Physiotherapy and rehabilitation in ankylosing spondylitis: is it still the mainstay of management in the era of biologics?

Ankylosing spondylitis is a systemic inflammatory disease characterized by involvement of sacroiliac joints, spine and entheses. In the last two decades a lot of progress has been made both in the diagnosis and management of axial spondyloarthritis, including nonradiographic axial spondyloarthritis. Nonsteroidal anti-inflammatory drugs and TNF inhibitors reduce pain and improve quality of life in most patients. However, the radiologic progression seems to continue, probably due to the interacting pathways of inflammation and bone turnover. Despite pharmacological advances, nonpharmacological therapies including rehabilitation, exercise, spa or balneotherapy, and occupational therapy are still an integral part of the management of patients with ankylosing spondylitis. Although the duration and intensity of nonpharmacological therapies are not conclusive and the compliance for these therapies is low, effective pharmacological therapies seem to motivate and improve the compliance of the patients. Furthermore, the combination of pharmacological and nonpharmacological therapies seems to be feasible and have synergistic effects.

KEYWORDS: ankylosing spondylitis ■ axial spondyloarthritis ■ exercise ■ physiotherapy ■ rehabilitation

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Axial spondyloarthritis: new definitions & management

Ankylosing spondylitis (AS) is a systemic rheumatic disease characterized by inflammation of sacroiliac joints (SIJs), spine and spinal entheses. Other manifestations of the disease include an association with HLA-B27, peripheral joint involvement predominantly of the lower extremities, dactylitis, uveitis, enteric mucosal lesions and skin lesions [1,2]. The past two decades have seen dramatic advances in the pathogenesis, diagnosis, assessment and treatment of AS [3]. The immunohistologic examination of SIJs from patients with AS demonstrated the important role of TNF-α [4]. MRI of the SIJ and axial skeleton is a useful method to detect early active inflammatory lesions with or without structural changes [5]. Advances in MRI led to diagnosis of patients in the early phase of their disease and these patients, without definite radiographic changes in the SIJs, could be classified as having nonradiographic axial spondyloarthritis [6]. In the last update of Assessment of SpondyloArthritis International Society (ASAS)/European League Against Rheumatism (EULAR) recommendations, pharmacologic therapies for the management of AS included NSAIDs, TNF blockers, local corticosteroids and disease-modifying antirheumatic drugs (only for patients with peripheral arthritis) [7].

All these important advances pose the question 'are exercise, physical therapy and rehabilitation still needed for patients with AS in the era of biologics?' A recent Cochrane review suggested that exercise had an effect on spinal mobility measures, pain, physical function and patient global assessment [8]. In the last update of ASAS/EULAR recommendations, patient education and regular exercise are stated as the major nonpharmacological therapies [7] and the importance of supervised exercises has been underlined [8,9]. Recently, the Ankylosing Spondylitis International Federation (ASIF) published recommendations for AS concerning behavior and environmental adaptations including exercises, sports and recreational activities, and suggested that daily disease-specific exercises are an essential part of the therapy of AS [10]. Although evidence from the literature on the effectiveness of nonpharmacological therapies in AS is growing, it must be highlighted that nonpharmacological therapies are an integral part of the management of AS and can be used in addition to, but not instead of, any anti-inflammatory therapies (**Box 1**) [11]. The objective of this review is to highlight the importance and integrality of nonpharmacological therapies for patients with AS in the era of new and effective pharmacotherapies.

Exercise

Exercise is a subset of physical activity and is used for maintaining or improving physical

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Box 1. Key advice to clinicians regarding physiotherapy and rehabilitation in patients with ankylosing spondylitis.

- With regards to early ankylosing spondylitis, rehabilitation programs including patient education, preventive strategies and exercise should start as soon as the disease is diagnosed. Maintaining proper posture, environmental and occupational modifications, regular exercise, awareness and consciousness for possible complications may prevent further detrimental effects of the disease.
- Like any pharmacological therapy, nonpharmacological therapies should be patient-centered. Therefore, any physiotherapy and rehabilitation program should be the product of shared decisions between the patient and the physician, and should be individualized. Rehabilitation programs should enable the patient to achieve independence, social integration and improve their quality of life.
- Patients should be properly assessed and monitored using valid assessment tools and sudden changes during physiotherapy interventions should be carefully examined. Not all pain and discomfort is related to the flares, and complications such as fractures or ruptures should be kept in mind.
- Patients should be encouraged to participate in lifelong regular exercise. For better compliance and benefit, these exercises could be individualized according to the patient's needs and expectations.
- Conventional exercise protocols including flexibility and stretching of the spine and root joints and breathing exercises should be recommended. Patients should be encouraged to take part in sports and recreational activities. Swimming is one of the most suitable sports; however, contact sports with high risk of trauma should be avoided.
- There is limited evidence for the use of some physical therapy modalities in the management of ankylosing spondylitis. However, some of these modalities could be used based on expertise or the evidence acquired from their use in other rheumatic disorders.

fitness. Exercises for patients with AS are usually a combination of muscle strengthening, range of motion, flexibility and cardiorespiratory exercises [12]. Exercise programs improve aerobic capacity, muscle strength, flexibility and spinal mobility [13]. Although positive effects of exercise in reducing symptoms and increasing function and spinal mobility is well recognized, long-term outcomes and the influence on radiographic progress is not shown in the studies. Different types of exercises, such as land-based, water-based, home-based, individual and supervised exercises, have been described and studied; however, it is yet to be determined which type of exercise is more effective. A recent Cochrane review suggests that: individualized home-based exercises or supervised exercises are superior to no intervention; supervised group exercises are superior to home exercises; and a combination of spa and group physiotherapy is superior to group physiotherapy alone [8].

