



Soft tissue injury and antibiotic regimes

Dr. Behçet AL
ED of Medicine Faculty, Gaziantep
University/Turkey
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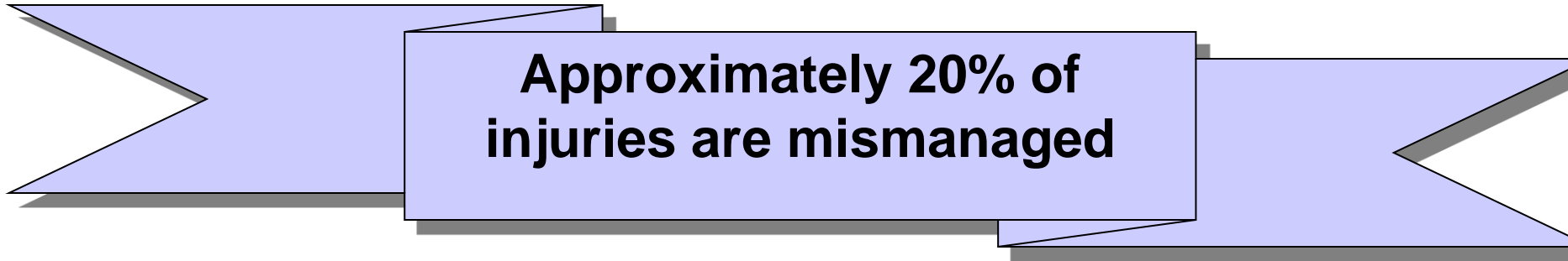
Incidence

- The estimates soft tissue injury is about **%1 of ED admissions .**

The estimated incidence of traumatic wound infection is %6

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**PAB therapy administration is
15.2% .**

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**Approximately 20% of
injuries are mismanaged**

**No well-defined criteria for
AB treatment for wounds
management;**

N.K. Paschos et al. / Injury, Int. J. Care Injured 45 (2014) 237–240238

**A great wide use, misuse, and overuse of
PAB is reported in literatures**

The time between the injury and admission to the ED is an independent predictor of the infection

Only a subset of **high-risk wounds** stand to benefit from prophylactic antibiotics (PAB).

Management of Crush injuries

In case of Crush injuries

- Operative management,
- Long-term care,
- Cosmetic outcome,
- Effects on lifestyle,
- General health should be considered.

Delayed/mistreatment cause

- Psychological devastation,
- Cosmetically unacceptable results.

Risk factors for infection

- Nature of the host,
 - diabetes mellitus,
 - chronic renal failure,
 - obesity, malnutrition,
 - immunocompromising illnesses,
 - therapies such as corticosteroids and chemotherapeutic agents,
 - Extreme young or old age
- The characteristics of the wound,
 - Wound include high bacterial;
 - Oil contamination;
 - Crush injury.
 - Injury associated with tendons, joints, and bones; puncture
 - Intraoral wounds, most mammalian wounds
- The treatment used.
 - Certain treatments, such as the use of epinephrine-containing solutions,.
 - High number of sutures.
 - Treatment performed by inexperienced doctor

Lammers RL et al. Prediction of traumatic wound infection with a neural network-derived decision model. Am J Emerg Med 2003;21:1–7.

Holtom PD. Antibiotic prophylaxis: current recommendations. J Am Acad Orthop Surg 2006;14:S98–100.

Infected Wounds



Puncture wounds
Contaminated Wounds
Bite wounds

are often infected
with multiple
organisms,

Edlich RF et al. Revolutionary advances in the management of traumatic wounds in the emergency department during the last 40 years: part I. J Emerg Med 2010;38(1):40–50.

Broad-spectrum PAB against aerobic and
anaerobic organisms should be
administered

Habeeba Park et al. Complex Wounds and Their Management Surg Clin N Am 90 (2010) 1181–1194

Reasons of poor healing/long-term nonhealing



Injuries at junction
Inadequate surgical closure,
Ischemia,
Anastomotic failure,
Infection.
Foreign material into wounds

The initial assessment

An evaluation to identify and correct life-threatening injuries

The resuscitation of ***-hypotension, -hypoxemia, -hypothermia, and -coagulopathy***

Identify the zone of necrosis, stasis, hyperemia

Early collaboration between the the clinics

Prompt and thorough assessment and timely operative management are key to optimal treatment of complex wounds.

