Complex Regional Pain Syndrome: Epidemiologic Features, Treatment Approaches, Workday Loss and Return to Work/Disability Ratios

Kompleks Bölgesel Ağrı Sendromu: Epidemiyolojik Özellikleri, Tedavi Yaklaşımları, İş günü Kaybı ve İşe Dönüş/Sakatlık Oranları

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Abstract

Objective: The aim of this study was to assess the epidemiologic features of complex regional pain syndrome (CRPS) and the effectiveness of the treatment approaches and to investigate its effects on working life.

Material and Methods: The medical records of 106 consecutive patients who were diagnosed with CRPS were reviewed retrospectively regarding demographics, inciting events and injury sites, duration of symptoms, radiologic signs (direct roentgenogram, scintigraphy), treatment modalities, duration of hospitalization, workday loss, treatment outcomes, and disability as a sequela.

Results: The most common inciting events were fracture and soft tissue injuries. The mean duration of symptoms was 4.1±3.0 months and of workday loss was 187.5±107.4 days. The clinical outcome in 93 patients (87.7%) was sufficient enough to enable patients to return to their previous work after the rehabilitation program.

Conclusion: The management period of CRPS is usually long and causes high workday loss; some patients became disabled despite all therapeutic interventions.

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Key words: Complex regional pain syndrome, epidemiology, treatment, workday loss, disability

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Özet

Amaç: Bu çalışmanın amacı kompleks bölgesel ağrı sendromunun (KBAS) epidemiyolojik özellikleri ile tedavi yaklaşımlarının etkinliklerini değerlendirmek ve iş hayatına olan etkilerini incelemektir.

Yöntem ve Gereçler: KBAS tanısı konan ardışık 106 hastanın tıbbi kayıtları demografik özellikler, başlatıcı (tetikleyici) olaylar, yaralanma bölgesi, semptom süresi, radyolojik bulgular (direkt röntgen ve sintigrafi), tedavi modaliteleri, hastanede yatış süresi, iş günü kaybı, tedavi sonuçları ve sekel olarak kalan sakatlık dikkate alınarak retrospektif olarak incelenmiştir.

Bulgular: En sık başlatıcı (tetikleyici) olay kırık ve yumuşak doku travmalarıydı. Ortalama semptom süresi 4.1±3.0 ay ve ortalama iş günü kaybı 187.5±107.4 gündü. Rehabilitasyon programı sonucu 93 hastanın (%87.7) klinik sonuçları önceki işlerine geri gönderilmeye yetecek kadar iyiydi.

Sonuç: KBAS'ın tedavi süresi genellikle uzundur ve sıklıkla fazla iş günü kaybına sebep olur. Bununla beraber, bazı hastalarda tüm terapötik yaklaşımlara rağmen sakatlık gelişebilir.

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Anahtar sözcükler: Kompleks bölgesel ağrı sendromu, epidemiyoloji, tedavi, iş günü kaybı, sakatlık

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Introduction

Complex regional pain syndromes (CRPS) are painful disorders that develop as a disproportionate consequence of traumas. These disorders are most common in the limbs and are characterized by pain (spontaneous pain, hyperalgesia, allodynia), active and passive movement disorders (including an increased physiological tremor), abnormal regulation of blood flow and sweating, edema of skin and subcutaneous tissues, and trophic changes in skin, organs of the skin, and subcutaneous tissues (1). Despite general interest in CRPS, a clear understanding concerning this disorder is still lacking, resulting in several pathophysiological concepts and treatment methods (2-4). The uncertainty surrounding this disorder is well reflected by the disparate nomenclature, such as causalgia, Sudeck's atrophy, post-traumatic dystrophy, sympathetically-maintained pain, algodystrophy, reflex sympathetic dystrophy (RSD) etc. (3). Making a reliable diagnosis may be complicated by a lack of uniform

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definition of CRPS. This has led the International Association for the Study of Pain (IASP) to advocate the use of the term complex regional pain syndrome (5).

Treatments range from physical therapies and noninvasive medications to sympathetic ganglion blockade and sympathectomy (6). There is no treatment that guarantees improvement. An early and interdisciplinary approach is the basis for an optimal and successful treatment (7).