Patients with AS are generally young and of working age, therefore, home-based exercises are practical and time efficient. Home-based exercises consist of back and recreational exercises. Regular home-based exercises not only reduce pain, but also improve spinal stiffness, chest expansion and quality of life in patients with AS [14]. The optimum duration and intensity of the exercises are not clear. The perception of the positive effects of exercises are well known by patients, however, their compliance is low [15,16]. Some patients may not be aware of the benefits of exercise or have some difficulty performing exercise [17]. Motivation itself may improve function as much as exercise, therefore, any intervention to motivate and to increase the amount of exercise are beneficial [18].

Supervised or group exercises are superior to home exercises [8]. An intensive group exercise was found more effective than home exercise in improving symptoms, mobility and impairment [19]. Another study found that home-based exercises were cheaper, more easily performed and as efficient as supervised exercise and also favorably preferred by the patients with AS [20]. There are studies focusing on 'experimental exercise' designed for postural affections and exercises of shortened muscle chains in patients with AS [21]. The 'Global Posture Re-education' method is based on the treatment of the shortened muscle chains and has been shown to be superior to conventional exercises in patients with AS [21,22].

There is also a growing number of studies on the combination of exercise and anti-TNF treatments [23,24]. A recent study reported that combination of home exercise and TNF-blocking therapy was superior for increasing functional capacity, joint mobility and quality of life compared with anti-TNF therapy alone [23]. Also, group exercises combined with anti-TNF treatments were more efficient in patients with AS, suggesting that intensive rehabilitation is more efficient in patients previously stabilized with biological therapy [24]. In addition, motivation levels and the time spent exercising improved in patients who were treated in combination with anti-TNF [25]. Anti-TNF treatments have synergistic effects through reducing pain and fatigue, therefore, improving motivation and compliance [24].

Patient education

Rehabilitation should be patient centered and should enable the patient to gain independence, social integration and improve quality of life.

Patient education programs covering the diagnosis, prognostic and therapeutic options are highly important to achieve better self-management [26]. Also, patients should be informed of patient societies and self-help groups, as well as reimbursement and insurance systems for better profit. Nonpharmacological approaches, such as patient education and regular exercises, are considered of the same importance as NSAIDs in the first-line therapy of axial spondyloarthritis [7].

Educational courses provided by a qualified team with an interdisciplinary approach have been reported to be more beneficial in patients with early spondyloarthritis [27]. The efficacy of educational programs in terms of financial advantages and reducing sick leave has been shown [28].

The effect of behavioral education programs in patients with rheumatoid arthritis or psoriatic arthritis has been assessed in a randomized controlled trial (RCT). A total of 86 patients received behavioral programs and 81 received standard programs. Patients in the behavioral group showed significantly better pain, fatigue, and functional skills and self-efficacy scores after 6 months of treatment. The authors concluded that a behavioral arthritis education program was effective at improving pain and self-efficacy over a 1-year period [29]. Another study revealed improved pain and anxiety after 12 months of cognitive–behavioral therapy targeting relaxation, modifying thoughts and feelings, and scheduling positive activities in patients with AS [30]. The efficacy of combining educational–behavioral or rehabilitation plus educational–behavioral programs with TNF-blocking therapies has been assessed. The authors concluded that combining intensive group exercise with an educational–behavioral program could provide promising results in the management of patients with clinically stabilized AS under treatment with anti-TNF [24].

Group education programs, as well as self-management courses, have been shown to be useful and improve functioning and motivation [31–33].

Physiotherapy modalities

Evidence-based data on the effectiveness of physiotherapy modalities in the management of AS are lacking. Therefore, the use of these modalities in AS should be based on previous experience acquired from their use in other musculoskeletal disorders [11]. Although thermotherapy is widely used in the physical therapy of rheumatic diseases, the effectiveness of this modality on joint inflammation or disease activity is not clear. The findings of earlier studies were controversial [34]. To date, only two studies have been published in the English literature. One of these studies involved 17 patients with AS and rheumatoid arthritis, and showed that treatment with infrared sauna improved pain, stiffness and fatigue in both groups. Also, no change was noted in disease activity during the 4-week course of treatment [35]. The other study evaluated the effect of total body cryotherapy and whole spine paraffin mud packs in a small group of patients with AS [36]. There is a wide range of electrotherapy modalities used for treatment of musculoskeletal disorders. Only one RCT compared transcutaneous electrical nerve stimulation (TENS) with sham TENS over 3 weeks and reported short-term relative decrease in pain that did not reach statistical significance [37]. Comprehensive occupational therapy (OT) includes combination of daily living activity training, joint protection, energy conservation, instruction in using assistive devices and house adaptations, and advice for leisure time and work. A small randomized study assessed the effect of OT on functional status in 27 patients with AS treated with TNF inhibitors. After 16 weeks, significant improvement in Bath Ankylosing Spondylitis Functional Index , Bath Ankylosing Spondylitis Disease Activity Index, short form-36 (SF-36) mental component score and pain score has been reported in favor of the OT group [38].

