



Round : Major Surgery - Burns.....

Group no : B3.....

Done By : Johainah Taha.....

*Degrees of Burn :

1. First degree :- a. pain + erythema

b. epidermis layer

c. no contracture

d. 1-6 days

e. heal with regeneration

f. apply only to thermal burn.



2. Second degree :- a. necrosis of the epidermis and varying depth of the dermis

(superficial, intermediate, deep)

b. pain, erythema, blisters, blanching

c. burned area is wet with exudate.

d. Applies only to thermal burns.



3. Third degree :- a. full thickness

b. Eschar (dead tissue, insensitive, lathergy, inelastic, hard)

c. Applies only to thermal burns.



4. Fourth degree :- a. full thickness

b. penetrate deep tissue to fat, muscle, bone.

c. require immediate professional treatment.

Burn Thickness	Deepest Skin Structure Involved	Appearance	Pain	Prognosis (Without Surgical Intervention)
Superficial (first-degree)	Epidermis	Dry, blanching erythema	Painful	Heals without scarring, 5-10 days
Superficial partial-thickness (second-degree)	Upper dermis	Blisters; wet, blanching erythema	Painful	Heals without scarring, < 3 weeks
Deep partial-thickness (second-degree)	Lower dermis	Yellow or white, dry, nonblanching	Decreased sensation	Heals in 3-8 weeks; likely to scar if healing > 3 weeks
Full-thickness (third-degree)	Subcutaneous structures	White or black/brown, nonblanching	Decreased sensation	Heals by contracture > 8 weeks; will scar

First degree	Partial thickness burns. - Characterized by erythema (localized redness). - Appear sunburn-like. - Are not included when calculating burn size. - Usually heal by themselves.	Third degree	Full thickness burns. - Full skin has been destroyed. - Deep red tissue underlying blister. - Presence of bloody blister fluid. - Muscle and bone may be destroyed. - Require professional treatment.
Second degree	Partial thickness burns. - Part of skin has been damaged or destroyed. - Have blisters containing clear fluid. - Pink underlying tissue. - Often heal by themselves.	Fourth degree	Full thickness burns. - Penetrate deep tissue to fat, muscle, bone. - Require immediate professional treatment.

Burn - Round Notes

* Primary Survey (ABCDE Approach) + pain management.

1. Airway with C-Spine protection :

- ensure airway patency [airway starts from (mouth/nose) to Larynx]
- Look for signs of airway compromise →
 1. Soot in the mouth (السواد والشحار)
 2. Singed nasal hairs
 3. hoarseness of voice
 4. Redness
 5. Stridor (but this is in the late stage)
- Early intubation if airway edema or inhalational injury is suspected. (I check them using Laryngoscope)



2. Breathing and ventilation :-

- assess ① Respiratory Rate ② O₂ sat. ③ Capnograph.
- administer 100% Oxygen for suspected inhalation injuries or carbon monoxide poisoning.
- Inspection :-
 1. Chest expansion
 2. Chest symmetry
 3. Flail Chest (paradoxical movement)
 4. Check if there is any burn on Chest

2 fractures in at least 3 adjacent ribs

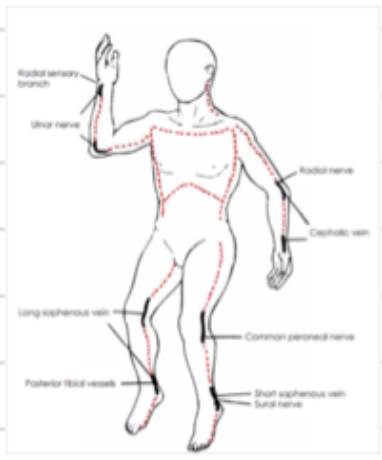
ملاحظة عن O₂ : عند استنشاق السخنة غاز CO اى اى affinity اعلى من O₂ بـ 200 مرة ، حيث يربط على Hb يكون الـ Carboxyhemoglobin ؛ ويبقى الى الابد الـ O₂ حبيبه Normal زوبنصير falsely normal

