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Original article

Diagnostic contribution of a second percutaneous needle biopsy in patients with spontaneous diskitis and negative blood cultures and first biopsy



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ABSTRACT

Objectives: The primary objective was to assess the diagnostic contribution of a second percutaneous needle biopsy in patients with spontaneous diskitis and negative findings from blood cultures and the first biopsy. We also assessed the sensitivity of the first biopsy and the diagnostic contribution of post-biopsy blood cultures.

Methods: Multicenter retrospective study of patients managed between 2004 and 2014. We excluded patients with postoperative diskitis.

Results: We identified 63 patients with spontaneous diskitis, negative blood cultures, and at least one percutaneous needle biopsy during the study period. The first biopsy established the diagnosis in 33 (52%) patients. Of the 30 remaining patients, 10 (33%) had a second biopsy, which was positive in 6 (60%), and 20 (67%) received probabilistic antibiotic therapy. There were 8 positive blood cultures after the first biopsy but, among them, 7 occurred in biopsy-positive patients. Biopsy yield varied with the guidance method (needle guidance software or imaging by computed tomography and/or fluoroscopy) and operators. Antibiotic therapy within the 6 months preceding the first biopsy was significantly associated with having a negative first biopsy (15/30 versus 7/33; odds ratio, 3.13; 95% confidence interval, 1.07–9.13; $P < 0.05$).

Conclusion: In our study, a second needle biopsy was useful, providing the bacteriological diagnosis in 60% of cases of spontaneous diskitis with negative findings from blood cultures and the first biopsy.

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1. Introduction

Diskitis is an infection of one or more intervertebral disks. The typical presentation combines inflammatory pain and stiffness of the involved spinal segment and a fever. In atypical forms, the diagnosis may be substantially delayed [1]. Identification of the causative organism is a key step in the management of diskitis, as it allows the selection of effective antibiotics [2]. Blood cultures may identify the causative organism in 40% to 60% of cases [3,4]. In patients with negative blood cultures and no evidence of severe infection or neurological compromise, a percutaneous needle biopsy of the abnormal disk is recommended. When this test is

negative in a patient whose disk abnormality developed spontaneously, the consensus is that probabilistic antibiotic therapy should be given [5]. However, challenges to this approach include bacterial resistance, adverse effects of probabilistic antibiotics [6], and an unfavorable cost/benefit ratio. Therefore, identifying the organism before starting the antibiotics is a key priority. One means of achieving this goal may consist of performing a second biopsy. Only three studies addressing the potential contribution of a second biopsy to the diagnosis of spontaneous diskitis have been reported to date [2,7,8].

The primary objective of our study was to assess the diagnostic contribution of a second biopsy in patients with spontaneous diskitis and negative findings from blood cultures and the first biopsy. The secondary objectives were to evaluate the sensitivity of the first biopsy, to identify factors associated with biopsy findings, and to evaluate the diagnostic contribution of post-biopsy blood cultures.

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2. Methods

We conducted a multicenter retrospective study of patients who underwent one or more percutaneous needle biopsies to diagnose suspected spontaneous diskitis. Two French centers participated, the Reims university hospital and the Charleville-Mézières hospital. The study period was January 1, 2004, to June 1, 2014. The electronic databases of the two participating hospitals and their radiology departments were searched to identify all patients who were admitted for diskitis and had one or more percutaneous needle biopsies during the study period. We then selected those patients with infectious diskitis defined as suggestive imaging findings combined with any of the following: recovery of an organism from the disk, a paraspinal abscess, or blood samples; histological evidence of tuberculosis; or a converging set of clinical, laboratory, and outcome features for which infectious diskitis was the only plausible explanation [9].

Exclusion criteria were postoperative diskitis, positive blood cultures before the development of spontaneous diskitis, spontaneous diskitis with negative blood cultures investigated by surgical biopsy, tumors, and crystal deposition disease. We included only patients with spontaneous diskitis and negative blood cultures investigated by one or more percutaneous biopsies.

We collected the bacteriological and histological findings from each biopsy. Biopsies whose histology suggested diskitis but that contained no granulomas or identifiable organisms were classified as negative.

Starting in 2007, all biopsies were performed in compliance with 2007 recommendations [5]. Guidance was by computed tomography (CT) and/or fluoroscopy or by CT with needle guidance software. A sterile disposable biopsy kit was used (Laurane®, 11 to 14 G, Laurane Medical, Le Pradet, France). When needle guidance software was used, the biopsy target and trajectory were determined using CT reformations based on rotational acquisitions obtained on a Phillips angiography table, with iGuide postprocessing software.