The management period is usually long and causes high therapeutic costs and loss of productivity. Some patients fail to improve despite all therapeutic interventions and became disabled. As a result, when both compensation costs and disability are considered, CRPS appears to be a socioeconomic problem (8).

The objective of this study was to assess the epidemiologic features of CRPS and the effectiveness of the treatment approaches and to investigate its effect on working life.

Patients and Methods

This was a retrospective study undertaken with the approval of the local ethics committee. The medical records of 114 consecutive patients who were diagnosed with CRPS and hospitalized in Gulhane Military Medical Academy (GMMA) Haydarpasa Training Hospital, Physical Medicine and Rehabilitation Department, between 2001 and 2007, were reviewed retrospectively. GMMA Haydarpasa Training Hospital is a military hospital that serves both the military and civilians. The medical records of the patients were retrieved and reviewed by one of the authors, who was not involved in the evaluation or treatment of patients. The diagnoses were reassessed for relevance to the proposed modified International Association for the Study of Pain (IASP) CRPS criteria and 2 patients who did not meet the criteria were excluded (9). Additionally, 5 patients older than 65 years or retired and 1 high school student were excluded because one of our aims was to evaluate the negative effect of CRPS on official productivity. Data of the remaining 106 patients were assessed regarding demographics, inciting events and injury sites, duration of symptoms, radiologic signs (direct roentgenogram, scintigraphy), treatment modalities, duration of hospitalization, workday loss, treatment outcomes, and disability as a sequela.

Initiation of CRPS-related symptoms was considered while determining the duration of symptoms. For example, in post-fracture-developing CRPS cases, early traumatic management and casting periods were not taken into account.

Duration of symptoms and duration of hospitalization and home rest periods were considered while determining the mean workday loss related with CRPS. Duration of symptoms was added to this calculation because patients were not at work during this period and were seeking medical care in different health care institutions.

"Return to work" was accepted as successful outcome while assessing the treatment outcomes. Two main clinical criteria were taken into account when deciding on ending the hospitalization and/or rest period and consequently sending the patients back to the work: (a) restriction in the range of motion (ROM) of the affected limbs and (b) visual analogue scale (VAS) for pain. Improvement in ROM to less than ¼ restriction and VAS <4 were accepted as a good clinical outcome and patients meeting these criteria were sent back to the work. These criteria for return to work are used routinely in our clinic for CRPS patients.

Results

The mean age of the 106 patients was 22.7±7.4 (range 17-38 years) and all of the patients were male and active in their work life at the onset of disease. The mean duration of CRPS symptoms was 4.1 ± 3.0 months (range 1-17 months) (123.5±91.1 days [range 30-510 days]) at the hospitalization date. Inciting events were reported by patients as follows: 49 (46.2%) fracture, 42 (39.6%) soft tissue injury (e.g. strains, sprains, contusions, etc.), 9 (8.5%) soft tissue laceration (with sharp or penetrating objects like knife or glass), 3 (2.8%) joint dislocation, 2 (1.9%) joint dislocation and fracture combination, and 1 (0.9%) with no obvious inciting event (spontaneous) (Table 1).

The CRPS localizations were as follows: 62 hands (58.5%, 34 right, 28 left), 39 feet (36.8%, 22 right, 17 left), 3 elbow (2.8%, 2 right, 1 left), and 2 knee (1.9%, right). Thus, upper limbs were affected in 65 patients (61.3%, 36 right, 29 left) and lower limbs in 41 patients (38.7%, 24 right, 17 left) (Table 1).

Three-phase bone scintigraphy was done in 78 patients (73.6%) and showed a pattern consistent with the diagnosis of CRPS in 74/78 (94.9%) patients. Direct roentgenograms were available for all patients and 67 patients (63.2%) had local spotty or local diffuse osteoporosis (57 and 10 patients, respectively) (Table 1).

Rehabilitation program including physical therapy (whirlpool or contrast bathing, transcutaneous electrical nerve stimulation (TENS) and gentle active-assisted ROM exercises, postural correction, elevation of the affected extremities), and non-steroidal anti-inflammatory drugs (NSAIDs) were applied in all patients. The mean number of physical therapy sessions was 19.6±9.3 (range 5-61). Anti-depressants in 21 (amitriptyline, n: 15; venlafaxine, n: 6), calcitonin (intramuscular) in 11, corticosteroids in 5 (peroral prednisolone, n: 2; deflazacort, n: 3), synthetic ACTH (intramuscular) in 2, and bier block in 2 patients were also applied (Table 2).

