Case Report

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Delayed Primary Closure of the War Wound Versus Primary Closure

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Abstract

War wound is considered as a dirty wound and is liable to get infected and risk the trauma patient life if not properly managed.

Along years of my practice in the field of war trauma surgery since 1994, I have met lots of war wounded patient suffering from infected wound or even prolonged wound infection e.g., soft tissue infection and bone infection.

Wound debridement alone is not enough, at the beginning of my experience with war wound, many cases got infection in spite of wound debridement before primary closure of the wound. After getting in contact with international committee of red cross in 1996, I started to follow the ICRC guidelines of war wound management which is composed of many steps in logical order for the method of proper wound debridement followed by delayed primary closure of the wound instead of primary closure.

Using ICRC method of war wound management and delayed primary closure, I have never suffered a case of wound infection, unless the debridement was not done properly.

Keywords: War wound (WW); Dirty contaminated wound; Primary closure (PC); Delayed primary closure (DPC); Limb saving

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Introduction

Saving a patient limb or saving a human being life is highly appreciated by Allah and considered as if you saved lives of all mankind as mentioned in Qur'an. Questions especially directed to general surgeons and orthopedic surgeons who met with trauma cases and dirty wounds like; left colonic perforation, rectal trauma, and open fracture; did you suffer prolonged wound infection!

Did you try all kinds of sensitive antibiotics using culture and sensitivity but your patient wound infection never heal! Do you aware that the best antibiotic is proper surgical debridement and wound management!

Did you suffer the prolonged hospital stay of your patient!

Did your patient systems and general health suffered systems and multiple organ failure!

Did the family and country suffered financial burden due the cost of prolonged hospital stay!

Did you met with prolonged brain infection after penetrating head trauma!

All of the above can occur because the war wound (which is a dirty wound; IBN SINNA) is not properly managed [1].

Presence of FB may be a reason or the presence of dead tissue or a separated non vascularized piece of bone fragment.

What are other general factors that can affect war wounded patient outcome?

Outcome of patient management depends on

- Severity of the wound
- General condition of patient

Pre-hospital care

- Protection, first aid and lifesaving & limb saving procedures in the field
- Triage and treatment given in the field
- Evacuation time, conditions of transfer

Hospital care

- Resuscitation & hospital triage

- Care in the ER & OR / ICU

Post-operative nursing care

Post hospital care

Physiotherapy, Rehabilitation & vocational training or return to the battle field.

So, it's clear now that war wound care doesn't start at the hospital but should start at the moment of injury in the field, for that reason, all health staff should be trained to deal with war injured, starting from first responders in the field (health staff and civil defense personnel) and ambulance team [2].

Case Study

Case study has been defined in two groups below:

Group A cases

1. Chronic sinus and suppuration after open fracture of femur in YEMEN war

2. Injury of the left colon with failure of primary repair (weapon wound in YEMEN)

3. Cut wrist with gangrene of the hand and failure of primary closure after below elbow amputation in Seirraleone civil war

4. Prolonged brain suppuration after head trauma in South Sudan civil war

5. Colonic injury leading to necrotizing fasciitis of the post abdominal wall and back muscles ended by death in South Sudan civil war

Group B cases

1. Healing of rectal tear after colostomy and secondary closure in Syria war

2. Healing of brain trauma after proper brain DBR and DPC in South Sudan war

3. Healing of forearm war trauma after DBR and DPC in South Sudan

4. Healing of open humeral fracture after proper DBR and DPC in South Sudan

5. Healing of left colonic injury after colostomy and secondary repair in Syria war

In group A cases the results were failure due to the following reasons

- Case A1 non vascularized separated bone fragment was left inside and acts as FB.
- Case A2 severe peritoneal contamination and soiling.
- Case A3 improper DBR: amputation of the gangrenous hand only aiming to save the forearm and neglecting that the gas gangrene organisms has spread more proximally leading to severe infection after hand amputation (underestimation), re-amputation was done above elbow with proper DBR and the case succeeded.
- Case A4 prolonged suppuration even after 3 surgical attempts due to small bone fragment lodged inside the brain, once removed in the 4th surgery, the wound healed.
- Case A5 due to neglected FB inside the abdomen with improper colonic surgery lead to necrotizing fasciitis extensively extended beyond the operable situation allover the trunk, paravertebral muscles and posterior abdominal wall-ended by death.

Group B cases

- Case B1 Rectal tear managed by colostomy and secondary closure-healed with short hospital stay.
- case B2 Brain trauma at the frontal lobe-proper DBR was complicated with intraoperative bleeding which was hardly controlled followed by primary closure with very successful outcome.
- Case B3 Forearm wound was managed by proper DBR and DPC according to ICRC guidelines-healed with short hospital stay.
- Case B4 fracture humeral shaft with radial nerve injury-proper DBR and DPC with excellent outcome
- Case B5 left colon injury-colostomy with secondary closure-good outcome.

