Author: Debra Heitmann, MD Reviewer: Danielle Hart, MD

Case Title: Human Fight Bite with Deep Tissue Infection

# Target Audience: Medical Students, Residents

Primary Learning Objectives: key learning objectives of the scenario

1. Demonstrate a targeted initial approach to evaluation of penetrating hand injuries.

2. Identify the signs, symptoms and complications of human bite injuries to the hand.

3. Develop an approach to the management of infected human bite injuries to extremities.

Secondary Learning Objectives: detailed technical goals, behavioral goals, didactic points

1. Understand the value of taking a thorough history.

2. Understand the pathophysiology of infections from human bites.

Critical actions checklist

1. Obtains true mechanism of injury through HPI

2. Obtains tetanus & HepB vaccination history, and administers Td or TdaP, HepB IgG, and starts hepB vaccination series

3. Performs complete neurovascular exam of the hand

4. Initiates appropriate IV antibiotics to cover gram positives, eikenella & anaerobes

5. Orders Xray of hand

6. Consultation of Hand or Orthopedics service for exploration, irrigation & drainage of wound / deep space infection in OR, and admission for IV antibiotics. Participant should provide a clear summary of findings & diagnosis during this encounter.

7. Provides informative communication with patient

## Environment

1. Room Set Up – ED examination room
2. Mannequin set up
   1. None - Standardized Patient Case
   2. Moulage - dominant hand moulaged to show a bleeding, purulent, ecchymotic wound over dorsum of MCP joint of ring/pinky fingers, bandage gauze for wound
   3. Lines – peripheral IV catheters
   4. Fluids – NS or LR
   5. Airway equipment - none
   6. Drugs / medications
      1. Pain medications (IV opiates)
      2. Antibiotics to cover human oral flora
3. Props
   1. EKGs – none
   2. X-rays – hand
   3. Labs – CBC, BMP, INR, PTT

d. Photos: infected hand from fight bite (optional)

## Actors

1. Roles – patient, nurse, consultant

Aside from the patient role, the other roles are optional depending on available actors.

1. Who may play them – faculty, nurses, other residents, other students, standardized patients
2. Action Role – what role do they serve in the scenario?

Patient - the young man is the primary individual that provides the history and demonstrates the hand injury. He is to act reluctant, minimizing the injury and withhold information until prompted further to communicate circumstances of the injury.

Nurse - staff member who will facilitate carrying out orders and delivering medications. Obedient but questions why the need for tests. He/she can also facilitate the case with prompts if needed.

Consultant - the role of Hand Surgery consultant that can be contacted on the phone or arrive in person. The main role is to obtain a verbal presentation of the case and prompt clinical questions to the participant.

**For Examiner Only**

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Case Title: Human Fight Bite with Deep Tissue Infection

**CASE SUMMARY**

**CORE CONTENT AREA**

Musculoskeletal

Infectious Disease

**SYNOPSIS OF HISTORY/ Scenario Background**

Chief complaint with inaccurate mechanism of injury given freely. All further information must be requested.

Chief Complaint 31 year old male presents to the ED c/o acute hand pain after having fallen 3 days prior. The hand is painful and swollen.

With further questioning & prompting only, patient admits to having punched someone in the face and cut his knuckle, perhaps on the teeth of the victim.

Past medical history Past fracture of opposite hand

Medications and allergies None; NKDA

Family and social history Smoker, Drinker, smokes cannabis

No relevant family history

Vaccination history Last tetanus unknown

Has not had hepatitis B vaccination series

**SYNOPSIS OF PHYSICAL**

Vital Signs BP: 140/70 P: 110 R: 18 T : 99.0

PE: Right dominant hand demonstrates contusion/laceration of MCP joint of rIng finger with signs of deep tissue infection

hand and fingers are swollen

skin - dorsum of hand is erythematous, ecchymotic, warm

laceration over ring finger MCP( #4) shows purulent/serous discharge

tenderness is present near the wound and along the ring/pinky fingers including palpation of the tendon sheath

fingers have ROM but painful to extend

**For Examiner Only**

**CRITICAL ACTIONS**

**Scenario branch points/ PLAY OF CASE GUIDELINES**

1. **Critical Action**

**Patient is prompted to provide a more thorough HPI that reveals a fight bite has occurred.**

Details: Patient first states that injury occurred as a result of a fall. Patient should act reluctant or impatient to provide further details. With further prompting, patient reveals that the injury occurred, in fact, not from a fall but a fight. He punched the face/mouth of another man while drinking in a bar. He noticed the cut and bleeding immediately following the punch. He is unsure if his hand struck the teeth of the victim.

