

Chapter 1

Introduction

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The prevalence of most bone and joint infections is steadily increasing, mainly due to the rising life expectancy of the population, and the increased use of bone fixation devices and prosthetic joints. For frequent infectious diseases, such as respiratory tract, urinary tract, and bloodstream infections, many diagnostic and therapeutic aspects have been studied in a controlled fashion [e.g. 1–3]. In contrast, in the field of bone and joint infections, randomized controlled trials are rare. Exceptions are a randomized controlled study on the role of rifampin in patients with orthopedic implant-associated infections, and a controlled trial comparing two different durations of antibiotic treatment in patients with vertebral osteomyelitis [4,5]. Therefore, diagnostic and therapeutic advice must be based mainly on individual clinical expert knowledge and observational studies [6–10].

The optimal diagnostic and therapeutic management of bone and joint infections needs special know-how in different fields of medicine. Many physicians have only limited clinical experience, since arthritis and osteomyelitis are rare infectious diseases. Therefore, a multidisciplinary approach to these infections is desirable. Only for a few topics are internationally accepted guidelines for the management of bone and joint infections available [11–13]. In addition, publications on the clinical practice comprising different aspects of these infections are scarce. The aim of this book is to close this gap with texts from a multidisciplinary team of experts in the field. Indeed, specialists in microbiology, clinical pharmacology, preclinical research, pediatrics, pediatric and adult orthopedic surgery, infectious diseases, and cardiovascular surgery contributed to this book. This broad spectrum of expertise made it possible to cover a wide range of pathophysiological, epidemiological, diagnostic, and therapeutic aspects of bone and joint infection. The principal focus of the book is on clinical practice. It should enable clinicians to manage patients according to the best available evidence.

Besides the routine microbiological tests, novel non-culture techniques are increasingly used for the diagnosis of infectious diseases, including bone and joint infection. However, the clinical role of molecular diagnostic procedures and mass spectrometry is ill defined.

The potential advantages of these techniques are a more rapid identification and a higher sensitivity, especially in patients with antibiotic pretreatment or with difficult-to-detect microorganisms [14,15].

With a worldwide increase in multidrug resistance, alternative antimicrobial therapies are looked for. The use of bacteriophages is a promising option in patients with bone and joint infection caused by multiresistant bacteria. Bacteriophages have a long history, however it is only recently that experimental and clinical data appeared in the literature [16]. In the near future, controlled clinical trials will show their role in biofilm infections.

The role of the bone/serum ratio in the antimicrobial treatment of bone and joint infections is still a matter of debate. Important methodological differences have to be considered to adequately judge data on bone penetration. These data are often controversially discussed in the literature, mainly due to the use of varying experimental techniques in different studies [17,18]. Distinct differences in the extent of bone penetration by various classes of antimicrobial agents have been observed. However, the proof for the clinical relevance of these differences is still missing. Thus, knowledge about pharmacokinetics and pharmacodynamics of antibiotics in bone should stimulate planning of clinical studies to fill this missing gap. Many current treatment concepts are based on preclinical studies *in vitro* and in animals [19]. Such data are especially important for the management of implant-associated infections, a field in which controlled clinical trials are lacking.

Septic arthritis encompasses a non-homogenous group of joint infections. In this book, eight different clinical situations are covered. In arthritis of children, many aspects differ from arthritis in adults. In children, *Kingella kingae* plays a prominent role, a microorganism which in adults almost exclusively causes endocarditis [20]. In addition, *Streptococcus agalactiae* is still common in neonates. In contrast, *Haemophilus influenzae* type b almost disappeared in young children due to the effective conjugate vaccine. Arthritis of axial joints is rare and difficult to diagnose. IV-drug use is the most frequent risk factor of all types of axial arthritis, namely of the sternoclavicular joint, the symphysis pubis, and the sacroiliac joint. Surgery is rarely needed if the diagnosis is rapidly made and the patient has no pyogenic complications. Prosthetic joints are increasingly used not only in hip and knee, but also in other joints, mainly shoulder, ankle, and elbow. The perioperative infection rate ranges from about 0.5–1.5% after hip or knee arthroplasty up to 10% after elbow or ankle joint replacement. Since many aspects vary between the different joint prostheses, separate chapters deal with periprosthetic joint infection in this book.

Osteomyelitis encompasses a large spectrum of different diseases. Many different classifications are used, depending on different aspects of disease (e.g. pathogenesis, duration, presence of implant) and according to the specialist who is managing the case (e.g. orthopedic surgeon, infectious disease specialist, pediatrician, angiologist). In this book, aspects of age (children, adults), duration of disease (acute, subacute, chronic), presence of implant, anatomic location (long bones, vertebrae, jaws), and presence of diabetes are presented in separate chapters.

Together with all authors, I trust that this multidisciplinary book will allow the gathering of rapid and exhaustive information regarding all types of bone and joint infection. If this book allows you to improve patient management, we have reached our goal.

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