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Research Article

**A STUDY ON THE EFFECTS OF MANAGEMENT ON
CHILDREN SUFFERING FROM BRAIN ABSCESS**¹Dr Sana Khalid, ²Dr Ahsan Ali, ³Dr Tuba Khan¹Women Medical and Dental College Abbottabad²Khawaja Muhammad Safdar Medical College Sialkot³Ayub Medical College Abbottabad

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Abstract:

Objective: The aim of this study is to determine the predisposing factors and management outcomes in the children present with brain abscess.

Methodology: This study is prospective research work performed in DHQ Hospital Abbottabad from August 2017 to January 2020. All the children having up to 14 years of age and suffering from Brain Abscess got admission in the hospital. After obtaining the clinical history of the patients, we performed the necessary physical investigation and other related examinations. Evacuation of the abscess was carried out and excision of the wall of abscess was performed after application of craniotomy. The collection of the data was carried out on well-organized Performa. We analyzed the results and compared these results with local and international data with the usage of SPSS V.23.

Results: In this research work, we included 25 patients up to the age of 14 years. 68% (n:17) patients were males and 32% patients (8) were female. There was presence of vomiting and fever in all patients. The predisposing contributory factors were paranasal sinusitis in 36.0% (n: 9) patients followed by otitis media in 28.0% (n: 7) patients. There was presence of abscess in frontal lobe in 36.0% (n: 9) patients, in temporo-parietal site in 32.0% (n: 8) patients, posterior fossa in 20.0% (n: 5) patients and there was presence of multiple abscesses in 12.0% (n: 3) patients. We performed the craniotomy, evacuation of the pus was carried out, and we excised the wall of abscess in all the patients. There was expiry of 12.0 (n: 3) patients.

Conclusion: It is possible to decrease the rate of prevalence of Brain Abscess with the treatment of its predisposing reasons like sinusitis and otitis media. Treatment of the abscesses of smaller size of less than 2.0cm is possible through antibiotics. Complete pus evacuation and abscess wall's excision after performance of craniotomy in combination with proper antibiotics is ideal standard for the administration of brain abscess among children.

KEYWORDS: Antibiotics, Craniotomy, Brain Abscess, Pediatrics, Otitis Media, Sinusitis, Evacuation, Excision.

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INTRODUCTION:

Focal suppurative procedure within the parenchyma of brain that starts as a localized region of the cerebritis and changes into pus collection enclosed in a wall is known as brain abscess. Infectious procedure that influences the central nervous system may threaten the important functions of neurology and even life. There is much improvement in the prognosis of such patients over past 25 years because of the advancement in technology of the modalities of treatment and diagnosis as new innovations in MRI, CT scan and antibiotics. However, regardless of these advancement, infections of central nervous system are main cause of high rate of morbidity as well as mortality [1]. The most frequent predisposing factors are paranasal sinusitis, Otitis Media, surgery of brain, brain trauma and cyanotic diseases of hearts [2]. The most common presentations of these complications are vomiting, headache and seizures. There can be presence of altered consciousness level, rigidity of neck and focal neurological deficits [3]. Intra-ventricular abscess rupture and herniation of the brain may be life-taking complications.

There is stereotyped appearance of abscess and enhancement of the ring on contrast enhanced computed tomography [4]. Diffusion-weighted magnetic resonance imaging may be supportive in the diagnosis of the Brain Abscess even in the stage of cerebritis [5]. The abscesses of smaller sizes can be managed through medical antibiotic treatment without surgery [6]. Surgical treatment of brain abscesses is also followed by antibiotic treatment [7]. Pus aspiration is minimal invasive method and this method can be repeated whereas craniotomy and abscess excision are the extensive surgical methods needs anesthesia for long durations [8]. This research work was carried out to evaluate the different predisposing factors and results of different surgical managements in the patients of brain abscess.

