

Pubic Osteomyelitis after Treatment for Prostate Cancer

A Case Report and Review of the Literature

Els Van Nieuwenhuysse^{1*}, Bart Kerens² and Paul Vanderschot³

¹Department of Green Chemistry and Technology, Ghent University, Belgium

²Department of Orthopedics, Algemeen ziekenhuis Sint-Maarten, Belgium

³Surgeon-traumatologist, UZ Leuven, Belgium

***Corresponding author:** Els Van Nieuwenhuysse, Department of Green Chemistry and Technology, Ghent University, Humbeeksebaan 143, 1980 Zemst, Belgium, Tel: +32485649149; Email: els.van.nieuwenhuysse@telenet.be

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Abstract

Osteomyelitis pubis is a known, rare complication related with the treatment of prostate cancer. It can occur after surgery, radiotherapy and after ultrasound therapy. The latency between the treatment modality and the onset of the osteomyelitis is different for all treatment options. Symptoms are mostly subtle and non-specific, causing a delay in the diagnosis. For the diagnostic work-up, clinical examination, laboratory tests and medical imaging are necessary. The irrevocable diagnosis will be made by culture of a bone aspirate. Treatments consist of antibiotic therapy and surgery. The medical condition of the patient and the location of the infection determine the type and extent of the surgical modality.

Keywords: Osteomyelitis pubis; Prostate cancer; Prostatectomy; Radiotherapy; Treatment

Introduction

Osteomyelitis pubis is a rare condition which includes 2% of all appearances of haematogenous osteomyelitis. Symptoms are not always clear and specific. Together with its rare occurrence, this results in a delay or missing of the diagnosis [1]. The aim of this case report is to offer an overview of the causes of osteomyelitis pubis in patient with a history of prostate cancer and its differential diagnosis.

Case Report

We present a 73-year old man with a productive fistula in the left inguinal area causing an annoying and painful local feeling for eleven months.

His medical history included prostate cancer G3T3aN0 nine year ago treated with a radical prostatectomy followed by local radiotherapy. One year later, an additional radical cystectomy with urinary deviation type Bricker was performed because of necrosis of the vesicourethral anastomosis.

The clinical examination showed a moist inguinal wound with a surrounding red skin. A level probe revealed immediate contact of the wound with the pubic bone. The patient didn't experience any pressure pain. He had a normal range of motion with a limited limping gait pattern.

Magnetic resonance imaging and computed tomography of the pelvic discovered an osteitis of the pubic bone with bilateral bonemarrowoedema and some inflammatory changes of the surrounding muscles (Figure 1) as well as an abscess to the right of the symphysis. A complementary X-ray showed the features of osteomyelitis (Figure 2). Lastly, a total body scintigraphy revealed an increased remodelling of the pubic bone bilateral of the symphysis.

The patient was referred to the university hospital of Leuven, Belgium, for treatment. This consisted of resection of the pubic symphysis and fistula track. Wound closure was performed with negative pressure therapy for seven days. Antibiotic therapy with piperacillin-tazobactam was started immediately postoperative and was switched to vancomycin and clindamycin 600mg once a day for 2 months based on operative cultures. After this initial intravenous antibiotic therapy, minocycline 100mg twice a day was prescribed for another month. Inflammatory parameters in the blood like C-reactive protein (CRP) and the leucocytosis were controlled every week in early stage, twice a week after normalisation. After finishing the entire therapy, the wound stayed dry and clean and inflammatory parameters completely normalised. The patient knew a full functional recovery.

Discussion

Causes and Pathogenesis

Pubis osteomyelitis is a rare complication of pelvic surgery such as prostatectomy, both suprapubic as transurethral [2], gynaecological procedures, bladder resection, incontinence surgery [3], kidney transplantation and inguinal hernia repair [4]. The causative germ depends on the surgical procedure. In a suprapubic prostatectomy, bacteria typically found in urinary infections can cause a bone infection in this area [3]. The latency between surgery and osteomyelitis is typically between 2 to 17 weeks after surgery [3,5].

Osteomyelitis also has been seen after radiotherapy, both after external radiation and after brachytherapy with an external boost [6]. Radiotherapy causes cellular damage of the bone [7], an increase of osteoblasts and osteoclasts in the bone, an impaired mineralisation,

microvascular damage and a reduction in elastic resistance of the bone. This all results in an increased susceptibility to necrosis and bone fractures, typically occurring more than 20 months after radiotherapy [8]. These effects are most prominent after high-dose radiation, poorly fractionated radiotherapy or repeated cycles with low energy [9]. The lag time is ranging from 1.5 to 23 year [6,8].

A third treatment for prostate cancer causing osteomyelitis is high-intensity focused ultrasound (HIFU) [6]. Fistula from the prostate to the pubic bone can develop by ultrasound and may be a reason for osteomyelitis of the pubic bone [9].

Symptomatology

Clinical manifestations of osteomyelitis pubis are very subtle. Excessive bone destruction can be present without clear signs of infection. Possible symptoms are pain at the pubic bone and/or adductors, painful wide gait [6] and severe pain with abduction [1,3,10,11]. While walking, the pain can radiate to the perineal, testicular, suprapubic or inguinal region [10]. Recurrent urinary tract infections can be present as well [6]. Sometimes, wound drainage or development of a fistula is the only sign [3]. General symptoms may be malaise [11] and a low grade fever [1,3,10,11].

Laboratory Findings

Moderate leucocytosis, an increased erythrocytes sedimentation rate (ESR), increased alkaline phosphatase [3,10] and acute phase proteins (C-reactive protein and fibrinogen) are characteristic for bony infections [10]. In aggressive conditions, hypo-albuminemia can be present as well [6]. In early cases, a blood culture can reveal the causative germ [12].

