

# Septic arthritis of hip after radiotherapy for carcinoma of cervix

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## ABSTRACT

Radiation-induced damage to the bone is characterised by four main pathological findings: osteoporosis, bone-marrow fibrosis, trabecular microfractures and disseminated areas of focal necrosis. The complications of radiotherapy affecting hip and pelvis are well known, but septic arthritis of the hip joint following pelvic irradiation is a rare occurrence. Radiation-induced damage associated with a compromised host defence may be considered responsible for this complication. We report septic arthritis of hip joint in a 64-year-old woman who was treated with pelvic radiotherapy for carcinoma of the cervix eight years ago. She was successfully treated by two-stage reconstruction, consisting of debridement and antibiotic-loaded cement spacer insertion in the first stage and total hip replacement in the second stage.

**Keywords:** cervical carcinoma, pelvic irradiation, septic arthritis of hip, total hip arthroplasty

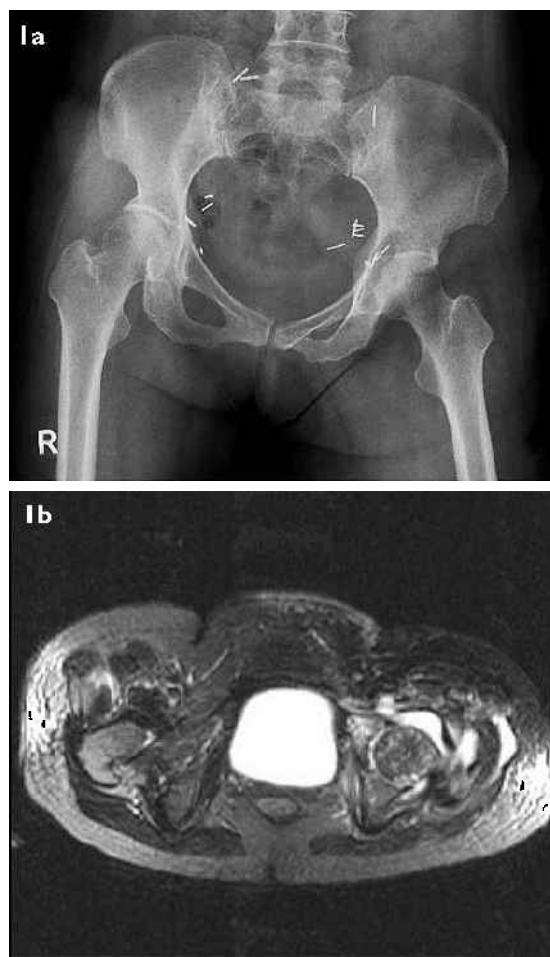
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## INTRODUCTION

The complications of radiotherapy affecting the hip and pelvis are well known. Baensch reported a femoral neck fracture after pelvic irradiation in 1927.<sup>(1)</sup> Since then, many authors have reported radiation-induced changes in the hip under various terminologies, such as radiation osteonecrosis, post-irradiation osteoarthritis and radiation injury of the hip.<sup>(1)</sup> Septic arthritis of the hip joint following pelvic irradiation is a rare occurrence, with only four cases reported in the literature.<sup>(2,3)</sup> We report a case of septic arthritis of the hip joint in a woman who was previously treated with pelvic radiotherapy for carcinoma of the cervix. She was successfully treated by a two-stage reconstruction, consisting of debridement and antibiotic-loaded cement spacer insertion in the first stage and total hip replacement (THR) in the second stage.

## CASE REPORT

A 64-year-old woman presented complaining of pain in the left hip for one year, and which was aggravated for the past one month. She was treated for carcinoma of the cervix (stage Ib) eight years ago at another institute. She had undergone total abdominal hysterectomy with bilateral salpingo-oophorectomy. Adjuvant radiotherapy



**Fig. 1** (a) Anteroposterior radiograph of pelvis shows reduction in joint space in the left hip with osteopenia of the femoral head and neck. Clips from the pelvic surgery are also seen. (b) Axial T2-W MR image of pelvis shows an effusion in the left hip and trochanteric bursa with marrow changes in the left femoral head.

