

정위적 생검으로 확진이 되지 않았던 예의 분석

,¹ BK21 ,² ,³ ,⁴
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김경현¹ · 박용숙⁴ · 정현호¹ · 장종희^{1,2,3} · 장진우^{1,2,3} · 박용구^{1,2,3} · 정상섭⁵

Analysis of the Non-diagnostic Results after Stereotactic Biopsy

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Objective: Although stereotactic brain biopsy has played an important role in the diagnosis and management of brain lesions, there is a significant number of patients in whom a histologic diagnosis is not achieved. The non - diagnostic result of stereotactic biopsy poses a management dilemma. The goal of this study was to analyze the non - diagnostic results after stereotactic biopsy, subsequent management, progress and final diagnosis.

Methods: The authors reviewed the clinical and radiological records of 158 patients who underwent stereotactic brain biopsies using Leksell stereotactic frame. We included 138 patients who were followed more than 6 months in this study.

Results: The results were diagnostic in 118 cases and the overall diagnostic yield of the procedure was 85.6%. A definite histological diagnosis was not made in 20 patients: gliosis in 10, normal white matter in 5, necrosis in 2, infiltration of inflammatory cell in 2, and insufficient material in 1. The subsequent managements, progress and their final diagnoses were described.

Conclusion: Stereotactic biopsy has evolved as a powerful and safe tool to provide tissue diagnoses with minimal disruption of normal functioning brain. Multiple serial biopsy, intraoperative histological diagnosis, and updated imaging - guided biopsy should be tried to minimize the sampling error. Clinical and radiological follow - up are essential for further diagnosis and management in non - diagnostic cases.

KEY WORDS: Diagnostic accuracy · Diagnostic yield · Intracranial lesion · Non - diagnostic result · Stereotactic biopsy.

서 론

10~20

(stereotactic biopsy)

1)2)6)9 - 11)13)15)16)19)23)

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대상 및 방법

1997 11 2003 2 Leksell
stereotactic system(Elekta AB, Stockholm, Sweden)
(intrinsic lesion)

158 6
138 . , ,

Leksell stereotactic system MRI
(stereotactic frame)
(target point,
end point) T1 - MR

T2 - MR

K - Neuroplan®
(sulcus)
(entry point) , 3
(trajectory)

(Fig. 1).
(sampling error) 가

MR
가
side - coring (Sedan -
type biopsy needle)