اد Skin ميزر خاصية الـ Elasticity فلو انخرق الـ Chest داير ميدير مارح يتوسع

كيسى tourniquete عم تمنع Chest expansion وبالتالي يتقلل الـ Respiration

وهذا الحرق الدايرو ميدير بنسبي Circumferential burn وبها الحالة ينقص جزء من الحلقة

ويسمى هاي العملية Escharotomy skin open



ولو كان الـ Burn بالـ limbs و برضه كان Circumferential حياني اى عمل Compression على الـ Vessels ولهاك ينقل

Escharotomy skin open

- Palpation :-
1. tracheal deviation.
 2. Subc. emphysema (Surgical) $\rightarrow$ it is not dangerous, but it indicates that there is something wrong $\rightarrow$ air trapping
 3. Fractures and dangerous.
 4. Chest expansion $\left\{ \begin{array}{l} \text{Check its Raise} \\ \text{Check symmetry} \end{array} \right.$

- Percussion :- ((مهمة جداً لا تعرف نوع الـ Pneumothorax))

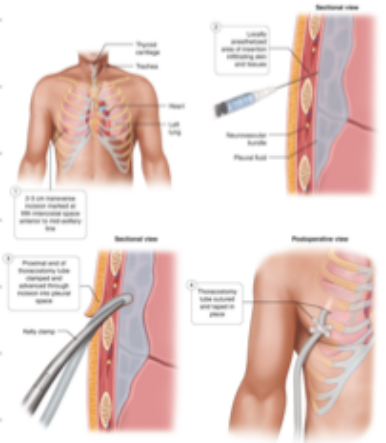
* Normal $\rightarrow$ Resonance

* Abnormal $\rightarrow$ Hyper Resonance $\rightarrow$ Tension pneumothorax
 $\rightarrow$ Dull $\rightarrow$ Hemo. pneumothorax

الـ Percussion أسرع طريقة لأقارب بينهم ، ومهم أن تعرف نوع Pneumothorax ؛ لأنهم يختلفوا بالخطورة و
 بالطريقة تبعاً الـ Management .

من الأخطر ؟ Tension pne. ؛ يقتل أسرع ومناوشت أقل لتصرف معه .

? management



Tension $\rightarrow$ needle decompression (midclavicular, 2nd int. costal)

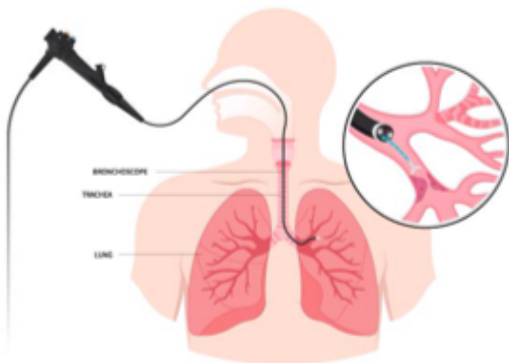
Hemo $\rightarrow$ Chest tube (5th IC space mid-axillary)

- Auscultation

- Consider Bronchoscopy if inhalational injury is suspected

الحلوفيه انه بشوف لو في injury أو لا ، وبريقه بتخلص من الـ toxicity والـ washings and dusts

BRONCHOSCOPY



3. Circulation with Hemorrhage Control :-

- Monitor : 1. HR 2. BP 3. Capillary Refill
- Check if there is any cyanosis.
- If there is active bleeding → Compression, if it doesn't stop → Tourniquet.
- Establish **2 Large Bore IV lines** (in unburned skin) or Consider central access if needed.

* - Begin Fluid resuscitation using **Parkland Formula** :-

Fluids in First 24h (ml) = $4 \times \text{Body weight (kg)} \times \text{TBSA (\%)}$

- ↳ - give 50% in the first 8h
- ↳ - give the remaining in the next 16h
- ↳ - Use **Lactated Ringer's Solution**.

