

Original Article: Evaluation of the Frequency of Laboratory Findings of Bacterial Meningitis in Children

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ABSTRACT

Several factors predispose to bacterial meningitis in the individual, including: immune system defects, functional spleen transmission, anatomical defects in the nervous system, fistulas in the middle and inner ear, cranial fractures, or Paranasal sinuses, brain shunting. Clinical signs can vary in different age groups. In infants, nonspecific symptoms include severe crying, irritability, anorexia, vomiting, lethargy, and full Fontanelle, myalgia, and fever. Common symptoms in children and adults include headache, photophobia, stiff neck, vomiting, altered consciousness, and fever. Diagnosis is based on clinical signs, blood tests and evaluation of various factors, and finally LP and CSF examination. In the CSF, cell count and protein differentiation, protein level, glucose level are checked and hot staining, bacterial culture, and in cases of suspected Cryptococcus, fungal culture and agglutination, and latex tests are performed to check for polysaccharide Buccal antigens.

Introduction

In meningitis, seconds and minutes are very important and should be diagnosed as soon as possible and treatment started as soon as possible. A patient after clinical diagnosis of meningitis or high suspicion of it and an overview of the possible source of infection (ear, sinuses, urinary tract, skin...) should be taken immediately in the absence of local neurological signs and symptoms and Popular edema to take

cerebrospinal fluid. But if there is a neurological disorder, you must first have a CT scan to rule out space-occupying lesions in the brain. The scan was performed and if it was negative, then proceeded to LP.

Given the tremendous importance of meningitis in pediatrics and the key role that diagnostic tests play in identifying this deadly disease, and given that many diagnostic tests available in our country are far from reaching world standards (e.g. In pediatric meningitis,

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CSF culture rarely yields acceptable results. We decided to first evaluate the diagnostic value of each of the clinical signs of meningitis and identify the most common manifestations of meningitis in our country. Therefore, we should evaluate the diagnostic value of laboratory diagnostic tests in patients with proven meningitis and briefly explain to an Iranian physician how much he can trust the patient's symptoms and how much he can rely on laboratory results. Trust. Also, in another part of this plan, common objects involving the CNS (in the form of meningitis) will be identified, which will greatly help in the choice of experimental treatment in these patients. Complications of meningitis are divided into unstable and stable groups: Unstable complications include: subdural effusion, ADH, prolonged fever (Figure 2). Permanent complications include: neurological disorders, mental retardation, seizures, learning disabilities, visual impairment, behavioral disorders [1-4].

In this census paper, by referring to the archives of Fatemi Children's Hospital - Qom Stock Exchange, we separate the files of hospitalized children with a diagnosis of bacterial meningitis in the years 2019-2021 and collect the necessary information using a checklist. The statistical population is the same as the target population. Age, sex, the reason for referral, blood sugar, number of blood leukocytes, blood BUN, blood Cr, blood Na⁺ blood, K⁺ blood, blood culture positive, number of CSF leukocytes, glc in CSF, Pr in CSF, CSF Culture positive. By collecting information and classifying and separating them and using the SPSS software package, the information is analyzed [5-7].

Meningitis

When the skull is broken by an accident such as an accident, the same pieces of bone may tear the meningeal layers, and if tissue repair is not done properly, it may cause meningitis. Meningitis is a protective layer on the brain and spinal cord, so if someone has meningitis or inflammation of the meninges, it must be determined that the meningitis is of spinal or cerebral origin [8-10].

Mange curtain

The meningeal membrane has three main layers:

- A soft layer of urine that attaches to the gray cells in the cerebral cortex and nourishes them.
- The next layer is a stronger layer called a spider, which looks like a tiny and intertwined spider web under a microscope. And it creates an environment with resilience so that it does not hit the bone tissue whenever, for example, the head shakes quickly. So it has the mode of a shock absorber.
- The hard layer that has a stronger texture than the previous two layers and protects them.

The community of these three named layers, namely hard-nosed, arachnid and soft-nosed, is called meninges. There is also a fluid in the meningeal space called the meningeal fluid that keeps the brain afloat [11-14].

Causes of meningitis

If germs or foreign matter enter the fluid through the blood vessels in any way and cause infection, the bones that protect the meninges will break and cause tissue damage, or any other factor that can cause inflammation of these membranes can occur. Give meningitis in the brain or spinal cord. Most people consider meningitis to be an infection due to insufficient information, but this is not always the case. The inflammatory source of meningitis is often viral or bacterial and should be treated as soon as the disease is known. The type of treatment and even its severity varies depending on the underlying cause of meningitis. In some people, the disease can be cured even without treatment and only with supportive therapies, but in others, for example, if the invasive agent is the herpes simplex virus, more specific treatment is needed [23-30]. In addition, bacterial meningitis is much more dangerous and requires immediate action. The patient must be treated correctly and based on the underlying cause of the inflammation. If treated incorrectly, the

patient may progress to coma or even death [15-19].

