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MANAGEMENT OF NON-ADULT ACUTE BACTERIAL MENINGITE

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ABSTRACT

Introduction: Meningitis involves the brain and spinal cord, corresponding to an inflammation of the leptomeninges. Acute bacterial meningitis (MBA) is a neurological emergency, as it has high morbidity and mortality. The identification of the disease as early

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as possible and the initiation of the respective treatment is important to improve the patient's prognosis. Objective: To analyze the management of patients with acute bacterial meningitis. Methodology: This is an integrative review of the last 5 years, from 2020 to 2025, the site used for research was the Virtual Health Library (VHL). The databases used were the Latin American and Caribbean Literature on Health Sciences (LILACS), IBECS and Medline. The descriptors used were: "treatment" "meningitis" "bacterial" "management". A total of 52 articles were found, which were submitted to the selection criteria. In addition, a document from the Neurology Treaty of the Brazilian Academy of Neurology was used. The inclusion criteria were articles that were made available in full and that were related to the proposal studied. The exclusion criteria were articles available in the form of abstracts, case reports and those that were not related to the proposal studied. Results and Discussion: The use of antibiotic therapy is important for the treatment of this disease. It is used empirically in clinical suspicion, as its postponement is associated with increased mortality. The most commonly used class of antibiotics are beta-lactams, among them, mainly, penicillin G, ampicillin, cefepime, meropenem, ceftriaxone and cefotaxime. In newborns it is done with cefotaxime associated with ampicillin. In children and adults, a 3-generation cephalosporin, such as ceftriaxone or cefotaxime, is used along with vancomycin. Patients over 50 years of age use a 3rd generation cephalosporin, plus vancomycin and ampicillin. Immunosuppressed patients use vancomycin, ampicillin, and cefepime or meropenem. The use of corticosteroids is important to reduce the inflammatory response and improve the prognosis. Prophylactic antibiotics may be used in some cases. The use of the vaccine helps prevent the disease. Conclusion: From this perspective, the importance of appropriate management is evidenced, through diagnostic suspicion and early treatment to reduce morbidity and mortality, thus improving the patient's prognosis.

Keywords: Meningitis. Bacterial. Acute. Handling. Treatment.

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INTRODUCTION

Meningitis involves the brain and spinal cord, corresponding to an inflammation of the leptomeninges (arachnoid and pia mater) (BATISTA, 2022). There is a possibility of infection from different causes, whether viral, bacterial, parasitic, or fungal (BATISTA, 2022).

The respiratory tract is the form of transmission of the disease that can lead to a process of dissemination, by secretion and droplets from the upper airways (BATISTA, 2022).

Acute bacterial meningitis (MBA) is a neurological emergency, as it has high morbidity and mortality (SUNWOO *et al.*, 2021). Annually, it is estimated that there are close to 1.2 million cases of this condition in the world (SUNWOO *et al.*, 2021). It is among the 10 main causes of lethality by infectious agents, in addition to being responsible for causing sequelae in survivors (GAGLIARDI, 2019).

Regarding signs and symptoms, 2 of the following manifestations may be present: fever, headache, nausea and/or vomiting, and neck stiffness (GAGLIARDI, 2019). Regardless of whether or not the cerebrospinal fluid test is performed in suspected infection, blood culture and empirical treatment associated with dexamethasone should be performed as early as possible, as the late administration of antibiotics is associated with increased mortality and complications (GAGLIARDI, 2019; SUNWOO *et al.*, 2021). It should be noted that cerebrospinal fluid puncture is a key method for diagnostic confirmation and etiological identification of the pathogen (CARTER, 2022). There are some contraindications to puncture, such as local puncture infection, signs of severe sepsis or rapidly evolving rash, coagulation abnormalities, and cardiac or respiratory impairment (CARTER, 2022).

