

環境醫學急重症

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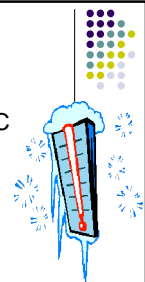
Introduction

- Hypothermia
- Heat disorder
- Electrical Injuries and Lightning Injuries
- Anaphylaxis
- Venomous Snake Bites

Hypothermia

Hypothermia

- Definition : core temperature $<35^{\circ}\text{C}$
- Classification:
 - Mild: 34°C to 36°C
 - Moderate: 30°C to 34°C
 - Severe: $<30^{\circ}\text{C}$
- Causes:
 - Environmental (exposure to cold temperatures), hypothyroidism, sepsis, adrenal insufficiency, drugs, CNS disorders, iatrogenic (fluid resuscitation) and metabolic disorders



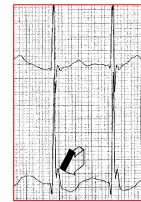
Mild hypothermia

- Core temperature : 34°C to 36°C
- Clinical feature:
 - Lethargy
 - Vasoconstriction
 - Shivering
 - Cold diuresis
 - Increased oxygen demand



Moderate hypothermia

- Core temperature : 30°C to 34°C
- Clinical features:
 - Lethargy \rightarrow stupor
 - Dilated pupils
 - Bradycardia, arrhythmias
 - Hypotension
 - Muscle rigidity
 - Cessation of shivering
 - Decreased O_2 demand



I wave
(Osborn wave)



Severe hypothermia

- Core temperature : $<30^{\circ}\text{C}$
- Clinical features:
 - Stupor \rightarrow coma
 - Dilated, nonreactive pupils
 - Potential malignant arrhythmias
 - Sinus brady \rightarrow Af with SVR \rightarrow Vf \rightarrow Asystole
 - Difficult to detect breathing
 - Difficult to detect pulse, blood pressure



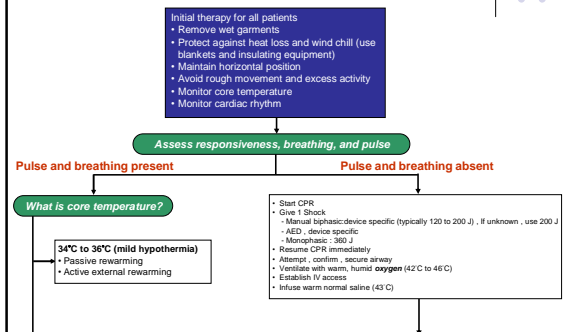
Hypothermia: Management

- 一般之處置
- 檢查神智, ABC (需檢查30~45秒)
- 有脈搏者: 按照低體溫嚴重度給予回溫
- 無脈搏者: CPR, 電擊去顫 (VT/VF), 體溫大於30度才可靜脈給藥及繼續電擊

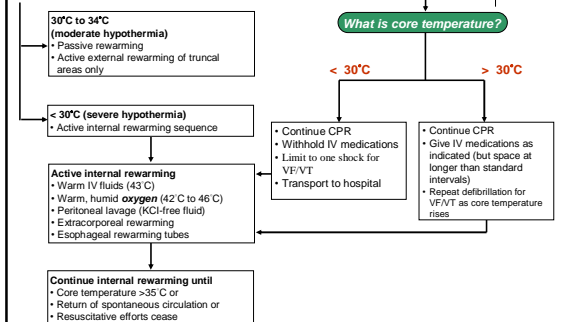
Hypothermia: Management

- Removal from the cold environment and prevent further heat loss
- Begin warming process
 - Passive external rewarming (被動體外加溫)
 - 擦乾, 移除濕冷衣物, 溫毛毯
 - Active external rewarming (主動體外加溫)
 - 溫氈, 烤燈, 暖風扇, 溫水袋, 溫IV輸液
 - Active internal rewarming (主動體內加溫)
 - 吸入42~46°C 溫熱潮濕空氣, 溫熱之靜脈輸液 (43°C), 鼻胃管灌洗 (43°C), 尿管膀胱灌洗 (43°C), 腹膜腔灌洗 (43°C KCl-free fluid, 每次兩升), 體外循環回溫 (ECMO), 食道回溫管回溫