Bacterial meningitis

Bacteria are an important and common cause of meningitis and may enter the nerve or cerebrospinal fluid in different ways. For example, a person who has had a bedsore or even had an infection, abscess, or wound in other parts of his body has also developed meningitis. Bacteria that enter the bloodstream and enter the brain and spinal cord along the way cause acute bacterial meningitis. In most cases, the bacteria enter the bloodstream during an infection and contaminate the blood or, in scientific terms, cause sepsis and bacteremia. The bacterium then enters other tissues, such as nerve tissue, during the vascular exchange [20-22]. For example:

- During surgery with contaminated equipment or even at the dentist, if poor quality equipment is used, the bacteria can spread to other parts of the nervous system through the blood or nerve of the tooth.
- During accidents and bone fractures, the infectious agent can enter directly from the damaged scalp.
- During the LP or Lumbar Puncture, in which the doctor inserts a needle into the area to sample cerebrospinal fluid (CSF), the bacteria can enter the meningeal fluid directly if the equipment is contaminated during this invasive procedure.
- Even dental infections that spread to the ear and infections that start in the ear themselves can be transmitted to the auditory nerve or balance due to neglect and open their way to the brain and spinal cord.

Research findings

A total of 122 patients were analyzed, of which 50 were girls (41%) and 72 were boys (59%). The ratio of boys to girls is 1.43 to 1. 19 patients (15.9%) were in the age group under 2 months

and 69 patients (56.6%) were in the age group of 2 months to the end of 7 years and 43 patients (27.9%) were also in the age group over 7 years. Out of 19 people under 2 months of age, 4 (21.1%) were girls and 15 (78.9%) were boys. Of 69 people in the age group of 2 months to 7 years, 31 (44.9%) were girls and 38 (55.1%) were boys and out of 34 people in the age group over 7 years, 15 (44.1%) were girls and 19 (55.9%) were boys. In 106 (86.9%) of these patients, fever was mentioned as one of the reasons for referral. Nausea in 75 patients (61.5%) was one of the causes of referral. Vomiting in 80 patients (65.6%), headache in 52 patients (42.6%), cough in 11 patients (9%), restlessness in 6 patients (4.9%), seizures in 8 patients (6.6%), lethargy in 23 patients (18.9%) and not breastfeeding and anorexia in 10 patients (8.2%) were the main complaints. In the age group under 2 months, fever was the most common reason for hospitalization in 68.4%, followed by non-breastfeeding in 36.8%, restlessness and lethargy in 21.1% of patients, and vomiting and seizures in 5.3% of patients. Has been the most common reason for hospitalization. Vomiting, nausea in 47 patients (68.1%), headache in 26 patients (37.7%), nausea in 15 patients (21.7%) [23-25].

Indifference and cough were the most common causes in 10 patients (14.5%). In the age group over 7 years, the most common reasons for hospitalization were as follows: fever 9 (85.3%), nausea and vomiting 28 (82.4%), headache 26 (76.5%), lethargy 4 People (11.8%), Seizures were observed in 2 patients (5.9%) and cough in 1 patient (2.9%). In the study of blood glucose, the mean hospital stay time in the under 2 months group was 93.42. (Standard deviation 58.67) with a minimum of 29 and a maximum of 251. In the age group of 2 months to the end of 7 years, the mean blood sugar at the time of admission (39.36) was 11.25 with a minimum of 46 and a maximum of 217 [26-28].

In the age group over 7 years, the mean blood glucose at the time of admission (43.71) was 122.68, with a minimum of 78 and a maximum of 256. In total, only 2 people had hypoglycemia in the age group under 2 months. Of the total number of children, 45 (36.8%) had leukocytosis, of which 2 (16.7%) in the age

group under 2 months, 28 (40.6%) in the age group of 2 months to 7 years, and 15 people (44.1%) were in the age group over 7 years. The mean levels of BUN and Cr in the group of children under 2 months are 29.78 (14.6) and 1.24 (2.2), respectively, while in the age group of 2 months to 7 years, these values are respectively (9.9). 17) 25.98 and (65%) 0.66 and in the age group over 7 years are 27.35 (9.4) and 0.64 (17%), respectively.

In the total population of children studied, an increase in BUN in 57 cases (46.7%) was identified, of which 12 (66.7%) in the age group under 2 months, 28 (53.8%) in the age group 2 months to 7 years old and 17 people (65.4%) were in the group of children over 7 years old. Cr level increased in 28 children (22.9%) of which 15 (83.3%) were under 2 months old, 8 (16%) were 2 months to 7 years old and 5 (20%) They are in the age group over 7 years. In the study of electrolytes, the mean level of Na⁺ in the age group up to 2 months (4.7) was 139.38, in the age group 2 months to 7 years (5.4) 133.61, and in the age group over 7 years (6) 134.81 Was. There were 47 cases (38.5%) in the total population of Hyponatremia, of which 4 cases (3.8%) in the age group under 2 months, 30 cases (58.8%) in the age group 2 months to 7 years, and 13 cases (50%) were over 7 years old in the age group. The mean level of K⁺ in the age group up to 2 months (84%) was 5.13, in the age group 2 months to 7 years (88%) was 4.13 and in the age group over 7 years (51%) was 3.85. There were 16 cases of hypokalemia, of which 10 patients (19.6%) were in the age group of 2 months to 7 years and 6 patients (235.1) were in the age group over 7 years. In the study of blood culture test results, 188 cases were reported to be negative (96.7%) and 4 cases (3.27%) were reported as positive, including one case of Citrobacter, one case of Pneumococcus, one case of Sod and Mona, and one case of Staphylococcus.

