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Clinical Pharmacological Approach To The Use Of Antibacterial Therapy In Older People

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Abstract. The clinical pharmacological approach to antibacterial therapy in older people is crucial for ensuring effective treatment while minimizing adverse effects and resistance development. This article explores age-related physiological changes that influence drug pharmacokinetics and pharmacodynamics, including altered absorption, distribution, metabolism, and excretion. The selection of appropriate antibacterial agents, dose adjustments, drug interactions, and the risks of polypharmacy in elderly patients are analyzed. Additionally, strategies for optimizing therapy to reduce antibiotic resistance and improve patient outcomes are discussed, along with recent advancements in geriatric antimicrobial stewardship.
Keywords: Antibacterial therapy, elderly patients, clinical pharmacology, pharmacokinetics, pharmacodynamics, antibiotic resistance.

INTRODUCTION

The high incidence of infectious pathology in the elderly, along with its unfavorable prognosis, justifies the widespread use of antimicrobials in them. The latter are among the most frequently prescribed drugs (about 40%) in specialized long-term care units for elderly patients. However, the prescription of antimicrobials in older age groups is not always clinically justified.

The decision to prescribe antimicrobials to the elderly requires mandatory consideration of the characteristics of this age group:

age-related morphofunctional changes in various organs and tissues;
polymorbidity (the presence of two or more diseases);
chronic course of many diseases;
drug therapy requiring the use (often long-term) of several drugs (forced polypharmacy);
features of clinical manifestations of infection;
more frequent and severe drug complications;
features of psychosocial status.

The choice of antimicrobials in the elderly is determined by various factors, the most important of which are discussed below.

MATERIALS AND METHODS

An approximate determination of the etiology of infection is the most important criterion in the choice of antimicrobial agents. This is due to the need to initiate therapy as early as possible, which is associated with a high risk of rapid progression of infectious inflammation, development of complications, frequent decompensation of concomitant pathology, and an unfavorable prognosis for the disease. For example, mortality in the first 30 days in patients over 65 years of age with severe pneumonia, in whom antibacterial therapy was initiated in the first 8 hours after admission, was significantly lower than in patients who received antimicrobial agents at a later date. Clinical manifestations of infection in elderly patients may be atypical, nonspecific, or absent altogether. One of the features of the clinical manifestations of geriatric infection is the frequent absence of fever, the presence of cognitive impairment, sudden confusion, and weak local symptoms of infection. Often, clinical symptoms of infection in the elderly, in particular with urinary tract infections, are completely absent. There are some peculiarities of the etiology of infections in elderly people [1]. Thus, if the causative agents of community-acquired pneumonia in the general population are a fairly limited range of microorganisms (S. pneumoniae, H. influenzae, M. pneumoniae and C. pneumoniae), then in elderly people, along with the above bacteria, the causative agents of the disease can be enterobacteria and P. aeruginosa.

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Elderly people are the highest risk group for tuberculosis, not counting patients with HIV infection. Mortality from tuberculosis also increases with age. Its level in the elderly is 10 times higher than in young people.

The most typical geriatric infections are UTIs, the mortality from which in the elderly is 5-10 times higher than in young people. In contrast to younger people, in whom UTIs occur mainly in sexually active women, among the elderly this infection is observed in patients of both sexes. The main causative agents of urinary tract infections are E. coli, Proteus spp., other enterobacteria, less often - Enterococcus spp., S. aureus. Most cases of urinary tract infections in the elderly are latent, asymptomatic bacteriuria is often detected, causing difficulties in interpretation and deciding on the advisability of antibacterial therapy.

Special situations in geriatric practice are infections in people living in nursing homes. Approximately 75% of all infections in them are pneumonia, urinary tract infections, skin and soft tissue infections [2].

The spectrum of causative agents of pneumonia in people living in nursing homes includes S. pneumoniae (12.9%), H. influenzae (6.4%), S. aureus (6.4%), M. catarrhalis (4.4%), the Enterobacteriaceae family (13.1%). The etiology of pneumonia in this population is not always possible to determine, due to the frequent inability to obtain an adequate sputum sample for testing. Another problem is the difficulty in distinguishing between microbial colonization with aerobic gram-negative microorganisms and true infection. It is known that the frequency and extent of colonization of the oropharynx with gram-negative microorganisms increases with age.