Habeeba Park et al. Complex Wounds and Their Management Surg Clin N Am 90 (2010) 1181–1194

Obtain a thorough physical examination,
Use aseptic technique,
Anesthetize the wound before cleansing,
Surgical debridement, and mechanical cleansing
Remove foreign body,

.
Pozet A et al. Diagnosis and treatment of uncommon wounds. Clin Plast Surg 2007;34:749–64
..

The “golden period” to initiate PAB

6-24 hours from the time of injury,

Otherwise can see

- Increase of bacteria,
- Progression of invasive infection,
- Demonstrating of clinical outcomes

PAB



Within first 3 h

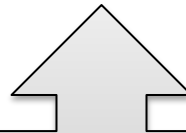
WHEN?

DURATION?

3-5 Days

AGENTS?

the most common skin pathogens (Staphylococcus aureus and Streptococci).



For the first-line therapy :

Cloxacillin and first-generation cephalosporins are appropriate and recommended

Uncomplicated injuries and PAB



PAB fail to reduce the overall rate of infection and cause resistant pathogens.

No significant outcome was seen between PAB use for uncomplicated wounds and control subjects,



Rule:

PAB is not recommended for simple wounds.

Injury with open fractures (Gustillo Anderson) and joint wounds and PAB.

Consider the

Mechanism of injury,
Severity of soft tissue damage,
Configuration of the fracture, and
Degree of contamination.


Neurovascular injury,

Sepsis in type IIIB open fractures is 17- 27%.

Pollak AN et al. The relationship between time to surgical debridement and incidence of infection after open high-energy lower extremity trauma. J Bone Joint Surg Am 2010;92:7–15.

Luchette FA et al, East Practice Management Guidelines Work Group: practice management guidelines for prophylactic antibiotic use in open fractures., 2006.

A prospective, randomized, controlled trial on the importance of antibiotics in the treatment of open fractures



The infection rates were
13.9%, in the placebo
10%, penicillin and
2.3% cephalosporin groups,

Patzakis MJ et al . Factors influencing infection rate in open fracture wounds. Clin Orthop Relat Res 1989;243:36–40.

To reduce infection rate against both gram-positive and gram-negative organisms AB are recommended to administer within 3 hours of injury.

Rule :
**Use of antibiotics for open fractures
and joint wounds is recommended**

However, the duration of therapy and the optimal antibiotic choices remain unresolved.

After wound closure for type I and II 24h;

For type III injuries 72 h.

Infecting organisms, and antibiotic choice

Type I,II open fractures: Organisms:

S aureus, *Streptococci* spp, and aerobic gram-negative bacilli are the most common

Antibiotic:

First/second-generation **cephalosporin** (should be given within 6 hours of the injury and for 24 hours after wound closure).

Alternative AB regimen an extended-spectrum **quinolone** (eg, gatifloxacin or moxifloxacin)

Type III open fractures may require better coverage for gram-negative organisms:

cephalosporin+ aminoglycoside

(within 6 hours following the fracture, and be continued for 72 hours).

Contaminated and ischemia: **penicillin** (particularly for *Clostridia* spp) may be added to provide coverage against anaerobes,

