



REHABILITATION
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LIBRARY

COMPREHENSIVE REHABILITATION OF BURNS

Edited by

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COMPREHENSIVE REHABILITATION OF BURNS

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Dedication

To those who have suffered burn injuries and from whom we have gained knowledge through clinical and research activities.

Series Editor's Foreword

From the first moment I concluded that a volume in the *Rehabilitation Medicine Library* series should be devoted to burn rehabilitation, I have been in a state of suspense. My excitement and hopes have been well repaid: Steve Fisher and Phala Helm have put together an outstanding book of which all of us can be proud.

This book bridges like a Colossus the two overlapping fields where clinicians and their associates have received incomplete messages for several decades. Here, considerations of rehabilitation and of acute burn care are carefully woven together into one text.

Having decided on the scope of the book, Doctors Fisher and Helm chose their authors carefully and wisely. Looking on anxiously and not being an expert in burn management, I could not be as sure then as I am now of that care and wisdom. After seeing a few and then all of the manuscripts, my early sense of relief has expanded to exhilaration. We have a fine book in our hands, written by well-informed experts. It will bring credit to the *Rehabilitation Medicine Library*, and the editors and their chosen authors deserve the thanks of both the professionals and the patients who are the subject of this book.

JOHN V. BASMAJIAN, M.D.

Preface

Because the burn trauma victim may suffer contractures, disfiguring scars, amputation, and subsequent disability, physical medicine and rehabilitation should be an integral part of the care of these patients. Burn care requires a team concept with the involvement of the entire physical medicine and rehabilitation team. Burn rehabilitation is a somewhat unique and specialized area of care of which physical medicine and rehabilitation has become increasingly involved.

There are over 200,000 patients hospitalized each year because of burn trauma. A greater percentage of these patients survive extensive burns than a decade ago. Although the mortality figures have improved, the morbidity from burns is still very significant. Physical medicine and rehabilitation can play an extremely important role in reducing this morbidity.

Unfortunately, little has been published in any detail regarding the overall rehabilitation approach to the burn patient. This volume of the *Rehabilitation Medicine Library* deals in detail with important aspects of this comprehensive care. The authors were selected from members of the burn team. The objective of the volume is to give an in depth approach to the rehabilitative care of the burn patient as it is perceived nationally. It is hoped this manuscript will not only be useful to neophytes but will also be a working handbook for those dealing with burns on a day to day basis.

Acknowledgments

We cite John Basmajian who envisioned this book and encouraged us in our efforts. We wish to sincerely thank Amelia (Mimi) Rinks and Trudy Evans for their unselfish efforts and their skilled organizational and administrative assistance. Finally, we thank the contributors, without whom this book would have been impossible.

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1

Introduction—Statement of the Problem

IRVING FELLER
CLAUDELLA A. JONES

History of Burn Care

Throughout history, burn care has been remarkable in its variety but limited in its progress. Ancient formulas, found on Egyptian papyri over 5000 years old, told how to “feed” the wound. Hippocrates, called the Father of Medicine (400 B.C.), recommended old swine’s fat mixed with resin and bitumin, spread on a piece of cloth, warmed in a fire and applied as a bandage to the burn. Byzantines in the 7th century advocated soaks using bull’s gall dissolved in much water, with the brine of pickled olives and pounded leeks. This same nutritional approach continued through the Renaissance. Ambroise Paré, a famous French surgeon of the 15th century, upon the recommendation of a country lady, advised treating the burn wound with salted onion; this was perpetuated in medical literature for three centuries. Once the germ theory was accepted (late 19th century), physicians soaked burn dressings in 10% silver nitrate to eliminate “beasties”, which it did, along with any surrounding tissue. Today, as in the past, a variety of topical agents are used to control the bacteria in the wound. Because the burn wound is clearly visible to all, it is not surprising that doctors in the past concentrated their efforts on applying the medication of the times.

Full-thickness burns (third degree) cannot heal without skin grafting, a technique known to ancient Hindus and the first form of tissue transplant used in man. Skin grafting was seldom attempted until the late 19th century. Not until Reverdin’s success with tiny epidermal grafts in 1869 did this procedure become common practice. Shortly after, others reported success with larger pieces of skin, then with deep slashes, and finally with full-thickness grafts. In 1939, Padgett invented the dermatome (a device to cut a layer of skin) and eliminated the roadblock to freehand slicing. We now

know that topical therapy of the wound and skin grafting must be combined with meticulous systemic therapy if the severely burned patient is to survive.

