DRUG THERAPY IN

Rheumatology Nursing

Second Edition

Edited by
SARAH RYAN

John Wiley & Sons, Ltd

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Preface

This revised text provides a comprehensive exploration of the drug treatment used in the management of rheumatological and related conditions. It will provide a valuable resource to all nurses and other health professionals in the care of patients with a rheumatological condition, be it in the hospital, community or research setting.

The text has been revised to include the management of patients receiving biologic therapies, my thanks to Susan Oliver who has written this comprehensive section. It is amazing to think that when this book was originally published in 1999, biologic treatments were primarily being used for patients in research studies, whereas now, they have become a mainstream therapy for many patients with an active inflammatory condition. Drugs such as Leflunomide and Mycophenolate are also being used more widely. Also new evidence has altered our use of non steroidal anti-inflammatory drugs (NSAIDs) in practice, this is addressed within this new text and the use of case scenarios will help nurses develop their clinical decision-making skills in the context of the current evidence. There is also a review of community-based provision for patients with a rheumatological condition.

Not only have there been dramatic changes in drug therapy for patients, nurse prescribing has become law and the implications of this for rheumatology nurses are discussed.

Patients will often require a combination of drug therapy to provide symptomatic control and disease suppression. The addition or alteration to a patient's drug treatment will require exploration of the patient's (and their significant others') expectations to ensure that all treatment has meaning and relevance within the patient's contextual framework.

The revised book contains four chapters, each divided into several short sections; each part begins with learning objectives which will guide the reader as to the content of the chapter. The book is based on clinical and research findings to ensure the adoption of evidence-based practice within clinical settings.

The primary aims of this book include:

- An understanding of those rheumatological conditions where drug treatment can be effective.
- The provision of information on different disease processes, so that the utilization of drug therapy can be placed in context.
- Increasing knowledge for nurses and other health professionals on the classification of drugs in common usage, including analgesia, NSAIDs, disease modifying anti-rheumatic drugs (DMARDs), biologic therapies, cytotoxic drugs, steroids, treatments for gout and osteoporosis.

- An exploration of the role of the nurse in the management of drug therapy, focusing on the knowledge and skills required to undertake drug surveillance and assessment of interventions.
- A comprehensive exploration of patient education: theories, principles, content and delivery of education are discussed.
- A review of community based provision for patients with rheumatological conditions.

This book can be used as a reference text for those nurses who seek specific answers regarding an aspect of practice, for example what advice should be given to a patient regarding pregnancy who is taking Leflunomide, as well as providing in-depth information on the principles and components of a wide range of drug therapies for clinicians specializing in this field.

The nurse performs a pivotal role in guiding, supporting and educating the patient and the family to manage their condition effectively. The utilization of this text will enable practitioners to develop and advance their practice to the benefit of the patient.

Sarah Ryan

1 Rheumatological Conditions

JANET CUSHNAGHAN AND JACKIE McDOWELL

Learning objectives

After reading this chapter you should be able to:

- Discuss the anatomy and physiology of the musculoskeletal system in health and illness.
- Describe the process of inflammation and the immune response.
- Develop an understanding of the rheumatic diseases where drug therapy is required.
- Discuss the effects of rheumatic disease on physical, psychological and social well-being.

1.1 INTRODUCTION

The primary objective of this book is to provide the nurse with the knowledge and subsequent understanding of the role drug therapy plays in the management of rheumatological conditions. It is essential therefore that nurses must have a good knowledge and understanding of rheumatological conditions themselves.

Rheumatology is the branch of medicine dealing with disorders of the joints, muscles, tendons and ligaments. Arthritis and the rheumatic diseases in general constitute the major cause of chronic disability in the United Kingdom. It is estimated that musculoskeletal diseases account for one third of the physical disability experienced in the community in the United Kingdom and have an economic cost that exceeds that of heart disease and cancer.

The terms arthritis and rheumatism or rheumatic disease encompass a host of conditions causing much pain and suffering to those affected. The burden of these diseases is felt not only by the sufferer and their family, but also by the community, in terms of the cost of healthcare and the loss of working days. Because of the diversity of rheumatic conditions it is helpful to classify them into groups. This may be undertaken in different ways incorporating:

- clinical and laboratory features;
- disease mechanisms – for example, autoimmunity;
- anatomic structures involved;
- genetic factors;
- involved organ systems and specific abnormalities or deficiencies.