Radiological Findings

The diagnostic imaging of osteomyelitis requires a combination of different imaging modalities for accurate clinical staging [12].

Typical signs for osteomyelitis on X-ray are bone erosions, osteolytic lesions and irregularities of the boundaries of the bone with separation of the pubic symphysis. In a more developed stage, evidence of bone repair with new bone formation recovered from the periosteum or sclerosis of the pubic symphysis is present [3]. Callus formation is only possible if an adequate blood supply is present [13].

Ultrasound can be helpful for the diagnosis of fluid collections, periosteal involvement and abnormalities in

the surrounding soft tissues. It can also be used for guidance of a diagnostic or therapeutic aspiration, drainage or tissue biopsy [12].

Computed tomography (CT) can reveal inflammatory changes of the bone [10] like fragmentation of the symphysis with lytic and sclerotic regions, soft tissue masses and their dimensions, sinuses, fistulae and abscesses. However, CT shows false positive results in 10% of all cases [1]. Nevertheless, it is a useful method to detect early erosions and evaluate the presence of sequestrae cloacae, foreign bodies and/or gasification [12].

Magnetic resonance imaging (MRI) is useful to study the lesions thoroughly. MRI provides excellent anatomical details, shows the extent of the involvement of the bone as well as the presence of oedema or the distribution in the adductors [6]. Between the infected and non-infected bone, a sclerotic rim [14], which can be seen as a demarcation line on T1 images, is formed [7]. Increased bone activity as well as inflammatory changes can be visualised on T2 images [10]. MRI is the most sensitive [1,6,7,12] (sensitivity of 100%[1]) and most specific [12] imaging modality in the diagnosis of osteomyelitis, superior to CT [6].

A last imaging modality useful in the diagnosis of osteomyelitis is a bone scintigraphy with ^{99m}Tc-methyl-difosfonate [4,10] or gallium [3,4] which exhibit hyperactivity at the pubic region. Iodine-111-labeled white blood cell scan identify infection more specifically which is useful for locating the burdens of osteomyelitis [12] and is useful to evaluate the treatment consequences [12].

Bone Culture

The irrevocable diagnosis of osteomyelitis is provided by a biopsy of the pubic bone for microscopic and microbiological investigation [6]. However, in chronic osteomyelitis, only a small percentage of the biofilm colonization is culturable making even the most sophisticated culture methods fail to identify a germ, even in case of an overwhelming clinical infection [12].

Differential Diagnosis

Neoplasia, auto-immune disorders and dysplasia can imitate infections of the bone [12]. After radiotherapy, other kinds of bone damage due to metastases and radionecrosis are possible. To diagnose osteomyelitis, at least two of the three diagnostic criteria – radiological changes, histological properties and positive microbiological cultures - must be present [5].

Treatment

Osteomyelitis pubis is a condition which requires a multidisciplinary approach. A good cooperation between reconstruction urology [6], pelvic surgeons and specialists in infection diseases is required in order to organise the treatment in a logical sequence [13]. In cases of rectal involvement, a colorectal surgeon should be consulted as well [6].

In early stages, the lesions are still easily accessible by antibiotics which can build up a sufficient concentration in the bone. Antibiotic therapy without other treatment options can be sufficient [3]. In longer standing infections, the blood flow can be compromised resulting in the impossibility to build up efficient antibiotic concentrations in the infected region [10]. Therefore, a combination of antibiotics and surgery is required [3].

When contraindications for surgery are present or if a curative therapy would be too extensive, treatment are palliative with incision and drainage, oral antibiotics, ambulant support and analgetics [12].

Antibiotics

The use of antibiotics is essential. The total duration of treatment depends on the intraoperative assessment of the completeness of the resection and the virulence of the germ(s) found in the culture [6]. Initially, it must be administered intravenously for 4 to 6 weeks [1,8]. After this period, the antibiotic therapy must be continued for at least 4 weeks orally. Treatment should be continued until normalisation of the ESR and CRP, which can take up to three months or more [10]. In the presence of comorbidities, for example diabetes mellitus, a prolonged antibiotic therapy is recommended [4].

Surgery

The basic principles of the surgical treatment are debridement of the infected bone, excision of the necrotic soft tissue and an adequate bone biopsy. The target of surgery is eradication of the infection and stabilisation of the bone [15]. The bone must be removed tangentially until the exposed bony surface is well supplied with blood. Soft tissue must be removed until smooth and well perfused edges are found. Foreign bodies should be removed. Additionally, antibiotic beads can be placed in the persistent tissue defect to obtain high antibiotic doses locally [12].

When the amount of bone resection is causing instability, one can decide to perform a subtotal or intralesional resection with the maintenance of the subchondral bone together with aggressive antibiotic therapy. There is a lower chance of cure but it can offer a

better function of the limb [13]. Another option is to provide an additional stabilization performed by a bone transfer, an external fixator or stabilisation in situ following the debridement and an antibiotic depot [12].

Wound closure can be performed primary after a start over with new sterile material or secondary to allow further wound drainage [13].

Conclusion

Osteomyelitis pubis in patients with a treated prostate cancer can occur after surgery, radiation as well as after HIFU. To diagnose and determine the best treatment, an extensive diagnostic work-up based on clinical signs and technical investigations, is necessary. The treatment includes a combination of surgery and antibiotics. Because of the limited prevalence of this condition, it is for the best of the patient that the medical doctor who will treat him, is experienced with this pathology.

Conflict of Interest

There is no conflict of interest.

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