

:
 : 2000 1 2002 7 58
 67
 58 9
 . 67 63
 , 4
 . 10 가
 14, 16,
 18 20 gauge (n=8),
 (n=17), (n= 20), (n= 21), (n=1)
 (T4 - T10, n=11), (T11 - L1, n=14) (L2 -
 L4, n=25) (L5 - S1, n=17)
 : 58 22 (38%) . 17 , 4 , 1
 36
 (n=21), (n=1), (n=5), (n=9)
 9 1 9 67
 : , 7/17 (41%); , 8/21 (38%);
 , 6/20 (30%); 1/8 (13%).

, Rieneck K (3) CT
 (CT)
 . CT CT 57%
 (1). CT
 , (1)
 CT 91%
 , (2) 88.9%
 (4).

1
 2
 3

2000 1 2002 7

:

58

9 1 4

2 가 25 , 가 33

, 17 80 54 .

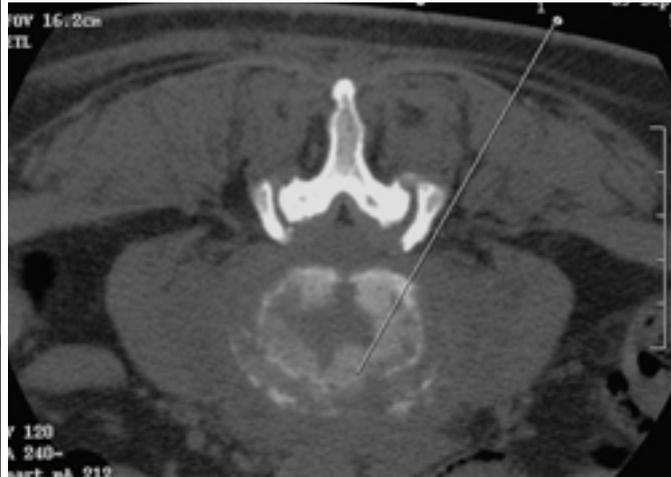
CT HiSpeed CT/i scanner (GE medical systems, Milwaukee, U.S.A.) , 21

14G osteo - site biopsy needle (Cook, Chicago, U.S.A.), 8 16G Osty - cut needle (Angiomed, Berlin, Germany), 12

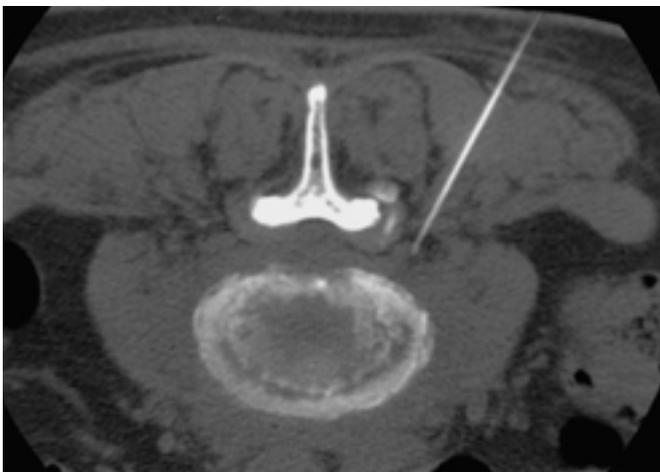
18G aspiration needle (Manan, Chicago, U.S.A.), 26 20 G aspiration needle (Manan,



A



B



C



D

Fig. 1. The sequence of spinal biopsy; A 60-year-old female was confirmed as TB spondylitis by specimen culture and smear.
A. Scout film demonstrates the radiopaque reference markers, which are placed in right paramedian lines on the skin at the level of biopsy.
B. Preliminary localization image demonstrates two radiopaque reference makers on the skin. The exact site of biopsy is marked on the screen. Trajectory drawn to the surface of skin gives the direction the needle must take. The point of entry, angle of entry and depth of penetration of the needle are calculated.
C. A 22G spinal needle is inserted to the lesion through posterolateral approach for periosteal anesthesia. Localization image demonstrates the tip of the needle located at adjacent right facet joint.
D. Localization image demonstrates a 14G biopsy needle is inserted through posterolateral approach to the vertebral body and the tip of biopsy needle is located at cortical margin of vertebral body. Another 16G coaxial needle is passed lumen of 14G needle and the needle tip is located within lesion in the vertebral body. Tissue is cored out advancing the needle into the vertebral body with a rotation motion.

Chicago, U.S.A.)

(transcostovertebral approach) (Fig. 3D)

(Fig. 1A),

3 - 5 mm

. 67 63

, 4

(Fig. 1B). 22G
2%

58 10
(Polymerase chain reaction, PCR)
가

CT 3 mm
(Fig. 1C),

CT

58 22 (38%)
17 , 4 , 1

(Fig. 1D).