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Table 1.1 Classification of rheumatic diseases.

Inflammatory arthritis
Rheumatoid arthritis
Juvenile arthritis
Polymyalgia rheumatica
associated with spondylitis
Ankylosing spondylitis
Reiter's syndrome
Psoriatic arthritis
associated with infectious agents
Septic arthritis
Reactive arthritis
associated with crystals
Gout
Pseudogout
Non inflammatory
Osteoarthritis
Fibromyalgia
Connective tissue disorders
Systemic lupus erythematosus
Scleroderma
Polymyositis

Classification is hampered by the absence of firm aetiological evidence for most diseases but for this chapter we intend to use a simplified classification, which will correspond to the philosophy of drug therapy which is the main purpose of this text. Table 1.1 classifies the rheumatic diseases according to the presence or absence of inflammation and further subclassifies inflammatory arthritis according to associations that may be present.

1.2 FEATURES OF RHEUMATIC CONDITIONS

Symptoms of rheumatic disease can be determined by a clinical history taking and thorough physical examination. Laboratory and radiographic investigations can aid diagnosis and eliminate certain features but nothing can replace the clinician's clinical skills and pattern recognition. Patients with a rheumatological condition often experience symptoms of pain, swelling, stiffness and loss of function. These symptoms give rise to impairments, which in turn may produce handicap or disability, depending on the interaction of environmental, resource and psychological factors.

One of the primary objectives of the clinical history is to ascertain a greater understanding of the pain:

- Is it inflammatory?
- What is the origin of its presentation?
- What are the aggravating factors?
- What is its temporal pattern?
- Are there any constitutional symptoms suggesting a systemic illness, such as fever or weight loss?

PAIN

Arthralgia implies pain originating from or around a joint, but not necessarily from within the joint itself. Periarticular structures may be responsible for the pain or it may be referred from somewhere away from the joint. Pain originating from joint structures should be improved by resting the joint and aggravated by stretching the joint or weight bearing.

STIFFNESS

Stiffness after prolonged immobility suggests inflammatory joint disease or synovitis. Stiffness alone is a non-specific symptom and can be present in other diseases such as Parkinsonism. It is also present in older individuals. Clinically significant stiffness lasts more than 30 minutes, and in inflammatory disease the duration of stiffness is proportional to the severity of inflammation.

SWELLING

Swelling may be due to synovitis, cellulitis or oedema and it is important to distinguish between them. Joint swelling may be due to soft tissue swelling or synovitis or it may be due to bony swelling indicating osteoarthritis (OA).

JOINT INVOLVEMENT

The pattern of joint involvement, including its symmetry, is helpful in making a diagnosis, although it should be noted that there is considerable overlap between the major causes of inflammatory polyarthritis.

FUNCTION

Loss of function is an important consequence to the patient and should be assessed in work, leisure and home activities. Functional ability depends on need, motivation and environmental factors. The assessment of function will be discussed later in this chapter.

1.3 EPIDEMIOLOGY

Epidemiology is the study of the incidence, distribution and determinants of disease in populations in order to identify causes and ultimately lead to prevention (Table 1.2). In studying the epidemiology of rheumatic disease it is important that diagnostic criteria are used to ensure standardization of disease definition and allow comparisons between populations. Criteria that are designed for research purposes or for entry into clinical trials may not be suitable for routine clinical practice. The prevalence estimates for selected rheumatological disorders are shown in Table 1.3.

Mortality from musculoskeletal disorders is low. The major impact in the population is in terms of morbidity and disability. OA is the most common type of arthritis and its frequency increases with age. Back complaints represent a quarter to a third of all musculoskeletal morbidity.

Table 1.2 Epidemiological definitions.

Incidence	The number of new cases of disease per unit time (for example, cases per annum)
Prevalence	Total number of cases of the disease at a given time point in a defined population
Morbidity	Number of cases with a defined outcome of the disease
Mortality	Number of cases dying from the disease per unit time (for example, deaths per annum)

Table 1.3 Prevalence estimates for selected rheumatological disorders.