Cueing Guideline: If not prompted and case progresses, pt can ask during management "Doc, if I cut this on something other than the ground like .....uh, somebody's jewelry or something, is that more dangerous? "

1. **Critical Action**

**Obtains tetanus & HepB vaccination status and administers Td or TdaP, HepB IgG and starts HepB vaccination series.**

Detail: Patient should answer questions accurately about PMHx if prompted – states last Td unknown and that he has not had the HepB vaccination series.

Cueing Guideline: If immunization history is omitted, patient can ask during discussion of

treatment, "Doc, i just need the antibiotics and that's all? i am not gonna get something

like AIDS or hepatitis, am I?"

1. **Critical Action**

**Performs complete neurovascular exam of the hand**

Detail: Patient should cite extreme pain and tenderness to area of laceration and area

surrounding the wound. Testing of motor exam should produce pain proximal and on

palmar side to suggest spread of infection.

Cueing Guideline: If diagnosis of deep tissue infection or worse is minimized, patient can prompt "Doc, how come when i move my fingers, my hand is killing me up here (pointing to the wrist) when the cut is down here at the knuckle?"

1. **Critical Action**

**Initiates appropriate IV antibiotics to cover gram positives, eikenella and anaerobes**

Detail: Purulence and extent of the infected wound mandates intravenous antibiotics not oral.

Cueing Guideline: If oral antibiotics are chosen, patient and can ask "Are you sure that I can go home with this? This looks really bad and really hurts." If patient’s antibiotic choice does not cover human oral flora, then the nurse can ask, “Are you sure doctor? I haven’t seen that antibiotic used for this type of hand injury before.”

1. **Critical Action**

**Orders Xray of hand**

Detail: Evidence of direct trauma whether due to fall or disclosed punch warrants an Xray.

Cueing Guideline: If Xray is omitted, patient can prompt "Doc, do you think it's broken?"

1. **Critical Action**

**Consultation of Hand / Orthopedics service**

**Provides clear summary of findings / diagnosis to consultant**

**Requests operative exploration, irrigation, and drainage of the wound, and admission**

Detail: Severity of infected wound necessitates consult and admission to Hand / Orthopedics service. The conversation should be a comprehensive description of findings, test results and clinical impression, with the participants stating that the patient will need to go to the operating room for exploration, irrigation, and drainage.

Cueing Guideline: Any omitted portion of discussion can be prompted by the consultant through opened ended questions, such as "So what do you think is going on?" or “So, what would you like me to do with him?” If further prompting is required, the consultant can ask about the depth of the wound, extent of the infection, or signs of tendon laceration.

1. **Critical Action**

**Provides informative communication with patient**

Detail: Patient should be kept informed of plans, impression, and provider should answer questions when they arise.

Cueing Guideline: If patient is not well informed, he should inquire further. If still inadequately informed, he can become dissatisfied and upset that he “doesn’t know what is going on.”

**SCORING GUIDELINES**

1. Participants are scored for the number of critical actions rather than speed of decision making.

2. Emphasis on critical actions can be customized to the level of learner. For instance, medical students may be expected to complete a thorough H/P but may not realize wound exploration is essential.

MS PGY

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | 1 | 2 | 3 | 4 |  | 1 | 2 | 3 |
| **Critical Actions** |  |  |  |  |  |  |  |  |  |
| Obtains true mechanism of injury from HPI |  |  |  |  | X |  | X | X | X |
| Obtains tetanus status & Hepatitis hx; gives Td/TdAP, HepB IgG & starts HepB vaccination series |  | X | X | X | X |  | X | X | X |
| Performs complete neurovascular exam of hand |  |  |  | X | X |  | X | X | X |
| Administers IV antibiotics |  |  |  |  | X |  | X | X | X |
| Orders Xray of hand |  |  |  | X | X |  | X | X | X |
| Consultation of Hand service with clear summary of findings and diagnosis |  |  |  |  | X |  | X | X | X |
| Provides informative communication with patient |  | X | X | X | X |  | X | X | X |

**For Examiner Only**

**HISTORY**

**Onset of Symptoms:** Pain - 3 days ago

Bleeding - 3 days ago

Swelling - the next morning, 2 days

Discharge - 1 day

**Background Info:** Patient reports having fallen 3 days ago after going out with friends. He thinks he struck his right hand on the ground. He complains of gradual worsening of pain, swelling and discharge from the hand injury since then. Now, he has had difficulty sleeping and finally decided to come to the ED for care.

