COMMON HAND INJURIES, SPLINTING, AND THERAPY

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2:45-3:30pm
Objectives

- Become familiar with splint materials and education
- Overview of common sport related upper extremity injuries seen by Occupational Therapy.
- Overview of treatment for upper extremity injuries related to sport.
- Overview of splinting for upper extremity injuries related to sport.
- Understand the rules for athletics regarding the use of playing casts/splints
- Recognize splint treatment options for common athletic injuries
Splinting
Splinting

- Orthoplast Splints
  - Questions
    - What’s the Diagnosis?
    - What position?
    - Are there any pins to avoid or protect?
    - Forearm Based, Hand Based,
      Finger Based, Long Arm?
Splinting

- Splint materials are 1/16”, 3/32” or 1/8” thick.
- Minimal/mod/max resistant
- Splint materials vary in character – vary by memory, amount of drape, rigidity, perforated or solid.
- Lastly, they come with almost any color.
Splinting

Common Static Splints

- **Tip Protector Splint**
  - Used for distal finger injuries for protection and support.

- **DIP Extension Splint**
  - Used for distal finger injuries for protection and support
  - Percutaneous pinning at distal finger

- **DIP Hyperextension Splint**
  - Mallet fingers

- **Ulnar/Radial Gutter Splint**
  - Used for fractures of the hand, sprains/strains

- **Wrist Cock Up/Neutral Wrist Resting Splint**
  - Used for fractures of the hand/forearm, sprains/strains

- **Clam Shell Splint**
  - Used for greater support and protection of the wrist/forearm.

- **Thumb Spica Splint**
  - Used for thumb fracture, sprains/strains for protection and support
Splinting

- Wear and Care
  - Wear schedule per doctors orders and/or therapist’s recommendations
    - May depend on if static vs dynamic vs static progressive
    - Caution to observe for skin tolerance and splint fit
  - Care
    - Wash with warm water and antibacterial soaps
    - Use of alcohol based products to clean splint and decrease smell works the best
    - Education on what to avoid with the splints – hot weather - summer, in car dash, do not put in dishwasher, etc.
Splints in Athletics

SDHSAA

Volleyball:

Rule 4, Article 1: A guard, cast or brace made of hard and unyielding leather, plastic, pliable (soft) plastic, metal or any other hard substance shall not be worn on the hand, finger, wrist or forearm, even though covered with soft padding.

Rule 4, Article 2: Hard and unyielding items (guards, casts, braces) on the elbow, upper arm or shoulder must be padded with closed-cell, slow recovery foam padding no less than ½-inch thick. An elbow brace shall not extend more than halfway down the forearm.
Splints in Athletics

SDHSAA
Basketball:
Rule 3-5-2 a,b:

a. Guard, cast or brace must meet the following guidelines:
   A guard, cast or brace made of a hard and unyielding substance, such as, but not limited to, leather, plaster, plastic or metal shall not be worn on the elbow, hand, finger/thumb, wrist or forearm; even though covered with soft padding.

b. Hard and unyielding items (guards, casts, braces, etc.) on the upper arm or shoulder must be padded with a closed-cell, slow recovery foam padding no less than ½ inch thick.
Splints in Athletics

SDHSAA

Football:
Hard and unyielding items (guards, casts, braces, etc.) on the hand, wrist, forearm, elbow or upper arm are **illegal unless covered with a padded, closed-cell, slow recovery foam padding no less than ½ inch thick.**
Splints in Athletics

SDHSAA

Track: If a guard, cast, brace, splint, etc. is worn and determined by the referee that padding is required, such padding shall be closed-cell, slow recovery foam no less than ½ inch thick. Knee and ankle braces which are unaltered from the manufacturer’s original description do not require any additional padding.