The mean duration of hospitalization was 28.3±17.4 (range 5-106) days. Additionally, mean duration of home rest with home program (active ROM exercises, contrast bathing, elevation and NSAIDs if needed) was 36.4±35.3 (range 0-165) days. The mean workday loss related with CRPS was 187.5±107.4 days (Table 1).

Table 1. Patient demographics, manangement periods and outcomes

Variable	n	%
Age (years)	22.7±7.4 (range 17-38)	
Gender (male)		100
Mean duration of symptoms (months) Localization	4.1±3.0	
Upper extremity	65	61.3
Hand	62	58.5
Elbow	3	2.8
Lower extremity	41	38.7
Foot	39	36.8
Knee	2	1.9
Inciting event		
Fracture	49	46.2
Soft tissue injury (strain, sprain, contusion)	42	39.6
Soft tissue laceration (with sharp or penetrating objects)	9	8.5
Joint dislocation	3	2.8
Joint dislocation + fracture	2	1.9
Spontaneously	1	0.9
Direct roentgenogram (positive signs)	67/106	63.2
Local spotty osteoporosis	57	53.8
Local diffuse osteoporosis	10	9.4
Three phase bone scintigraphy (positive signs)	74/78	94.9
Mean duration of hospitalization (days)	28.3±17.4 (range 5-106)	
Mean duration of home rest (days)	36.4±35.3 (range 0-165)	
Mean workday loss (days)	187.5±107.4	
Return to work outcomes		
Successful	93	87.7
Unsuccessful	13	12.3

Clinical outcomes were good (VAS <4 and ROM restriction <1/4) in 93 patients (87.7%) and they were discharged to return to their previous work at the end of the rehabilitation program. Thirteen patients (12.3%) had ROM restriction ≥1/4 and VAS ≥4 (6 hand, 5 feet, 1 elbow and 1 knee CRPS), and clinical outcomes were not sufficiently successful to enable them to return to their previous work (Table 1).

Discussion

Complex regional pain syndrome is a painful and disabling disease and also causes loss of workdays for almost all patients. In some cases, it may result in permanent productivity loss. In this study, all patients were male and younger than reported in the previous literature (mean ages: 37.7, 44, 34 and 38 years) (10-14). Although previous literature gender ratios showed female predominance (2, 10, 15, 16), we had no female patients. This is likely because our hospital is a military hospital, and although all military personnel and their families and civilians are eligible for treatment at our hospital, most of our patients were active working young military personnel. This probably explains the male dominance and younger mean age in comparison with the previous literature. Secondly, only the active working patients were evaluated in this study in order to assess the negative effect of CRPS on working life.

Mean duration of the symptoms (4.1±3.0 months) at the first hospitalization date was fairly short and early. It is naturally expected that this affects the clinical outcomes positively, because early management of the disease was the general accepted rule for good clinical outcome in CRPS (9,17).

Table 2. Treatment modalities and number of patients

Treatment Modality	n	%
Physical therapy *	106	100
NSAIDs	106	100
Antidepressant	21	19.8
Calcitonin (i.m.)	11	10.4
Corticosteroid	5	4.7
Synthetic ACTH	2	1.9
Bier blockage	2	1.9

*Physical therapy: whirlpool or contrast bathing, TENS and gentle active assisted ROM exercises, postural correction, elevation of the affected extremities, NSAIDs: Nonsteroidal antiinflammatory drugs, ACTH: Adrenocorticotropic hormone

According to our data, fractures (46.2%) and soft tissue injuries (39.6%) accounted for the majority of the inciting events, and only one patient (0.9%) had no obvious inciting event. The localizations of the CRPS were upper limbs in 61.3% and lower limbs in 38.7%, with a slight right-sided dominance. Both results were consistent with the previous data as mentioned by Ghai et al. and Harden et al. (18,19). The reason for the upper limb dominance is not clearly known. It might be only a reflection of the higher frequency of injuries to the upper limbs in general (20).