RESULTS AND DISCUSSION

Pharmacokinetic properties of AMPs in elderly patients may change due to concomitant diseases with functional disorders of the kidneys and liver. Along with manifest pathologies (chronic renal failure, liver dysfunction, etc.), age-related changes in the kidneys and liver that affect the metabolism and elimination of AMPs should also be taken into account. It is known that with age, glomerular filtration rates decrease, which should be taken into account when prescribing AMPs excreted by the kidneys. When choosing AMPs in elderly patients with concomitant chronic renal failure, it is preferable to prescribe drugs that are metabolized in the liver (macrolides, metronidazole) or have a dual elimination pathway (cefoperazone). For AMPs with a renal excretion pathway, it is necessary to reduce the dose proportionally to the decrease in glomerular filtration. The pharmacokinetic interaction of AMPs with other drugs is of particular importance in elderly patients receiving several drugs for their frequently occurring concomitant pathology (calcium, iron, NSAIDs, theophylline, etc.). For example, absorption of fluoroquinolones may be impaired in elderly patients receiving iron, aluminum, magnesium, and calcium preparations due to concomitant pathology.

Compliance with pharmacotherapy [3]. In elderly and senile people, it is preferable to use AMPs prescribed 1-2 times a day. This is especially true for injectable drugs, since it not only provides a convenient dosing regimen, but also reduces the risk of post-injection complications (phlebitis, hematomas). Single or double oral administration of AMPs promotes greater compliance in elderly patients who, due to memory and vision impairment and the lack of, often, outside supervision, have problems with following the prescribed regimen.

Resistance to AMPs is more common in elderly people than in young people. This is facilitated by polymorbidity in the elderly, more frequent previous antibacterial therapy, especially in patients with repeated infectious exacerbations of COPD or recurrent urinary tract infection, and, finally, living in nursing homes. Widespread and often unjustified use of AMPs contributes to the development of resistance not only to "old" drugs, but also to relatively recently introduced drugs, such as fluoroquinolones. Therefore, when choosing AMPs for empirical therapy, it is necessary to take into account the local epidemiology of antibiotic resistance that has developed in the region, hospital, or department.

AMP safety is of particular importance in elderly patients due to concomitant, often multiple, diseases. Thus, in elderly people, nephrotoxic and ototoxic effects of aminoglycosides, nephrotoxic effect of high doses of cephalosporins are more often recorded, and the administration of cotrimoxazole is associated with a higher risk of neutropenia. It is advisable to reduce the dose of AMPs in patients with significant weight loss, especially in women. When prescribing AMPs excreted by the kidneys, it is necessary to adjust the dose taking into account creatinine clearance, which decreases after 30 years of life annually by 1 ml / min. It is necessary to prescribe with caution to the elderly or, if possible, avoid the use of aminoglycosides, amphotericin B, vancomycin.

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In order to ensure greater safety, it is preferable to prescribe AMP orally or timely switch from parenteral to oral administration (step therapy).

The criteria for switching from parenteral administration to oral AMP should be considered normal body temperature indicators with 2-fold measurement over the last 16 hours, a tendency to normalize the number of leukocytes, subjective improvement in well-being, the absence of signs of impaired absorption. The optimal time for switching from parenteral to oral therapy is 48-72 hours. Usually, they switch to the oral form of the same AMP, but it is possible to use a drug with a spectrum of activity close to the parenteral AMP. For example, if ampicillin was administered parenterally, amoxicillin is prescribed orally. To ensure high compliance, preference should be given to AMPs with good bioavailability and a convenient dosing regimen (1-2 times a day). Modern fluoroquinolones, in particular levofloxacin, can meet these requirements. Currently, there is extensive data on the high clinical and microbiological efficacy of levofloxacin in the context of step therapy, comparable to ceftriaxone and superior to the combination - ceftriaxone or cefuroxime axetil in combination with erythromycin or doxycycline in the treatment of severe community-acquired pneumonia. The cost of AMPs, all other things being equal, is of considerable importance for the elderly. At the same time, when assessing their financial capabilities, the doctor should be aware that often the use of a cheaper drug can lead to insufficient effect, a protracted course, the development of complications and, ultimately, the treatment turns out to be more expensive [4]. Ultimately, the most expensive AMP is the one that has no effect.

CONCLUSION

Antibacterial therapy in older adults requires a careful and individualized approach due to age-related physiological changes and the increased risk of drug interactions. Rational prescribing, dose adjustments, and antimicrobial stewardship programs are essential to minimize adverse effects and combat antibiotic resistance. Future research should focus on developing optimized treatment guidelines specifically tailored to the elderly population to enhance therapeutic efficacy and patient safety.

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