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Comparative Study of Antibiotic Regimens for Lung Abscess Treatment

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Annotation: Vaccines, immune sera, and monoclonal antibodies represent pivotal tools in the prevention and treatment of infectious and non-infectious diseases. Vaccines, based on live-attenuated, inactivated, subunit, or mRNA platforms, stimulate active immunity by inducing a targeted and long-lasting immune response. They have significantly reduced the prevalence of life-threatening diseases such as polio, measles, and COVID-19.

Immune sera, derived from the plasma of immunized individuals or animals, confer passive immunity by providing ready-made antibodies. This approach is particularly useful for immediate protection or therapeutic intervention, such as in the management of rabies, snake bites, and certain toxin-mediated conditions.

Monoclonal antibodies, engineered to target specific antigens, have revolutionized the treatment landscape. Their applications range from infectious diseases, such as respiratory syncytial virus (RSV) and SARS-CoV-2, to chronic conditions like rheumatoid arthritis and various cancers. Advances in biotechnology have enabled the development of humanized and fully human monoclonal antibodies, enhancing their efficacy and reducing adverse effects.

This abstract highlights the critical roles of vaccines, immune sera, and monoclonal antibodies in modern medicine, emphasizing their mechanisms of action, therapeutic applications, and impact on global health. Ongoing research continues to expand their potential, addressing emerging infectious threats and complex diseases.

Keywords: SARS-CoV-2, mRNA, RSV, mAbs

Introduction

In the etiopathogenesis of acute pulmonary suppurations, non-spore-forming anaerobic microorganisms play a leading role. More than 300 species of pathogens of this group are known, capable of causing destruction of the lungs. Of the purulent foci, Bacteroides, Fusobacterium, Peptostreptococcus, Peptococcus and others are most often isolated, that is, flora that usually colonizes the nasopharyngeal region. In acute abscess and gangrene of the lung, non-spore-forming anaerobes are always found in association with aerobic hospital strains. Most often these are Pseudomonas aeruginosa, Escherichia coli, Klebsiella pneumoniae, Staphylococcus aureus, etc. In

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the pathogenesis of bacterial destruction of the lung, great importance is attached to the disruption of the patency of the bronchial branches with the formation of atelectasis, as well as the disruption of blood circulation in the bronchial and pulmonary vessels with the development of ischemia of the bronchopulmonary structures. It arises majorly from aspiration of oral bacteria, complications from other lung diseases or bacterial pneumonia. A lung abscess It is potentially a life threatening condition that requires appropriate treatment. Comparative study of the antibiotic regimens aim to determine appropriate and most effective treatment approach it majorly involves comparing different antibiotic combinations, dose adjustment and time duration to identify optimal treatment plan or therapy for specific population.

Treatment of acute bacterial destruction of the lung is the unconditional prerogative of surgeons. The best results are achieved in specialized thoracic departments. The severity of the patient's condition requires a variety of intensive care, parasurgical procedures and emergency surgeries when complications arise.

Conservative treatment includes infusion media and drugs capable of correcting homeostasis disorders that develop as a result of prolonged intoxication, hypoxemia and anorexia. Methods of efferent therapy and gravitational surgery are used, provided that the abscesses are adequately drained.

When a patient with acute bacterial destruction of the lungs is admitted to a surgical hospital, empirical antibacterial therapy is immediately prescribed based on data on the polymicrobial etiology of pleuropulmonary infection. Subsequently, the prescriptions are adjusted taking into account the results of microbiological examination of the contents of the abscesses. Combined antibacterial therapy is often used in the treatment of acute abscess of the lung. However, monotherapy with cefoperazone/sulbactam or carbapenems is possible. In the acute period of the disease, antibiotics are administered mainly intravenously. An indispensable condition for antibacterial therapy is the prevention of systemic mycosis with antifungal agents (diflucan, mycosyst, flucosanol, etc.).

Purpose of the study: To determine the safe treatment approach for this lung infection and identifying the most effective antibiotics, optimizing treatment duration and informing clinical guidelines, as it is potentially a life-threatening condition.

