

## Management of Pediatric Brain Abscess: Experience with 21 Cases

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### ABSTRACT

**Objective:** To evaluate clinical presentation, diagnosis and treatment of brain abscess in pediatric age group.

**Material and Methods:** This observational study was conducted at the department of Neurosurgery / pathology, Post-graduate medical institute, Lady Reading Hospital Peshawar from Jan 2011 to December 2013. A total of 21 consecutive patients who undergone surgery (aspiration / excision) for brain abscess with age less than 14 years were included in the study irrespective of their gender. Those treated conservatively or age more than 14 years were excluded from the study.

**Results:** We had total 21 children who underwent surgery for brain abscess in the study period. There were 62% males and 38% females. Most of the patients presented with fever (66.7%) and headache / vomiting (61.9%). Otitis media (33.3%) and cyanotic heart disease (23.8%) were the common predisposing factors. CT brain with contrast was done in all the patients with brain abscess. Most of the children (52.4%) with brain abscess were offered bur-hole aspiration. In 57.1% patients the culture report was positive. The commonly identified organisms were streptococci in 41.7 % cases and staphalococci in 25%.

**Conclusions:** We concluded from this study that otitis media and cyanotic heart disease were the common predisposing factors for pediatric brain abscess. The common presenting features were fever followed by headache / vomiting. CT brain with contrast is the investigation of choice to diagnose brain abscess. Most of the children with brain abscess needs aspiration. Culture was positive in most but not all the cases.

**Key Words:** Brain abscess, Burhole aspiration, Capsulotomy, Craniotomy.

### INTRODUCTION

Brain abscesses is a very important pathology, with high mortality and morbidity. It is a challenge for the neurosurgeon because it needs good clinical, pharmacological, and surgical skills for providing good clinical outcomes.<sup>1,2</sup>

Brain abscess is collection of pus in brain parenchyma which may be single or multiples.<sup>3</sup> Solitary abscess are usually because of spread from surrounding infections as otitis media or sinusitis or it may be because of penetrating skull injuries and cranial surgery. Children with cyanotic heart disease have more chances of brain abscess.<sup>4</sup>

The clinical features of brain abscess may be in

the form of raised intracranial pressure, focal neuro-deficient, seizures or systemic features such as fever. The diagnosis of brain abscess in children is made on the basis of clinical features, CT and MRI brain. The organism is identified after culturing the collected puss.<sup>4,5</sup>

Small brain abscess can be managed conservatively while larger one with mass effect or doubtful diagnosis needs surgical aspiration and or excision.<sup>6,7</sup> The 1<sup>st</sup> surgery on brain abscess was performed by a French surgeon S.F Morand in 1752 and Cairns was the 1<sup>st</sup> neurosurgeon who used penicillin for brain abscess in 1943.<sup>8</sup>

As there is limited local study on this topic, the

aim of this study is to evaluate the management of pediatric brain abscess in our set up and thus to provide better treatment to our patients.

## MATERIAL AND METHODS

This observational study was conducted at the department of Neurosurgery / pathology, Post-graduate medical institute, Lady Reading Hospital Peshawar from Jan 2011 to December 2013. A total of 21 consecutive patients who undergone surgery (aspiration / excision) for brain abscess with age less than 14 years were included in the study irrespective of their gender. Those treated conservatively or age more than 14 years were excluded from this study.

After getting approval from the hospital ethical committee to conduct the study and taking informed consent, the medical record of children who underwent surgery for brain abscess was evaluated. The diagnosis was made on the basis of clinical features and CT brain with contrast. All information was entered into a proforma especially designed for this purpose. The data was analyzed by statistical program SPSS version 11.

## RESULTS

During three years of study 21 patients in pediatric age group underwent surgery for brain abscess. The gender distribution with male / female ratio is given in table 1.

**Table 1:** Gender distribution.

Gender	Number of Patients	Percentage	Ratio
Male	13	62%	1.6
Female	08	38%	01

**Table 2:** Clinical presentation.

Feature	Number of Patients	Percentage
Fever	14	66.7
Headache / vomiting	13	61.9
Altered consciousness	08	38
Neurodeficient	08	38
Seizures	06	28.6

## Predisposing Factors:

In descending orders are Otogenic brain abscess in 7 (33.3%) patients, cyanotic heart disease in 5 (23.8%) cases, penetrating head injuries in 4 (19%) patients, post cranial surgery 2 (9.5%) and others in 3 (14.3%) cases.

