CT-guided biopsy in suspected spondylodiscitis

Percutaneous tissue biopsy is a key step in the spondylodiscitis diagnosis and management, often utilizing CT-guided biopsy or fluoroscopy-guided disc aspirations.

Although CT-guided biopsies are culture-positive in a minority of cases, the majority of positive cultures are useful to tailor antibiotic treatment. Empirical treatment with clindamycin may cover almost all micro-organisms in positive biopsy specimens, provided patients are not immunocompromised. Outcome appears similar between culture-positive and culture-negative patients [1].

Inflammatory infiltration of the paravertebral space indicated successful pathogen detection by CT-guided biopsy. Specificity was increased by the additional occurrence of epidural infiltration or paravertebral abscesses [2] [3].

A high CRP was a strong predictor of isolation of the causative organism. Repeat CT-guided biopsy was found to have limited value with a low positive yield (14.2%) in a study [4].

MR imaging is mandatory to determine the optimal biopsy position. No clinical or imaging parameter could rule out a positive biopsy result and thus omit an unnecessary procedure. Biopsy should not be avoided if antibiotic treatment has previously been administered [5].

Overall microbiologic yield of repeat CT-guided biopsy for patients with suspected infectious spondylodiscitis was low at 14.3%; however, a higher yield was identified in patients who were younger in age and not exposed to pre-biopsy antibiotics [6]

Epiduritis and the size of paravertebral edema on MRI are associated with detection of a microbial pathogen in suspected septic spondylodiscitis. For patients without these MRI signs, the need for further investigations such as enriched or prolonged cultures, a second CT-guided biopsy, or even surgical biopsy need to be discussed [7].

Other possible ways of detecting the pathogen are to use a percutaneous punch under anesthesia and CT-guided biopsy with fine needle puncture. The latter can be performed during the same

session, to lay a drain to reduce stress on the abscess. A disadvantage of CT-guided puncture is that it gives relatively low quantities of tissue, so that pathogens are only successfully detected in about half of the patients.

Intraoperative sampling – Intraoperative removal of tissue samples is the most reliable method of detecting the pathogen, as it gives relatively large quantities of tissue. The pathogen detection rate is then about 75%

Germ isolation by needle biopsy or open biopsy allows proper antibiotic treatment and faster healing [8].

1)
Kasalak Ö, Wouthuyzen-Bakker M, Adams HJA, Overbosch J, Dierckx RAJO, Jutte PC, Kwee TC. CT-guided biopsy in suspected spondylodiscitis: microbiological yield, impact on antimicrobial treatment, and relationship with outcome. Skeletal Radiol. 2018 Oct;47(10):1383-1391. doi: 10.1007/s00256-018-2944-2. Epub 2018 Apr 16. PMID: 29663026; PMCID: PMC6105146.
2)
Spira D, Germann T, Lehner B, Hemmer S, Akbar M, Jesser J, Weber MA, Rehnitz C. CT-Guided Biopsy in Suspected Spondylodiscitis–The Association of Paravertebral Inflammation with Microbial Pathogen Detection. PLoS One. 2016 Jan 4;11(1):e0146399. doi: 10.1371/journal.pone.0146399. PMID: 26727377; PMCID: PMC4699662.
3)
Pazinato LV, Urakawa FS, Setuguti DT, da Motta-Leal-Filho JM, de Menezes MR. Diagnostic Yield of Computed Tomography-Guided Procedures for Spondylodiscitis. Cardiovasc Intervent Radiol. 2022 Jun;45(6):800-807. doi: 10.1007/s00270-022-03132-z. Epub 2022 Apr 7. PMID: 35391545.
4)
Ahuja N, Sharma H. The effectiveness of computed tomography-guided biopsy for the diagnosis of spondylodiscitis: an analysis of variables affecting the outcome. Eur Rev Med Pharmacol Sci. 2017 May;21(9):2021-2026. PMID: 28537686.
5)
Foreman SC, Schwaiger BJ, Gempt J, Jungmann PM, Kehl V, Delbridge C, Wantia N, Zimmer C, Kirschke JS. MR and CT Imaging to Optimize CT-Guided Biopsies in Suspected Spondylodiscitis. World Neurosurg. 2017 Mar;99:726-734.e7. doi: 10.1016/j.wneu.2016.11.017. Epub 2016 Nov 10. PMID: 27840205.
6)
Czuczman GJ, Marrero DE, Huang AJ, Mandell JC, Ghazikhanian V, Simeone FJ. Diagnostic yield of repeat CT-guided biopsy for suspected infectious spondylodiscitis. Skeletal Radiol. 2018 Oct;47(10):1403-1410. doi: 10.1007/s00256-018-2972-y. Epub 2018 May 18. PMID: 29777259.
7)
Chotard E, Jacquier H, Bart G, Richette P, Rioux C, Joly V, Goossens J, Palazzo E, Forien M, Jelin G, Yazdanpanah Y, Dieudé P, Le Goff B, Ottaviani S. MRI Features Associated With the Detection of Microbial Pathogens by CT-Guided Biopsy in Septic Spondylodiscitis. J Clin Rheumatol. 2022 Jan 1;28(1):e189-e194. doi: 10.1097/RHU.0000000000001683. PMID: 33337806.
8)
Sobottke R, Seifert H, Fätkenheuer G, Schmidt M, Gossmann A, Eysel P. Current diagnosis and treatment of spondylodiscitis. Dtsch Arztebl Int. 2008 Mar;105(10):181-7. doi: 10.3238/arztebl.2008.0181. Epub 2008 Mar 7. PubMed PMID: 19629222; PubMed Central PMCID: PMC2696793.