**Chief Complaint:** "My hand hurts"

**Past Medical Hx:** Fracture of Left hand - five years ago - casted

Immunization - Tetanus in public school system

No Hepatitis vaccinations.

**Past Surgical Hx:** None

**Habits:** Smoking: 1 PPD

ETOH: 2 beers/day 4 days/week

Drugs: occasional cannabis, No IVDA

**Family Medical Hx: N/A**

**Social Hx:** Marital Status: single

Children: none

Education: High School incomplete

Employment: car repair mechanic in local garage

**ROS:** List pertinent positives and negatives:

Moderate pain at rest which increases with movement of wrist, hand and fingers. no pain in elbow or shoulder

No numbness, tingling in extremity

No fevers or sweats

No weakness, dizziness

No additional myalgias, arthralgias

**For Examiner Only**

**PHYSICAL EXAM**

**Patient Name:** Joseph Wackamole **Age & Sex:** 21 year old male

**General Appearance:** Well-developed, well-nourished male in mild distress due to pain

**Vital Signs:** BP: 140/70 P: 110 R: 18 T : 99.0

**HEENT:** There is no evidence of trauma. Pupils are equal, round and reactive to light. Extraocular movements are intact. The ear exam is normal. The oral exam is normal.

**Neck:**  The skin is normal in appearance. There is no tenderness to palpation. There is full range of movement.

**Skin:** The entire skin examination is normal except for the region of the right hand. There is a blanchable erythema without sharp borders localized to dorsum of the right hand surrounding a 2 cm laceration over MCP joint #4. The erythema extends to the ring and pinky fingers. The skin is warm to touch with diffuse tenderness in the hand, especially upon palpation of the two digits. There are no streaks or crepitus proximally. There are no petechia or purpura.

**Lungs:** Clear to auscultation without wheezes, crackles or rales. Breath sounds are equal bilaterally.

**Heart/Vascular:**

Tachycardia with regular rate and rhythm. There are no murmurs, rubs or gallops. Pulses are equal and 2+ in all extremities.

**Abdomen:** Soft, nontender and nondistended. Bowel sounds are normal.

**Extremities:** The right hand is diffusely swollen. A 2 cm laceration is noted on the dorsum of the MCP Joint of the ring finger and shows some cloudy, serous discharge. There is a blanchable erythema localized to the dorsum of the hand and the ring and pinky fingers. The hand is diffusely tender to palpation without crepitus especially near the wound and the ring finger. Radial and ulnar pulses are 2+. Capillary refill is less than 5 seconds in all fingers. The fingers are resting in a position of slight flexion. Range of motion produces pain in the fingers. Full flexion is possible but extension is limited and painful. Sensory exam is intact.

The wrist, elbow and shoulder examination is normal.

The left hand shows a healed deformity of fourth metacarpal but has full range of motion and neurovascular exam. All other extremities have full range of motion without tenderness.

**Neurological:** Alert and oriented to person, place and time. Cranial nerves are intact. Sensory exam is intact. Motor examination is normal except for limited strength of the digits of the right hand. Deep tendon reflexes are 2+ in all extremities.

**Mental Status:** Normal.

**For Examiner Only**

**STIMULUS INVENTORY**

#1 Emergency Admitting Form

#2 CBC

#3 BMP

#4 XR Right Hand

#5 Photo of Right Hand (if case is used as an oral case test)

