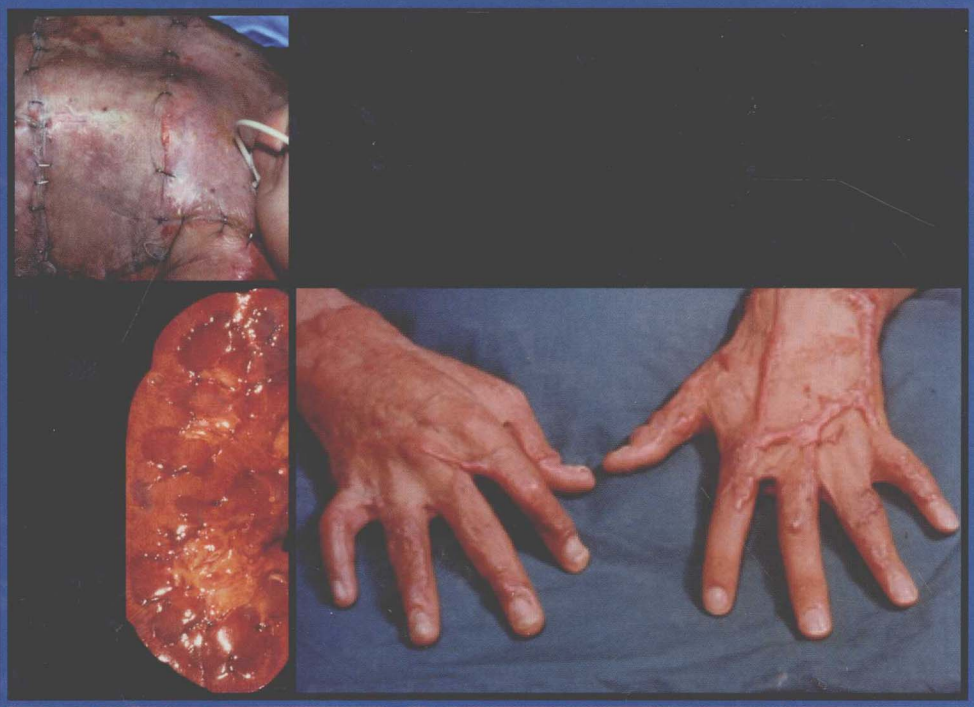
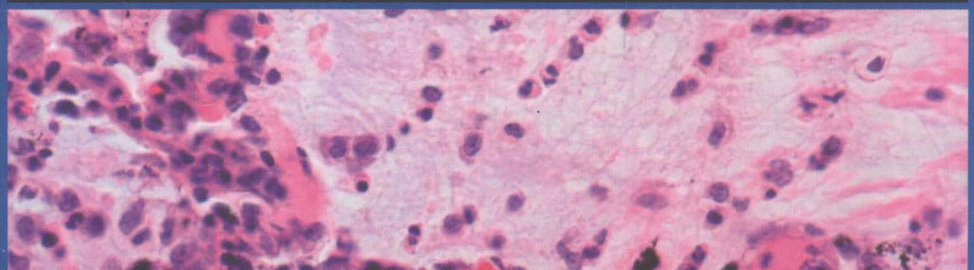
David N. Herndon

TOTAL BURN CARE

Fourth Edition





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SAUNDERS

Total Burn Care

FOURTH EDITION

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Preface
to the fourth Edition of Total Burn Care

The last 25 years burn care has improved to the extent that persons with burns covering 90% of their total body surface area can frequently survive. In the five years since the publication of the third edition of this book basic and clinical sciences have continued to provide information further elucidating the complexities of burn injuries and opportunities for improvement in care. In this edition advances in the treatment of burn shock, inhalation injury, sepsis, hypermetabolism, the operative excision of burn wounds, scar reconstruction and rehabilitation are completely reexamined. Burn care demands attention to every organ system as well as to the patient's psychological and social status. The scope of burn treatment extends beyond the preservation of life and function; and the ultimate goal is the return of burn survivors as full participants back into their communities.

The fourth edition has been extensively updated with massive additions and new data, new references; almost all chapters have been totally rewritten and updated. There are many new chapters and sections in this edition along with demonstrative color illustrations throughout the book.

Totally new to this edition is a web based support section for many of the chapters that include powerpoint presentations and helpful videos. Power points should allow visual representations of the topics covered in chapters for group discussions and individual burn units. Video clips should allow better understanding of complex procedures and concepts.

New material has been added to this edition reflecting the varied physiologic, psychological and emotional care of acutely burned patients evolving through recovery, rehabilitation, and reintegration back into society and daily life activities.

The scope of burn treatment extends beyond the preservation of life and function and the ultimate goal is the return of burn survivors, as full participants, back into their communities.