Manual therapy is a traditional modality and effective intervention for several musculoskeletal disorders. A RCT reported that self and manual mobilization may improve chest expansion, posture and spinal mobility in patients with AS [39].

Balneotherapy & spa therapy

Hydrotherapy may improve fatigue, pain, stiffness, function and sense of wellbeing in the management of AS. A number of open studies have shown variable results for spa treatment [40–43].

Spa and balneotherapy has been traditionally used in the treatment of AS to improve spinal mobility and pain [44,45].

In a recent meta-analysis, Falagas *et al.* underscore some efficacy for balneotherapy in rheumatic diseases including AS, however, they commented that the research quality is not robust enough to draw firm conclusions [46]. A recent study showed better functions and quality of life if spa rehabilitation was combined with etanercept treatment [47]. Similar results have

been reported by others demonstrating long-term improvement and high tolerability in the combination of spa rehabilitation and anti-TNF treatments [48].

Conclusion

In this era, we have very effective drugs that achieve higher remission rates, symptomatic relief and even retardation of structural damage in various rheumatic diseases. Despite the highest remission rates being achieved in AS under treatment with anti-TNF agents, it is still difficult to suggest that these treatments completely prevent structural damage and ongoing new bone formation. Physiotherapy and rehabilitation is important to reduce pain, preserve spinal flexibility, prevent postural deformities, improve muscle strength and maintain endurance in patients with AS. Rehabilitation programs have documented synergistic effects when used with NSAIDs and anti-TNF treatments. Therefore, nonpharmacological treatments, including physiotherapy and rehabilitation, are an integral part of the management of AS.

Future perspective

In the next 5–10 years, work will focus on early recognition and treatment of axial spondyloarthritis. Recent developments on the genetic markers and other biomarkers of disease, as well as the high success rate of early interventions with biologics, are encouraging. In the near future, new

Executive summary

Axial spondyloarthritis: new definitions & management

- Ankylosing spondylitis (AS) is a systemic rheumatic disease characterized by inflammation of sacroiliac joints, spine and spinal entheses.
- Recent advances have made it possible to recognize axial spondyloarthritis at an early stage, namely nonradiographic axial spondyloarthritis, even though the percentage of these patients who will develop AS is still unknown.
- Despite potent anti-TNF agents, ongoing radiographic progression seems to be a problem.
- Optimal management of AS consists of a combination of pharmacological and nonpharmacological treatments.

Exercise

- Exercise is the mainstay of the nonpharmacological management of AS.
- Exercises for patients with AS are usually a combination of muscle strengthening, range of motion, flexibility and cardiorespiratory exercises.
- A recent Cochrane review suggests that individualized home-based exercises or supervised exercises are superior to no intervention; supervised group exercises are superior to home-based exercises; and a combination of spa and group physiotherapy is superior to group physiotherapy alone.
- Patients with AS are generally young and of working age; therefore, exercise prescription should be feasible and should be individualized according to the needs and expectations of the patient.
- Recent studies show that combining exercise regimens with anti-TNF drugs seems to be feasible.

Patient education

- Rehabilitation should be patient centered and should enable the patient to gain independence, social integration and improve quality of life.
- Patient education programs covering the diagnosis, prognostic and therapeutic options are highly important to achieve better self-management.
- Educational courses provided by a qualified team with an interdisciplinary approach have been reported to be more beneficial in patients with early spondyloarthritis.

Physiotherapy modalities

- Evidence for the effectiveness of physiotherapy modalities in the management of AS is limited.
- Their use for the management of AS should be encouraged and based on expertise or the evidence acquired from their use in other rheumatic disorders.

Balneotherapy & spa therapy

- Evidence for use of balneotherapy and spa therapy in the management of AS is limited. The low quality of the studies restricts the ability to draw firm conclusions.
- Based on the data and expertise this modality has some benefits and results are encouraging if used in combination with other treatments such as anti-TNF agents.

Conclusion

- In this era of biologics, physiotherapy and rehabilitation in patients with AS is still an integral part of the management of AS.
- Physiotherapy and rehabilitation is important to reduce pain, preserve spinal flexibility, prevent postural deformities, improve muscle strength and maintain endurance in patients with AS.
- Rehabilitation programs have documented synergistic effects when in combination with NSAIDs and anti-TNF treatments.

treatment modalities that will stop radiographic progression may be expected, however, non-pharmacological management of AS, including patient education, self-help groups, physiotherapy and rehabilitation interventions, will remain significant. Further research should focus on how and to what extent early rehabilitation interventions prevent deformities and disease progression, and their significance when used in combination with potent biologics.

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