CT

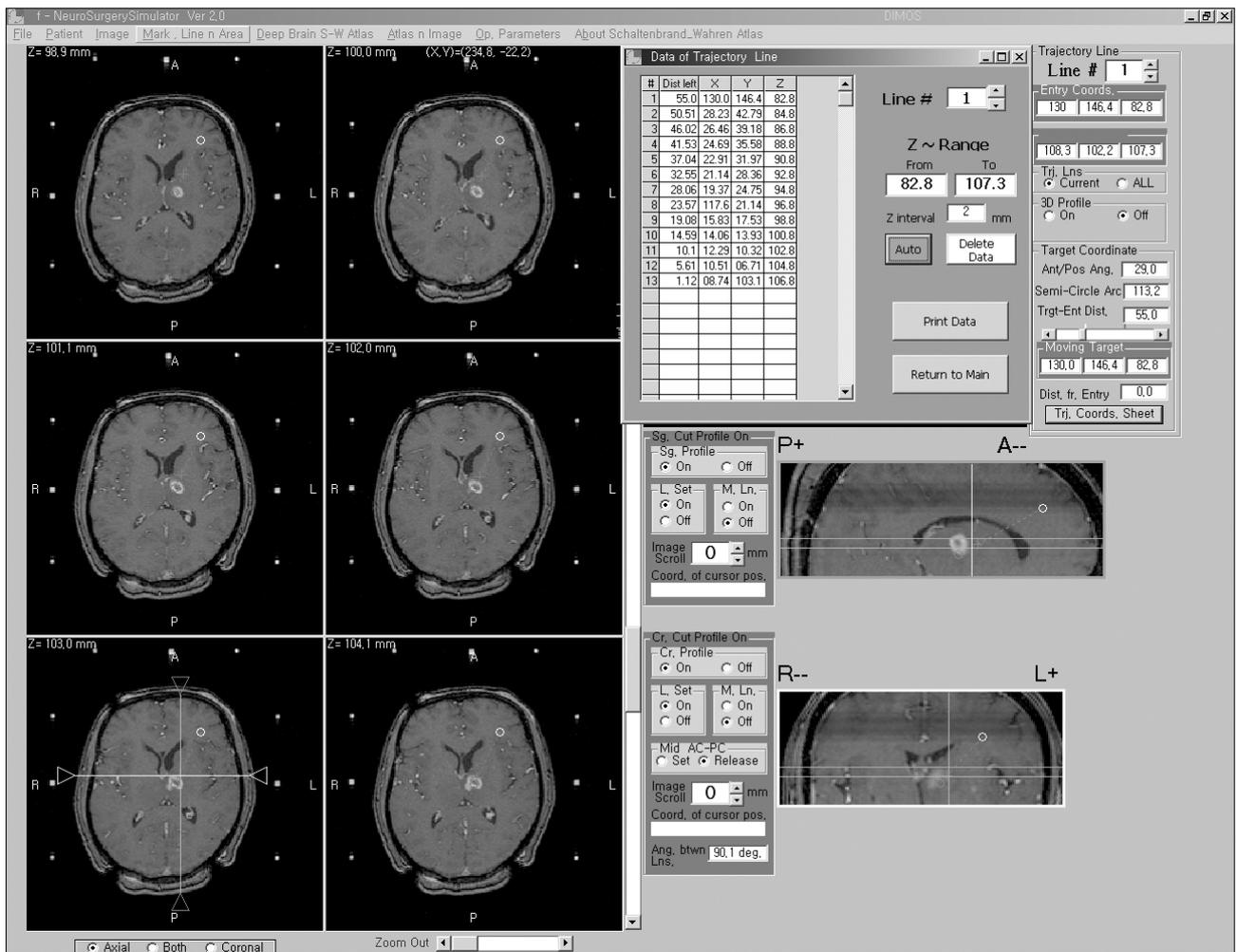


Fig. 1. Planning for stereotactic biopsy using K-Neuroplan®.

Table 1. Histopathologic results of stereotactic biopsy

| Pathology | No. of patients (%) |
|--------------------------------|---------------------|
| Neoplastic | 110 (79.7%) |
| Pilocytic astrocytoma | 1 |
| Diffuse astrocytoma | 20 |
| Oligodendroglioma | 1 |
| Anaplastic astrocytoma | 17 |
| Glioblastoma | 29 |
| Gliomatosis cerebri | 2 |
| Lymphoma | 25 |
| Germinoma | 4 |
| Choriocarcinoma | 1 |
| Mixed germ cell tumor | 1 |
| PNET* | 1 |
| Medulloblastoma | 2 |
| Pineocytoma | 1 |
| Central neurocytoma | 1 |
| Metastatic tumor | 4 |
| Non-neoplastic | 8 (5.8%) |
| PML** | 4 |
| Radiation necrosis | 3 |
| Abscess | 1 |
| Non-diagnostic | 20 (14.5%) |
| Gliosis | 10 |
| Normal white matter | 5 |
| Necrosis | 2 |
| Inflammatory cell infiltration | 2 |
| Insufficient material | 1 |
| Total | 138 (100%) |

*PNET : primitive neuroectodermal tumor

**PML : progressive mul-tifocal leukoencephalopathy

(targeting error) .
 138
 20 (14.6%) , (gliosis)가 10 (50%),
 5 (25%), (necrosis)
 (infiltration of inflammatory cell) 2 (10%),
 (insufficient material)
 가 1 (5%) . , ,
 Table 2 .
 가 7 (35%),
 (glioblastoma) 4 (20%), (low
 grade astrocytoma) 2 (10%),
 (pilocytic astrocytoma), (malignant lympho-
 ma), (germinoma), (Lan-
 gerhans 'cell histiocytosis) 가 1 (5%)
 3 (15%)
 (Figs. 2 and 3).

고 찰

MRI (functional imaging)

결 과

, 24 , 21) , ,
 가
 , CT MRI 10~40%
 1)2)6)9 - 11)13)15)16)19)23)
 138
 118 (85.6%) ,
 Table 1 .
 34.3(8.1~87.4) .
 52 (37.7%), 20 (14.5%), 11 , 가
 (8.0%), 8 (5.8%), 7 (5.1%), , ,
 5 (3.6%), 4 (2.9%), , ,
 3 (2.2%) , 가 25 (18.1%) , , ,
 CT , ,

Table 2. Subsequent management, progress and final diagnosis of non-diagnostic results after stereotactic biopsy*

| Stereotactic diagnosis & subsequent management | Follow-up | Final diagnosis | No. of patients (%) |
|--|----------------------------------|--------------------------------|---------------------|
| Gliosis | | | 10 (50%) |
| Conservative | Regressed | Inflammatory lesion | 3 |
| Conservative | Regressed | Encephalitis | 2 |
| Conservative | Growing | Low grade glioma | 2 |
| Conservative & angiography | Regressed | Vasculitis | 1 |
| Repeated biopsy | | Langerhans' cell histiocytosis | 1 |
| Conservative | No change for 9 months | Unknown | 1 |
| Normal white matter | | | 5 (25%) |
| GKS | Regressed | Pilocytic astrocytoma | 1 |
| Conservative | Growing and then repeated biopsy | Glioblastoma | 1 |
| RTx | Growing and then repeated biopsy | Glioblastoma | 1 |
| Conservative | No change for 12 & 24 months | Unknown | 2 |
| Necrosis | | | 2 (10%) |
| RTx | Growing and then open removal | Glioblastoma | 2 |
| Inflammatory cell infiltration | | | 2 (10%) |
| Conservative | Regressed | Vasculitis | 1 |
| RTx & CTx | PR | Lymphoma | 1 |
| Insufficient material | | | 1 (5%) |
| RTx & CTx | CR | Germinoma | 1 |
| Total | | | 20 (100%) |