(5000 cGy) was given to the whole pelvis. There was no sign of recurrence or metastasis thereafter. There was no history of recent respiratory, genitourinary or skin sepsis. On examination, she had tenderness in the left groin and trochanteric region. There was fixed flexion deformity of 20° in left hip, with further flexion up to 80°, abduction of 30° and external rotation of 20°. Adduction and internal rotation were not possible. Examination of the contralateral hip, spine and both knees revealed no abnormality.

The laboratory studies showed total leucocyte count (TLC) of 13,600/mm<sup>3</sup>, erythrocyte sedimentation rate (ESR) of 89 mm/hr and C-reactive protein (CRP) of 14.9 mg/dL. The radiograph of the pelvis showed reduction in the joint space in the left hip (Fig. 1a). Magnetic resonance (MR) imaging of pelvis showed synovial thickening with

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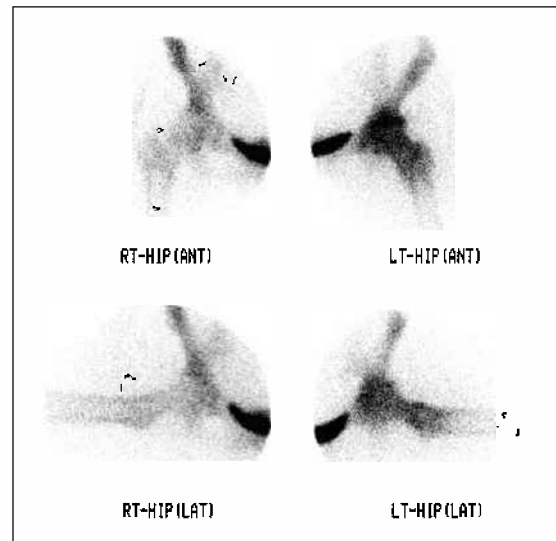
joint effusion and bone marrow oedema affecting the subchondral area of the femoral head and acetabulum. There were oedematous changes in the periarticular soft tissue with fluid collection in left trochanteric bursa (Fig. 1b). Bone scintiscan showed diffusely increased uptake in the left hip joint (Fig. 2). Aspiration of the hip joint confirmed presence of purulent material.

She underwent arthrotomy for drainage of pus, along with thorough debridement of all infected tissue and removal of the femoral head; followed by implantation of an antibiotic-loaded cement spacer. 4 g of vancomycin was mixed with 40 g Surgical Simplex bone cement (Stryker, Limarick, Ireland) in spacer (Fig. 3). Tissue culture showed growth of non-A non-B  $\beta$ -haemolytic Streptococci, sensitive to vancomycin and cefotaxime. The patient received intravenous antibiotics for three weeks and oral antibiotics for another four weeks. TLC, ESR and CRP were repeated periodically. A second surgery consisting of a THR was performed when the TLC was 5,600/mm<sup>3</sup>, ESR 14 mm/hr and CRP was 0.3 mg/dL. Uncemented Fitmore Acetabular cup (Zimmer, Winterthur, Switzerland) and uncemented femoral stem-Cone prosthesis (Zimmer, Winterthur, Switzerland) with metal-on-metal articulation were used. The postoperative period after THR was uneventful. Arthroplasty was functioning well at three years, with radiographs showing good bone ingrowth. (Fig. 4)

## DISCUSSION

A past history of radiation therapy is rarely considered as a risk factor for septic arthritis. However, isolated reports of septic arthritis complicating rheumatoid arthritis, crystal-induced arthritis, osteonecrosis and sickle cell disease are available.<sup>(3)</sup> Chemotherapy is considered as a systemic risk factor for septic arthritis because of possible immunosuppression.<sup>(3)</sup> There are two reports about septic arthritis of the shoulder after radiotherapy for breast carcinoma.<sup>(3,4)</sup> Radiation-induced damage associated with compromised host defence and lymphatic stasis was considered responsible by those authors.<sup>(4)</sup>