((حتمل تفصيل اور fluids تحت شوي))

4. Disability (neurological assessment) :-

- we use AVPU (alert, verbal, pain, uncon.)
- It should be normal, but if it wasn't, this indicates having head trauma or other problem.
- Look for signs of hypoxia.
- Look for pelvic fracture (open book fracture) + If there is any bleeding
- one of the most important reasons that lead to being unconscious → **electrical burn**

Syncope ← Arrhythmia ←

ملاحظة بما يخص GCS :-
بجانب مع ال Secondary وليس D

5. Exposure and Environment :-

- remove clothing and jewelry to prevent further thermal injury.
- Cover the patient with clean, dry sheets to prevent hypothermia + evaporation
- ↳ **Skin هو ال First barrier** ولا يحمي ال burn حينئذ كيش خصائص من المحافظة على درجة الحرارة
- Log Roll. منع ال Fluid loss وغيرها

حاجتا لو وصل ال Patient حالة Unstable بدنا نرجع نفيد الخطوات

• Secondary survey حال نستقل

- ↳ Take history using AMPULE
- ↳ Do PE
- ↳ Measure GCS

** IV Access and fluid resuscitation:

1. Establish 2 Large bore IV lines

2. USE Parkland formula to guid fluid resuscitation:

$$\text{total fluids (ml)} = 4 * \text{Body weight (kg)} * \text{TBSA (\%)}$$

↳ total body surface area

← طبيب كيف نصبه؟ عن طريق 9



* Upper limb ← 9% لكل إيد

* head + neck ← 9%

* anterior trunk ← 18%

* posterior trunk ← 18%

* Genitalia ← 1%

* Legs ← 18% كل قدم

* Upper limb ← 9% لكل إيد

* head + neck ← 18% (أصغر، أكبر)

* anterior trunk ← 18%

* posterior trunk ← 18%

* Genitalia ← 1%

* Legs ← 14% كل قدم

سنوات حسب TBSA

* لو حركات البريف 1st degree

الجواب not calculated

3. administer 50% in the first 8h. هاي النسبة مهمة لأنعرف كم لازم أعطي بكل ساعة.

* Count time from the burn occurrence (not hospital arrival)

and the remaining 50% in the next 16h

example For a 70 kg patient with 40% TBSA burns:-

$$4 * 70 * 40 = 11,200 \text{ ml in } 24 \text{ h}$$

5600 ml in the first 8h, 5600 ml over the next 16h

4. Fluid type ⇒ Lactated Ringer's solution (due to its electrolyte composition)

* avoid colloids (ex. albumin) in the first 24h due to increased capillary permeability.

الدكتور سأل بين اخضر، فقدان السوائل بسبب الحروق أو بسبب نزيف، الجواب كان التزيف ولكن بشكل عام سهل علي أتحكم فيه.

** Wound Care :-

1. Clean the burn with normal saline or water to remove debris
2. Remove dead tissue, debris and loose skin to prevent infection and improve healing.
3. Reassessment.
4. Check if there is any circumferential burns in Chest or limbs
5. topical antimicrobial therapy
6. Dressing
 - Cover wounds to maintain a moist environment and reduce pain.
 - Avoid tight dressing, ensure proper circulation.

** Key Criterias for admitting a burn patient: *

1. total Body Surface Area involvement :- $> 10\%$
2. Depth of Burns :- full thickness (3rd degree burn) regardless the size
3. Burns in critical areas → face, hands, feet (especially palms and soles), genitals, major joints (fibrosis بنفخ)
4. Electrical or chemical burns → it effects:
 1. heart by arrhythmias
 2. Muscles
 3. kidney



شرح : الفكرة انه ال Electrical بيجل internal burn
و حيحصل عندي ال Bones وبالتالي تحصل ال muscles
ما يؤدي لحدوث Muscle burn مما يؤدي الى :-

1. ال myoglobin يوصل الدم ومن الدم لكيفية الى البول ← حبيب injury على الكلى ← Acute kidney injury
 2. حبيب في edema والي حنضط على ال Blood vessels ← Ischemia ، الحبيب شو ممكن اكل ؟؟
- Myoglobinuria result in **Rhabdomyolysis** , Fasciotomy
- myoglobin in urine → dark black / brown urine
 - to prevent renal impairment → Hydration + Alkalinization of urine + Mannitol diuresis