Successful cases were managed according to ICRC guidelines as follow

After proper resuscitation and anesthesia

1. Wound hygiene: wash the patient soap and water, wash the wound with soap and water then saline.
2. Wound exploration.
3. Complete wound excision - incision / debridement: excise necrotic and contaminated tissues in anatomical order layer by layer to visualize the deeper structures in this order:
    - Skin + Subcutaneous tissue
    - Fascia

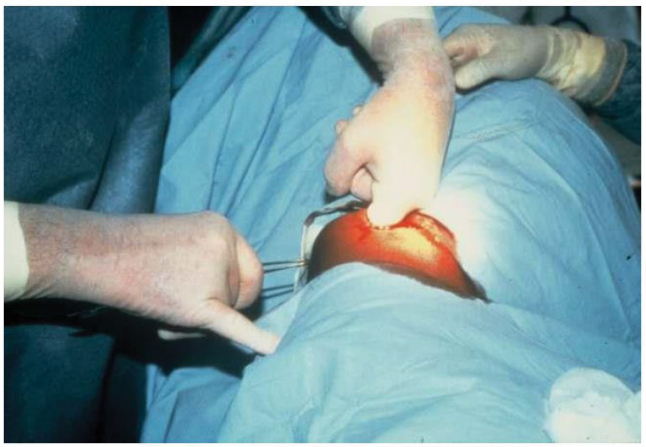

Figure 1 Wound Exploration - Use your fingers to define the bullet track and direction.

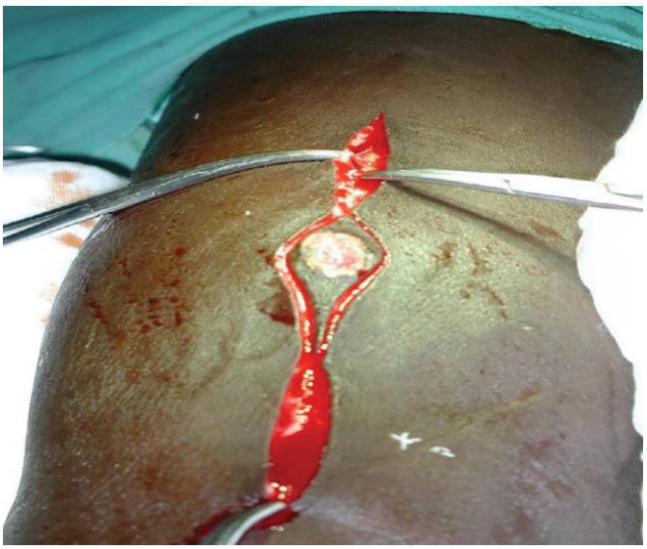

Figure 2 Incision - Starts 5 cm before the site of bullet inlet and extended longer to the direction of wound track, to open the whole roof of the wound track.

Figure 3 Excision - Start by excising all contaminated devitalized dead skin and subcutaneous tissue, until bleeding is seen.

- Muscles
- Tendons
- Vessels

Nerve surgery, just marking of the nerve, no primary repair! – nerve repair is done 6 weeks or later in absolute clean wound [3].

Bone removal of all detached non vascularized fragments and keep all vascularized non-detached fragments to support healing of fracture (Figures 1-7).

Bone

All detached (avascular) bone fragments should be removed

Bone fragments are found to be a very common cause of wound infection in absence of obvious cause (Figures 8-14).

Leave the wound open for drainage-no sutures: exceptions: head & neck, genitalia

Figure 4 Excise all dead muscles until bleeding is seen.

Figure 5 Tendon: excise dead tendon.

Figure 6 Healthy tendon should be covered by muscles or soft tissue to ensure blood supply to the tendon (never leave the tendon exposed otherwise it will be devitalized).

No unnecessary dressing changes until day 5 except if the wound gets soaked

Figure 7 Vascular repair should be done early before (2-6 hours) as after 8 hours 100% tissue death occurs and reperfusion injury may risk the patient life.

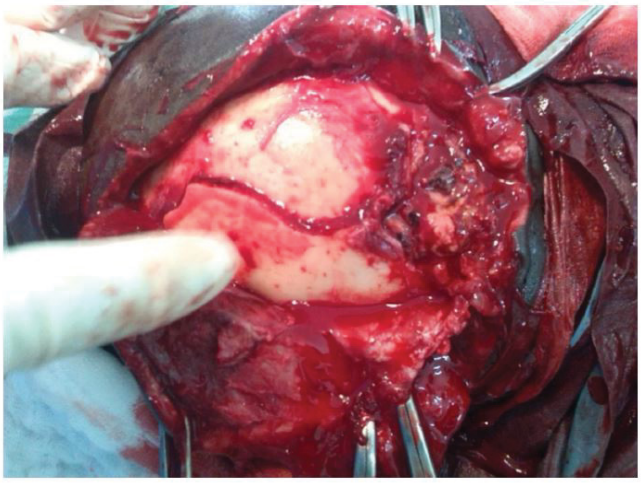

Figure 8 Removing bone fragment may be a challenge especially in head injury when the bone is deeply seated in the brain, the wound and brain will remain contaminated infected unless the fragment is removed.