**Table 3:** Radiological investigations.

Investigation	Number of Patients	Percentage
Plain x-ray skull	4	19
CT brain	21	100
MRI brain	11	52.4

**Table 4:** Operative treatment offered.

Treatment	Number of Patients	Percentage
Aspiration	11	52.4
Excision	03	14.3
Aspiration + excision	07	33.3

## Organism Identified

In 12 (57.1%) patients the culture report was positive. The identified organisms were streptococci in 41.7% (5/12) cases, staphalococci in 25% (3/12) patients and bacteriodes in 16.6% (2/12) cases. Two (16.6%) patients had mixed gram positive and negative infection.

## DISCUSSION

Brain abscess is one of those diseases which neurosurgeon can treat easily. Brain abscess is more common in male gender as compared to female. Sarmast and colleagues<sup>9</sup> studied one hundred and fourteen patients with brain abscess and reported that 72.8% of their patients were male and 27.2% female. Lehri and colleagues<sup>10</sup> also reported that brain abscess is more common in males. The exact reason for this is not clear. But in our study also male (62%) children were more common than female (38%).

The clinical features of brain abscess may be because of raised intracranial pressure (ICP), focal (neurodeficient, seizures) or systemic effects. In adults features of raised ICP and focal features are more com-

mon than systemic effects (fever) but it is vice versa in children.<sup>11</sup> This could be the reason that we had more patients with fever (66.7%) than those with headache and vomiting (61.9%). Lee and colleagues<sup>12</sup> studied 25 children with brain abscess and reported fever in 72% cases and headache / vomiting in 36% patients.

In our study the four main predisposing factors in descending orders are Otogenic brain abscess in 33.3% patients, cyanotic heart disease in 23.8% cases, penetrating head injuries in 19% patients and post cranial surgery 9.5% cases. Haider and colleagues<sup>13</sup> also reported that otitis media (31.1%) and cyanotic heart disease (26.7%) are the common predisposing factors for brain abscess. Brain abscess as a complication of penetrating injuries in children is a common entity. These may be due to missile or non missile objects as pencils, chop sticks, bamboo sticks, toys.<sup>14-17</sup>

CT scan with and without contrast is the best diagnostic and monitoring tool in the management of brain abscess. While MRI can be preferred in the early cerebritis stage.<sup>18</sup> That is why we did CT brain in all patients with brain abscess while MRI brain in 52% of the cases. Other studies have also reported that CT brain is the radiological investigation of choice for brain abscess.<sup>13</sup>

The treatment of brain abscess is antibiotics with or without surgery. The options for surgery are aspiration, excision or aspiration with excision. Most of the time abscess need aspiration while excision (capsulotomy) is needed in selected patients when abscess is in non-eloquent area, have thick capsule, have foreign body or failure of aspiration.<sup>13</sup> Keeping in mind these indications 52.4% of our patients needed aspiration alone while the rest needed excision with or without aspiration.

Culture of abscess is important to identify the infective organism. In the past the culture yield from these abscess were less than 50%. Lee and colleagues<sup>12</sup> found that 64% of their patients had positive culture report and the most common organisms were streptococci and staphylococcus aureus. Lehri and colleagues<sup>10</sup> reported that 40% of their patients had streptococcus intermedius followed by bacteriodes (30%) and staphylococcus aureus (15%). In our study we had positive culture report in 57.1% patients. The identified organisms were streptococci in 41.7% cases, staphylococci in 25% patients and bacteriodes in 16.6%. So the results are not much different.

## CONCLUSION

We conclude from this study that otitis media and cyanotic heart disease are the common predisposing factors for pediatric brain abscess. In children fever is the common presenting features than headache / vomiting. CT brain with contrast is the investigation of choice to diagnose brain abscess. Most of the children with brain abscess needs aspiration. Culture is positive in most but not all the cases.

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