I would like to express my deep appreciation to the many respected colleagues and friends who have volunteered tirelessly of their time to produce the various chapters in this book and especially to the Shrines Hospitals for Children staff.

Sincere appreciation goes to Shari Taylor for her excellent secretarial assistance, to Ms. Sharon Nash for her editorial skills. Finally I would like to thank my wife Rose for her invaluable personal support.

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2012

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Contents

PPT Online — 10, 11, 12, 14, 15, 16, 17

PPT & Video Online — 13

* deceased

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CHAPTER 1

A brief history of acute burn care management

Ludwik K. Branski, David N. Herndon, Robert E. Barrow

The recognition of burns and their treatment is evident in cave paintings which are over 3500 years old. Documentation in the Egyptian Smith papyrus of 1500 BC advocated the use of a salve of resin and honey for treating burns.[1] In 600 BC, the Chinese used tinctures and extracts from tea leaves. Nearly 200 years later, Hippocrates described the use of rendered pig fat and resin impregnated in bulky dressings which was alternated with warm vinegar soaks augmented with tanning solutions made from oak bark. Celsus, in the first century AD, mentioned the use of wine and myrrh as a lotion for burns, most probably for their bacteriostatic properties.[1] Vinegar and exposure of the open wound to air was used by Galen, who lived from 130 to 210 AD, as a means of treating burns, while the Arabian physician Rhases recommended cold water for alleviating the pain associated with burns. Ambroise Paré (1510–1590 AD), who effectively treated burns with onions, was probably the first to describe a procedure for early burn wound excision. In 1607 Guilhelmus Fabricius Hildanus, a German surgeon, published *De Combustionibus*, in which he discussed the pathophysiology of burns and made unique contributions to the treatment of contractures. In 1797, Edward Kentish published an essay describing pressure dressings as a means to relieve burn pain and blisters. Around this same time, Marjolin identified squamous cell carcinomas that developed in chronic open burn wounds. In the early 19th century, Guillaume Dupuytren (Figure 1.1) reviewed the care of 50 burn patients treated with occlusive dressings and developed a classification of burn depth that remains in use today.[2] He was, perhaps, the first to recognize gastric and duodenal ulceration as a complication of severe burns, a problem that was discussed in more detail by Curling of London in 1842.[3] In 1843 the first hospital for the treatment of large burns used a cottage on the grounds of the Edinburgh Royal Infirmary.

Truman G. Blocker Jr (Figure 1.2) may have been the first to demonstrate the value of the multidisciplinary team approach to disaster burns when, on 16 April 1947, two freighters loaded with ammonium nitrate fertilizer exploded at a dock in Texas City, killing 560 people and injuring more than 3000. At that time, Blocker mobilized the University of Texas Medical Branch in Galveston, Texas, to treat the arriving truckloads of casualties. This 'Texas City Disaster' is still known as the deadliest industrial accident in American history. Over the next 9 years, Truman and Virginia Blocker followed more than 800 of these burn patients and published a number of papers and government reports on their findings.[4–6] The Blockers became renowned for their work in advancing burn care, with both receiving the Harvey Allen Distinguished Service Award from the American Burn Association. Truman Blocker Jr was also recognized for his pioneering research in treating burns 'by cleansing, exposing the burn wounds to air, and feeding them as much as they could tolerate'.[7] In 1962, his dedication to treating burned children convinced the Shriners of North America to build their first Burn Institute for Children in Galveston, Texas.[7]

Between 1942 and 1952, shock, sepsis, and multiorgan failure caused a 50% mortality rate in children with burns covering 50% of their total body surface area.[8] Recently, burn care in children has improved survival such that a burn covering more than 95% total body surface area (TBSA) can be survived in over 50% of cases.[9] In the 1970s Andrew M. Munster (Figure 1.3) became interested in measuring quality of life, when excisional surgery and other improvements led to a dramatic decrease in mortality. First published in 1982, his Burn Specific Health Scale became the foundation for most modern studies in burns outcome.[10] The scale has since been updated and extended to children.[11]

Further improvements in burn care presented in this brief historical review include excision and coverage of the burn wound, control of infection, fluid resuscitation, nutritional support, treatment of major inhalation injuries, and support of the hypermetabolic response.

