

# FUNCTIONAL RESTORATION OF ANKYLOSING SPONDYLITIS PATIENTS USING DOCUMENTATION BASED CARE TREATMENT CONCEPT- PRELIMINARY RESULTS

**Meral Kozakçioğlu Prof. MD**

Maltepe University, Dept. of Physical Medicine and Rehabilitation, Maltepe, Istanbul, Turkey

## ABSTRACT

• **Objective:** Ankylosing spondylitis is a chronic, inflammatory rheumatic disease that causes arthritis of the spine and the sacroiliac joint thus affecting the mobility of the spine. The aim of this study was to evaluate effect of documentation based care program on range of motion and isometric muscular strength of the lumbar muscles during flexion, extension, rotation and lateral flexion in a group of patients with ankylosing spondylitis.

• **Material and Method:** Three patients with ankylosing spondylitis attending to functional restoration program using DBC were included in the study. Measuring and training units (DBC International,

Vantaa, Finland) are used to measure the maximum isometric strength of the trunk muscles and mobility during flexion-extension, rotation and lateral flexion of the lumbar spine.

• **Results:** In patients with ankylosing spondylitis, functional restoration led to significant increase of motion in all planes. Increase of strength was noted during lumbar flexion, extension, rotation and lateral flexion.

• **Conclusion:** The efficiency of using DBC functional restoration program in terms of gain in range of motion and strength has been demonstrated on ankylosing patients.

• **Key Words:** Ankylosing spondylitis, DBC, functional restoration. Nobel Med 2009; 5(Suppl 1): 63-66

## ÖZET

### ANKİLOZAN SPONDİLİT HASTALARINDA DOKÜMENTASYONA DAYALI TEDAVİ KONSEPTİ KULLANILARAK FONKSİYONEL RESTORASYON-PRELİMİNER SONUÇLAR

• **Amaç:** Ankilozan spondilit omurga ve sakroiliyak eklemlerde artrite neden olarak omurganın mobilitesini etkileyen kronik, inflamatuvar bir romatolojik hastalıktır. Bu çalışmanın amacı dokümentasyona dayalı tedavi programı (Documentation Based Care Treatment Program-DBC) alan ankilozan spondilitli hastalarda lomber omurganın fleksiyon, ekstansiyon, rotasyon ve lateral fleksiyonu sırasında eklem hareket açıklığını ve izometrik kas gücünü değerlendirmektir.

• **Materyal ve Metod:** Ankilozan spondilit tanısı ile takipte olan ve DBC ile fonksiyonel restorasyon programına devam eden üç (3) ankilozan spondilit hastası

çalışmaya dahil edildi. DBC cihazının ölçüm ve egzersiz üniteleri (DBC International, Vantaa, Finland) kullanılarak lomber omurganın fleksiyon, ekstansiyon, rotasyon ve lateral fleksiyon hareketleri sırasında mobilite ve maksimum izometrik kas gücü ölçümleri gerçekleştirildi.

• **Bulgular:** Mevcut çalışma DBC fonksiyonel restorasyon programının ankilozan spondilitli hastalar üzerinde eklem hareket açıklığı ölçümleri ve kas gücü açısından etkin olduğunu göstermektedir.

• **Sonuç:** Ankilozan spondilit hastalarında fonksiyonel restorasyon tüm planlarda eklem hareket açıklığında artma ile sonuçlandı. Lomber omurganın fleksiyon, ekstansiyon, rotasyon ve lateral fleksiyon hareketleri sırasında kas gücünde artma izlendi.

• **Anahtar Kelimeler:** Ankilozan spondilit, DBC, fonksiyonel restorasyon Nobel Med 2009; 5(Suppl 1): 63-66

## INTRODUCTION

Ankylosing Spondylitis (AS) is a member of a group of rheumatic diseases (spondyloarthropathies) affecting the spinal column. AS is a chronic, inflammatory rheumatic disease that leads to arthritis of the spine and the sacroiliac joint and eventually result in vertebral fusion termed as ankylosis. Diagnosis of AS is based on assessments of symptoms, evidence of decreased mobility and radiological changes in the sacroiliac joints.<sup>1</sup> Ankylosis of the spine is a debilitating condition that can cause loss of spinal mobility and function thus impairs quality of life. Additionally, restriction of mobility appears to be an important factor for referral of patients with AS to hospital.<sup>2</sup>