Discussions and evaluations

Based on the data, we conclude that bacterial meningitis is more common in boys than girls and is most common between the ages of 2 months and 7 years. In the paper, it is mentioned

that purulent meningitis is more common in boys than girls. It is most common between the ages of 2 months and 2 years. In the clinical picture, fever was the most common reason for referral. After fever, nausea, restlessness, and lethargy were the most common symptoms in the age group under 2 months, and nausea, vomiting, and headache after fever were the most common symptoms in the two age groups. These results are consistent with the sources mentioned in irritants, restlessness, and non-breastfeeding are significant in young infants and there is usually fever. Older children may experience disturbances of consciousness and back pain, and usually have Corning and Brodsky symptoms if they are diagnosed with bacterial meningitis. Seizures and coma may occur. Elsewhere, acute central nervous system infection is the most common cause of fever along with signs and symptoms of central nervous system disease in children. There were extensive changes in the blood glucose at the time of referral, but the mean blood sugar in all three groups was in the normal range and only two patients had hypoglycemia, which was in the age group of fewer than 2 months, which was probably due to not breastfeeding. The presence of leukocytosis in the age group under 2 months was not a suitable indicator for the diagnosis of bacterial meningitis, while in the two age groups over 2 months, about half of the patients had clear leukocytosis. It is noteworthy that in 101 patients (82.7%) the number of neutrophils constitutes 50% of the number of WBCs, of which 17 (89.7%) in the age group under 2 months, 58 (84%) in the group 2 months to 7 years old and 26 people (76.4%) are in the age group over 7 years. References in the diagnosis of bacterial meningitis do not mention WBC in the blood because the main criterion for diagnosis is based on CSF fluid analysis. The mean levels of BUN and Cr in the age group under 2 months were in the range higher than normal, but in the other two age groups, the mean levels of BUN and Cr were in the acceptable range. In this case, no similar study was performed. Hyponatremia and hypokalemia are relatively common in the age group above 2 months, while in the age group under 2 months these electrolytes were in the normal range. Hypokalemia is not mentioned in the literature,

but Hyponatremia is considered very important due to the syndrome of disproportionate secretion of antidiuretic hormone (SIADH), which causes excessive fluid retention and increases the risk of intracranial pressure. The amount of fluid therapy plays an important role. The incidence of this syndrome has been determined in 30-50% of patients. The value of blood culture in this study was very weak in confirming the diagnosis of meningitis because no information was recorded for 64 cases (52.4%) and on the other hand in other cases (44.2%) 54 cases were negative and only (3.27%) positive cases have been mentioned. According to blood culture sources, it is positive in 50-90% of patients. In the study of CSF leukocytes, we concluded that this variable has a high diagnostic value, and this value increases with age, so that in the age group over 7 years, 100% of leukocytes have increased, and in the same study, this We found that in 87.7% of cases neutrophils constitute more than 50% of CSF leukocytes. However, in 2.4% of cases, we did not have information about the percentage of CSF neutrophils. In the remaining 9.9% of cases, they were either TB meningitis or had a positive culture and smear, or the diagnosis was based solely on response to treatment. Sources also state that in acute bacterial meningitis the number of WBCs in CSF is 60000-100 and elsewhere it is 1000-100 that PMNs often form. In poorly treated bacterial meningitis, the number is 1-1000, and elsewhere is 5-10000, where PMNs are usually predominant, but if the treatment is prolonged, mononuclear cells are predominant. In Tuberculous meningitis, there are 10-500, which are mostly Polymorphonuclear and then mostly lymphocytes and monocytes.

Conclusion

By collecting data and categorizing them and using the SPSS software program, we examined the quality of each variable in the target population and concluded that: Bacterial meningitis is more common in boys than girls and is more common in the age group of 2 months to 7 years than in other ages. The most common cause is fever. 2 patients (1.6%) had

hypoglycemia at the time of referral. In the study of leukocytosis, 46 patients (37.7%) had leukocytosis. An increase in BUN in 57 patients (46.7%) and an increase in Cr in 28 patients (22.9%) were determined. 47 patients (38.5%) had Hyponatremia and 16 patients (13.1%) had hypokalemia. In total, in 4 cases (3.27%) B/C was positive, in 54 cases (44.2%) B / C was negative and in 64 cases (52.4%) no report was recorded. CSF color was clear in 53 cases (43.4%) and colorless in 69 cases (56.5%). In the study of the number of WBCs in CSF, there was an increase in leukocytes in 112 patients (91.8%), which was dominated by neutrophils.

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