Rheumatic disorder	Estimated percent prevalence
Arthropathies	
RA	1.0
In children <16 yrs	0.06
Osteoarthritis	
Moderate/severe X-ray changes in hands or feet	23.0
Knee	3.8
Hip	1.3
Ankylosing spondylitis	0.1
Psoriatic arthropathy	0.1
Crystalline arthritis	1.0
Connective tissue disease	
Systemic lupus erythematosus (SLE)	0.006
Systemic sclerosis	0.002
Back troubles	>20.00

1.4 ANATOMY AND PHYSIOLOGY OF THE MUSCULOSKELETAL SYSTEM

Before learning about the pathology of rheumatic diseases it is important to have an understanding of the anatomy and physiology of the musculoskeletal system in health. The musculoskeletal system serves several purposes:

- it provides stable support;
- it facilitates movement
- it protects vital organs
- it allows for growth and renewal over the lifetime of the individual (Simkin, 1994).

Components of the musculoskeletal system are muscle, bone, tendons, ligaments, cartilage and synovial tissue. All musculoskeletal tissues are supplied by the circulation and guided and protected by their innervation.

MUSCLE

Skeletal or striated muscle provides the energy or driving force for musculoskeletal activity. Chemical energy derived from foodstuffs is ultimately converted to the mechanical energy required to do work. Individual striated fibres are bundled in perimysial tissue that transmits the force of muscle contraction through tendons to attachments on bone. Each fibre can only work in the direction of its long axis and it is only the variety of arrangements within muscles and the cooperation between muscles that allow the full range of possible human activities.

BONE

No muscle contraction would be effective unless it could produce directed motion through a skeletal lever. Each effective motion comes about as muscles act on bones to move the limbs, head or torso. In some cases the mechanical advantage of the muscles is poor and they exert substantial transarticular compressive forces in order to generate the desired movement. The bones of the skeleton have evolved to withstand and distribute these forces. Bone is characterized by the deposition of hydroxyapatite crystals in a well organized, collagenous matrix. There are two types of mature bone: compact and trabecular.

Compact bone is predominant and found in the shafts of long bones. The shafts of long bones contain little or no internal osseous structure, but have a marrow cavity filled with fat and loose interstitial tissue. The bone is covered by a sensitive periosteum that is capable of new bone formation.

Trabecular bone refers to the cross-braced architecture found beneath articular surfaces and in the vertebral bodies. All trabeculae undergo remodelling through ongoing processes of osteoclastic resorption and osteoblastic formation of bone.

CARTILAGE

The contact surfaces of bones are covered by a cushion of cartilage. For the most part this is hyaline articular cartilage, which is principally comprised of water. Its structure is of proteoglycan aggregates restrained within a framework of type II collagen fibres. These aggregates are made up of keratan sulfate and chondroitin sulfate. Cartilage is remarkably firm and resilient. It undergoes continuous turnover, the principal players in this being the chondrocytes that are individually active but are relatively sparse in numbers so the overall metabolic activity of cartilage is relatively low. Normal hyaline cartilage lacks blood vessels and nerves and relies on adjacent structures for nutrition, namely the synovial microvessels.

The synovial fluid is the vehicle carrying nutrients to the chondrocytes and returning waste products to the blood stream. The absence of nerves in articular cartilage means that damage to this structure alone cannot be painful but in conjunction with the involvement of adjacent soft tissues or subjacent bone it will cause pain. A second type of cartilage is fibrocartilage, found at sites subject to shearing forces or under tensile stress. Examples include the moon-shaped cartilages called menisci over each tibial plateau and the principal load-bearing region in the roof of the acetabulum. This type of cartilage is more notable for its fibrous component (mainly type I collagen) than for its proteoglycan composition.

SYNOVIUM

This is a living lining and covers all intra-articular surfaces other than the articulating areas of cartilage. It is a thin structure, in health, with a normal depth of 25–35μm. It is comprised of a well-organized matrix of numerous microfibrils and abundant proteoglycan aggregates. Within this matrix lie the synovial cells. The structure has protective and synthetic capabilities.