Despite stiffening, spinal mobility should be maintained in AS.<sup>3</sup> Rehabilitation is an essential component of the management of patients with AS. Even in patients with low back pain, it is postulated that the presence of persistent LBP causes patients to avoid daily activities, which may lead to physical deconditioning, both generally (e.g., loss of cardiovascular capacity) as specifically (e.g., loss of strength and endurance of paraspinal muscles).<sup>4</sup>

The aim of this study was to evaluate effects of DBC program on range of motion and isometric muscular strength of the lumbar muscles in patients with AS.

## MATERIAL and METHOD

Three patients with AS attending to functional

restoration program using DBC at a private outpatient clinic (MK) were included in the study. Patients with current nerve root entrapment with intolerable pain, cauda equina syndrome, spinal cord compression, tumors, instability of the spine, severe osteoporosis, previous spinal surgery, cardiovascular or metabolic conditions that could limit exercise capacity were excluded from the study. Also patients who have started but could not complete a minimum of 12 treatment sessions were excluded from the analysis. Patients were evaluated at baseline and completion of the restoration program.

## Measurements

Specially trained physiotherapist at the outpatient clinic is responsible for the interview, measurement and treatment. Measuring and training units (DBC International, Vantaa, Finland) are used to measure the maximum isometric strength of the trunk muscles. The reliability of test results in the devices is acceptable test-retest correlations being higher than 0.90.<sup>9</sup> The strength measurements include flexion-extension of the lumbar spine (DBC 130, DBC 110) rotation (DBC 120) and lateral flexion (DBC 150) on both sides of the lower spine. The results are recorded as the torque produced around the axis of the movement arm in proportion to the patient's body (Nm/kg) so the results of patients of different sizes and weights are comparable. Mobility is measured with the same units using flexion, extension, rotation and lateral flexion movements similar to strength measurements. The movement amplitude and fixation mechanisms of the devices are →

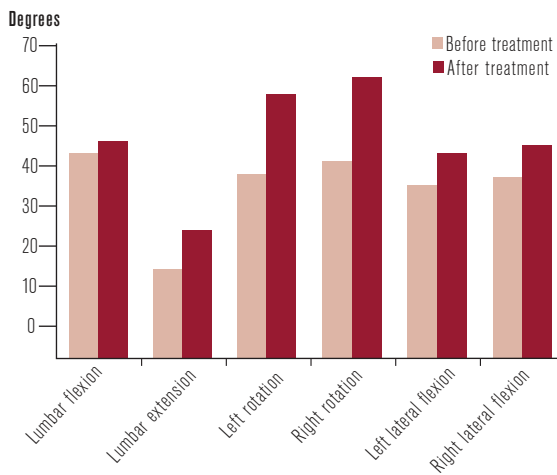


Figure 1: Range of motion measurements before and after treatment

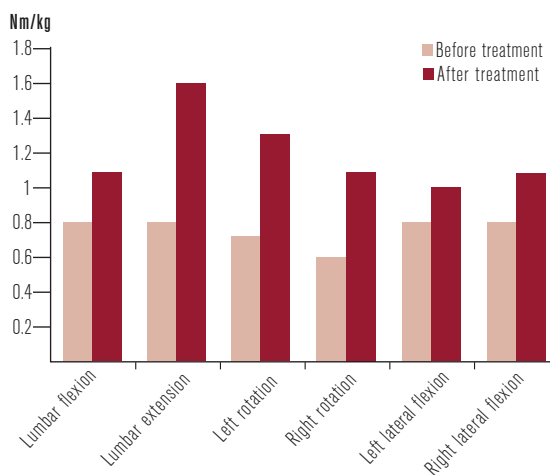


Figure 2: Lumbar strength measurements before and after treatment.

adjusted to focus on the movement of the lumbar spine. The results are given as deviations from the neutral position (degrees).