5. Circumferential burns

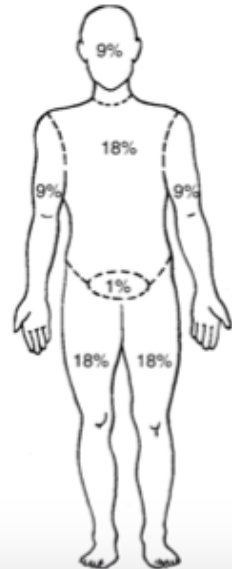
6. Comorbid Conditions → these conditions complicate recovery ; example: 1. Diabetes 2. Cardiovascular diseases
7. Pediatrics and elderly → Abuse , Autism , Suicide ... 3. Renal diseases 4. Immunosuppression.
8. associated trauma or injuries → example: head injuries → neurosurgery.
9. psycho social of functional concern → Lack of home care , social circumstances. (لما احس ما في Care للمريض)
10. Inhalational injury → sign of airway damage + suspected inhalation of toxic gases

* Complications of Burns:-

استوائ

1. Scarring and contractures
 - Keloids: thick raised scars.
 - Hypertrophic scars: raised and confined to wound area.
 - Contractures: tightening of scar tissue leading to loss of mobility and deformities.
2. Infection
3. Burn Shock
4. Pulmonary edema
5. Renal failure
6. Cardiac arrhythmia
7. Severe dehydration.
8. Neurological complications
 - Nerve damage → paralysis, numbness
 - Post-burn neuropathy → neuropathic pain, phantom limb sensation.
9. Hyperglycemia
10. Stress Ulcer

Surgical Recall

Define: TBSA STSG Are acid or alkali chemical burns more serious? Why are electrical burns so dangerous?	Total Body Surface Area Split Thickness Skin Graft In general, ALKALI burns are more serious because the body cannot buffer the alkali, thus allowing them to burn for much longer Most of the destruction from electrical burns is internal because the route of least electrical resistance follows nerves, blood vessels, and fascia; injury is usually worse than external burns at entrance and exit sites would indicate; cardiac dysrhythmias , myoglobinuria, acidosis, and renal failure are common	What is the "rule of nines"? In an adult, the total body surface area that is burned can be estimated by the following: Each upper limb = 9% Each lower limb = 18% Anterior and posterior trunk = 18% each Head and neck = 9% Perineum and genitalia = 1%
How is myoglobinuria treated? سنوات	To avoid renal injury, think " HAM ": Hydration with IV fluids Alkalization of urine with IV bicarbonate → Black urine Mannitol diuresis	
Define level of burn injury: First-degree burns Second-degree burns Third-degree burns Fourth-degree burns	Epidermis only Epidermis and varying levels of dermis A.k.a. "full thickness"; all layers of the skin including the entire dermis (Think: "getting the third degree") Burn injury into bone or muscle	What is the "rule of the palm"? Surface area of the patient's palm is ≈ 1% of the TBSA used for estimating size of small burns
How do first-degree burns present?	Painful, dry, red areas that do not form blisters (think of sunburn)	What is the burn center referral criteria for the following? Second-degree burns >20% TBSA Third-degree burns >5% TBSA Second degree >10% TBSA in children and the elderly Any burns involving the face, hands, feet, or perineum Any burns with inhalation injury Any burns with associated trauma Any electrical burns
How do second-degree burns present?	Painful, hypersensitive, swollen, mottled areas with blisters and open weeping surfaces	
How do third-degree burns present?	Painless, insensate, swollen, dry, mottled white, and charred areas; often described as dried leather	
What is the major clinical difference between second- and third-degree burns?	Third-degree burns are painless, and second-degree burns are painful	What is the treatment of first-degree burns? Keep clean, ± Neosporin® pain meds Remove blisters; apply antibiotic ointment (usually Silvadene®) and dressing; pain meds Most second-degree burns do not require skin grafting (epidermis grows from hair follicles and from margins) Skin transplantation from one site to injured
By which measure is burn severity determined?	Depth of burn and TBSA affected by second- and third-degree burns TBSA is calculated by the "rule of nines" in adults and by a modified rule in children to account for the disproportionate size of the head and trunk	What is the treatment of second-degree burns? 1. Biobrane® (silicone artificial epidermis—temporary) → Porcine collagen, silk fibroin. 2. Silverlon® (silver ion dressings) → Antimicrobial dressing
	What are some newer options for treating a second-degree burn?	
	What is the treatment of third-degree burns?	Early excision of eschar (within first week postburn) and STSG
	How can you decrease bleeding during excision?	Tourniquets as possible, topical epinephrine, topical thrombin
	What is an autograft STSG?	STSG from the patient's own skin