*conservative : conservative management, regressed : regressed lesion on follow-up MR images, growing : tumor growing on follow-up MR images, no change : no change of lesion on follow-up MR images, GKS : Gamma Knife radiosurgery, RTx : radiation therapy, CTx : chemotherapy, PR : partial remission, CR : complete remission

Fig. 2. A 75 year-old female with a periventricular lesion. A : Initial T1-weighted MR image shows a well-enhanced and necrotic lesion. B : Immediately postoperative CT shows well targeted biopsy, but the pathological result of the 1st stereotactic biopsy was normal white matter. C : Follow-up T1-weighted MR image (1 month after 1st biopsy) shows growing of the lesion. Repeated stereotactic biopsy was performed and the final diagnosis was glioblastoma.

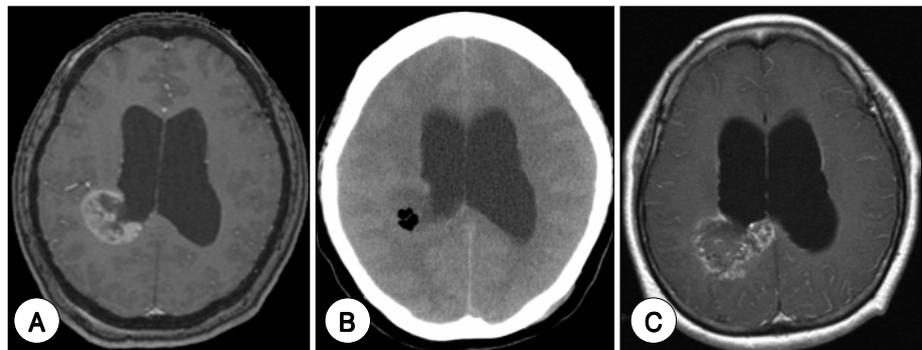
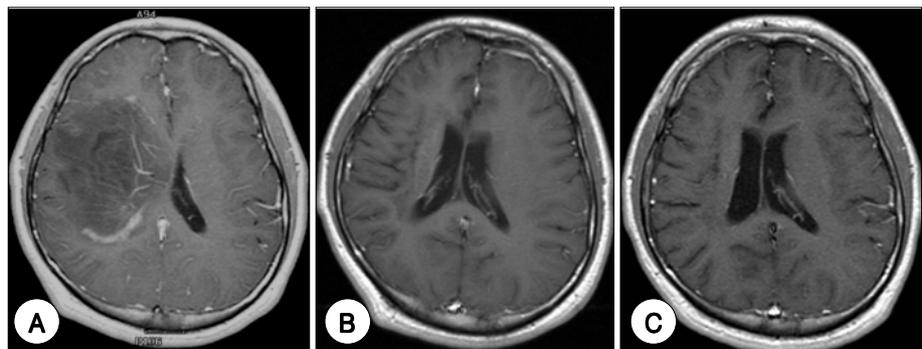


Fig. 3. A 22 year-old male with a periventricular and periinsular lesion. A : Initial T1-weighted MR image shows a diffuse, large, and partially enhanced lesion that has mass effect. The pathological result of stereotactic biopsy was gliosis. B : Follow-up T1-weighted MR image (13 months after 1st biopsy) shows a shrunk lesion. C : Follow-up T1-weighted MR image (40 months after 1st biopsy) shows a large area of leukomalacia and no evidence of active disease. At last, this patient was clinically diagnosed as encephalitis.



가 , 가 가 가 .
 , 가 가 가 .
 , (choriocarcinoma), 80~97%
 , (brain - pial interface) , 가 (1)4)8)10)
 , 가 가 가 가
 , (oligodendroglioma), (ependymoma),
 , (primitive neuroectodermal tumor),
 , 가 (germ cell tumor) 가
 , (diagnostic yield) (diagnostic accuracy) 2가 가 1~2 가 .
 , (targeting error),
 , 가 (non - diagnostic) 가 가
 , (1)3 - 5)7)8)10 - 12)14)15)17)18)20)22)23)
 , 가 가 가
 . CT 가 가 가 .
 80~99% , (cytology)가 가 .
 85.4% MRI
 , 가 (frozen section) 가
 , (MR spectroscopy), MRI(perfusion MRI),
 가 (positron emission tomography ; PET)
 , (1)4)8 - 12)15)17)18)20)

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