가

2 9 1
9 1 (n=2),
(n=2), (n=5) . 2 9
(n=1), (n=1),
(n=2) (n=5)

(Fig. 2A, B).

14G 20 G
14 G 16 G
14G 2-3 cm

1 (11%) 1, 2

17), (n=1)

(n= 21), (n= 20), (T4 - T10, n=11),
(T11 - L1, n=14), (L2 - L4, n=25)
(L5 - S2, n=17)

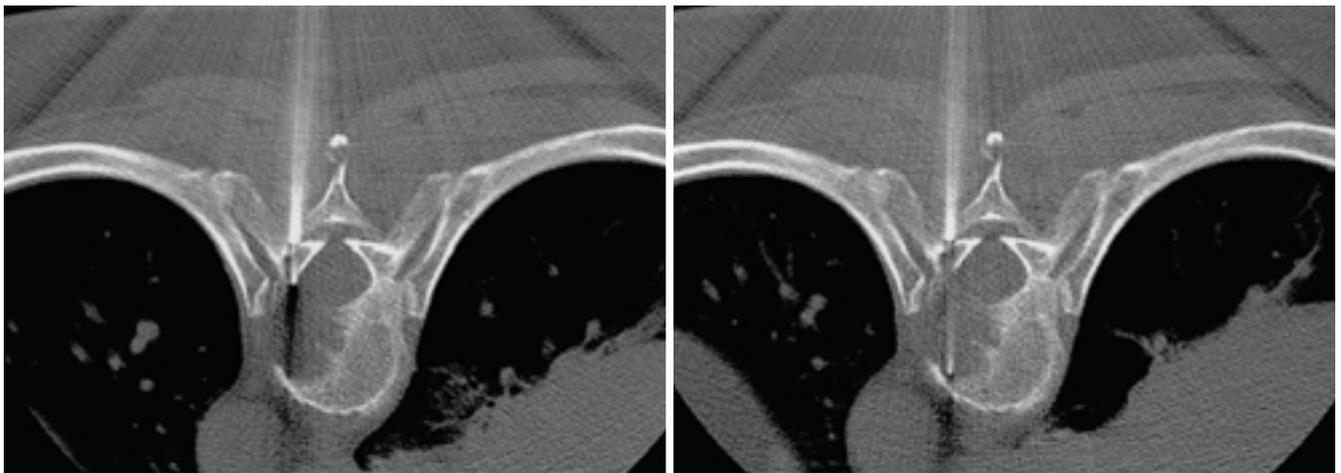
PCR

9 ,
49 21 16 , 4
1 , 16

10 3A), 43

가 (Fig. 3A), 43
(Fig. 3B), 11
(Fig. 3C), 3

6 (AFB)
2 . 4
AFB가 , PCR . 4



A **Fig. 2.** A 57-year old male with suspected infectious spondylitis. Coaxial approach is well documented at the T10 vertebral body through transpedicular approach. The specimen is diagnosed non-specific inflammation.
A. A 14G needle is passed through the left pedicle. The tip of biopsy needle is located at the margin of the lesion in vertebral body before the coaxial needle is inserted.
B. A 20G needle is passed through the lumen of the 14G needle with coaxial approach and the tip of the coaxial needle is located within the lesion in the vertebral body.

AFB
 , 2 AFB 58 11
 . 4
 AFB , PCR
 (Table 1). 4 가
 , 1 가
 . 49 28
 . 28 17
 , 4 . 7

Table 1. Diagnosis of Tuberculous Spondylitis Confirmed by Culture, Smear and PCR

	Smear (+)	Smear(-)	Total
Culture (+)	6	4	10
Culture (-)	2	5 (PCR* (+))	7
Total	8	9	17

Note. *PCR(+): positive polymerase chain reaction to AFB



Fig. 3. Variable approach routes of CT- guided biopsy in infectious spondylitis.

A. A 36-year old female is aspirated with 16G biopsy needle and confirmed in tuberculous spondylitis. Posterior approach to psoas abscess is well shown. Pus was aspirated.

B. A 49-year old male is diagnosed in non-specific inflammation. Posterolateral approach to intervertebral disc with suspected discitis is shown. The needle is traversed obliquely in the vertebral body, passing superior to transverse process. The path of the needle that will avoid the spinal nerve root is demonstrated.

C. A 29-year old male is confirmed in TB spondylitis. The needle is shown through transpedicular approach to the vertebral body. Localization image demonstrates the needle passing through the left pedicle into the lesion and the needle tip located within the intervertebral disc.