What diagnostic imaging is used for smoke inhalation?	Bronchoscopy	Why do most severely burned patients require nasogastric decompression?	Patients with greater than 20% TBSA burns usually develop a paralytic ileus → vomiting → aspiration risk → pneumonia
What lab value assesses smoke inhalation?	Carboxyhemoglobin level (a carboxy-hemoglobin level of $>60\%$ is associated with a 50% mortality); treat with 100% O_2 and time	What stress prophylaxis must be given to the burn patient?	PPI to prevent burn stress ulcer (Curling's ulcer)
How should the airway be managed in the burn patient with an inhalational injury?	With a low threshold for intubation ; oropharyngeal swelling may occlude the airway so that intubation is impossible; 100% oxygen should be administered immediately and continued until significant carboxyhemoglobin is ruled out	What are the signs of burn wound infection?	Increased WBC with left shift , discoloration of burn eschar (most common sign), green pigment, necrotic skin lesion in unburned skin, edema, ecchymosis tissue below eschar, second-degree burns that turn into third-degree burns, hypotension
What is "burn shock"?	Burn shock describes the loss of fluid from the intravascular space as a result of burn injury, which causes "leaking capillaries" that require crystalloid infusion	Is fever a good sign of infection in burn patients?	NO
What is an autograft STSG?	STSG from the patient's own skin	Why is glucose-containing IVF contraindicated in burn patients in the first 24 hours postburn?	Patient's serum glucose will be elevated on its own because of the stress response
What is an allograft STSG?	STSG from a cadaver (temporary coverage)	What fluid is used after the first 24 hours postburn?	Colloid; use D5W and 5% albumin at 0.5 cc/kg/% burn surface area
What thickness is the STSG?	10/1000 to 15/1000 of an inch (down to the dermal layer)	Why should D5W IV be administered after 24 hours postburn?	Because of the massive sodium load in the first 24 hrs of LR infusion and because of the massive evaporation of H_2O from the burn injury, the patient will need free water; after 24 hours, the capillaries begin to work and then the patient can usually benefit from albumin and D5W
What prophylaxis should the burn patient get in the ER?	Tetanus	What is the minimal urine output for burn patients?	Adults 30 cc; children 1–2 cc/kg/hr
What is used to evaluate the eyes after a third-degree burn?	Fluorescein	How is volume status monitored in the burn patient?	Urine output , blood pressure, heart rate, peripheral perfusion, and mental status; Foley catheter is mandatory and may be supplemented by central venous pressure and pulmonary capillary wedge pressure monitoring
What principles guide the initial assessment and resuscitation of the burn patient?	ABCDEs, then urine output; check for eschar and compartment syndromes	What are the common organisms found in burn wound infections?	Staphylococcus aureus, Pseudomonas, Streptococcus, Candida albicans
What are the signs of smoke inhalation?	Smoke and soot in sputum/mouth/nose, nasal/facial hair burns, carboxyhemoglobin, throat/mouth erythema, history of loss of consciousness/explosion/ fire in small enclosed area, dyspnea, low O_2 saturation, confusion, headache, coma	How is a burn wound infection diagnosed?	Send burned tissue in question to the laboratory for quantitative burn wound bacterial count; if the count is $>10^5$ /gram, infection is present and IV antibiotics should be administered
What is the "Parkland formula"?	$V = TBSA \text{ Burn } (\%) \times \text{Weight (kg)} \times 4$ Formula widely used to estimate the volume (V) of crystalloid necessary for the initial resuscitation of the burn patient; half of the calculated volume is given in the first 8 hours , the rest in the next 16 hours	How are minor burns dressed?	Gentle cleaning with nonionic detergent and débridement of loose skin and broken blisters; the burn is dressed with a topical antibacterial (e.g., neomycin) and covered with a sterile dressing
What burns qualify for the Parkland formula?	$\geq 20\%$ TBSA second- and third-degree burns only	How are major burns dressed?	Cleansing and application of topical antibacterial agent
What is the Brooke formula for burn resuscitation?	Replace 2 cc for the 4 cc in the Parkland formula	Why are systemic IV antibiotics contraindicated in fresh burns?	Bacteria live in the eschar, which is avascular (the systemic antibiotic will not be delivered to the eschar); thus, apply topical antimicrobial agents
What is Rule of 10's?	For determining Hourly IVF Rate: $TBSA \times 10$ (pts 40–80 kg)		
How is the crystalloid given?	Th rough two large-bore peripheral venous catheters		
Can you place an IV or central line through burned skin?	YES		
What is the adult urine output goal?	30–50 cc (titrate IVF)		