MATERIAL AND METHODS:

This study was a prospective research work conducted at DHQ Hospital Abbottabad from August 2017 to January 2020. Ethical committee of the institute gave the permission to conduct this research work. All the patients suffering from brain abscess up to the age of fourteen years got admission for treatment. After collecting the complete history and clinical assessment, we performed the necessary examinations as count of the complete cells of blood and computed tomography scan of the brain. If there was requirement then we also performed magnetic resonance imaging. All the patients present in the cerebritis stage of the complication or abscesses of small size of less than 2.0 cm without resulting

mass impact got referrals to related department of pediatric medicine for clinical management. We did not include these patients in this research work. We planned the surgical intervention in the patients present with brain abscess of greater than 2.0 cm size, causing mass impacts neurological deficit, at aliquant region or with signs and symptoms of increased intracranial pressure. We included all these patients in this research work.

The utilization of mannitol (20.0%) was carried out if there was presence of the signs of increased intracranial pressure. We initiated the meropenem, metronidazole and vancomycin intravenously. We checked the fitness of the patients for GA (General Anesthesia) and assessed them for surgical intervention. The aspiration of the pus was carried out with the help of needle from open anterior fontanelle in all four infants. We made a burr hole at proper site for the aspiration of the pus with the help of brain cannula in pediatrics having more than 1 year of age. We performed the craniotomy for the excision of the abscess in the case of the thick loculated-septate pus which was not aspirated from the burr hole. If there was presence of the multiple abscesses, the aspiration of the abscesses of only larger size were carried out. We sent the isolated pus for the sensitivity and culture check. We changed the antibiotics accordingly. We also performed the CT scan after completing 7 days if there was appearance of the clinical features of abscess recollection in the course of treatment. We continued the antibiotic treatment for 4 to 6 weeks. We obtained the follow-up computed tomography scan at completion of treatment routinely and in-between if needed. The collection of the collected information was carried out on a well-organized Performa. SPSS V.23 was in use for the processing of the collected information. The comparison of the findings was carried out with local and international data.

RESULTS:

In this research work, we managed 25 patients suffering from brain abscess. 68% (n: 17) patients were males and 32.0% (n: 8) patients were female. The age of the patients was up to 14 years. There was presence of vomiting and fever in all 25 patients. 84% (n: 21) patients were suffering from headache, 40.0% (n: 10) patients with seizure, there was focal neurological deficit in 24.0% (n: 6) patients and irritability was present in 16.0% (n: 4) patients. The most important predisposing factors were paranasal sinusitis in 36.0% (n: 9) patients, otitis media in 28.0% (n: 7) patients, endocarditis secondary to cyanotic disease of heart in 16.0% (n: 4) patients, trauma of brain in 8.0% (n: 2) and there was no detection of the causative factors in 12.0% (n: 3) patients.

Table-I: Predisposing Causative Factor

Causative factor	No. of Patients	Percentage
Para nasal sinusitis	9	36%
Otitis media	7	28%
Endocarditis	4	16%
Brain trauma	2	8%
Unknown	3	12%
Total	25	100%

There was presence of abscess in frontal lobe in 36.0% (n: 9), temporo-parietal site in 32.0% (n: 8), posterior fossa five (20.0%) patients and multiple abscess in 12.0% (n: 3) patients. The aspiration of the pus was carried out with the help of needle through open anterior fontanelle in 16.0% (n: 4) patients having less than 1 year of age, with the utilization of brain cannula after forming a burr hole in 60.0% (n: 16) patients and we performed craniotomy for the excision of thick multi-loculated septate pus present in 24.0% (n: 6) patients. There was expiry of 12.0% (n: 3) patients, 2 after the excision through craniotomy and 1 after the abscess aspiration.