Figure 9 Also deeply seated fragment in a bulky thigh muscles is another challenge.

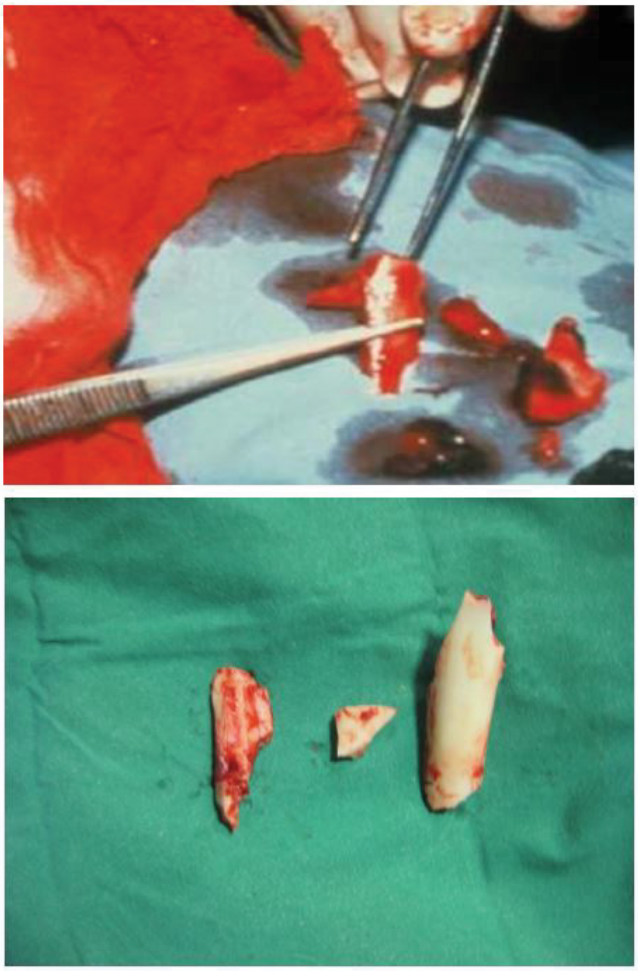

Figure 10 Bone fragments are found to be a very common cause of wound infection in absence of obvious cause.

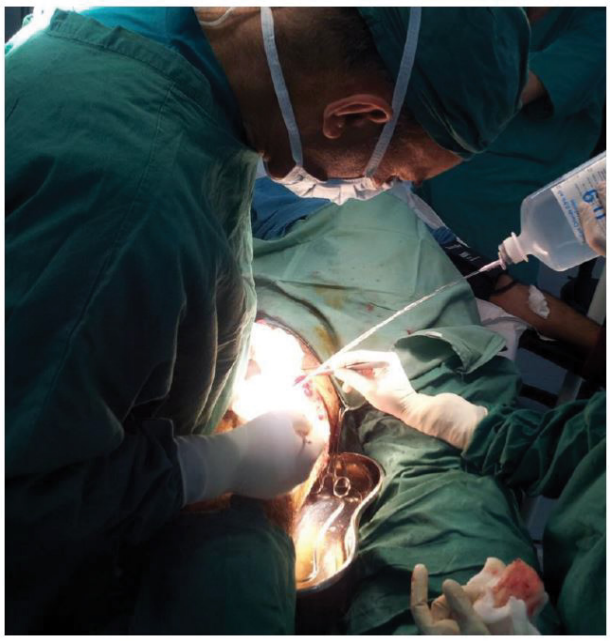

Figure 11 Copious irrigation of the wound with normal worm saline is important before you end the surgery.

Figure 12 Primary closure in head injury.

Figure 13 Wound left open without suture for DPC after 5 days.

Figure 14 Large bulky dressing (fluffy gauze dressing) to absorb blood and secretions.

Figure 15 Delayed Primary Closure (DPC: after 4-7 days) or early grafting.

Figure 16 Early grafting of a wound or burn is very important once the wound is clean.

Antibiotics and Tetanus Prophylaxis

Analgesia

Care of the general condition of the patient + nutrition

After 5 days, remove dressing

Sticky and non-sticky dressing

- Non sticky dressing means wound infection
- Dry sticky dressing means clean wound ready for DPC (delayed primary closure) or for early grafting
- Delayed Primary Closure (DPC: after 4-7 days) or early grafting
- Early grafting of a wound or burn is very important once the wound is clean (**Figures 15-17**)

Figure 17 Mismanaged Wound - This kind of wounds will be infected and we need to apply the above roles from scratch.

Conclusion

- War wound is a dirty contaminated wound
- War wound management starts at the battle field so you have to have well trained prehospital trauma team
- Proper debridement (DBR) anatomically layer by layer
- Leave the wound open never do primary closure except in head, neck and genitalia
- Large bulky dressing
- No unnecessary dressing changes (for 5 days unless soaked)
- Delayed Primary Closure (DPC) or grafting
- Early physiotherapy
- Rehabilitation

References

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