

MEDICAL GRAND ROUNDS  
PARKLAND MEMORIAL HOSPITAL  
MAY 4, 1972

BRAIN ABSCESS

*by Ralph Thompson*

Case # 1

This patient was a 48-year old man admitted [REDACTED]-65. He had been known to have rheumatic heart disease with aortic stenosis and aortic insufficiency. On [REDACTED] 1965, he developed the sudden onset of chills and fever which continued up until the time of admission. On admission there was fever and evidence of aortic stenosis and aortic insufficiency. No embolic manifestations were noted. He had several blood cultures positive for group B hemolytic streptococcus. The patient was placed on penicillin therapy and improved somewhat. Nothing specific in the way of unfavorable progress except some elevation of temperature was noted however, until [REDACTED], at which time he developed sudden numbness on the right side of his body with a little expressive difficulty. Following this, he had a grand mal seizure. A brain scan was done and showed a positive scan with a lesion on the left parietal area. A craniotomy was done with tapping of an abscess cavity containing about 25 ml. of thin purulent material which was negative on culture. Subsequent to this time he had no significant further difficulties as far as his central nervous system was concerned, but he did develop congestive heart failure on the basis of destruction of his aortic valve. A valve prosthesis was put in place, but the patient did poorly post-operatively and subsequently expired.

Case #2

This patient was a 54-year old man admitted [REDACTED]-64. He had had a respiratory infection up for about one week prior to admission and had been treated with tetracycline. About one week prior to admission he noticed some intermittent difficulty with his speech, but had not called this to anyone's attention. On the day before admission, he had a convulsive seizure and when he awoke from this he had some aphasia. He also had a right hemiparesis at this time. Subsequently he had another seizure and he became comatose. He was brought to the Emergency Room and subsequently had carotid angiograms which showed a left frontoparietal mass. Craniotomy was done and a large abscess was tapped. Smear showed gram positive branching mycelia and the culture yielded Nocardia. He was treated with sulfonamides for approximately two months and slowly improved so that he had no neurologic deficit. He has remained well.

Case #3

This patient was a 52-year old man admitted to the hospital [REDACTED]-71. He gave a history on admission of what appeared to be the acute onset of headache, fever and stiff neck. The initial examination suggested that he had an acute meningitis. Shortly after admission, however, the review of history with the family revealed that the patient had had a two week history of increasingly severe, progressive headaches with blurring of vision, some possible "blind spots" and for the 24 hours preceding had some confusion. On admission he had a stiff neck and his temperature was 101. There were no heart murmurs. Blood cultures were negative. The cerebrospinal fluid showed 13,800 cells, 90% polys, and the sugar was 25 mgm/100 ml. The smear and culture were negative. A brain scan done that same day was positive for a left occipital lesion. A trephine was done and a large abscess drained. Group D streptococcus was isolated from the abscess. The patient was treated for six weeks with large doses of penicillin and streptomycin. He has had a rapid recovery and is doing well at the present time.

Case #4

The patient was a 29-year old woman admitted to the hospital [REDACTED]-71. This patient gave a history of long standing problem with sinusitis and had frequently consulted an otolaryngologist who "washed out" her sinuses. During the prior 10 days before admission, she noted a definite change in the headache pattern with a more persistent, more severe and different type of headache. The headache also appeared to be more on the right side. No fever had been noted. She consulted a neurologist 10 days before admission and a thorough examination at this time revealed no definite abnormalities. She was sent home with some pain medication and with the request to report back her progress within a few days. Three days later it was reported that she appeared to be drugged and her husband thought the medication was too strong for her. This medication was stopped but the symptoms did not abate. They did not recheck with a physician until the day of admission when the husband found her to be comatose. Retrospectively she had been getting worse all during the week with a decreasing level of consciousness. The patient was comatose with a dilated fixed right pupil. Angiograms on admission showed a large frontal lobe mass. Frontal craniotomy was done and 45 cc of foul smelling pus were evacuated. Culture of this yielded *Bacteroides*. The patient was started on penicillin and chloramphenicol and given supportive measures, but expired during the evening of the day of admission.

# UNFULFILLED EXPECTATIONS IN CEREBRAL ABSCESS (26)

"...it is clear that since the introduction of penicillin there has been no worthwhile further gain in mortality - and in some respects the results have shown a tendency to get worse".