Hypothermia Algorithm



Hypothermia Algorithm



Heat disorder

Heat disorder

- Classification:
 - Heat cramps
 - Heat exhaustion
 - Heat stroke
- Predisposing factors
 - Physical activity (hot and humid environment)
 - Extremes of age, poor physical condition, fatigue
 - Inadequate indoor cooling and Excessive clothing
 - Dehydration
 - Skin disorders
 - Drugs (phenothiazines, anticholinergics, amphetamines, haloperidol, cocaine, TCA)

Heat cramps

- Pathophysiologic:
 - Inadequate replacement of salt from loss through sweating => hyponatremia => muscle cramps
- Clinical feature
 - Severe muscle cramping involving the calves, thighs and shoulders
 - Body temperature is normal
- Treatment:
 - Oral or IV fluid and electrolytes replacement
 - Rest in cool environment

Heat exhaustion

- Pathophysiologic:
 - Salt water depletion from sweating loss => hypovolemia and hypoperfusion with normal mental status and neurological exam
- Clinical feature:
 - Extreme fatigue and profuse sweating, dizziness, headache, nausea, vomiting
- Treatment:
 - Bed rest in a cool environment
 - Rapid IV fluid and electrolytes replacement

Heat stroke

- Pathophysiologic:
 - Breakdown of central thermoregulatory control => hyperpyrexia with altered mental status, neurologic symptoms and cerebral edema
 - End-organ and systemic dysfunction
 - Cardiac (CHF with pulmonary edema)
 - Pulmonary (ARDS)
 - Liver (marked elevation of AST/ALT)
 - Kidney (hematuria, proteinuria, acute tubular necrosis)
 - Muscular (rhabdomyolysis and acute renal failure)
 - Hematologic (altered coagulation => bleeding, DIC)

Heat stroke

- Classic heat stroke
 - Most often in elderly patients by environmental heat exposure
 - Sweating initially then stop sweating and develop hot, dry skin
 - Lab:
 - Respiratory alkalosis + mild acidosis
 - Mild coagulopathy + CPK elevation
 - Normal glucose and calcium level
- Exertional heat stroke
 - Most often in young and healthy patients in strenuous exercise
 - Diaphoretic and sweating
 - Lab:
 - Respiratory alkalosis + marked lactic acidosis
 - DIC + rhabdomyolysis
 - ↑ BUN/Cr (ARF)
 - Hypoglycemia and hypocalcemia
- Treatment:
 - Stabilization, monitoring ABC and rapid cooling

Electrical Injuries and Lightning Injuries

Anaphylaxis

- Definition:
 - A life-threatening systemic hypersensitivity reaction to contact with an allergen
- Allergens:
 - Insect stings
 - Drugs, vaccines, and contrast media
 - Some foods (milk, eggs, fish, shellfish, peanut and tree nut.....)
 - Idiopathic
- Clinical features:
 - Respiratory
 - Mucous membrane swelling, hoarseness, stridor, wheezing
 - Cardiovascular
 - Tachycardia, hypotension, vascular collapse
 - Cutaneous
 - Pruritus, urticaria, angioedema
 - Gastrointestinal
 - Nausea, vomiting, abdominal pain and diarrhea



Anaphylaxis

- Oxygen supplement
- Epinephrine :
 - IM 0.3 to 0.5 mg (1:1000) Q5-10'
 - IV (1:10 000; 10 mL) 1-5 mL over 5 minutes (嚴重有生命危險者)
 - IVF 1-4 µg/min
 - SC 休克病患吸收差
- Antihistamines: diphenhydramine 25 mg IV or IM
- H2 blockers: cimetidine 300 mg PO, IM, or IV
- Crystalloid fluids : NS 1-2 L 甚至 4L
- Bronchodilator: albuterol ± ipratropium inhalation
- Corticosteroids: methylprednisolone
- Glucagon: 使用 β-blockers 者, 1-2 mg IM or IVQ5 min