In one study, a difference in the causative agents of meningitis was observed in patients who acquired it in the community and in those who acquired it in the hospital (SUNWOO *et al.*, 2021). *Streptococcus spp.* was the main cause in the community, reaching 34.9% of the cases, while *Staphylococcus spp.* reached 44.1% of the cases in the hospital environment (SUNWOO *et al.*, 2021). Aspects such as neurological complications, advanced age, and severe mental status deterioration were associated with those with the worst prognosis (SUNWOO *et al.*, 2021).

In patients with community-acquired meningitis, *K. pneumoniae* was the most common in isolation, corresponding to 25.6%, followed by *S. pneumoniae* (18.6%) and *L.*

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monocytogenes (11.6%) (SUNWOO *et al.* , 2021). Among patients with medically related meningitis, the most common isolated agents were, respectively, coagulase-negative staphylococci (28%), then *S. aureus* (16.1%), followed by *Enterobacter spp.* (13.6%) (SUNWOO *et al.*, 2021).

MBA is a disease that has high complication rates, and in up to 39.1% of cases it may present neurological complications, with a mortality rate of 14.8% in a period of 3 months (SUNWOO *et al.*, 2021).

Some of the cerebrovascular complications involved in the disease can occur, such as cerebral infarctions (DELIRAN, 2022). There are other complications, although less common, such as cerebral sinus thrombosis and subarachnoid hemorrhages (SAH) (DELIRAN, 2022). SAH is rare, but severe, which can have a mortality rate of more than 50% of cases and unfavorable outcomes of more than 80% (DELIRAN, 2022).

An adequate understanding of the pathogen that caused the host infection, in addition to its respective susceptibility to the antibiotic, is an important factor to optimize antimicrobial treatment, being important for the treatment and its respective improvement of the patient's condition (SUNWOO *et al.* , 2021).

In this sense, the earliest possible identification of the disease and the initiation of its treatment is important to improve the prognosis (SUNWOO *et al.*, 2021).

The objective of this study is to analyze the management of patients with acute bacterial meningitis.

METHODOLOGY

This is an integrative review of the last 5 years, from 2020 to 2025, the website used for research was the Virtual Health Library (VHL) and the databases of the Latin American and Caribbean Literature on Health Sciences (LILACS), IBECS and Medline. The descriptors used were: "treatment" "meningitis" "bacterial" and "management". A total of 52 articles were found, which were submitted to the selection criteria. In addition, a document from the Neurology Treaty of the Brazilian Academy of Neurology was used.

The inclusion criteria used were language-independent articles, from 2020 to 2025, which were related to the proposed theme and which were made available in full. The exclusion criteria were: articles available in the form of abstracts, case reports and those that were not related to the proposal studied.

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After the selection, 6 articles remained, in addition to the neurology document. The articles were submitted to a thorough analysis for data collection. The results were shown descriptively.

RESULTS AND DISCUSSION

Stabilization of the airway, circulation, and breathing is a primary and immediate priority (CARTER, 2022). There is an association with increased intracranial pressure in patients with MBA, and some studies indicate the monitoring of this pressure by invasive monitoring and cerebrospinal fluid diversion techniques for treatment and, therefore, improving the patient's prognosis in cases where there is this elevation, but there is a need for further studies for the real feasibility of this monitoring and technique (EL-HAJJ *et al.*, 2024; PROVENCIO, 2024).

The use of antibiotics should be administered immediately after blood culture collection (CARTER, 2022). If a septic patient, the guidelines regarding sepsis are used for management (CARTER, 2022). A delay of more than 2 hours in the administration of the antibiotic is associated with a doubling of mortality, and it is recommended to administer the antibiotic within this period of time in patients with the infection without sepsis, in order to reduce patient mortality (CARTER, 2022).