### Functional Restoration Program

Functional Restoration Program aims to:

- Restore the range of motion
- Restore muscle coordination and movement control
- Improve muscle endurance
- Improve general condition
- Re-educate patients in the difference between normal physical loading and pain
- Reduce fear and avoidance behaviour

Functional Restoration Program combines specific exercises together with cognitive-behavioral support. The exercises progress gradually and are carried out under close supervision of trained staff. Cognitive-behavioral support includes individual education and “learning by doing”. Towards the end of the program,

a home exercise program is introduced to maintain the results. The treatment includes mobility and muscle exercises with specific equipment together with stretching and relaxation exercises, and functional muscle and coordination exercises with special emphasis to extensor muscles. The treatment is primarily based on equipment training; correct loading and range limiters ensure that exercises are performed in a painless range of motion and that they find their target in the lumbar spine. Restoration includes controlled movements in lumbar flexion/extension, rotation and lateral flexion.

Treatment is planned on the basis of initial strength and mobility measurements and records are kept of the progress. The treatment is begun with low loads for the first four weeks with the object of improving mobility and teaching coordination of the lumbar spine. The load is gradually increased and at the end of the program the patients are instructed to continue individual secondary prevention program twice a week.

The treatment of sessions average duration is 60 minutes. DBC software is a Microsoft windows® based computer program for documentation, designing treatment programs and management of patient information. An evaluation of function, pain and impairment levels and overall treatment satisfaction is carried out of the conclusion of the program. We report range of motion and strength measurements before and after functional restoration program. Values are expressed as mean±standart deviation.

### RESULTS

The mean age of the study group was 33±10.58 years (25,29 and 45 years). Duration of low back pain complaints ranges from 36-180 months. They completed 22±3.6 treatments sessions during 95±25.98 days.

As range of motion concerned, functional restoration led to significant increase of motion. The mean lumbar flexion increased from 43.3±7.6 degrees to 46.7±5.7 degrees, lumbar extension from 15.7±9.8 degrees to 24.7±4.9 degrees, lumbar left rotation 37±9.8 degrees to 56.3±10 degrees, lumbar right rotation from 40.7±11 degrees to 62.7±9.3 degrees, lumbar left lateral flexion from 34.7±10.5 degrees to 41.7±2.9 degrees and right lateral flexion from 36.3±10.3 degrees to 43.3±5.8 degrees. The mean strength of lumbar flexion increased from 0.8±0.5 Nm/kg to 1.1±0.6 Nm/kg, lumbar extension 0.8±0.2 Nm/kg to 1.6±0.7 rotation from 0.7±0.4 Nm/kg to 1.3±0.8 Nm/kg, right rotation from 0.6±0.3 Nm/kg to 1.1 Nm/kg ±0.6 Nm/kg, left lateral flexion from 0.8±0.5 Nm/kg to 1±0.6 Nm/kg, right lateral flexion from 0.8±0.4 Nm/kg to 1.1±0.6 Nm/kg. →

## DISCUSSION and CONCLUSION

The present study has demonstrated the efficiency of using DBC functional restoration program on AS patients. Since physiotherapy and exercise are often advocated in these patients accurate outcome measures are essential.<sup>5</sup>

A growing body of research have suggested that exercise is a crucial component of AS management.<sup>6-8</sup> Dougados et al have reported that physical therapy and exercise are necessary adjuncts to pharmacotherapy.<sup>6</sup> The Cochrane review for physiotherapy interventions for AS published in 2005 have indicated that exercise performed by patients under supervision (compared with home exercise regimens) was beneficial for spinal mobility.<sup>9</sup> More recent studies have further supported that exercise therapy should remain a mainstay of AS treatment complementing medical therapy.<sup>10</sup> Extension exercises need to be emphasized in patients with AS. McNeill et al. have measured trunk strengths in patients with low-back problems and healthy controls and demonstrated that the patients had attempted extension strengths that were significantly less than their strengths in the other types of movements tested.<sup>11</sup> Active therapies for low back pain include various

efforts such as back school programs, and aerobic exercise to intensive strengthening exercises with training devices. DBC program is also an active treatment intervention allowing objective measurements in terms of mobility and strength. DBC functional restoration program have been used for patients with low back pain. Functional restoration emphasizes physical and behavioral improvements over pain eradication and relies heavily on guidance from repeated quantification of function.<sup>12</sup> Giemza et al. have evaluated the efficiency of DBC functional restoration program on patients with low back pain was demonstrated including improvement of range of motion in all planes.<sup>13</sup> DBC offers the advantage of providing objective measures for quantification of improvements. The study has certain limitations. Since DBC program requires a long term participation few patients could be included in the study.