TABLE 1

## WESSEX NEUROLOGICAL CENTER TREATMENT OF BRAIN ABSCESS (30)

	<u>100 cases</u> 1951-57	<u>100 cases</u> 1962-67
Dead	37%	42%
Severe deficit	7%	7%
Well	56%	51%

TABLE 2

## BRAIN ABSCESS 31 CASES 1959-1971

### Outcome

Died	13 (42%)
Alive, with disability	8
Well	10

TABLE 3

CAUSES FOR FAILURE IN MANAGEMENT OF BRAIN ABSCESS  
(4, 13, 25, 30, 33, 51, 55)

Nature of the lesion (perhaps responsible for 20%  
of deaths)

Diagnostic difficulties

Inappropriate evaluation of clinical course

Inadequate or inappropriate therapy

TABLE 4

BRAIN ABSCESS - 31 CASES 1959-1971

Source of infection

Paranasal sinuses	7
Lung	6
Infected tooth	3
Otitis	2
Septicemia	2
Congenital heart disease	2
Endocarditis	1
Nasal fracture	1
Facial injury without fracture	1
Unknown	6

TABLE 5

STAGES IN DEVELOPMENT OF BRAIN ABSCESS (77)

- 1) Edema, infiltration of leukocytes  
(encephalitic stage)
- 2) Liquefaction  
Usually localized  
Occasionally - satellite abscesses  
rupture into ventricle  
(meningitis)
- 3) Formation of abscess wall

TABLE 6

## SYMPTOMS AND SIGNS OF BRAIN ABSCESS (14, 30)

Headache  
 Change in consciousness  
 Focal signs  
 Fever and signs of infection  
 Signs of meningitis ("ruptured" abscess)

TABLE 7

## BRAIN ABSCESS 31 CASES 1959-1971

Symptoms and Signs

Total number with available accurate history	29
Headache	25
Altered consciousness (drowsiness, grand mal, or coma)	24
Focal signs	25
None of above recorded	

- 1 - Dentate nucleus abscess found at autopsy
- 1 - Temporal lobe abscess secondary to carcinoma of mastoid
- 1 - Multiple small abscesses in patient with staphylococcal septicemia

TABLE 8

## TEMPERATURE AND PERIPHERAL BLOOD FINDINGS IN PATIENTS WITH BRAIN ABSCESS. (14)

Parameter	No. of cases	Median
Temperature	85	99-100
WBC	83	11,000-12,000
PMN	81	70 - 79%
ESR	39	45-50 mm/hr
ESR (in cyanotic pts)	14	1 mm/hr

TABLE 9

## CEREBROSPINAL FLUID ABNORMALITIES IN BRAIN ABSCESS (14)

	Abnormal (%)
Pressure	67
Protein	67
Glucose	25
Cells	67
Culture	13

TABLE 10

## BRAIN ABSCESS 31 CASES 1959-71

Lumbar puncture performed -	21
CSF glucose recorded	12
Low CSF glucose	6

Total cells per cu. mm.	% Polys.	Glucose	
		CSF	Blood
13,800	90	25	240
11,700	90	<10	90
6,280	85	28	400
2,970	92	45	118
32	30	45	121
28	50	28	72

TABLE 11

## HAZARDS OF LUMBAR PUNCTURE IN BRAIN ABSCESS

Carey (14)	62 Taps performed - Mortality 8%
Garfield (30)	a) Taps done in 140 patients before definitive treatment b) "Significant deterioration" within 48 hours in 41, of whom 25 died c) 98 - no deterioration first 48 hours 20 of these died.

TABLE 12

## ELECTROENCEPHALOGRAPHY IN BRAIN ABSCESS

Garfield (30)	Localization accurate in	51%
Carey (14)	Localization accurate in	47%

TABLE 13

CEREBRAL ANGIOGRAPHY IN BRAIN ABSCESS  
(10, 13, 16, 30, 63)

## Accuracy of localization by arteriography

Garfield (30)	71 cases
Subdural	68%
Frontal	65
Temporal	100
Parietal	67
Average of all . . . . .	73%
Carey et al (14)	34 cases
Percent localizing	85%

TABLE 14

BRAIN SCANS IN BRAIN ABSCESS  
(1, 9, 21, 22, 45, 57, 58,  
60, 73, 78)

Total cases in references cited	28
Total "positive" scans	28



TABLE 15

BRAIN ABSCESS 31 CASES 1959-1971

Brain scans

Total patients with scans	18
Positive scans	16
Negative scan	1
Equivocal scan (ruptured frontal lobe abscess)	1

TABLE 16

BACTERIOLOGY IN 14 CASES OF BRAIN ABSCESS (75)

Proteus	4
Streptococci	3
Staphylococcus	3
Bacteroides	1
E. coli	1
Paracolon	1
Pseudomonas	1

TABLE 17

BACTERIOLOGY IN 30 CASES OF BRAIN ABSCESS (55)