The pathology of radiation-induced injury of the hip is nonspecific, but four main findings are associated: osteoporosis, bone-marrow fibrosis, trabecular microfractures and disseminated areas of focal necrosis.<sup>(1)</sup> The threshold of radiation-induced changes in the bone is thought to be 3,000 rads, with death of cells usually occurring at 5,000 rads.<sup>(5)</sup> Fractures of the femoral neck occur in approximately 2% of patients after radiation therapy to pelvis.<sup>(5)</sup> Massin and Duparc reported 71 hips treated by THR for various lesions associated with radiation, including atraumatic femoral neck fracture, osteonecrosis of the femoral head or the acetabulum, and radiation osteitis of the whole pelvis.<sup>(1)</sup> Two cases of protrusio acetabuli that were attributable to radiation-induced osteonecrosis have been reported in the literature.<sup>(6,7)</sup>



**Fig. 2** Bone scintiscans show diffusely increased uptake in the left hip joint.



**Fig. 3** Anteroposterior radiograph of the pelvis after PROSTA-LAC insertion on the left side. Bolus of antibiotic-loaded cement is packed into the acetabulum and molded to articulate with the head of the femoral component. We used a smaller sized femoral component retrieved from another patient and inserted it into the femoral canal with the antibiotic-loaded bone cement.

We believe that septic arthritis of the hip after pelvic irradiation is actually an infection occurring in a bone previously damaged by radiation osteonecrosis. Our patient had complained of pain in the left hip for one year, due to radiation osteonecrosis. Cell injury and death can occur directly from the effects of radiation, but can also be the consequence of progressive interstitial and vascular fibrosis.<sup>(1)</sup> The compromised local environment along with a reduced host defence provide a site for colonisation following bacteraemia. Yang et al reported an infection of the hip joint in three cervical cancer patients treated with radiotherapy.<sup>(2)</sup> One patient was treated for septic arthritis initially, while the other two underwent total hip arthroplasty for radiation osteonecrosis and developed prosthetic joint infection. The subacute onset of infections with a resultant delay in diagnosis and destruction of the joint was also observed by Chaudhari et al, who reported that five breast cancer patients treated by surgery and radiotherapy suffered from infection at the ipsilateral



**Fig. 4** (a) Anteroposterior radiograph of the pelvis, taken immediately after total hip replacement, shows good alignment and position of both components with restoration of limb length. (b) Three years postsurgery, the components are stable without any sign of loosening or migration.

shoulder joint.<sup>(4)</sup>

The causal relationship between septic arthritis of the hip and pelvic irradiation may not appear acceptable, particularly in this case where when septic arthritis developed eight years after radiation therapy and the primary malignancy was cured. But this patient did not have any other source of sepsis in her body at the time of diagnosis, and primary septic arthritis of hip is otherwise uncommon in adults. According to Chanet et al, this complication is more likely to occur 10–30 years after irradiation than in the first months.<sup>(3)</sup> In their series, median time interval between radiation therapy for breast carcinoma and development of septic arthritis of the shoulder was 16 years. Deleeuw et al also observed that the irradiated bone showed progressive deterioration as late as 14 years after treatment, and bone that originally was thought to have been unaffected by radiation later showed deterioration.<sup>(5)</sup>

Two-stage reconstruction using an antibiotic-loaded cement spacer is considered a preferred treatment for infected joint prosthesis, and encouraging results have also been obtained with using it for primary hip infection.<sup>(8,9)</sup> Use of antibiotic-loaded cement spacer effectively eradicated the infection in the first instance with a considerably shortened duration of treatment and avoided morbidity associated with prolonged recumbency, that would have been caused by excision arthroplasty. It also reduced the duration and dose of systemic antibiotics.

There are a few reports about results of THR in irradiated hips; none of them have shown promising results.<sup>(1,7,10,11)</sup> In the largest series (71 hips) on THR in irradiated hips, Massin and Duparc had acetabular loosening in 52% hips at a mean follow-up of 69 months using standard cemented cups in 49 hips.<sup>(1)</sup> They then started using an acetabular reinforcement ring, which had aseptic loosening of 19% at mean 40 months. Others recommend special techniques, including bone grafting,

peripheral support rings, well-fixed and optimally-placed sockets and gradual rehabilitation, as being mandatory.<sup>(10)</sup> In our patient, there was no sign of loosening of either component at three years after surgery; and she is still on regular follow-up. In conclusion, septic arthritis of the hip is an uncommon complication of pelvic irradiation, which can cause considerable disability for the patient years after being cured of primary malignancy. Two-stage reconstruction using antibiotic-loaded cement spacer is the preferred treatment option for such patients.

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