Table-II: Region of Location of Brain Abscess

Location area	No. of Patients	Percentage
Frontal lobe	9	36%
Temporoparietal	8	32%
Posterior fossa	5	20%
Multiple abscess	3	12%
Total	25	100%

Table-III: Treatment Modalities

Treatment modality	No. of Patients	Percentage
Needle aspiration through fontanelle	4	16%
Burr hole aspiration with brain cannula	15	60%
Craniotomy and excision of abscess	6	24%

DISCUSSION:

This research work was carried out on the pediatrics of up to 14 years of age. We managed and included 25 patients who were suffering from brain abscess. There were 21 patients from 1 to 14 years of age and there were 4 infants having less than one year of age in this research work. There were 17 male and 8 female patients in this research work. Mazumdar D stated that there can be development of the brain abscess at any age, 71.0% in males and 29.0% in females [9]. Ranjith stated that it is more frequent in the group of younger age mostly in first three decades of life [7]. There was presence of vomiting and fever in all patients, headache in 84.0% (n: 21) patients, seizure in 40.0% (n: 10) patients, focal neurological deficit in 24.0% (n: 6) patients and altered consciousness level in 20.0% (n: 5) patients. There were 4 infants with less than one year of age and they were not able to speak and presented with reluctant behavior during feeding and irritability. Eva Tonon stated fever in 79.0%, headache in 69.0%, neurological deficit in 66.0%, seizures in 27.0% and altered consciousness level in 21.0% patients [10]. Chuang in his research work presented the seizures after brain

abscess due to bacteria and results of its management [11].

The most important predisposing factors were paranasal sinusitis in 36.0% (n: 9) patients, otitis media in 28.0% (n: 7) patients, endocarditis secondary to cyanotic disease of heart in 16.0% (n: 4) patients, trauma of brain in 8.0% (n: 2) patients and there was no identified cause in three patients. Mazumdar D in his research work also mentioned the paranasal sinusitis as most important predisposing factor followed by OM [9]. Brain Abscess with unidentified reasons was also mentioned by Stanescu GL [12]. The incidence of Brain Abscess in the patients who were immunocompromised was not recorded in this current research work but is stated by the research work of Nelson [13]. There can be development of the abscess after surgery of brain as stated by Yang [14]. There was presence of abscess in frontal lobe in 36.0% (n: 9) patients, temporo-parietal site in 32.0% (n: 8) patients, posterior fossa in 20.0% (n: 5) patients and multiple abscess in 12.0% (n: 3) patients. Eva Tonon stated the site of abscess in temporal lobe of 36.0%, frontal in 30.0%, partial in 26.0% and occipital in 8.0% patients [10].

Ashraf stated the chances of brain abscess according to location as 46.0% in frontal, 28.0% in temporo-parietal, 8.0% in occipital site and 8.0% at multiple regions [15]. In this research work, there was positive culture in 48.0% (n: 12) patients and no growth in 52.0% (n: 13) patients. Ashraf stated the positivity of culture in 36.0% and negative in 64.0% cultures [15]. The most common micro-organism separated from the pus was *Streptococcus milleri* in according to some research works performed by Ashraf, Atiq [16] and Sineviratne [17]. The most common isolated microorganism from pus was *staphylococcus aureus* in the research work of Bhand [18]. The research work conducted by Brouwer MC mentioned the same surgical intervention procedure as elaborated by this research work. We evaluated the administration of the brain abscess clinically and with follow-up computed tomography scan in each patient and similar protocol was stated by Nathoo [12]. Follow-up ultrasonography from open anterior fontanelle in 4 infants was carried out in this research work. It can be performed from the burr hole formed for initial surgical intervention as stated by Hayashi in this research work [2]. There are some limitations of this research work as sample size of this research work was very small. There is suggestion to conduct this type of research works on larger sample size to consolidate the findings of this research work.

CONCLUSIONS:

There is much common occurrence of the paranasal sinusitis and otitis media in the countries which are under development and these are the main predisposing factors of brain abscess. Therefore, timely and complete therapy of these reasons may decrease the chances of the development of brain abscess. Timely detection of the suspected patients of Brain Abscess and rapid empirical treatment with antibiotics should be initiated immediately in each patient of Brain Abscess even if the patient is in cerebritis stage. The management of the abscesses of smaller sizes of less than 2.0cm is possible without surgical intervention. Less surgical intervention is much effective and safe for mild cases.

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