JOURNAL MEETING

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MASS CASUALTY TRIAGE AFTER AN AIRPLANE CRASH NEAR AMSTERDAM

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背景

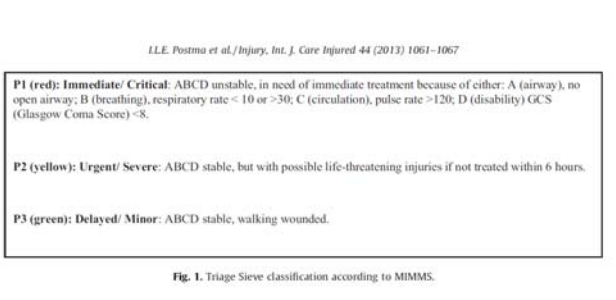
- 這篇文章是關於February 25, 2009 一架Turkish Airlines的波音737-800客機的墜機意外,當時機上有135名乘客,其中9位當場死亡,其餘126人則需要進行檢傷分類已決定運送及處理順序.
- 檢傷分類對於mass casualty incident非常重要,有效執行可以減少mortality 和 morbidity,也可避免醫療資源浪費
- Critical mortality rate 與overtriage成正相關

研究目的

- Triage process:
  - a. prehospital and inhospital triage process的結果
  - b. 不同的triage classifications與outcome的關係
- P3 and walking wounded:
  - a. P3 casualties and 'walking'casualties 受到哪些傷害
  - b.這群人的受傷嚴重程度
- Mechanism of injury and spinal immobilisation:
  - a. 創傷機轉與mass casualty triage是否有關?
  - b.創傷機轉是否影響轉送途中有沒有做脊椎固定?

方法

- 回溯分析調查報告,救護車記錄,病歷
- Outcomes 有triage classification, 創傷種類, AIS, ISS, 緊急處置 ,spinal immobilisation



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P1 (red): Immediate/ Critical: ABCD unstable, in need of immediate treatment because of either: A (airway), no open airway; B (breathing), respiratory rate < 10 or >30; C (circulation), pulse rate >120; D (disability) GCS (Glasgow Coma Score) <8.

P2 (yellow): Urgent/ Severe: ABCD stable, but with possible life-threatening injuries if not treated within 6 hours.

P3 (green): Delayed/ Minor: ABCD stable, walking wounded.

Fig. 1. Triage Sieve classification according to MIMMS.

Modified Baxt Criteria

- Chest decompression (needle or tube thoracostomy)
- Intravenous fluids for a systolic blood pressure < 90 mm Hg, or absence of radial pulse.
- Blood transfusion.
- Assisted ventilation or open airway procedure.
- Invasive central nervous system monitoring with brain imaging or other evidence of increased intracranial pressure.
- Non-orthopaedic operation (or pelvis stabilization) with positive findings within 6 hours.

P1: ISS ≥16: One of modified Baxt criteria within 6 hours of crash: +
P2: ISS 9-15: No Baxt criteria but admission > 24 hours.
P3: ISS ≤8: No Baxt criteria and discharged < 24 hours.

Fig. 3. Modified Baxt criteria.

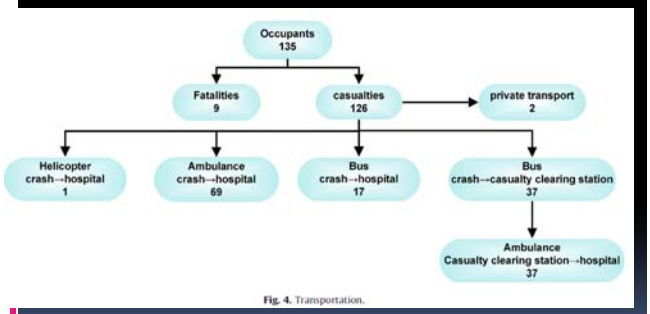


Fig. 4. Transportation.

結果

Table 1
Triage disposition according to location and injury criteria.

	P1	P2	P3	Total
Prehospital triage[a]	Unknown	≥2	≥34	124
Inhospital triage	35 (28%)	40 (32%)	49 (40%)	124
ISS	13 (10%)	22 (18%)	89 (72%)	124
Baxt (see also Fig. 3)	4 (3%)	42 (34%)	78 (63%)	124

[a] From the prehospital triage documentation of only 36 victims (2 P2, 34 P3) was found.

- 按照ISS計算本次的 inhospital overtriage 有 63% ,如果按照 Baxt criteria則達到 89%.其對應的 undertriage rate 為11% 和 8%
- Critical mortality rate → 0%.

結果

Table 2
Results of P3 and 'walking' casualties.

	P3 and walking ($n = 50$)
Mean ISS (median; IQR; range)	4.1 (2; IQR 1/5; 0–22)
Hospitalised	17 (34%)
Mean no. of days in hospital (median; IQR; range)	7 days (3; 2/10; 1–17)
Fracture	11 (22%)
Spinal fracture	7 (14%)
Surgery	7 (14%)
Surgery for spinal fracture	5
At least 1 moderate injury (AIS ≥ 2)	22 (44%)
At least 1 serious injury (AIS ≥ 3)	6 (12%)

結果

Table 3
Transportation to 1st receiving hospital.

