Optimisation of Functional Outcome of a Severely Burned Patient With Multidisciplinary Approach: A Case Report

Ciddi Düzeyde Yanığı Olan Bir Hastada Fonksiyonel Sonuçların Optimizasyonunda Multidisipliner Yaklaşım: Bir Olgu Sunumu

Ali Akbar Yousefi Azarfam, Oya Özdemir, Nezahat Özgül Ünlüer, Yeşim Gökçe Kutsal, Alp Çetin

Hacettepe University, Faculty of Medicine, Department of Physical Medicine and Rehabilitation, Ankara, Turkey

ABSTRACT

Rehabilitation concept of interdisciplinary team work is of high importance to manage the long-term sequels of burn injuries. A 30-year-old man with 65% of total burned surface area of neck, face, whole back and both upper and lower extremities with fire had stayed in the burn service of our university hospital for 100 days after initial interventions. He underwent several debridement procedures for cervical region, posterior surface of right upper extremity, right elbow, and full thickness grafting procedure for posterior surface of the left elbow. During this period the patient's extremities were supported by static splints to prevent contractures, and daily exercises including range of motion, strengthening and stretching were prescribed. Afterwards, the patient was admitted to our rehabilitation service and in addition to ongoing rehabilitation program strengthening with Thera-Band and occupational therapy including exercises such as grasping and releasing objects, buttoning up a shirt or trouser and picking up a glass were started. A dynamic "aeroplane" splint, with adjustable elbow angle, was used for the upper extremities. After 8 weeks of rehabilitation program, the greatest increase in active ROM was achieved in shoulders, but unfortunately the left second and third interphalangeal joints remained unchanged. Multidisciplinary concept provided in special burn centres is the key to successful burn rehabilitation and excellent outcomes. This case was presented in order to emphasize the important place of burn rehabilitation in the scope of Physical medicine and rehabilitation speciality.

Keywords: Burn, multidisciplinary, rehabilitation, splint

ÖZET

Yanığa bağlı fonksiyonel kayıpları en aza indirmek için multidisipliner ekip çalışması ve erken, uygun ve yoğun rehabilitasyon programlarının uygulanması gereklidir. Bu olgu sunumunda 30 yaşındaki, erkek hastada toplam %65 oranında boyun ve yüzde, her iki üst ekstremitenin ve sırtın tamamında ve her iki alt ekstremitede 2., 3. ve 4. derece alev yanığı gelişmiş. Hasta ilk müdahalelerin ardından 100 gün süreyle hastanemizin yanık ünitesinde yatarak tedaviye alındı ve bu süreç içerisinde cerrahi debrideman ve servikal bölegeye, sağ üst ekstremite arka yüzüne ve dirseğe, sol üst eksteremite dirsek arkasına tam kat file cilt greft onarım yapıldı. Ayrıca bu dönemde yanıktan etkilenen eklem bölgeleri anti kontraktür pozisyonunda statik ortezlerle desteklendi ve eklem hareket açıklığı egzersizleri, güçlendirme egzersizleri ve gerekli eklemlerde germe egzersizleri günlük olarak yaptırıldı. Daha sonra hastanemizin rehabilitasyon servisinde yatarak rehabilitasyon programına alınan hastaya üst ve alt ekstremite aktif ve pasif eklem hareket açıklığı

Corresponding Author
Yazışma Adresi

Ali Akbar Yousefi Azarfam

Hacettepe Üniversitesi Tıp Fakültesi, Fiziksel Tıp ve Rehabilitasyon AD, Ankara, Turkey

Phone: +90 312 305 15 75
E-mail: ali_youssefi_2001@yahoo.com

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egzersizleri, germe, ağırlıklı ve tera-bant ile güçlendirme, günlük yaşam aktivitelerini ve el fonksiyonlarını artırmaya yönelik iş uğraşı tedavisi uygulandı. Hastanın üst ekstremitesi için dirsek açısı ayarlanabilir dinamik "uçak" ortezi kullanıldı. 8 haftalık rehabilitasyon programı sonrası en çok eklem hareket açıklığı artışı omuzlarda sağlanırken sol ikinci ve üçüncü parmaklarda IP eklemlerdeki tam ekstansiyon durumunda değişiklik olmadı. Özel merkezlerde sağlanan multidisipliner ekip çalışması rehabilitasyon sürecinden en iyi sonuçları elde etmek için anahtar rola sahiptir. Bu olgu sunumu yanık rehabilitasyonunun Fiziksel Tıp ve Rehabilitasyon uzmanlık alanındaki verini ve önemini bir kez daha vurgulamak amacıyla yapılmıştır.

Anahtar sözcükler: Yanık, multidisipliner, rehabilitasyon, splint

Introduction

The incidence of burn injuries has declined in the last 60 years due to increased prevention of injuries at home and in the workplace. However there are over one million burn injuries every year in the USA. Individuals with burns are more likely to be young adult men of 20 to 40 years old (1).

Modern burn care includes four main stages of initial evaluation and resuscitation, initial wound excision, definitive wound closure, and the final stage of rehabilitation and reconstruction which begins during the resuscitation period and lasts all the time from initial stages to the end of hospital stay (2).

Burn injuries can result in significant functional loss and the rehabilitation program aims to return the patients to their previous activities of daily living. Rehabilitation concept of interdisciplinary team work is of high importance to manage the long-term sequels of burn injuries (1).

This case is presented to emphasize on the importance of the concept of "multidisciplinary approach" in burn rehabilitation procedure.