Anaphylaxis

- Angioedema:
 - labial swelling, hoarseness, lingual edema
 - ⇒ Early Intubation or needle cricothyrotomy
- Cardiopulmonary collapse :
 - Fiberoptic tracheal intubation
 - Needle cricothyrotomy + transtracheal ventilation
 - 快速大量輸液 2 - 4L
 - **High-dose epinephrine IV for Anaphylactic CPR!**
 - 1-3 mg (3 min), 3-5 mg (3 min), then 4-10 mg/min.
 - 靜脈給予抗組織胺
 - 類固醇
 - 積極地 CPR



Venomous Snake Bites



蛇類--總論

- 全世界
- 蛇類約2700種
 - 毒蛇有375種
- 台灣
- 蛇類約55種
 - 毒蛇有19種
 - 7種海蛇 12種陸蛇

毒藥物季刊



台灣常見六種有毒陸蛇



- 出血毒
 - 赤尾鮫-赤尾青竹絲
 - 龜殼花
 - 百步蛇--蝮蛇、尖吻蝮



- 神經毒
 - 雨傘節
 - 飯匙倩--眼鏡蛇



- 混合毒
 - 鎖鏈蛇--圓斑蝮



臨床中毒症狀決定因素

- 毒蛇咬傷 20% 為乾咬 dry bite (無毒液注入)
- 人體中毒反應程度決定於
 - 一、毒蛇種類
 - 二、毒液量
 - 1. 蛇之大小
 - 2. 咬傷之次數
 - 3. 毒牙數目
 - 4. 毒牙刺入皮下停留時間
 - 三、傷者之體型、年齡
- 雨傘節與百步蛇咬傷死亡率高達 20 % 以上

蛇咬傷到院前初步處置原則

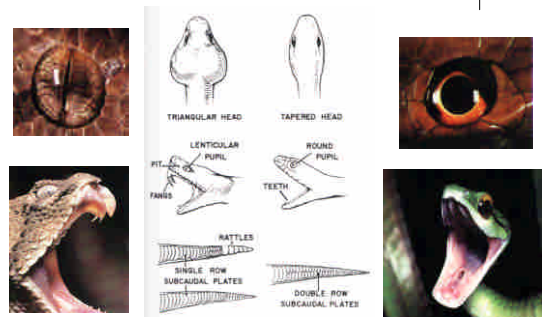
- 一、傷口之檢視與局部之處置
- 二、分辨毒蛇種類與評估毒性
- 三、固定不動與迅速送醫
- 四、排除會立即威脅生命之問題

一、傷口之檢視與局部之處置

1. 除去肢體上之束縛物，如戒指、手鐲及手錶
2. 吸血器之使用—使用30分鐘，可吸出 30% 毒液
3. 勿隨意切開傷口，以嘴吸吮或以手擠壓傷口
4. 勿冰敷或冷敷—易致局部循環變差，組織嚴重壞死
5. 勿用止血帶—易致肢體循環變差，嚴重壞死
6. 勿因局部處置而延誤送醫



二、分辨毒蛇種類與評估毒性



三、固定不動與迅速送醫

1. 彈性繃帶包紮
2. 護木固定
3. 置於較心臟低之位置



四、排除會立即威脅生命之問題

- 呼吸抑制
- 換氣不足
- 呼吸停止



醫院之治療原則

- 一、穩定生命徵象
 - 1.呼吸道的維持及輔助性呼吸
 2. 輸液治療
 4. 監視器
 3. 檢驗評估
- 二、局部傷口處置
 - 1.過去曾被採用之傷口十字切開法已不被接受
 - 2.局部血清注射已不被建議

醫院之治療原則

- 三、蛇種之鑑別
 - 1.有將蛇捕獲的情況下
 - 2.不知蛇種的情況下
依蛇之特徵由圖鑑指認
依咬傷之地域與情景
依全身症狀之有無
依牙痕形態
依局部腫脹及出血程度
依血液檢查結果

