the left femur just after the initial surgery in 1993 (a), 17 years later in 2010 (c), and 26 years after surgery in 2019 (d). A comparison of image C with image D demonstrates the slight migration of the staples into the pelvic cavity over time. Computed tomography of the left femur (b) shows the migration of the staples into the pelvic cavity and perforation of the bladder wall.

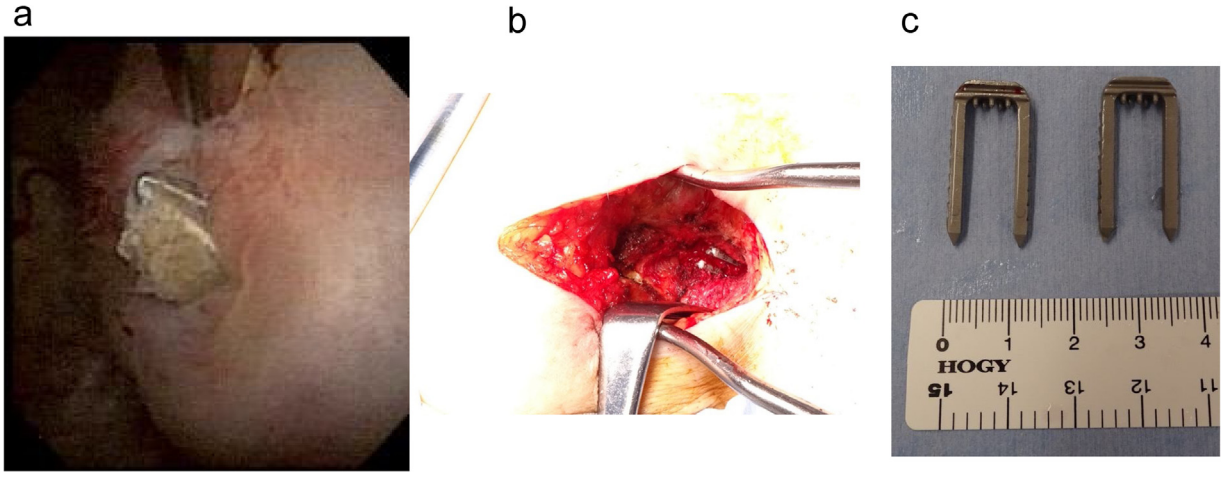

Fig. 4. Intraoperative findings from the second surgery.
Cystoscopy shows perforation of the bladder by staples covered with artificial ligaments (a). The staples were located deeper than the suprapubic branch and were not fixed to the pubis (b). Two staples were removed (c). There were no implant failures.

Declaration of Competing Interest

The authors declare no conflicts of interest.

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Ethical approval

This case report is exempted from ethical approval by our institution.

Consent

Written informed consent was obtained from the patient regarding the publication of this case report and accompanying images. A copy of the written consent form is available for review by the Editor-in-Chief of this journal upon request.

Author contribution

JI collected and interpreted the clinical data and wrote the manuscript. M Hatori and M Hosaka performed the initial surgery. KH and SY collaborated in the patient's medical care. TY and MW performed the second surgery. YH, MW and EI helped to draft the manuscript. All authors read and approved the final manuscript.

Registration of research studies

N/A.

Guarantor

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