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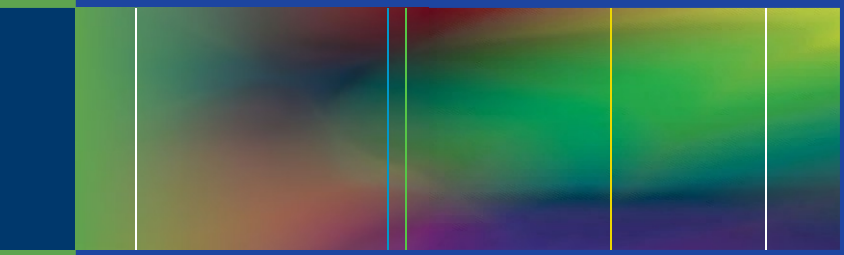

Therapy of the Hand and Upper Extremity

Rehabilitation Protocols

Springer

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Preface

The purpose of this book is to provide the orthopedic surgeon and hand surgeon as well as the physical, occupational, and hand therapist with an easy, "go-to" quick reference source for potential rehabilitation protocols. By no means does this book represent the only way to rehabilitate an injury or a surgery postoperatively, but it does represent our collective synthesizing of various therapy protocols over the last 15 years. This book has been written to try and meet the need for a quick reference text for rehabilitative protocols that the active clinician needs in their practice.

The evolution of orthopedic surgery, hand surgery, and rehabilitative therapy has been challenging in that some treatments have not withstood the test of time or the rigors of scientific evaluation. Nonetheless, this book tries to still honor the art of medicine while incorporating the latest accepted rehabilitative protocols that many surgeons and therapists are currently using. No one protocol is necessarily entirely satisfactory, but these outlines of protocols should allow the surgeon and therapist to build upon them to meet the needs of their patients. One of the important aspects of rehabilitation is to understand the different phases of treatment and that not all phases are necessarily "cut and dry," ending at one particular point of time and beginning at another. Much of therapy is really a fluid situation and must

be adjusted accordingly to the type of surgery (or injury) as well as the day-to-day condition of the patient. There is the old adage that great therapy can overcome even mediocre surgeries, and in some cases, that adage is quite correct. As therapy visits become more expensive for patients with higher deductibles and higher co-pays, as well as a limit on the absolute number of visits that the payer will cover, it is all the more important for each therapy visit to have a more significant impact both educationally as well as on the patient's physical condition.

In conclusion, we hope that this book benefits patients and helps the orthopedic surgeon, hand surgeon, physical therapist, occupational therapist, and the hand therapist provide better care for the patients that they all serve. We appreciate the many mentors who have imparted this knowledge to us, and this book represents our humble way of giving back for what so many have given to us.

Boston, MA — Scott F.M. Duncan
New Orleans, LA — Christopher W. Flowers

Contents

About the Authors

Scott F.M. Duncan M.D., M.P.H., M.B.A. is the Chair of Orthopedic Surgery at Boston University School of Medicine and Chief of Orthopedic Surgery at Boston Medical Center. Prior to this, he was System Chair of Orthopedic Surgery at Ochsner Health System. He received a Bachelor's Degree in Biology from Harvard University and went on to receive a Doctorate of Medicine from the University of Washington School of Medicine and a Master's Degree of Public Health in Epidemiology from the University of Washington School of Public Health. Dr. Duncan then completed an internship in general surgery at the University of Tennessee in Memphis and residency training in orthopedic surgery at the Campbell Clinic—University of Tennessee. He received his fellowship training in hand surgery, upper extremity surgery, and microsurgery at the Hospital for Special Surgery—Cornell Medical College in New York City. Dr. Duncan also has a Master's Degree of Business Administration in Healthcare from the University of Texas at Dallas.

Dr. Duncan worked at the Mayo Clinic in Arizona and the Mayo Clinic Health System in Minnesota for almost 10 years before joining Ochsner in 2011 and then Boston University in 2015. Dr. Duncan is board certified in orthopedic surgery by the American Board of Orthopedic Surgeons and has a Certificate of Added Qualifications in Hand Surgery.

Dr. Duncan has published numerous articles and book chapters on topics related to upper extremity surgery. He edited the textbook *Reoperative Hand Surgery* (Springer, 2012), which is utilized as a resource for hand surgeons worldwide for complex reoperative hand surgery cases. Dr. Duncan's clinical subspecialty practice involves hand, elbow, and shoulder surgery, as well as microsurgery.

Christopher W. Flowers M.D. received his Bachelors Degree from Morehouse College in Atlanta, Georgia in 2007 and went to The University of Texas Medical Branch at Galveston from 2007 to 2011 to receive his Doctorate of Medicine. He then completed his internship and began his residency at Ochsner Clinic Foundation in New Orleans, LA. His current post-residency plans involve applying for a Sports Medicine Fellowship. His research interests involve bridging the gap between the multiple teams involved in orthopedic patient care as well as various sports medicine related topics.