Note some advantages and disadvantages of the following topical antibiotic agents:

Silver sulfadiazine (Silvadene®)

Painless, but little eschar penetration, misses *Pseudomonas*, and has idiosyncratic **neutropenia**; sulfa allergy is contraindication

Mafenide acetate (Sulfamylon®)

Penetrates eschars, broad spectrum (but misses *Staphylococcus*), causes pain on application; triggers allergic reaction in 7% of patients; may cause **acid-base imbalances** (Think: Mafenide ACetate = Metabolic ACidosis); agent of choice in already-contaminated burn wounds

Polysporin®

Polymyxin B sulfate; painless, clear, used for facial burns; does not have a wide antimicrobial spectrum

Are prophylactic systemic antibiotics administered to burn patients?

No—prophylactic antibiotics have not been shown to reduce the incidence of sepsis, but rather have been shown to select for resistant organisms; IV antibiotics are reserved for established wound infections, pneumonia, urinary tract infections, etc.

Are prophylactic antibiotics administered for inhalational injury?

No

Circumferential, full-thickness burns to the extremities are at risk for what complication?

Distal neurovascular impairment

سنوات

How is it treated?

سنوات

Escharotomy: full-thickness longitudinal incision through the eschar with scalpel or electrocautery

What is the major infection complication (other than wound infection) in burn patients?

Pneumonia, central line infection (change central lines prophylactically every 3 to 4 days)

When should central lines be changed in the burn patient?

Most burn centers change them every 3 to 4 days

What is the name of the gastric/duodenal ulcer associated with burn injury?

Curling's ulcer (Think: **CURLING** iron burn = **CURLING's** burn ulcer)

How are STSGs nourished in the first 24 hours?

IMBIBITION (fed from wound bed exudate)

Is tetanus prophylaxis required in the burn patient?

Yes, it is mandatory in all patients except those actively immunized within the past 12 months (with incomplete immunization: toxoid × 3)

From which burn wound is water evaporation highest?

Third degree

Can infection convert a partial-thickness injury into a full-thickness injury?

Yes!

How is carbon monoxide inhalation overdose treated?

100% O₂ (± hyperbaric O₂)

Which electrolyte must be closely followed acutely after a burn?

Na⁺ (sodium)

Management of Burn steps:

1. ABCDE + fluid resuscitation
2. Pain Management
3. Ab
4. remove any blisters.
5. dressing



- Post burn contracture + fibrosis
- a complication of 3rd degree burns.
- they should have put skin graft for the patient to prevent this complication.

Fasciotomy Jaxi

↳ full thickness

• Serious complication → transformation into SCC