We collected the following data for each patients: age and gender; clinical symptoms (fever, spinal signs, decline in general health); affected disk(s); suspected portal of entry; comorbidities; contact with tuberculosis patients; use of non-steroidal anti-inflammatory drugs (NSAIDs) or glucocorticoids within a few days before admission; outcomes (complications, death); infective endocarditis; magnetic resonance imaging (MRI) or other imaging study suggestive of diskitis; serum C-reactive protein level; and universal PCR results.

For each biopsy, we recorded the following: date, whether one or more organisms were identified, histological findings, whether blood cultures were obtained after the first biopsy and/or after the second biopsy, type of anesthesia, approach, needle diameter, whether an abscess was aspirated, number of samples taken, whether samples were obtained from the upper and lower endplates, and whether the patient took antibiotics within 6 months before the first biopsy.

Qualitative data were described as *n* (%) and quantitative data as mean ± SD or median [interquartile range]. The Chi² test was applied for the univariate analysis of qualitative data. *P* values < 0.05 were considered significant.

3. Results

3.1. Study population

Between 2004 and 2014, 114 patients were admitted for spontaneous diskitis. Among them, 51 were excluded, for the following reasons: positive blood cultures, *n* = 45 (39%); initiation

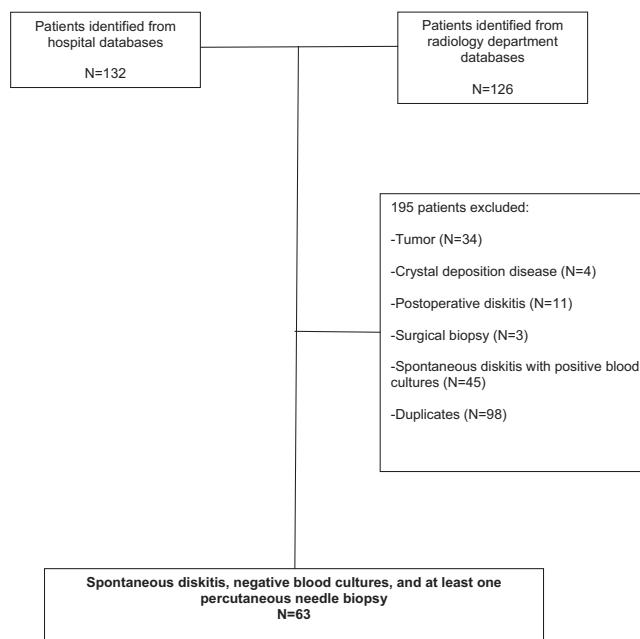


Fig. 1. Patient flow chart.

of probabilistic antibiotic therapy despite negative blood cultures and before a biopsy was performed, *n* = 3 (2.5%); and first biopsy performed surgically, *n* = 3 (2.5%).

The remaining 63 (56%) patients had spontaneous diskitis with negative blood cultures and underwent one or more percutaneous needle biopsies (Fig. 1). Table 1 lists their main characteristics. Their mean age was 68.2 years, the male-to-female ratio was 1.2, and the mean number of comorbidities per patient was 1.53 ± 0.86 . NSAID or glucocorticoid therapy within a few days before admission was noted for 4 (6%) patients. Infective endocarditis developed as a complication of the diskitis in 2 patients, including 1 with a pacemaker. MRI was performed in 60 (95%) patients; the findings

Table 1
Characteristics of the study population.

Number of patients, <i>n</i> (%)	63 (100%)
Age (years), mean ± SD	68.2 ± 13.0
Male-to-female ratio	1.2
Time from symptom onset to admission (days), mean ± SD	78 ± 70.3
Symptoms, <i>n</i> (%)	
Fever	18%
Spinal symptoms	76%
Decline in general health	67%
Location, <i>n</i> (%)	
Lumbar	56%
Thoracic	27.5%
Lumbosacral	9%
Cervical	3%
Thoracolumbar	3%
Cervicothoracic	1.5%
Suspected portal of entry, <i>n</i> (%)	
Skin	33%
Urinary tract	14%
Dental	14%
Gastrointestinal	7.5%
TB patient	7.5%
Unknown	24%
Comorbidities, <i>n</i> (%)	
Diabetes	30%
Cancer, past or present	24%
Heart failure	11%
Chronic kidney disease	10%
Immunosuppressant therapy	7.5%

TB, tuberculosis

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