Wrestling: Illegal in all cases.
Splints in Athletics

- NCAA/NAIA
  - Similar as previous rules
  - Always check with governing body
  - Communication with athletic trainers
Common Hand Injuries in Athletes

- Mallet Finger
- Tuft/Distal Phalanx Fracture
- Boutonniere Deformity
- PIP Jt Dorsal Dislocation
- Proximal Phalanx Fracture
- Metacarpal Fracture
- Thumb Fracture
- Scaphoid Fracture
- Distal Radius Fracture
Mallet Finger

Mallet Finger Injury
Mallet Finger

- Most common closed tendon injury found in athletes
- Usually the result of a jam against any surface
- Caused by disruption of terminal tendon on distal phalanx
- Present with pain, swelling and extensor lag at DIP joint.
Mallet Finger

- Management
  - without pinning
    - 6 wks - DIP hyperextension splint
    - custom orthoplast, alumifoam, Stack, serial cast
    - followed by 4-6wks of night wear or weaning from splint
    - AROM – PIP and MCP 1st 6wks

**No DIP bending allowed – **not even one time.**

- with pinning
  - same as above – splint is more supportive/protective because of pin
Mallet Finger

- Management of splint
  - Remove daily to check skin
  - Clean splint and finger with alcohol
  - Dry finger prior to splint placement
  - Use of paper tape with splints
Mallet Finger

- Case Study – Football player jammed finger when trying to make a tackle – noted DIP extensor lag – assessed at after hours orthopedic clinic – sent to orthopedic hand surgeon for further evaluation.

- Evaluation of acute mallet finger

- Orders sent to hand therapy for DIP hyperextension splint x 2

- Education provided on wear/care, playing with splint during football – buddy tape, SDHSAA ruled padding – discuss with athletic trainer
Mallet Finger

Case Study

- Combo Mallet finger and tuft fracture
- Recreational play with dodgeball
- 6 weeks wear time and then return to doctor
Mallet Finger
Mallet Finger
Mallet Finger
Tuft/Distal Phalanx Fracture

- Common fracture – smashing or crushing injury – caught in jersey, b/w helmets
- Usually treated conservatively
- If K-wire – removed approx. 3wks – AROM to DIP jt is then started
- Tip protector splint/volar DIP extension splint
- Hypersensitivity can be a problem
  - Desensitization program
Tuft Fracture/Distal Phalanx Fracture

- AROM – MCP/PIP
- Swelling Control
  - Elevation, ice, compression wrap/finger sleeve
Tuft Fracture/Distal Phalanx Fracture
Tuft Fracture/Distal Phalanx Fracture
Tuft Fracture/Distal Phalanx Fracture
Tuft Fracture/Distal Phalanx Fracture
Boutonniere Deformity
Boutonniere Deformity
Boutonniere Deformity

- Athletes usually injured by forced hyperflexion at the PIP jt. – “jammed” finger
- Central slip is disrupted at dorsal insertion at middle phalanx and lateral band migrates anteriorly
Boutonniere Deformity

- Management - Acute
- Full time volar based PIP extension splint with DIP free for 6 weeks and then night time wear for 4 weeks
- DIP free to allow dorsal movement of lateral bands and ensure oblique retinacular ligament does not get tight
Blocking Exercises

Focus on DIP blocking and reverse blocking exercises

- DIP BLOCKING
Boutonniere Deformity

- REVERSE BLOCKING
  - MCP's flexed with active extension of IP's,
Boutonniere Deformity

Management - Chronic

- Chronic or PIP flexion contracture
- Focus is on regaining passive PIP extension through dynamic, static progressive splint or serial casting
- Once PIP joint passive extension established – initiate or continue with emphasis on reverse blocking and active DIP blocking motion
- Continued focus on swelling reduction
PIP joint dorsal dislocation

- Volar Plate Disruption
  - Hyperextension injury
- Jammed Finger injury
PIP joint dorsal dislocation

- Orthoplast dorsal blocking splint at 20-30 degrees
- Decrease restriction of splint by 10 degrees each week starting at 2 to 3 weeks per orders; splint x 6wks
- Splint fabricated out of 1/16” material
- Distal strap removed to allow patient to perform AROM of IP’s within splint frequently during the day.
PIP joint dorsal dislocation

- Edema control techniques
- Edema wrap, compression wrap/finger sleeves
PIP joint dorsal dislocation

- Strengthening – 4 to 6 wks or when ordered by doctor
- Isometrics, therapy putty/ball
Proximal Phalanx Fracture

- Volar angulation, limited rotation usually occurs with proximal phalanx
- Need to have a balance between treating fracture and limiting adhesions/promoting gliding of the tendons
Proximal Phalanx Fracture

- **Management**
  - **Splinting**
    - MCP’s in flexion and IP’s extended “intrinsic plus” positioning – safe position
    - Forearm based or hand based gutter splint
  - **Position of MCP joints**
    - collateral ligament
    - stability
Proximal Phalanx Fracture
Management