#6 Additional questions for participant

**For Examiner Only**

**LAB DATA & IMAGING RESULTS**

**Stimulus #2**

**Complete Blood Count (CBC)**

WBC 14 /mm3

Hgb 12.6 g/dL

Hct 35.7 %

Platelets 140 th/mm3

Differential

Segs 85 %

Bands 8 %

Lymphs 15 %

Monos 4 %

Eos 0 %

**Stimulus #3**

**Basic Metabolic Profile (BMP)**

Na+ 135 mEq/L

K+ 4.4 mEq/L

CO2 28 mEq/L

Cl- 108 mEq/L

Glucose 110 mg/dL

BUN 12 mg/dL

Creatinine 0.5 mg/dL

**Diagnostic Imaging**

**Stimulus #4**

XR R Hand: No fracture, + soft tissue swelling

**Stimulus #5**

Photo R Hand: swollen right hand with laceration over MCP #4

**Learner Stimulus #1**

**ABEM General Hospital**

**Emergency Admitting Form**

Name: Joseph Wackamole

Age: 21 years

Sex: Male

Method of Transportation: Private car

Person giving information: Self

Presenting complaint: Pain to right hand

**Background:** Patient reports having fallen 3 days ago after going out with friends. He thinks he struck his right hand on the ground. He complains of gradual worsening of pain, swelling and discharge from the hand injury since then. Now, he has had difficulty sleeping and finally decided to come to the ED for care.

**Triage or Initial Vital Signs**

BP: 140/70

P: 110

R: 18

T : 99.0 T

**Learner Stimulus #2**

**Complete Blood Count (CBC)**

WBC 14 /mm3

Hgb 12.6 g/dL

Hct 35.7 %

Platelets 140 th/mm3

Differential

Segs 85 %

Bands 8 %

Lymphs 15 %

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**Learner Stimulus #3**

**Basic Metabolic Profile (BMP)**

Na+ 135 mEq/L

K+ 4.4 mEq/L

CO2 28 mEq/L

Cl- 108 mEq/L

Glucose 110 mg/dL

BUN 12 mg/dL

Creatinine 0.5 mg/dL

**Learner Stimulus #4 - XRAYS 1 of 3**



**Learner Stimulus #4 - XRAYS 2 of 3**



**Learner Stimulus #4 - XRAYS 3 of 3**



**Learner Stimulus #5**

NOTE TO Educational Users: The origin of the photo below is unknown. We are currently searching for a replacement photo..



**Learner Stimulus #6**

**Additional Questions for participant**

**1.Can you describe the complications of a human bite to the hand?**

fracture

foreign body

tendon injury

cellulitis

deep tissue infection

septic joint

osteomyelitis

**2.What are the main physicial exam findings of a deep tissue infection to the hand?**

Redness, warmth, purulent drainage, swelling, increasing pain,

crepitus, tenderness, fever

**3.What is the treatment for a deep tissue infection of the hand as a result of a human bite?**

Wound care

- copious irrigation, debridement of devitalized tissue

- No closure

Immobilization, elevation

Analgesia

Tetanus Prophylaxis

Hepatitis Prophylaxis

Intravenous Antibiotics

Admission

Hand/Orthopedic consultation

Possible surgical intervention

**For Examiner**

Date: Examiner: Examinee(s):

Scoring: In accordance with the Standardized Direct Observational Tool (SDOT)

The learner should be scored (based on level of training) for each item above with one of the following:

NI = Needs Improvement

ME = Meets Expectations

AE = Above Expectations

NA= Not Assessed

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Critical Actions** | **NI** | **ME** | **AE** | **NA** | **Category** |
| Obtains true mechanism of injury from HPI |  |  |  |  | PC, MK, ICS, P |
| Obtains tetanus status/Hepatitis hx; administers Td/TdAP, HepB IgG, & starts HepB vaccination series |  |  |  |  | PC, MK, PBL |
| Performs proper neurovascular exam of hand |  |  |  |  | PC, MK, PBL |
| Initiates appropriate IV abx |  |  |  |  | PC, MK, PBL |
| Orders Xray of hand |  |  |  |  | PC, MK, PBL |
| Consultation of Hand service & provides clear summary of findings & diagnosis |  |  |  |  | PC, MK, PBL, ICS, P, SBP |
| Provides informative communication with patient |  |  |  |  | PC, MK, ICS, P |

The score sheet may be used for a variety of learners. For example, in using the case for 4th year medical students, the key teaching points of the case may be the recognition of shock and treatment with appropriate fluid resuscitation. Other items may be marked N/A= not assessed.