20 positive cultures in 23 specimens

Group A Streptococcus	6
Staphylococcus	3
Pneumococcus	3
Hemophilus	3
Microaerophilic streptococcus	2
Anaerobic streptococcus	1
Bacteroides	1
"Viridans streptococcus"	1

TABLE 18

## BACTERIOLOGY IN 200 CASES OF BRAIN ABSCESS (30)

Organism	Number of patients
Streptococci*	105
Pneumococci	7
Staphylococci	40
Coliforms	30

\*"The majority of streptococci were anaerobic or microaerophilic"

TABLE 19

## BACTERIOLOGY IN 18 CONSECUTIVE BRAIN ABSCESSES (33)

Total number with positive cultures	15
Only aerobic cultures positive	0
Only anaerobic cultures positive	10
Both aerobic and anaerobic cultures positive	6
Total number of organisms	40

(Mortality - 69%)

TABLE 20

## BRAIN ABSCESS 31 CASES 1959-1971

Bacteriologic data

No culture recorded (autopsy only)	1
Negative smear, negative culture	5
Positive smear, negative culture	5
Gram positive cocci	3
Gram negative rods	1
Gram positive cocci and gram negative rods	1

Positive cultures - 21 organisms from 20 patients

TABLE 21

## BRAIN ABSCESS 31 CASES 1959-1971

Bacteriologic data - Microorganisms isolated from 20 patients

Anaerobic streptococci	5
Aerobic non-hemolytic streptococci	3
Aerobic hemolytic streptococci	
Group B	1
Non A or D	3
Staphylococcus aureus	2
Bacteroides sp.	2
Nocardia	2
Hemophilus sp.	1
Proteus sp.	1
E. coli	1

TABLE 22

## ANTIMICROBIAL THERAPY IN BRAIN ABSCESS

(11, 12, 27, 28, 33, 34, 44, 69, 72, 77, 91)

- 1) Initiation of therapy in absence of knowledge of the likely infecting organism or when initial gram stain does not indicate otherwise.

Penicillin - large doses (20 million units/day)  
 Chloramphenicol (2-4 Gm/day IV)

- 2) Cephalothin in patients hypersensitive to penicillin.  
 (11, 34)

TABLE 23

## ANTIMICROBIAL THERAPY IN BRAIN ABSCESS

Choice of drug for continuing therapy

- 1) Continuation of treatment based on smears and/or cultures and sensitivity tests.
- 2) The role of lincomycin or clindamycin may prove to be important. (28, 39, 67)
- 3) Unusual infections (7, 8, 9, 17, 18, 23, 24, 36, 40, 49, 57, 59, 61, 65, 66, 71, 74, 79, 84, 85, 86, 87)

TABLE 24

## ANTIBIOTIC DISC SENSITIVITIES OF BACTEROIDES (11)

<u>Drug</u>	<u>% of Strains Sensitive</u>
Chloramphenicol	100%
Tetracycline	74%
Erythromycin	50%
Penicillin/ampicillin	8%
Cephalothin	7%
Kanamycin	0
Colistin	0

TABLE 25

## SENSITIVITY OF ANAEROBES TO LINCOMYCIN (28)

Organism	Number of Strains	Minimal inhibitory conc. micrograms per ml.	
		Mean	Range
Bacteroides fragilis	28	12	1.6 - 25
Bacteroides funduliformis	9	9.3	<0.8 - 25
Bacteroides nigrescens	16	<0.1	<0.1 - 0.2
Bacteroides oralis	20	<0.8	0.8
Fusobacterium	16	0.1	<0.1 - 0.4
Unclassified bacteroides	15	1.6	<0.8 - 25
Clostridia	7	3.4	0.6 - 25
Various anaerobic cocci	21	1.3	0.2 - 2.5

TABLE 26

SURGICAL THERAPY OF BRAIN ABSCESS  
(5, 6, 13, 14, 30, 55, 75, 76, 83)

Controversy re aspiration, drainage, or excision

Carey (14) "The exact form of therapy, whether by abscess drainage, excision, or aspiration may not be as important as the fact that some pressure-relieving surgical procedure has been undertaken before irreversible brain-stem damage has occurred secondary to increasing abscess mass."

TABLE 27

SUMMARY

- 1) Awareness of an unusual disease.
- 2) Recognition that source is generally obvious.
- 3) Great significance of severe headache, changes in consciousness, focal signs.
- 4) Relative lack of signs of infection.
- 5) Relative importance of evidence of intracranial mass.
- 6) Hazards of lumbar puncture.
- 7) Value of brain scanning.
- 8) Urgency in the patient whose level of consciousness deteriorates.

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must read
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