Allen et al. (10) mentioned that the three-phase bone scan results of 53% of their patients were consistent with diagnosis of RSD (CRPS). In this study, three-phase bone scintigraphy was done in 78 of 106 patients and 74/78 (94.9%) of the results were consistent with the diagnosis of CRPS. This fairly high positivity may be related with the relatively early diagnosis of our patients. Also, 63.2% (67/106) of our patients had local spotty or local diffuse osteoporosis according to their direct roentgenograms. Three- phase bone scintigraphy and direct roentgenogram were not involved in the proposed modified research diagnostic criteria for CRPS, but may be considerable and helpful choices to confirm the diagnoses in some cases in clinical practice (9, 21).

The aim of the CRPS therapy was functional restoration of the affected limbs by restoring the ROM and reducing pain. The most common treatments provided for CRPS include physical therapy, NSAIDs, antidepressant medications, calcitonin, anticonvulsant medications, corticosteroids, opiate medications, sympathetic ganglion blocks, bier block, and some rare modalities like manual lymph drainage and hyperbaric oxygen therapy (18, 22-24). Unfortunately, no adequate comparative studies confirm the value of these methods in CRPS (20). In our patients, a comprehensive rehabilitation program including physical therapy (whirlpool or contrast bathing, TENS and gentle active-assisted ROM exercises, postural correction, elevation of the affected extremities), NSAIDs, antidepressants, calcitonin, corticosteroids, synthetic ACTH, and bier block was applied and clinical outcomes were sufficiently good in 87.7% of patients so as to enable their return to work. Sandroni et al. reported results in 74 patients (mean age 46.9±16 SD, mean symptom duration 11.6±12.4 months) in a population based study with 74% resolution rate for CRPS and, among the types of injury, fracture was associated with the greatest resolution rate (91%), statistically much better than sprain (78%) and miscellaneous others (55%) (20). According to our results, return to work did not mean that all patients were completely cured; rather, these patients met our clinical criteria to return to work (VAS <4 and ROM restriction <1/4). We were unable to establish exact results from the archives and thus some of these patients may have been completely cured while others continued having mild signs/symptoms. This relatively higher return-to-work ratio (87.7%) in our study may be related to the relatively lower mean age, early diagnosis and early comprehensive rehabilitation program. 12.3% of the patients could not return to their previous work. We were unable to ascertain exact data about their subsequent lives; most probably had to change their work because of disability related to CRPS, while others may have become permanently disabled.

In this study, one of our aims was to put forward the socioeconomic burden of CRPS. Toward this purpose, the mean workday loss was determined by accumulating mean duration of hospitalization and home rest periods and mean duration of symptoms. Mean workday loss was determined as 187.5±107.4 days. 19.6±9.3 sessions of physical therapy (whirlpool or contrast bathing, TENS and gentle active-assisted ROM exercises, postural correction, elevation of the affected extremities) and NSAIDs were applied in all patients; other medications including antidepressants, calcitonin (intramuscular), peroral corticosteroids, synthetic ACTH (intramuscular), and bier block were applied in some. The costs of medical care, workday loss and compensation costs of disabled patients must be taken into account in determining the socioeconomic burden. We were unable to determine the exact costs because of the retrospective design of our study.

There is limited knowledge in the literature about the costs of CRPS. Kemler and Furnee (25) reported that the cost for physical therapy alone was €5741/patient and for physical therapy plus spinal cord stimulation at 12-month intervals was €9805/patient. We could not

find any study that assessed the direct and indirect costs of CRPS. Nevertheless, it is clear that CRPS results in heavy costs to the affected person and the community.

The social and psychological problems related with the disease and disability also have an important impact on the patient's well-being.

Our study had some limitations, rirstly its retrospective design. Our methodology also did not allow determining the direct and indirect costs, but we feel it provides useful information regarding the socioeconomic burden of CRPS.

Complex regional pain syndrome is a serious health problem and source of work disability, despite all therapeutic interventions. It is also a serious socioeconomic problem for the community, given the lost productivity and the medical costs. The relatively early diagnosis and mostly non-invasive comprehensive rehabilitative management approaches are quite effective for successful treatment outcomes and high return-to-work ratios. Finally, further well-designed prospective researches are needed to determine the effect of early and non-invasive comprehensive rehabilitative management approaches in CRPS on the return- to-work and disability ratios.

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