Chapter-10

PATHOPHYSIOLOGY AND DIAGNOSIS OF RHEUMATOID ARTHRITIS

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DOI: https://doi.org/10.52458/9789388996846.nsp2023.eb.ch-10
Ch.Id:-GU/NSP/EB/CMDT/2023/Ch-10

ABSTRACT

Rheumatoid arthritis is a chronic autoimmune disease that affects a great number of individuals worldwide, leading to joint inflammation, pain, and disability. The chapter delves into the ethology and pathogenesis of RA, highlighting the role of genetics, environmental factors, and immune dysregulation in disease development. Furthermore, it explores the latest diagnostic tools and imaging techniques, shedding light on early detection and accurate monitoring of RA progression This book chapter provides a comprehensive overview of recent advances in the field of rheumatoid arthritis (RA). The core of the chapter revolves around therapeutic strategies, emphasizing the emergence of biologic agents and disease-modifying antirheumatic drugs (DMARDs) as game-changers in rheumatoid arthritis management. The chapter also discusses the significance of a multidisciplinary approach, incorporating physical therapy, occupational therapy, and patient education to increase the quality of life for rheumatoid arthritis patients. It concludes with a discussion of the challenges and opportunities in the field, emphasizing the need for continued cooperation between researchers, clinicians, and patients to advance our understanding and management of this complex autoimmune disease.

Keyword: *Rheumatoid Arthritis, Autoimmune Disease, Joint Inflammation, Pain and Disability, Management, Genetic and Ecological Factor.*

1.1 INTRODUCTION

Rheumatoid Arthritis (RA) is a chronic autoimmune disorder of uncertain origin, marked by enduring inflammation primarily impacting the peripheral joints. Typically commencing as a subtle, symmetrical arthritis, its trajectory remains unpredictable and variable. Nonetheless, early recognition and timely, suitable treatment can help alleviate pain and disability (Sluka, et.al.,2009).

1.2 EPIDEMIOLOGY AND ECONOMIC IMPACT

- The frequency of rheumatoid arthritis ranges from 0.5% to 1.5% among the population.
- RA predominantly affects female, with a relation of 3 women to every 1 man.
- Onset of rheumatoid arthritis typically occurs between the ages of 30 and 55.
- Over a span of 10 years, nearly half of all patients with rheumatoid arthritis experience substantial functional impairment, leading to progressive disability.
- Both men and women with rheumatoid arthritis face a reduced life expectancy by several years (Lawrence, et al.,1998).

10.3 PATHOPHYSIOLOGY

- Pathogenesis involves various factors, including both genetic and ecological factor influences.
- Immune cells and soluble inflammatory mediators play a crucial relation in the pathogenesis, although the relative contribution of individual components remains uncertain.
- Proliferation of cells in the synovial layer of the joint, together with infiltration by various cell populations, as orchestrated by cytokines, chemokines, growth factors, and hormones, produces a locally invasive pannus that is capable of invading and ultimately destroying cartilage, bone, and surrounding soft tissues (Goekoop-Ruiterman et. al., 2005). **Figure-10.1** indicates the damaging effects of rheumatoid arthritis including swollen synovium, and eroding bone and cartilage.

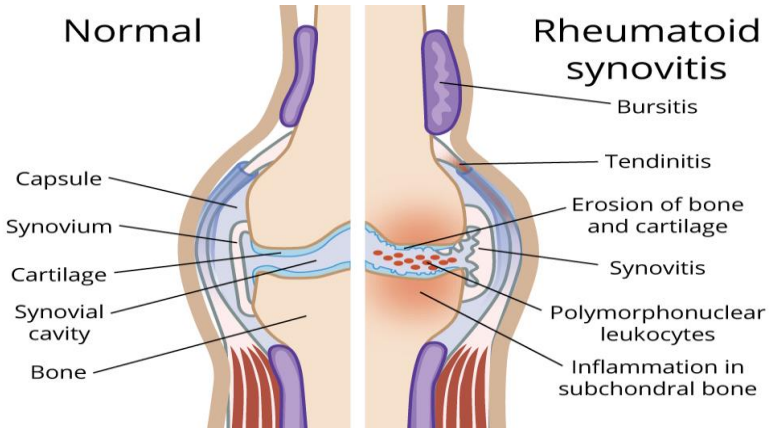

Figure-10.1: Right side shows the damaging effects of rheumatoid arthritis, such as a swollen synovium, and eroding bone and cartilage (adopted from Recklies A. D. et al., 2000).

10.4 CLINICAL FEATURES

- RA presents as a symmetrical polyarthritis affecting the small joints of the hands and feet.
- The onset is most often insidious but can be episodic or acute.
- Inflamed joints become swollen, painful, and stiff. Synovial fluid may accumulate, causing an effusion. Joint pain is usually more prominent and more persistent

than in osteoarthritis, occurring at rest, at night, and on activity. Prolonged early morning stiffness is a key diagnostic feature suggestive of inflammatory disease.

- In increase to causing peripheral symptoms, rheumatoid arthritis may also involve the cervical spine, causing pain in the neck and occipital headache.
- Pain may also occur as a result of temporomandibular joint disease (Arnett, et al.,1988).

10.5 RISK FACTORS

- Genes
- Age
- Sex
- Hormones
- Excess weight

10.6 DIAGNOSTIC CRITERIA

RA diagnosis typically relies on meeting four or more criteria outlined by the American College of Rheumatology, including:

1. Morning stiffness lasting at least 1 hour in and around the joints.
2. Soft-tissue swelling in three or more joints.
3. Swelling in the interphalangeal joints, metacarpophalangeal joints, or wrist joints.
4. Symmetrical arthritis.
5. Presence of subcutaneous nodules.
6. A positive rheumatoid factor test.
7. Radiographic evidence of erosions or periarticular osteopenia in the hand or wrist joints (Arthritis Rheum, 2002).

10.7 DIAGNOSIS AND TREATMENT

1. Early suggestion to a specialist is advisable for patients with rheumatoid arthritis or suspected synovitis of unknown origin.

2. Effective communication and education are essential, along with easy access to a multidisciplinary healthcare team.
3. While analgesics and nonsteroidal anti-inflammatory drugs can help alleviate pain, they don't influence disease progression.
4. Conventional disease-modifying or biological antirheumatic drugs are recommended, ideally within the first months or three months of diagnosis. Treatment should include methotrexate and at least one other disease-modifying agent, along with short-term glucocorticoids.
5. Regular monitoring is necessary to assess therapeutic effectiveness and drug toxicity. This involves tracking inflammatory markers and other key components of disease activity.
6. Routine checks should be conducted for comorbidities such as high blood pressure, ischemic heart disease, osteoporosis, and depression (Deighton, et al.,2009).
7. If the patient does not respond to nonsurgical therapies, a surgical consultation should be sought promptly.
8. Incorporating psychological therapy that covers coping strategies, relaxation techniques, disease and treatment education, and stress management can reduce pain and improve function.
9. Physical therapy is effective in managing rheumatoid arthritis and includes.
    - Aerobic exercise.
    - Strengthening exercises.
    - Transcutaneous electrical nerve stimulation.
    - Ultrasound therapy.
    - Manual therapy.
    - Ice therapy (J. M, et al.,2005).

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