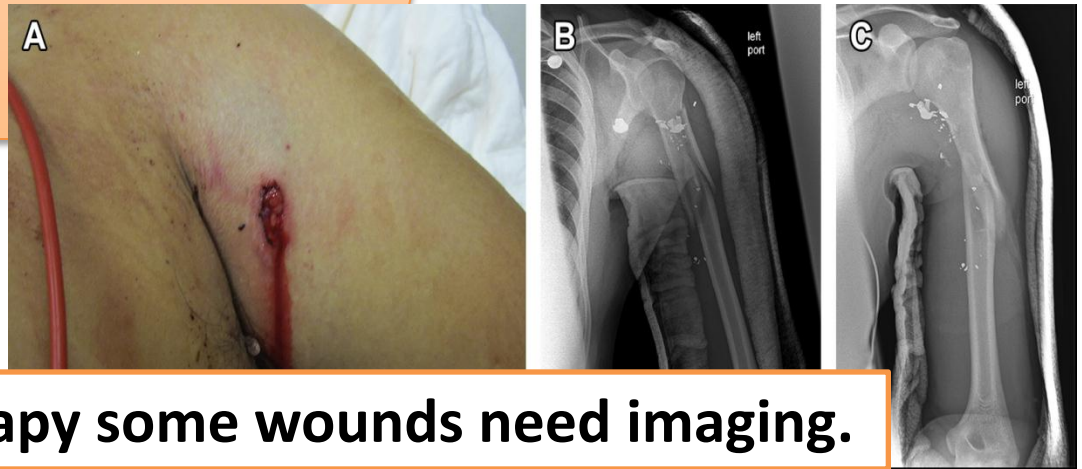
Begin AB therapy in the ER



Gunshot injury

Advanced Life Support principles,
Inspection of soft tissue
Define contamination,
A thorough neurovascular examination,
Local wound care,
Imaging, and fracture stabilization.

Report High-risk wounds (involve high-energy weapons, delayed presentation, large soft-tissue deficits, multiple projectiles, exposed bone, and those occurring on a battlefield or farm environment)



For an appropriate AB therapy some wounds need imaging.

Treatment of Gunshot injury

No universal protocol exists for PAB

Low-risk wounds:

PO cephalosporin or no AB.

Injuries caused by high-velocity gunshot are associated with increased risk of infection:

First-generation cephalosporin with/without an aminoglycoside is recommended for **48 to 72h**.

In grossly contaminated wounds
penicillin should be added to provide
additional anaerobic coverage of *Clostridia*
spp.





PAB, injury associated with FACIAL FRACTURES

Guidelines are less clear.
A systematic review revealed four randomized studies that examined the possible benefit of prophylactic antibiotics in such situations.

Skin injury with the **mandible fracture** benefit from a short-term course of PAB (<48 hours). The benefit of PAB is likely to be related to their effect on bacterial contamination from the **dentition and through the periodontal ligament.**

- Simple facial skin lacerations,
- Tongue lacerations, and
- Intraoral lacerations without facial fractures



No need to
use PAB

Facial or oral lacerations are associated with compound fractures of the mandible and in through-and-through lacerations of the mouth



First-generation **cephalosporin** with/without an **aminoglycoside** is recommended for 48 to 72h .

PAB for intra oral wounds

Injuries include mucosa only or the mucosa and adjacent skin (“through-and-through” lacerations (has 33% infection rate)

**Are generally
recommend to be given
PAB**

Intraoral lacerations managed with **penicillin** prophylaxis showed no significant difference compared with control group

Simple intraoral lacerations:
No routine PAB

Penicillin-allergic patients should receive
clindamycin

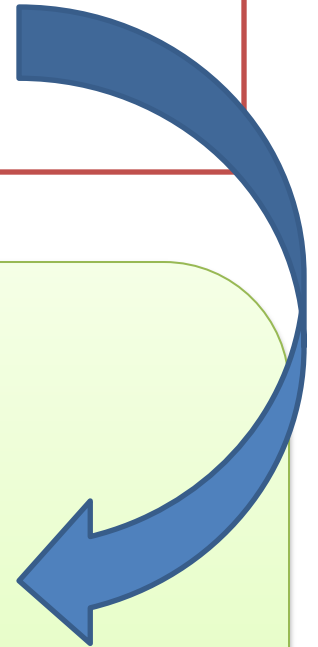
Tongue or intraoral lacerations in children

**There is insufficient evidence to make any
definitive recommendations with regard to PAB**

Bite wounds

Injury, Int. J. Care Injured 43 (2012) 2117–2121 (1592 pts)

The mean age 7.7 years
Dog bites 43.8%,
Human bites 43.6%,
Infected wounds 10.7%
Surgical intervention 1.7%



The estimated infection rate for

Dog: 2%-20%,
Cat: 28–80% and
Humans: 2–3%

Dog: crush injury, lacerations, abrasions
Cats: puncture wounds
Human: transmission risk of hepatitis B and C, HIV and even syphilis

McBean CE et al. Animal and human bite injuries in Victoria, 1998–2004. Medical Journal of Australia 2007;186:38–40.