Initially, treatment is carried out empirically (SUNWOO *et al.*, 2021). The choice of antibiotic depends on some factors, such as age, predisposing condition and immunological status of the host (SUNWOO *et al.*, 2021). In adults, according to previous epidemiological studies, there is a higher prevalence of pathogens that include *Neisseria meningitidis, Haemophilus influenzae, Streptococcus pneumoniae,* and *Listeria monocytogenes*. These pathogens are the main causes of bacterial meningitis in adults (SUNWOO *et al.*, 2021). There are other variables that have to be considered for specific treatment, such as bacterial resistance and whether it was acquired in the community or in a hospital environment, and it is important to investigate the clinical, microbiological and laboratory aspects for identification and appropriate treatment (SUNWOO *et al.*, 2021).

The K. pneumoniae *susceptibility rates* in one study were 85.7% for ceftriaxone, 81.3% for cefepime, and 100% for meropenem (SUNWOO *et al.* , 2021).

The most used class of antibiotics are beta-lactams, among them, mainly, penicillin G, ampicillin, cefepime, meropenem, ceftriaxone, and cefotaxime (BATISTA, 2022).

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Empirical treatment in newborns is done with cefotaxime associated with ampicillin (BATISTA, 2022). In children and adults, a 3-generation cephalosporin, such as ceftriaxone or cefotaxime, is used, along with vancomycin (BATISTA, 2022). Patients over 50 years of age use a 3-generation cephalosporin, plus vancomycin and ampicillin (BATISTA, 2022). Immunosuppressed patients use vancomycin, ampicillin, and cefepime or meropenem (BATISTA, 2022). The site of infection of the pathogen must also be taken into account, in addition to the age group, in the following table the empirical antibiotic is observed according to the suspicion of the pathogen and site of infection (table 1) (BATISTA, 2022):

Table 1: Empirical antibacterial treatment for Bacterial Meningitis according to bacteria and site of infection

Focus of Infection	Bacterium	Treatment
Sinusity or Otite	*Streptococcus* sp *Haemophilus* sp Gram-negative bacilli *Staphylococcus aureus*	Vancomycin + Metronidazole + cefotaxime or ceftriaxone
Nosocomial	*Staphylococcus* sp Gram-negative bacilli	Vancomycin + cefotaxime or ceftriaxone
Trauma penetrating or post-neurosurgery	*S. aureus* *E. coli*	Vancomycin + Metronidazole + cefotaxime or ceftriaxone
Endocarditis	*Viridans Streptococcus* Enterococcus	Vancomycin + cefotaxime or ceftriaxone

Source: Batista, 2022

The use of corticosteroids is also used as an adjuvant therapy, in order to reduce the inflammatory response in the cerebrospinal fluid and cerebral edema, with the most commonly used corticosteroids being hydrocortisone, prednisolone, and dexamethasone, of these, the most used is dexamethasone (BATISTA, 2022). There are studies that have observed that the use of corticosteroids is associated with decreased rates of hearing loss and short-term neurological sequelae (BATISTA, 2022). It has been noted that there is a decrease in mortality in patients infected with pneumococcus (BATISTA, 2022). It is more effective when administered minutes before or after antibiotic administration (BATISTA, 2022).

The use of antibiotics can be used in cases of prophylaxis in people who have had close contact with individuals with meningococcal meningitis and with exposure to

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respiratory tract secretions (BATISTA, 2022). In these cases, rifampicin is used (BATISTA, 2022). Other treatment options are ceftriaxone and ciprofloxacin (BATISTA, 2022). In meningitis caused by *H. influenzae* type B, rifampicin can be used for prophylactic treatment (BATISTA, 2022). The use of vaccines such as pentavalent, meningococcal type C, and pneumococcal are important to reduce the chances of infection and complications caused by the disease (BATISTA, 2022).

CONCLUSION

From this perspective, the importance of adequate management of the MBA is evidenced, either by identifying the disease early and starting treatment with empirical antibiotics, with the choice made depending on the patient's particularities, to improve the patient's morbidity and mortality, or also by using antibiotics prophylactically in patients who had contact. Vaccines also play a key role in preventing this condition to reduce infection and more severe forms of the disease.

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