Category: One or more of the ACGME Core Competencies as defined in the SDOT

PC= Patient Care

Compassionate, appropriate, and effective for the treatment of health problems and the promotion of health

MK= Medical Knowledge

Residents are expected to formulate an appropriate differential diagnosis with special attention to life-threatening conditions, demonstrate the ability to utilize available medical resources effectively, and apply this knowledge to clinical decision making

PBL= Practice Based Learning & Improvement

Involves investigation and evaluation of their own patient care, appraisal and assimilation of scientific evidence, and improvements in patient care

ICS= Interpersonal Communication Skills

Results in effective information exchange and teaming with patients, their families, and other health professionals

P= Professionalism

Manifested through a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse patient population

SBP= Systems Based Practice

Manifested by actions that demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care that is of optimal value

**Debriefing Materials:**

**Human Bites**

typically three types of injuries

- closed fisted (otherwise known as "the Fight Bite"); the highest risk for complications

- occlusion

- puncture

**Closed Fisted Injuries**

This is atraumatic injury, also known as a fight bite, whereby the knuckles(usually MCP Jt 3/4) or PIP joints make contact with the teeth of the victim resulting in an open skin wound and introduction of skin/oral flora into the soft tissue of the hand. Extension of the fingers can lead to the passage of bacteria into deeper structures including the joint space and tendons. These wounds are high risk for deep tissue infections, septic arthritis and osteomyelitis esp. if presentation is delayed. Additional injuries include fracture, tendon injury and inclusion of foreign bodies.

**History**

must have a high index of suspicion for wounds to hands

screen for injuries as a result of assault or abuse

**Microbiology**

Bacteria include skin and oral flora

- aerobic eg. *S. aureus, Streptococci, Eikenella corrodens*

- anaerobic eg. *Fusobacterium, Peptostretococcus*

Tetanus prone

Viral

- Hepatitis B

- HIV esp. if blood present in saliva

**Clinical Evaluation**

perform a thorough neuromuscular and vascular exam

examine for signs of

fracture gross deformity, swelling,

foreign body palpable mass

tendon injury inability to fully extend or flex

cellulitis redness, warmth, swelling

deep tissue infection purulence, fever, swelling, increasing pain

crepitus, tenderness

septic joint fever, severe pain, tenderness, warmth

osteomyelitis fever, pain/tenderness out of proportion to injury

open wounds should be explored using local anesthetic to determine the presence of

infection, FB, joint penetration, tendon laceration. Exploration should be done with

hand in extended and flexed positions.

**Debriefing Materials (cont'd):**

**Closed Fisted Hand Injuries**

**Ancillary Studies**

Laboratory

- if signs of systemic infection are present, blood cultures are

useful prior to the administration of antibiotics.

- CBC, ESR, CRP may be elevated in deep tissue infections but normal values do

not rule out the possibility.

Wound Cultures

- only useful in infected bites

Radiography

- useful for fracture, foreign bodies, gas, osteomyelitis(if late presentation)

**Treatment**

Wound care

- copious irrigation, debridement of devitalized tissue

- No closure - due to high risk of becoming infected. Delayed primary closure could

be considered.

- Bulky dressing

Immobilization, elevation

Analgesia

Tetanus Prophylaxis

Hepatitis

- any patient who is unvaccinated or has inadequate antiH-Bs antibodies AND

bitten by an individual whose status is unknown or positive for HBsAg should

receive both Hepatitis B immune globulin and vaccine

Antibiotics

- Non infected Bites

**any** human bite, especially those to hands, feet, joints and cartilaginous

structures, that **penetrate** the epidermis likely benefit from antibiotic

prophylaxis. Treatment is usually 5 days.

- Infected Bites

Injuries that demonstrate moderate to severe cellulitis, penetrate joint space or

show signs of deep tissue infection need admission for intravenous antibiotics.

Injuries that involve lacerated tendons should be considered for admission.

Hand or Orthopedic service should be consulted for possible surgical

debridement or drainage.

Treatment involves IV antibiotics until resolved then oral agents usually 10-14

days.

- Any bite being treated with antibiotics that is considered for outpatient management

should have close follow-up.

- Antibiotic suggestions:

Oral - Single agent - Amoxcillin-clavulanate,

Two agents - Doxycycline Metronidazole

Bactrim **PLUS** Clindamycin

PCN VK

Ciprofloxacin

Intravenous

Ampicillin-sulbactam, Piperacillin-tazobactam, Ticarcillin-clavulanate

**Keywords for future searching functions**

human bite, closed fist injury, fight bite, infected human bite.

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**Has this work been previously published? No**