Dendle C et al. Review article: animal bites: an update for management with a focus on infections.

Emergency Medicine Australasia 2008;20(6):458–67.

Types of bite wounds should undergo PAB

- Wounds involving the hand
- Wounds near a bone or joint
- Deep puncture wounds
- Moderate-to-severe crush injuries
- Wounds in areas of underlying venous and/or lymphatic compromise
- Wounds requiring surgical repair
- Wounds in immunocompromised patients

Prophylactic oral antibiotics should be administered for 3 days to 5 days, with close follow-up..

Infection not established

Amoxicillin + clavulanate (child, 22.5 + 3.2 mg/kg orally, 12 doses hourly for 5 d)

Infection established

Metronidazole (child, 10 mg/kg up to 400 mg) orally, 12 doses hourly for 14 d) EITHER

Cefotaxime (child, 50 mg/kg up to 1 g) IV daily for 14 d OR

Ceftriaxone (child, 50 mg/kg up to 1 g) IV daily for 14 d OR

Piperacillin + tazobactam (child, 100 + 12.5 mg/kg up to 4 + 0.5 g) IV, 8 doses hourly for 14 d OR)

Ticarcillin + clavulanate (child, 50 + 1.7 mg/kg up to 3 + 0.1 g) IV, 6 doses hourly for 14 d)

The goal of initial antibiotic therapy must cover

Anaerobes

Staphylococcus,

Streptococcus, and

Pasteurella species.

For patients with immediate penicillin hypersensitivity

Metronidazole (child, 10 mg/kg up to 400 mg) orally, 12 doses hourly for 14 d) EITHER

Doxycycline (child > 8 y, 5 mg/kg up to 200 mg) orally for the first dose, then 2.5 mg/kg up to 100 mg orally, 12 doses hourly OR

Trimethoprim + sulfamethoxazole (child, 4 + 20 mg/kg up to 160 + 800 mg) orally, 12 doses hourly OR)

Ciprofloxacin (child, 10 mg/kg up to +500 mg) orally, 12 doses hourly

Limite using of topical antimicrobials

They may be a source of contact dermatitis
Possible pseudomonas overgrowth,

The use of antimicrobial creams (containing malic acid or hypochlorite solutions)

Decrease bacterial colonization but can cause inflammation of
surrounding tissue,
Impede capillary blood flow to granulating tissue, or damage
fibroblasts, causing impairment in healing

Topical antibiotics

Reduce the infection rate of acute, minor, uncomplicated soft tissue wounds

Despite evidence in the literature of contact hypersensitivity to topical antibiotics, particularly to neomycin, the incidence in these studies was very low.

Rule:
**Topical preparations without an antibiotic
are not recommended due to their high
infection rate**

Contaminated wounds
Ointments containing **bacitracin, neomycin, or
polymyxin** is routinely used in the United States.

So far, the effectiveness of topical antibiotic ointments in managing minor wounds has not been properly investigated

As a result:

Topical AB is recommended for only stellate wounds



SUMMARY

Good surgical technique,
Early appropriate surgical intervention,
Source control,
Early tissue coverage, and

Thomas N et al. Animal bite-associated infections: microbiology and treatment. Expert Review of Anti-Infective Therapy 2011;9(2):215–26.

Obtain culture
Obtain wound irrigation.
Debride necrotic tissue, and
Remove any foreign bodies.
Administer tetanus booster

Then Appropriate AB therapy,

Accurate PAB indications

consensus

Immunocompromised patients;
Grossly contaminated wounds;
Delayed wound closure;
Patients at high risk for endocarditic;
Patients with open fractures and joint wound;
High-velocity gunshot wounds

Antibiotic solutions

Are associated with more wound infections and add cost,
potential immunologic sensitization, and selection of
resistant organisms.



**Antibiotic therapy
option is the
physicians' decision.**

Many thanks