Case Report

A 30-year-old man with 65% of total burned surface area (TBSA) of neck, face, whole back and both upper and lower extremities with fire had stayed in the burn service of our university hospital for 100 days after initial interventions. He underwent several debridement procedures for cervical region, posterior surface of right upper extremity, right elbow, and full thickness grafting procedure for posterior surface of the left elbow. During this period the patient's extremities were supported by static splints to prevent contractures, and daily exercises including range of motion (ROM), strengthening and stretching were prescribed.

Afterwards, the patient was admitted to our rehabilitation service and in addition to ongoing rehabilitation program strengthening with Thera-Band and occupational therapy including exercises such as grasping and releasing objects, buttoning up a shirt or trouser and picking up a glass were started. A dynamic "aeroplane" splint, with adjustable elbow angle, was used for the upper extremities. This splint was designed to maintain abduction in shoulder, neutral position at wrist and extension in interphalangeal joints.

The patient's burn wounds on anterior and posterior regions of his trunk and lower extremities are shown in Figure 1, and upper extremities in Figure 2. Furthermore, splint application for his upper extremities are demonstrated in Figure 3. All these photographs have been taken on discharge date.

The active ROMs of the patient's shoulders, elbows and wrists measured on admission and discharge are listed in Table 1. The degrees of flexion contracture and active ROM (flexion) of the proximal interphalangeal joints of both hands are also summarised in Table 2. After 8 weeks of rehabilitation program, the greatest increase in active ROM was achieved in shoulders, but unfortunately the left second and third interphalangeal joints which were in full extension before treatment, remained unchanged.

Discussion

Some physiatrists may not be eager to be involved in burn care, which seems to have poor outcomes in terms of functional recovery (3). This is partly due to the fact that burned patients have complex and long-term rehabilitation needs. Contractures, deformities, neurologic impairments, and psychological problems are the main problems these patients have to cope with. Despite this demanding and frustrating process, reasonable function can be achieved if the burn patient is an active participant in a long-term program of positioning, splinting and exercise through the long period of time from hospital admission (1). Although burn rehabilitation outcomes have improved, patients may suffer from disability and impairment in several activities and every-day tasks (4).

The focus of today's therapy is on an interdisciplinary and multimodal treatment concept. This concept includes early surgical wound excision, advanced critical care support, and an enough number of dedicated staff. Surgeons, psychiatrists and therapists are essential parts of this concept (5, 6).

Three major priorities for the burn rehabilitation include ROM exercises, anti-deformity positioning and splinting, and establishing a long-term relationship with

Figure 1. Burn wounds on anterior and posterior regions of the patient's trunk and lower extremities.

Figure 2. Burn wounds on the patient's wrists and hands.

Figure 3. Splint application for the patient's upper extremities.

Table 1. Active ROM measurements of the patient's shoulders, elbows and wrists on admission and discharge.

		Right		Left	
		Admission	Discharge	Admission	Discharge
Shoulder	Flexion	70	170	36	88
	Abduction	78	130	50	90
	External rotation	45	90	30*	50**
	Internal rotation	57	90	90*	90**
Elbow	Flexion	120	140	100	110
	Extension	0	0	0	0
Wrist	Flexion	25	45	28	43
	Extension	28	40	20	35

** Measured in 50 degrees of abduction position, ** Measured in 90 degrees of abduction position*

Table 2. Degrees of flexion contracture and active ROM (flexion) of the proximal interphalangeal joints of both hands

		Right				Left			
		Admission		Discharge		Admission		Discharge	
		Flexion contracture	Active ROM	Flexion contracture	Active ROM	Flexion contracture	Active ROM	Flexion contracture	Active ROM
PIP	I	25	+10	20	+50	55	0	40	+20
	II	80	+8	70	+30	Full extension	0	Full extension	0
	III	65	+15	50	+45	Full extension	0	Full extension	0
	IV	75	+7	70	+20	75	0	55	+25
	V	80	+5	65	+20	70	0	50	+50

***PIP:** Proximal interphalangeal , **ROM:** Range of motion*

the patient and family members to ensure compliance with therapy goals. Involving the patient's family in the rehabilitation process is essential to prevent a loss of motivation and can provide psychological support for the patient (2). Planning the treatment program needs the patients' previous daily routine to be considered and incorporated into the treatment program. Basic tasks such as feeding, grooming, and personal hygiene are of high priority (1).

Although pressure garment therapy is widely used to prevent abnormal scarring after burn injuries, some studies have questioned it's effectiveness to alter global scar scores (7).

Active assistive ROM exercises are used to maintain full ROM whereas resistive exercises are used to maintain or increase strength, ROM, proprioception, and coordination. The exercise therapy should begin with simple exercises, progressing to more difficult exercises as the patient's status improves (8).

Static or dynamic splints, when properly applied, can greatly alleviate burn contractures. Poor splint design choice may lead to complications such as excessive edema and wound bed abrasion. The splint must maintain proper fit without excessive pressure along its structure (9). Axillary splints to position the shoulders widely abducted, elbow splints to maintain extension in elbows, careful positioning of hips and knees including prone positioning, knee immobilizers and static splints for ankle to maintain neutral position, all can be used to prevent flexion contractures that are very common among burn patients (2).

Factors that result in poor prognosis and lower return to work rates in burn patients include facial and hand burns, larger burn size, older age, poor pre-existing health conditions, unemployment, and poor psychosocial state (10).

In the present case, some factors that contributed to a good outcome include early and proper initial interventions, good physical fitness before the accident, inter-disciplinary team work of surgeons, physiatrists and therapists and a strong psychological support by the patient's family.

In conclusion, multidisciplinary concept provided in special burn centres is the key to successful burn rehabilitation and excellent outcomes. Taking the lack of enough number of high quality burn care researches into account, editors, authors and burn care professionals should all cooperate in providing burn care staff with data from accurate and goal oriented studies.

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