醫院之治療原則

- 四、抗毒蛇血清之給予
 - 1.使用正確的抗毒蛇血清(種類及量)是毒蛇咬傷最決定性的治療
 - 2.咬傷經過3-4天再給與正確之血清仍有明顯效果
 - 3.每瓶血清20cc效價1000田中單位以上
 - 4.使用前須行皮膚過敏試驗--以生理食鹽水稀釋一百倍0.05-0.1cc皮內注射
 - 5.以0.1cc做皮膚過敏試驗。如陰性反應：則用靜脈點滴約30分鐘滴完。如為陽性反應，仍需給抗毒蛇血清：先打Hydrocortisone 200mg IV、Antihistamine 1 Amp IV。稀釋抗毒蛇血清至300-500 c.c N/S中，緩慢滴注2小時後打完。同時準備1:1000之epinephrine，如有過敏性休克發生，則給予0.5-1.0 ml皮下注射。
 - 6.抗毒蛇血清注射後局部或全身症狀未獲改善或持續惡化時，則應每隔半小時至二小時追加一劑量直到全身症狀改善為止。
 - 7.10歲以下小兒使用抗毒蛇血清，劑量要加倍

- 預防醫學研究所產製之抗毒蛇血清有四種

1. 抗兩傘節/飯匙倩
2. 抗赤尾鮫/龜殼花
3. 抗百步蛇
4. 抗鎖鏈蛇



- 夜間提供血清專線電話:02-27850288

醫院之治療原則

- 五、破傷風類毒素之給予
- 六、預防性抗生素之給予
- 七、傷口局部標記
- 八、其他併發症之預防與治療
- 九、血清病

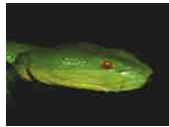
毒蛇咬傷分論



赤尾鮎 (赤尾青竹絲)



分布廣且數量多，咬傷率最高且致死率
低，為出血性毒蛇
特徵：體背中央有一行具黑邊的深綠色
斑，尾端為紅色

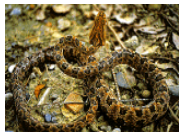


赤尾鮎咬傷

咬傷症狀：局部腫脹、疼痛、出血、起水泡



龜殼花



咬傷率不亞於赤尾青竹絲，為出血性毒蛇
特徵：體背中央有一行具黑邊的深色斑紋，上
下相連且向左右彎曲呈波浪狀斑紋



龜殼花咬傷

咬傷症狀：局部灼痛感、腫脹、出血、起水泡



百步蛇



- 台灣地區常見毒蛇中體型最大，為出血性毒
蛇
- 特徵：體二側有列倒三角形具黑邊的深棕色
斑



百步蛇咬傷

- 咬傷症狀：患處疼痛、快速腫脹、瘀血、出
血、產生水泡、血泡、其他器官出血

- 局部症狀嚴重
- 易致 compartment syndrome





鎖鏈蛇

相當少見，分佈於本省東南山區，為一**合併出血性與神經性毒蛇**

特徵：體背部有三縱列具白邊的黑棕色橢圓型斑紋，彼此相間成鍊狀。受干擾時會發出嘶嘶聲




鎖鏈蛇咬傷

- 臨床上則常出現出血症狀，毒性不亞於百步蛇
- 咬傷症狀：局部腫脹、出血、皮下瘀血、溶血、易造成**全身性出血與急性腎衰竭**





飯匙倩(眼鏡蛇)

- 為神經性毒蛇
- 特徵：遭到敵人時頸部擴張，背面呈具黑點之白色帶狀斑紋有如眼鏡，且會有噴氣聲






眼鏡蛇咬傷

- 咬傷症狀：局部疼痛、腫脹、潰爛、傷口變黑、組織壞死、全身性肌肉麻痺




雨傘節咬傷

- 雨傘節是台灣毒蛇中**毒性最強的**。
- 毒牙痕 fang mark 不明顯
- 局部症狀輕微易被疏忽
- 特徵：黑白相間之橫帶，黑寬白窄





雨傘節咬傷

- 咬傷後**10-15分鐘**後出現局部麻木感、運動失調、眼瞼下垂、瞳孔放大、口齒不清、流涎
- 在**2-72小時之內**出現譫忘昏迷因呼吸衰竭而死亡
- 最好觀察24小時