Many years ago, blood-letting was the most popular form of systemic therapy. David Cleghorn, an English brewer during the Renaissance era, is credited with recognizing that purging was harmful to the burned victim. Cleghorn gained a great deal of clinical experience through treating burns among his employees. Contrary to prevailing antiphlogistic theories, he advocated a supportive regimen; allowing his employees to drink the brew during their recovery provided them with fluids and nutritional replacement. It was noted in 1831 that cholera victims seemed to share a fluid depletion similar to that of burn victims, and saline solution was occasionally given to patients with major burns. In 1857, Passavant introduced continuous saline baths—using them to treat survivors of an explosion and fire in Frankfurt am Main. Twenty-five years later, autopsy studies in Munich revealed that the water content of the blood was reduced in severe burn victims. In 1905, an article in the *Journal of the American Medical Association (JAMA)* addressed the importance of treating burn victims with parenteral saline as well as early skin grafting. Hardor Sneve of St. Paul is credited with recognizing the need for combining fluid therapy with appropriate wound care and pain control, and introducing common sense to burn care (1905). Not until World War II was attention directed to complete systemic therapy.

One of the first organized approaches to managing the severely burned individual was initiated by Sir Archibald McIndoe, a plastic surgeon. Sir Archibald took an interest in resolving the problems encountered by pilots burned during the Battle of Britain. (The survivors of his efforts formed a club calling themselves the Guinea Pigs.) He not only pioneered a system of resolving their many-faceted problems, but trained plastic surgeons in the intricacies of débridement and grafting, and set up one of the world's first specialized burn care facilities in East Grinstead, Sussex, England.

Even after the 1940's, few physicians specialized in burn patient care, and they were slow to adopt advances being made in general medicine and surgery. The tragedy and magnitude of the Coconut Grove fire in Boston in 1940 focused a great deal of attention on solving the acute medical problems of the burn-injured. Oliver Cope, M.D., is credited with leading the care after this disaster. The burns today considered moderate were then viewed as critical. The cosmetic changes that occur with scarring, especially of the face and limbs, led to a morbid cultural response perpetuating the stigma associated with recovery from a burn. Doctors and nurses avoided the burn patient not only for these reasons, but also because of the excessive physical and emotional energy required to care for even minor burns without a system of care and an adequate facility. Attention to the rehabilitation of burned victims was only an afterthought and lagged behind progress in

other medical specialties. Major advances in burn care have been relatively recent, virtually all have occurred since 1940.

In the 1950's, based on a concern for a possible atomic catastrophe involving large numbers of burn casualties, the military supported an interest in burns. The Surgical Research Unit of Brooke Army Medical Center at Fort Sam Houston, Texas, was the site of an early burn conference. In December 1959, the first National Burn Seminar was also held there. Nine burn facilities were represented. These meetings continued yearly and the attendance had grown to 82 in 1966. Based on the burgeoning interest in burn care, by not only physicians, but by nurses, occupational therapists, physical therapists, and others, a committee was formed to offer membership to the entire spectrum of the burn care team. At the Eighth National Burn Seminar, bylaws for the American Burn Association (ABA) were drafted and the ABA came into formal existence in 1968.

The Progress of Burn Care to Date

Today, advances in burn care have not only kept pace with, but in many instances, have led the way for other medical specialties in problem solving.

Over the past 20 years there has been a dramatic increase in interest in burn patient care. Professionals are increasingly participating in burn care and burn care facilities are proliferating. At the present time, there are about 175 hospitals providing specialized burn care. Naturally, of interest is whether this has led to any improvements in the quality of care.

The National Burn Information Exchange (NBIE), established in 1964, collects and analyzes data on the burn problem, including etiology, mortality, morbidity, acute treatment, reconstruction, and cost. Over 50 specialized burn care facilities add uniform patient data on approximately 6000 new cases each year. At present, the data files contain over 70,000 case reports on patients treated at 125 burn care facilities.

The large volume of data accumulated by the NBIE allows a quality care assessment. Two outcomes are of primary interest in examining the quality of burn care: survival and, for survivors, the length of hospitalization. Figures 1.1 and 1.2 show, for all cases reported to the NBIE between 1965 and 1978, changes in survival rates and hospitalization time for survivors. Survival curves, modeled by probit analysis for the time periods 1965–1971, 1972–1975, and 1976–1978, show a steady increase in survival at all levels of burn severity (Fig. 1.1). Analysis of the data grouped by age and size of total body area (TBA) burned shows that improvements in survival are statistically significant for all but the most minor and most critical burns (tested at $\alpha < .05$). Especially dramatic are the survival increases in burns of 20–70% TBA. Improvements in survival are difficult to detect with minor burns because survival has been high since 1965, and in patients over age 50 with the very largest burns (80–100% TBA) because of the relatively