Industrial Injuries of the Hand: Mild to Mangled

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I have no relevant financial disclosures

DISCLAIMER...
Warning: Some of the following images contain graphic content. Viewer discretion is advised.

Now, my actual title slide...
The Mangled Hand
From Injury to MMI

A Hand Surgeon’s Perspective

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AGENDA

Introduction
Definitions
Initial Management
  Workplace, Transport, ER, OR
Secondary Procedures
Therapy
Mental Health / Other factors
Prostheses
Return to work / Outcomes
My Work Comp “Wish List”
Industrial Injuries of the Hand: Mild to Mangled

Introduction

- Work, home accidents, assault, MVC, GSW, Farm
- One of greatest challenges to hand surgeon
  - Variable tissue injury / loss
  - Complex reconstructions
  - Each case is different
- Limb and life altering
- Managing initial patient perception
Definitions

- Mangling/Mutilating – imprecise terms
- Mangle – French – Cut to pieces
- Mutilating – Latin – To cut or lop off, maim

These terms indicate significant loss of tissue/function

- How bad does it have to be to be ”mutilated”
  - What is an “acceptable” hand?
  - 1 thumb + 3 near- normal fingers w/ normal sensation???
Types of machines

Punch Press
Lathe
Tablesaw
Macerator
Conveyor Belt
Industrial Fan
Cotton Gin

Loose Clothing + _______
Initial Management

On-site

- Call 9-1-1
- Clean any gross debris if possible
- Place clean, slightly damp, loose bandage
- Direct pressure if bleeding
- If massive, uncontrolled bleeding, apply tourniquet
Initial Management
Transport of Body Parts

NOT submerged in ice water
Wrap in DAMP towel/gauze
Then in plastic bag on/in ice
Ideally – initial management by reconstructive surgeon

- Hand surgeon often consulted after seen in ER / Transferred

Document full history
- Mechanism
- Previous hand surgeries
- Previous functional status of limb
- Hand dominance
- Other injuries?

Initial injury can be underestimated
- Crush injuries in particular
- Also high pressure injection injuries
Initial Management

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Initial Management
In the Emergency Room

Primary cleaning
Avoid covering, uncovering, etc
Antibiotics
Pain medication
Tetanus Update
Take Photographs
Initial Management
In the Emergency Room

Primary cleaning
Avoid covering, uncovering, etc.
Antibiotics
Pain medication
Tetanus Update
Take Photographs
Get to a Level 1 hospital (typically)
Don’t discard potential “spare parts”

Carolinas Medical Center, Charlotte (1990)
Levine Children’s Hospital

Duke University Hospital, Durham (1982)

Baptist Hospital, Winston-Salem (1982)
Brenner Children’s Hospital

Vidant Medical Center, Greenville (1985)

UNC Hospitals, Chapel Hill (1982)
NC Children’s Hospital

WakeMed Health and Hospitals, Raleigh (‘06)
Initial Management
In the Operating Room

Many Factors / Variables

Some of the things that we consider in surgery:

- What to keep, what to discard
- Preserve sensation (more important than finger length)
- Parts that can’t be replanted = spare parts
- Good skin and soft tissue cover (either immediate, or planned)

- Bone and joint
- Vessel
- Nerve
- Tendons
- Skin and Soft tissue
- Single surgery or staged?
Initial Management
In the Operating Room

TIME TO FIRST SURGERY CAN BE IMPORTANT!
- Viability of tissues, infection risk

Body parts can be brought to the operating room before the patient

Remove tissue that’s not alive
- Skin, bone fragments, muscle

LOTS of irrigation

Remove Contamination

Stabilize bones

Repair and reconstruct other tissue
TIME TO FIRST SURGERY CAN BE IMPORTANT!
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Repair and reconstruct other tissue
Amputated Fingers

Rarely replant single fingers

“Clean slice” preferable

Multiple fingers – replant as many as possible
Not if crushed/mangled

Almost always replant the thumb

Smokers don’t do as well

Replant within 6 hours if “warm”

Up to 24 hours if kept “cold”
Secondary Surgeries

I tell all patients:

”More than 1 surgery”

“There will be complications”

Types of secondary surgeries

Skin/soft tissue coverage
Finger lengthenings
Tendon Reconstruction
Nerve Reconstruction
Infections
Removal of implants
Scar/contracture releases

“THERE WILL BE COMPLICATIONS”
As important as the surgery

Close relationship between surgeon/therapist

Referral often made immediately after 1st surgery

Early mobilization of *Uninjured* joints/body parts

Therapist sees patient much more frequently than MD
HAND THERAPY

ROLES OF THE HAND THERAPIST

- HANDS-ON / STRETCH / SPLINT
- TEACH TO ADAPT
- FAMILY SUPPORT (wound care, exercises)
- WOUND MONITOR / PROBLEM DETECTOR
- COUNSELOR
- MOTIVATIONAL COACH
- ADVISOR TO SURGEON
- LIASON BETWEEN PATIENT AND WORK
• HANDS are complex
  • ANATOMY
  • VARIETY OF INJURIES / PATHOLOGY
  • COMPLEX SPLINTS/BRACES
  • MULTIPLE PROTOCOLS