Early excision

In the early 1940s, it was recognized that one of the most effective therapies for reducing mortality from a major thermal injury was the removal of burn eschar and immediate wound closure.[12] This approach had previously not been practical in large burns owing to the associated high rate of infection and blood loss. Between 1954 and 1959, Douglas Jackson and colleagues, at the Birmingham Accident Hospital, advanced this technique in a series of pilot and controlled trials, starting with immediate fascial excision and grafting of small burn areas, and eventually covering up to 65% of the TBSA with autograft and homograft skin.[13] In this breakthrough publication, Jackson concluded that 'with adequate safeguards, excision and grafting of 20% to 30% body surface area can be carried out on the day of injury without increased risk to the patient'. This technique, however, was far from being accepted by the majority of burn surgeons, and delayed serial excision remained the prevalent approach to large burns. It was Zora Janzekovic (Figure 1.4),

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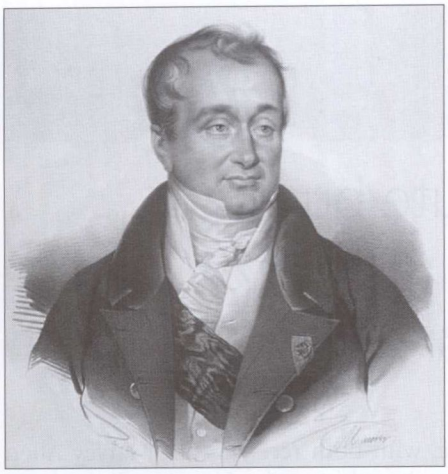

Figure 1.1 Guillaume Dupuytren.

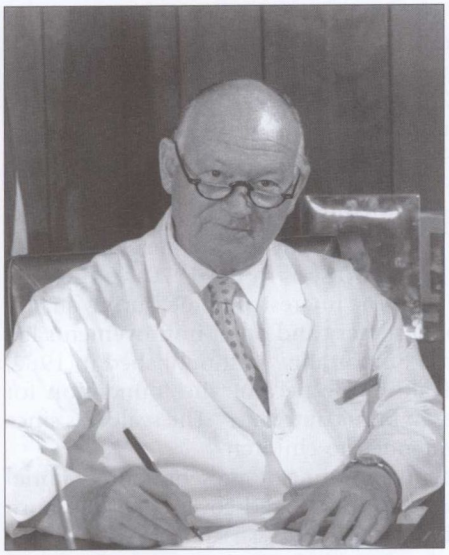

Figure 1.2 Truman G. Blocker Jr.

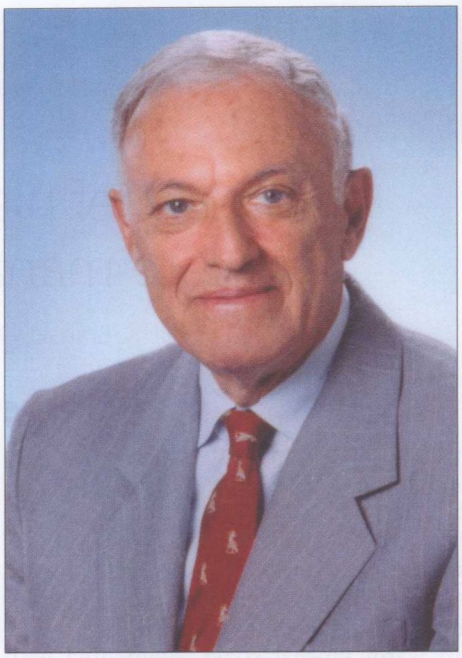

Figure 1.3 Andrew M. Munster.

Figure 1.4 Zora Janzekovic.

working alone in Yugoslavia in the 1960s, who developed the concept of removing deep second-degree burns by tangential excision with a simple uncalibrated knife. She treated 2615 patients with deep second-degree burns by tangential excision of eschar between the third and fifth days after burn, and covered the excised wound with skin autograft.[14] Using this technique, burned patients were able to return to work within 2 weeks or so from the time of injury. For her achievements, in 1974 she received the American Burn Association (ABA) Everett Idris Evans Memorial Medal, and in 2011 the ABA lifetime achievement award.

In the early 1970s, William Monafo (Figure 1.5) was one of the first Americans to advocate the use of tangential excision and grafting of larger burns.[15] John Burke (Figure 1.6), while at Massachusetts General Hospital in Boston, reported an unprecedented survival in children with burns over 80% of the TBSA.[16] His use of a combination of tangential excision for the smaller burns (Janzekovic's technique) and excision to the level of fascia for the larger burns resulted in a decrease in both hospital time and mortality. Lauren Engrav et al.,[17] in a randomized prospective study, compared tangential excision to non-operative treatment of burns. This study showed that, compared to non-operative treatment, early excision and grafting of deep second-degree burns reduced hospitalization time and hypertrophic scarring. In 1988, Ron G. Tompkins et al.,[18] in a statistical review of the Boston Shriners Hospital patient population from 1968 to 1986, reported a dramatic decrease in mortality in severely burned children which he attributed mainly to the advent of early excision and grafting of massive burns in use since the 1970s. In a randomized prospective trial of 85 patients with