Part I
Shoulder Arthroplasty

Chapter 1
Hemiarthroplasty/Total Shoulder Arthroplasty

Sling × 3 weeks (with immobilizer), Continue sling for three more weeks as needed

1–2 Weeks

- Goals:
  - Minimize pain and inflammation
  - Achieve staged PROM goals (avoid aggressive PROM)
  - Maintain integrity of replaced joint
  - Scapular stabilization
  - No active shoulder ROM, lifting, supporting body weight or lifting of body weight with hands, AVOID any shoulder hyperextension
- Exercises Days 1–3:
  - Pendulum hangs
  - Finger, wrist, and elbow AROM (no weight) Maintain integrity of replaced joint
  - Shoulder PROM: 100° Flexion, gentle ER to 30°, IR to chest and 45° Abduction
- Exercises Days 3–10:
  - Continue PROM—flexion, abduction, ER as tolerated in the scapular plane
    - NO Extension PROM, IR/ER in plane of scapula

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DOI 10.1007/978-3-319-14412-2_1,

- Begin resisted hand, wrist, and elbow AROM
- Resume general conditioning (walking, stationary bicycle)
  - NO Treadmill walking or elliptical
- Begin scapular isometrics and submaximal shoulder isometrics (in neutral)
- Pulleys (flexion and abduction)—as long as greater than 90° of PROM

- Exercises 10 Days–3 Weeks:
  - Continue PROM progression as tolerated (NO hyperextension)—limiting ER to protect subscapularis reattachment.
  - Gradually progress to shoulder AAROM.

Criteria before Phase 2: Shoulder PROM flexion/abd (90°), ER (45°), IR (70°), isometric activation of all shoulder musculature

3–6 Weeks

- Continue PROM progression, begin AROM
- Reestablish dynamic shoulder stability
- Continue PROM as tolerated, begin supine AROM flex/abd/IR/ER
- Begin AAROM horizontal adduction
- Begin rotator cuff and periscapular isometrics
- Begin scapular strengthening and stabilizations

Criteria before Phase 3: Supine shoulder PROM flexion (140°), abd (120°), ER (60°), IR (70°), elevate above 100° with good mechanics

6–12 Weeks

- Gradual restoration of shoulder strength, power, and endurance
- Optimize neuromuscular control
- Gradual return to functional activities with involved upper extremity

- Continue AROM as tolerated, begin IR/ER in scapular plane
- Begin gentle AAROM IR behind back
- Begin light functional activities
- Week 8: Begin progressive supine active elevation (anterior deltoid strengthening) with light weights (1–3 lb) and variable degrees of elevation
- Week 10: Begin resisted flexion, Abduction, ER (therabands/sport cords)
- Week 10: Progress IR behind back to AROM (AVOID overstretching)

Criteria before Phase 4: Supine shoulder PROM flexion (140°), abd (120°), ER (60°), IR (70°), elevate above 120° with good mechanics

12–24 Weeks

- Enhance functional use of upper extremity
- Improve muscular strength, power, and endurance
- Gradual return to advanced functional activities
- Gradually progress strengthening, add closed chain activities as tolerated
- Home exercise program 3–4 times per week
- Gradual return to moderately challenging functional activities

4–6 months—Return to recreational hobbies, gardening, sports, golf, doubles tennis

Chapter 2
Reverse Total Shoulder Arthroplasty

Sling × 3 weeks (with immobilizer), Continue sling as needed for three more weeks

1–3 Weeks

- Minimize pain and inflammation
- Achieve staged ROM goals (avoid aggressive PROM)
- Promote healing
- Scapular stabilization
- No active shoulder ROM, lifting, supporting body weight or lifting of body weight with hands
- Pendulum hangs
- AROM/AAROM: c-spine, elbow, wrist, and hand (no weight)
- Supine shoulder PROM: flexion/abd to 90° in the scapular plane, 20° ER (NO IR) being careful not to stress ER for subscapularis reattachment
- Begin periscapular/deltoid sub-maximal pain-free isometrics in the scapular plane

4–6 Weeks

- Supine shoulder PROM: flexion/abd as tolerated, ER as tolerated, IR to belt line
- No IR or extension, no lifting arm against gravity
- Begin gentle resisted exercises of elbow, wrist, and hand

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- Begin rotator cuff strengthening and deltoid strengthening with gravity eliminated
- Progress scapula and trapezius work with light resistance

7–8 Weeks

- Progress pain-free PROM, begin AROM
- Continue to restrict hyperextension shoulder ROM
- Progress PROM as tolerated, begin PROM IR to tolerance (<50°) in the scapular plane
- Begin AAROM/AROM: progress from supine to sitting/standing as tolerated (NO ext)
- Begin gentle glenohumeral IR and ER sub-maximal pain-free isometrics
- Begin gentle scapulothoracic rhythmic stabilizations and supine isometrics

9–12 Weeks

- Week 10: Begin standing-forward punch, seated rows, shrugs, bicep curls, and bear hugs
- Begin gentle periscapular and deltoid sub-maximal isotonic strengthening exercises
- Begin AROM with light resistance: supine flex/abd, side-lying IR/ER

12–16 Weeks

- Enhance functional use of operative extremity and advance functional activities
- Enhance shoulder mechanics, muscular strength, and endurance
  - * NO lifting greater than 6 lb
- Progress to gentle standing resisted flex/abd

17+ Weeks

- Continue strength gains
- Maintenance/Home exercise program
- Home exercise program 3–4 times per week
- Progression toward a return to functional activities within limits per MD

Part II
Shoulder Sports Injuries

Chapter 3
AC Joint Reconstruction

Sling for 5 weeks

0–3 Weeks

- Minimize pain and inflammation
- Full elbow and wrist ROM
- Home exercise program
- Protect fixation from weight of arm or anything over 5 lb
    * AVOID elevation past 90° for first 4 weeks
    * AVOID excessive reaching and IR/ER for first 5 weeks
- Pendulums, ball squeezes
- Theraband triceps and biceps exercises
- Isometric rotator cuff IR/ER, shoulder Abd/Add, flex, ext with arm at side ONLY

4–7 Weeks

- Progressive shoulder ROM to 90° flexion/abduction
- Minimize pain/swelling
- Avoid stressing fixation
- Continue pendulums/PROM
- Begin supine ER and forward flexion to full as tolerated, begin IR to full as tolerated
- Week 6: Begin AROM with terminal stress to prescribed limits as tolerated

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