Also, it should be noted that voluntary muscle strength is influenced by many factors such as motivation, fear that the action will cause pain or damage and emotional state.<sup>14, 15</sup> In the long term the functional gains obtained by DBC will be lost in case of detraining. The patients should adapt to changes in exercise habits and lifestyle in order to benefit from functional restoration provided by DBC.

<b>C</b>	<b>CORRESPONDING AUTHOR:</b> Meral Kozakçıoğlu Ozekici Prof. MD, Feyzullah cad. No:39 34843 Maltepe, İstanbul/Turkey <a href="mailto:meralk@maltepe.edu.tr">meralk@maltepe.edu.tr</a>
<b>✓</b>	<b>DELIVERING DATE:</b> 01 / 08 / 2008 • <b>ACCEPTED DATE:</b> 09 / 03 / 2009

## REFERENCES

- 1 Oh T, Brander V, Hinderer S, Alpinen N. Rehabilitation in joint and connective tissue diseases. 2. Inflammatory and degenerative spine diseases. Arch Phys Med Rehabil 1995; 76: 41-46.
- 2 Gran JT, Husby G. Ankylosing Spondylitis: a comparative study of patients in an epidemiological survey, and those admitted to a department of rheumatology. J Rheumatol 1984; 11: 788-793.
- 3 Dalyan M, Guner A, Tuncer S, Bilgic A, Arasil T. Disability in Ankylosing Spondylitis. Disabil Rehabil 1999; 2: 74-79.
- 4 Smeets RJEM, Wade D, Hidding A, et al. The association of physical deconditioning and chronic low back pain: A hypothesis-oriented systematic review. Disabil Rehabil 2006; 28: 673-693.
- 5 Wright V. Aspects of Ankylosing Spondylitis. Br J Rheumatol 1991; 30: 1-4.
- 6 Dougados M, Heijde VD. Ankylosing Spondylitis: how should the disease be assessed? Best Pract Res Clin Rheumatol 2002; 16: 605-18.
- 7 Worsworth BP, Percy MJ, Mowat AG. In-patient regime for the treatment of ankylosing spondylitis: an appraisal of improvement in spinal mobility and the effects of corticotrophin. Br J Rheumatol 1984; 23: 39-43.
- 8 Heikkila S, Vitanen J, Kautiainen H, Kauppi M. Sensitivity to change of mobility tests: effect of short-term intensive physiotherapy and exercise on spinal, hip, and shoulder measurements in spondyloarthropathy. J Rheumatol 2000; 27: 1251-1256.
- 9 Dagfinrud H, Kvien TK, Hagen KB. The Cochrane review of physiotherapy interventions for ankylosing spondylitis. J Rheumatol 2005; 32: 1899-1906.
- 10 Nghiem FT, Donohue JP. Rehabilitation in ankylosing spondylitis. Curr Opin Rheumatol 2008; 20: 203-207.
- 11 McNeill T, Warwick D, Andersson G, Schultz A. Trunk strengths in attempted flexion, extension and lateral bending in healthy subjects and patients with low back pain. Spine 1980; 5: 529-538.
- 12 Hazard RG. Spine update. Functional restoration. Spine 1995; 20: 2345-2348.
- 13 Giemza C, Bodnar A, Kabala T, et al. The efficiency assessment of rehabilitation with DBC method in low back pain patients. Ortop Traumatol Rehabil 2006; 29: 650-657.
- 14 Gibbons LE, Videman T, Crites Battie M. Determinants of isokinetic and psychophysical lifting strength and static back muscle endurance: A study of male monozygotic twins. Spine 1997; 23: 2412-2421.
- 15 Keller A, Johansen JG, Hellesnes J, Brox JI. Predictors of isokinetic back muscle strength in patients with low back pain. Spine 1999; 24: 275-280.