D. A 56-year old male with suspected infectious spondylitis. Transcostovertebral approach to the T9 vertebral body is well demonstrated. The needle is advanced between the anterior part of the transverse process and the neck of the rib and passed the costovertebral joint. The tip of the needle is located within the vertebral body. The specimen is diagnosed the fibrosis with cortical bone.

5 1 8 AFB가 3 2 1981 Adapson (5) (1). CT
 63 54 86% , 54 21 (41%) (2).
 21 20 , 16 G 8 4 , 20 G
 12 11 , 22G 22 (4, 5),
 19 14 G 16 G 가 , 가
 가 1 AFB가 (2, 7, 8). 가
 , 17 (transcostovertebral approach) (9 - 10).
 7 (41%), 21 8 approach) CT
 (38%), 20 6 (30%), 8
 1 (13%) , 1 (Table 2).
 가 1-2 가 , 가
 (1 - 3, 5, 7 - 12). CT 가 , (11 - 13). CT
 가 , 가 가
 가 , 가
 CT 18 G 20 G . 16 G

Table 2. The Location and Diagnostic Rate of the CT-guided Biopsy (confirmed No. /total No.)

Location	T ⁺	T-L ⁺⁺	L ⁺⁺⁺	L-S ⁺⁺⁺⁺	Total
Paravertebral lesion	3/5	1/4	3/8		7/17 (41%)
Vertebral body	1/6	2/5	5/7	0/3	8/21 (38%)
Intervertebral disc		0/4	3/6	3/10	6/20 (30%)
Psoas abscess		1/1	0/4	0/3	1/8 (15%)
Epidural abscess				0/1	0/1 (0%)
Total	4/11	4/14	11/25	3/17	22/67 (33%)

Note. ⁺T: Thoracic spine (T1-T11 vertebra)
⁺⁺T-L: Thoracolumbar junction (T12-L1 vertebra)
⁺⁺⁺L: Lumbar spine (L2-L4 vertebra)
⁺⁺⁺⁺L-S: Lu, bosacral junction (L5-S1 vertebra)

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The Diagnostic Usefulness of CT-guided Needle Biopsy or Aspiration in Infectious Spondylitis¹

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Purpose: To determine the diagnostic value of CT-guided biopsy or aspiration of the spine and paraspinal soft tissue in infectious spondylitis.

Materials and Methods: Between January 2000 and June 2002, 58 patients underwent 67 biopsies and/or aspirations under CT guidance to identify the organism causing infectious spondylitis, and were included in this study. Nine underwent rebiopsy. In all patients, MR images were available before biopsy and/or aspiration. In 63 of 67 procedures, the specimens or aspirates obtained were prepared for culture and smear, and for histological examination, four procedures involved aspiration only. In ten patients with suspected tuberculosis, a polymerase chain reaction test was performed. For all procedures, the transpedicular, transcostovertebral or paravertebral route was involved, according to the level and shape of the lesions, and 14-, 16-, or 18-gauge core biopsy needles and/or 20-gauge aspiration needles were employed. Lesions involved a paravertebral ($n=17$), psoas ($n=8$) or epidural ($n=1$) abscess; an intervertebral disc ($n=20$); or a vertebral body ($n=21$). The levels at the mid-thoracic spine were T4-T10 ($n=11$); at the thoracolumbar junction, T11-L1 ($n=14$); at the lumbar spine, L1-L4 ($n=25$); and at the lumbo-sacral junction, L5-S1 ($n=17$). In nine of 58 patients, rebiopsy was performed.

Results: Diagnosis was confirmed in 22 of 58 patients (38%), and was as follows: tuberculous spondylitis ($n=17$), pyogenic spondylitis ($n=4$), and fungal spondylitis ($n=1$). Thirty-six unconfirmed cases were diagnosed as nonspecific inflammation ($n=21$), fibrosis involving cortical bone ($n=1$), necrotic material ($n=5$) and inadequate specimen without evidence of malignancy ($n=9$). Only one of the nine cases in which biopsy was repeated was confirmed as tuberculous spondylitis. Diagnosis was confirmed in 7 of 17 paravertebral abscesses (41%), 8 of 21 vertebral bodies (38%), 6 of 20 intervertebral discs (30%) and 1 of 8 psoas abscesses (13%).

Conclusion: In infectious spondylitis, the overall diagnostic yield of CT-guided needle biopsy and/or aspiration is relatively low, but the procedure seems to be effective for excluding malignancy. In identifying the organisms involved in infectious spondylitis, a paravertebral lesion is in a more favoured location than a psoas lesion.

Index words : Spine, biopsy
Computed tomography (CT), guidance
Spine, infection

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