LIGAMENTS AND TENDONS

Ligaments are strong bundles of parallel type I collagen fibres that serve as ‘check-reins’ to prevent inappropriate movements. Each hinge joint, for example, is bordered by collateral ligaments to limit movements to flexion and extension. Every ligament runs from bone to bone. Tendons act as active drivers of joint motion as opposed to passive restrainers (ligaments). Tendons and ligaments insert into bone at anatomic sites known as entheses.

TENDON SHEATHS AND BURSAE

Tendons connect muscle bodies to, sometimes distant, insertion sites, and therefore often run through sheaths to avoid adherence to other structures. Similarly, points of potential friction, such as those between ligaments, bony prominences and overlying

skin are often protected by lubricating bursae. These flimsy structures are flattened sacks lined by a tissue that is histologically indistinguishable from synovium. They contain a fluid that appears synovial. It is no surprise therefore that tendon sheaths and bursae are the targets of the same inflammatory diseases that affect synovial joints.

SYNOVIAL JOINTS

These are the commonest type of articulation in the body. They are actively driven by muscles and tendons, stabilized by ligaments, cushioned by hyaline cartilage and are both nourished and lubricated by synovial tissue. A film of synovial fluid lubricates the bearing surfaces and the adjacent interfaces of synovium on cartilage and synovium on synovium.

PHYSIOLOGY

Physiology is the study of how living things work. The principal function of almost all joints is movement. Microscopic examination of synovium and cartilage shows them to be composed of metabolically active cells. This implies that they have the same nutritional requirements as other tissues, produce similar waste products and respond to hormonal and other metabolic stimuli in ways analogous to other tissues. Joints age as do other tissues, with subsequent effects on function. Aspects of physiology include circulation, lymphatics, pressure, diffusion, temperature and innervation. Changes in one ‘system’ can have clinically important effects on another and all are uniquely modified by physical movement.

CIRCULATION

Joints require a blood supply to ensure the health of the cartilage, which lacks blood vessels of its own. The nearest available blood vessels are the capillaries of the synovium. Transport of nutrients is dependent on diffusion. The synovium and synovial space have a major role in facilitating metabolic exchange and in maintaining a normal joint space environment. Large blood vessels of the limbs pass the articular regions, and feeder vessels enter and leave the joint capsule at positions that protect them from mechanical embarrassment during movement.

LYMPHATICS

There is a typical lymphatic system in the synovium but not in the cartilage. Synovial lymphatics carry excess fluid, high molecular weight solutes and protein,

tiny particulates and some cells out of the joint. This transfer is powered by normal movement of the joint.

INTRA-ARTICULAR PRESSURE

Normal intra-articular pressure in a resting joint is subatmospheric. In conditions where there is an abnormal volume of fluid in the joint the pressure will rise nonlinearly. The resulting pressure volume curve defines the compliance of the joint space and its surrounding connective tissue.

MOTION

Motion is the function of diarthrodial joints, but motion itself affects the physiology and health of the joint. If a joint is immobilized cartilage thins and loses its mechanical properties. The application and release of weight-bearing forces play a part in joint lubrication and in the diffusion of substances in and out of cartilage. Joint movement is also required to maintain health by:

- Maintaining normal strength and coordination of muscles
- Preserving bone mass
- Maintaining desired weight
- Preserving normal range of joint motion
- Increasing blood flow to the synovial tissues
- Permitting the lymphatic system to clear the joint of particulates and excess fluid.

INNERVATION

There are no nerves in articular hyaline cartilage. Most of the synovium is insensitive but there are small and isolated areas that are painful when stimulated mechanically. Small diameter nerve fibres are present within the confines of the capsule. The capsule, intra-articular fat pads, ligaments, periosteum, muscles and adjacent bone have abundant innervation. The major function of joint innervation appears to be proprioception – the perception of joint position, and the direction and velocity of movement.

TEMPERATURE

The normal intra-articular temperature of peripheral joints is far less than 37°C. Temperature is largely a function of blood flow. Joint movement increases joint temperature.