• Many hand problems are WELL beyond the scope of typical PT/OR

• 5 years and 4,000 hours + test
• Complex hand surgeries can be compromised by an under-qualified therapist
  • ACTUAL EXAMPLES
    • RUPTURE OF TENDON REPAIRS
    • INAPPROPRIATE SUTURE REMOVAL
    • LACK OF JOINT RANGE OF MOTION
    • BANDAGES TOO TIGHT $\rightarrow$ AMPUTATION
    • INEFFECTIVE SPLINTS $\rightarrow$ re-fracture
    • FAILURE TO NOTICE PROBLEMS (infection?)
55 year old male
Hand crushed between trailer-hitch and truck
POST-OP DAY 5

Arrives to office without translator

POST-OP DAY 6

"Therapy is mandatory at this point in time, we will initiate range of motion of all joints of all digits with the exception of the middle, ring and small finger metacarpal phalangeal joints. Swelling reduction techniques will be instituted."

Detailed therapy prescription written.
POST-OP DAY 14

“Unfortunately, he has not started therapy despite a very clear therapy prescription, which was written on 11/08. Additionally, we have been regularly trying to contact the patient's case manager starting on Monday, November 11. We have left several messages, and we unfortunately have not yet heard back from the case manager. The patient states that he was contacted today that he has a therapy appointment set up on 11/25.”

First therapy appointment – 21 days after injury!!
Between 1-2 Months after injury - 2-3 therapy visits per week

2 months after injury

“The pins have subsequently been removed. He has developed expected stiffness. I recommended continued therapy, and continued work restrictions with no use of the right hand at all”.
Between 3-4 months after injury
NO therapy appointments ???

“At the last scheduled office visit, he again did not have a certified medical Spanish translator… which has been a problem in the past.

Additionally… his last therapy appointment was 3-4 weeks ago The patient reports … the case manager “went on vacation” and further therapy was never approved.

The patient feels that “he has not made much progress in terms of flexibility and, in fact, he thinks that he has lost some over the last few weeks.”

“I am greatly disturbed and concerned … this is dramatically compromising his potential for good function in the future. I now feel he will require surgery in the future… but aggressive and continued therapy will help to potentially minimize the need for this.”

Therapy not started for TWO MORE WEEKS!
5 months after injury: 
Back to operating room for scar release
NEW CASE MANAGER
THERAPY 3x/week

7 months after injury:  MMI, rate and release

“I do feel that a substantial delay in starting therapy early in the course of his treatment led to a significant long-term impairment and long-term compromise of his final result.”
HAND THERAPY

55 y.o. male

Dominant left hand vs Lathe

Transfer from OSH
72 hours after initial surgery
Groin Flap
Groin Flap
2 months later
Complications and Additional Procedures

5 months – Revision of fixation of forearm fracture (non-union)

11 months – Thumb fusion, Small finger contracture release, 1st webspace opening

16 months – Removal hardware from hand

18 months – MMI – medium work
Hand Therapists

• 1-5 times per week
• I request a CERTIFIED HAND THERAPIST
  • There are other options, but safest best CHT
• If not at OrthoCarolina, then with a CHT I know
• I don’t hesitate to switch therapists
• All hand therapists have my cell phone number
• AS IMPORTANT AS THE SURGERY!!!! (or more!)
MENTAL HEALTH

- Adjustment disorders, depression, PTSD
- Important to recognize/identify
- Critical factor in patient recovery and outcome
  - Short and long-term
- Men have more difficulty expressing
- Referral to mental health professional when appropriate
  - Part of the overall care of the injured patient
Often overlooked or under-appreciated
Depression and anxiety play role in pain, outcome
I ask many/most patients about it
Prostheses

- Important aspect of care
- Often overlooked
- Can provide function
  - grasp, pinch, hold
- Many different types
Prostheses

- Immediate fit improves outcome
- Can improve body image/confidence
- Encourages patient to use hand
- I like prosthesis visit day 1!
- Acceptance is important
- Costly
- Wear and tear
- Replacements needed (lifespan)
Return to work

• Generally, no work until:
  • Acute pain resolved
  • Acute swelling resolved
  • Early wound healing

• I advocate early return to work when reasonable
  • “Deskwork”
    • Allows for limb elevation on desk
    • Important to set/adjust expectations/motivation
Return to work

• I explain EARLY the diff. b/w “restriction” and “disability”
• I explain EARLY that return to work may be interrupted
  • Additional surgery
  • Complications
  • Setbacks
• Return to work depends on job and modified duty available
• Compliance w/ modified work is important
  • I struggle with this
  • “My boss makes me do it anyway.”
OUTCOMES

• Multiple factors:
  • Injury related
  • Treatment related

• Patient factors:
  • Age
  • Health
  • Hand dominance
  • Occupation
  • PSYCHOLOGICAL MAKE-UP AND MOTIVATION
• There is no good standardized assessment system
• Severity of original injury plays huge role
• An experienced reconstructive hand surgeon is essential
• **THERAPY THERAPY THERAPY**
My Work Comp Wish List for the “Mangled Hand”

- Basic understanding of complexity of injury
- No delay in therapy, immediate referral to CHT
  - Encourage patient to attend and participate
    - THIS WILL DECREASE TOTAL DURATION OF TREATMENT AND PERIOD OF DISABILITY
- Working with me to understand job situation
- Expect complications and additional surgery
- Awareness of psycho-social aspects
THANK YOU