- ROM initiated per doctors orders and/or at 2-4 weeks with splint utilized up to 6 weeks.
- Athlete to wear splint that is least confining for protection per doctor and wrapped with approved ½” closed cell foam

- If reduction not maintained then closed reduction with pinning followed by open reduction and fixation – followed with AROM per doctor orders, edema and incision/dressing management
Proximal Phalanx Fracture

- Case Study
  - 10 y.o. playing football. Caught the ball and overextended small finger
  - Seen by orthopedics with closed reduction
  - Order for custom FA based intrinsic plus positioned splint
  - RICE principles
  - Return to doctor in 1 week for recheck
  - Initiate arom of hand as ordered
Metacarpal Fracture

- Metacarpal neck Fracture
  - Boxer’s Fracture
  - Common metacarpal Fx
  - Allows for angulation not rotation
Metacarpal Fracture

Management

- Splint - hand or forearm based splints – 4-6 wks
- Edema control
- ROM started at 2-4 wks
- Strengthening 4-6 wks or as ordered
- Return to play upon doctors orders or when evidence of healing is shown
Metacarpal Fracture

- MCP’s placed in flexed position in splints
  - Maintain length of MCP collateral ligaments
  - Provide stability
Metacarpal Fracture
Metacarpal Fracture

- Young male with Salter Harris II fracture – neck fracture
- Injured playing football
- Initiated with ulnar gutter splint and arom
- Splinted x 4wks and then as needed
Metacarpal Fracture

3 weeks post injury
Distal Radius Fracture
Accelerated Protocol

- **Days 3-5 Post-Op**
  
  Orthoplast Splint – Patient may remove splint for Light ADL activities - hygiene, dressing, eating, computer work
Case Study:

3-5 Days Post-Op

- AROM for wrist and forearm
  - Ensure patients are flexing/extending wrist with correct muscles by keeping MP joints bent with motion

- AROM/PROM fingers

- Edema Control

- Lifting Restriction – 5 lbs.
Active Range of Motion

TENDON GLIDING EXERCISES

Tendon gliding is a very important part of your exercise program.

There are three ways of making a fist:

- Straight
- Hook
- Fist
- Straight Fist
Accelerated Distal Radius Fracture Protocol

- Reinforce that wrist extensors – not – finger extensors are used for motion
Accelerated Protocol

- 2 Weeks Post-Op
  - PROM Wrist and Forearm
  - Isometric Exercises
  - Light Putty Exercises
  - Lifting restriction – 10 lbs.
Accelerated Protocol

- **3 Weeks Post-Op**
  - Wean from Splint
  - Return to sport – varies by Physician

- **4 Weeks Post-Op**
  - Concentric Wrist Strengthening
  - Medium Putty Strengthening
  - Splint Discontinued **
  - Lifting Restriction – 40 lbs.
Orthoplast Wrist Splint
Radial or Ulna Shaft Fracture
Ulnar or Radial Collateral Ligament Thumb Injury
Ulnar Collateral Ligament Thumb Injury

Ulnar Collateral Ligament Injury — force applied to digit in radial direction
Thumb Collateral Ligament Sprain
Conservative Management

- 0-4 Weeks – Hand based thumb spica splint
- 4-6 Weeks – AROM of thumb – painfree range
- 6-8 Weeks – Unrestricted range of motion
  - Splint for sport activity and protection
  - Gentle Strengthening Weeks
- 8 Weeks – Splint discontinued for light ADL activities, continued for Sport activities
- **dependent on joint tenderness.**
Thumb Collateral Ligament Injury
Surgical Management

- Initial Treatment – Wrist thumb Orthoplast Splint
- 4 Weeks – Pin Removal and AROM/AAROM to thumb and wrist.
- 6-7 Weeks – PROM to thumb,
  * Avoid lateral strain to thumb
- 8 weeks – Splint discontinued for light ADL Use.
- Possibly continued splint use for heavy hand use and sport
Splinting Options
Scaphoid Fracture

- Can be missed on initial X-ray secondary to edema
- Noted by tenderness with palpation at Anatomical snuff box
- Previously typically with surgical intervention and extended period of immobilization – leading to decreased range of motion and loss of ADL function of the hand
Scaphoid Fracture
Scaphoid Fracture

Internal fixation increases position of healing and decreases immobilization time.
Reference List

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