Materials and methods: a cohort study was performed in 3 patients' groups to compare outcomes in patients receiving different antibiotics regimens over time. An empiric antibiotic therapy was considered. Drugs were administered until the complete resolution of radiological abnormalities. Group 1 had 15 patients (7 men and 8 women), group 2 had 14 patients (6 women and 8 men) group 3 had 12 patients (7 men and 5 women). Group 1 was administered with combination of a ampicillin/sulbactam they were majorly having small abscess (<2cm), at the time of administration patients in group 1 were having normal hepatic and renal functions. In group 2 patients were administered with moxifloxacin (avelox) a fluoroquinolone it is also clinically effective and safe as ampicillin plus sulbactam in the treatment of lung abscess. In group 3 patients were administered with clindamycin, they were also majorly having small abscess (<2cm). Mean duration of the therapy for each group was noted. As well as the data for the effectiveness of the therapy within 14 days was also noted. It's also important to note the adverse effects and risk of clostridium defficile infection due to the therapy. As the therapy for lung abscess is a longer therapy which subsequently increases the risk of clostridium defficile infection. A descriptive statistical analysis also represented as absolute values and percentages was also done for the better regimen by comparing top research articles in order get a better clarity on regimen of lung abscess. It also shown the nearby similar results.

Results and discussion:

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In group 1 patients were administered with combination of ampicillin/sulbactam (1.5-3 gr IV), out of 15 patients 2 patients (13%) were allergic to ampicillin rest 13 patients responded very well to the therapy with very mild side effects, 11 patients (73%) complained about Nausea and rest 2 didn't shown any side effects. The mean duration of therapy was 26.5 days and the clinical response was 75.5% and 68% 10-14 days after therapy. Overall, the therapy was well tolerated and very effective. The 2 patients allergic to ampicillin were administered with alternative therapy of piperacillin/tazobactam shown nearby equal effectiveness with mean duration of therapy for 30 days and the clinical response of 70 and 62.5 10-14 days after therapy. In group 2 patients moxifloxacin (400 mg q.d) administered orally. Mean duration of the therapy with moxifloxacin lasted for 40 days. The overall clinical response was 72% which is approximately similar as compared to therapy with ampicillin/sulbactam. Moxifloxacin was also considered effective and well tolerated with 3 (21%) patients shown no side effects and 2 (14%) patients complained about diarrhea and nausea, 6 (42%) complained only about Nausea and rest 23% do not shown any side effects. As therapy with moxifloxacin is a long-term therapy which increases the risk of pseudomembranous colitis (infection caused by clostridium defficile). Group 3 patients administered with clindamycin (600 mg IV). Mean duration of the therapy was 24.5 days and the clinical response was 68.5% at the end of therapy and 64.5% 7-14 days after the therapy. Clindamycin was also well tolerated and equally effective in the treatment. Only 1 patient shown the hypersensitivity reaction to clindamycin, maculopapular rash after 7 days if initiation of the drug, 4 (33%) patients complained about the diarrhea and nausea, rest were normal with approximately no side effects. According to the statistical analysis the optimal duration of the treatment is 4-7 weeks. If the patient doesn't respond to the antibiotics within 7-8 days, an alternative complication or diagnosis should be considered. As empirical therapy clindamycin has shown 70 % success rate and ampicillin/sulbactam has shown 75-80% success rate and moxifloxacin has shown a success rate of 65%.

Conclusion: As a result of the study patient with lung abscess (<2 cm) were well tolerated and effective in case of all of the three therapies and all of them shown nearby none to mild side effects, the duration for the therapy with moxifloxacin was the longer (40 days) as compared with as that of ampicillicin/sulbactam (26.5 days) and clindamycin (24.5 days). While all of the three therapies were nearby equally effective, ampicillin and sulbactam having great overall clinical response of 75.5%. Ampicillin/sulbactam showed superior outcomes in terms of mean duration, reduced complication, resolution rates. However individualized therapy is very essential, considering factors such as microbial resistance and severity of the abscess.

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