	Spinal injury	No spinal injury	Total
Full immobilisation	11 (61%)	7 (9%)	18 (17%)
Only spine board	3 (17%) (no C-spine collar)	3 (4%)	6 (6%)
Only collar	0	1 (1%)	1 (1%)
No immobilisation	4 (22%)	54 (83%)	58 + 17[a] (75%)
Total	18[b]	65	100[a]

$N = 100$; no of casualties with documentation about spinal immobilisation.
[a] We assume that the 17 patients transferred together in a casualty bus were without spinal immobilisation.
[b] Excluding 5 patients with unknown immobilisation.

結論

- Turkish Airlines Crash的prehospital triage的資料稀少
- 使用Baxt criteria 的結果是overtriage rate很高
- 不能忽是那些在檢傷分類中分為輕度的傷患,可能存在尚未表現的嚴重傷害
- 轉送途中的spinal immobilisation使用太少

討論

- 在事故現場triage tags使用的太少
- 有專家提出當MCIs有>20–25 的傷患時使用triage tags並不能幫助現場的判斷
- 使用Baxt criteria 結果得到高overtriage rate, 使用ISS則有較低的overtriage rate
- 但是 ISS ≧ 16可能有完全沒有任何危害生命的傷病 ,所以並不建議使用ISS當作唯一評斷 critically injury的工具

討論

- 在一般情況下某種程度的overtriage用以抵銷undertriage是可以被接受的
- 5%的undertriage 如果搭配25–50%overtriage是可以被接受的

討論

- 當時在現場提出只有P1及P2的傷患需要到醫院進行治療,P3只要觀察就好,但P3的傷患也可能有類似脊椎骨折等的重大傷害,並且MIMMS 並無主張P3傷患不需要到院進行評估.除非當區域內的醫療資源用盡,不然所有傷患都應到醫院進行評估.而在現場則可以進行retriage減少undertriage的發生

討論

- 75% 的傷患在轉送途中未使用spinal immobilisation, 最後22% 被診斷出有脊椎損傷的病患沒有使用spinal immobilisation
- 在這次的處理中,當有症狀像是, 脊椎痛,意識不清(GCS < 15 or intoxication), distracting injury, 神經學症狀, 臉部受傷, 懷疑basilar skull fracture才會使用spinal immobilisation

C. Crawford Mechem, MD
PREHOSPITAL EMERGENCY CARE 2013;17:223–229

PREHOSPITAL ASSESSMENT AND MANAGEMENT OF PATIENTS WITH VENTRICULAR-ASSIST DEVICES

背景

- 隨著醫學的進步越來越多嚴重心衰竭的病人藉由ventricular-assist devices (VADs)可以不用住院接受治療只需要定期的追蹤即可
- Emergency medical services (EMS)有機會接觸到有安裝VADs的病人. 他們的狀況或許跟裝置本身, 病人的心臟疾病, 非心臟來源的疾病, 或是 創傷有相關.這篇文章希望能夠提供對於這類病人處置的意見

概要

- VADs的歷史演變
- 介紹各種不同的VADs
- 面對這類病人時,評估及處理上的困難
- 常見的緊急狀況,及其處置

VADs的歷史演變

- 1963首度應用於臨床
- 1969第一顆VAD植入
- 1970~80演變成電力驅動
- 1991植入VAD的病人可在院外生活, vented electric HeartMate LVADs
- 1994:Pneumatically driven HeartMate IP
- 1998:Electrically powered HeartMate VE and the Novacor LVAS

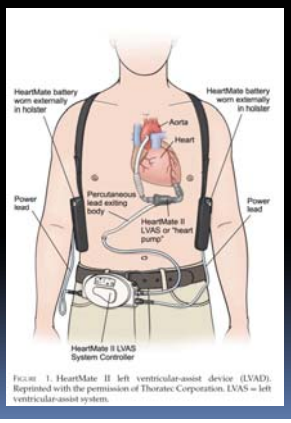


FIGURE 1. HeartMate II left ventricular-assist device (LVAD). Reprinted with the permission of Thoratec Corporation. LVAS = left ventricular-assist system.

LEFT VENTRICULAR-ASSIST DEVICE DESIGN

TABLE 1. Generations of Left Ventricular-Assist Devices

First Generation	Pulsatile blood flow
Berlin Heart ECXOR (Berlin Heart AG)	
HeartMate XVE (Thoratec)	
Novacor LVAS (World Heart Corp.)	
Thoratec PVAD (Thoratec)	
Second Generation	Continuous flow
HeartMate II (Thoratec)	
Jarvik 2000(Jarvik Heart)	
MicroMed DeBakey VAD (MicroMed Cardiovascular)	
Third Generation	較少hemolysis and clot formation
Berlin Heart INCOR (Berlin Heart AG)	**2 years survival rate** :
CentriMag (Levitronix)	continuous-flow 58%
CorAide (Cleveland Clinic Foundation)	v.s.
DuraHeart LVAS (Terumo Somerset, USA)	pulsatile-flow 4%
HeartMate III (Thoratec)	
HeartQuest (WorldHeart)	
HVAD Pump (HeartWare)	
Levacor (World Heart Corp.)	
VentrAssist (formerly Ventracor)	
Fourth Generation	
MAGNEVAD (Gold Medical Technologies)	
HeartAssist 5 (MicroMed Cardiovascular)	

原因 : 較少的infection, right heart failure, respiratory failure, renal failure, and arrhythmias

併發症

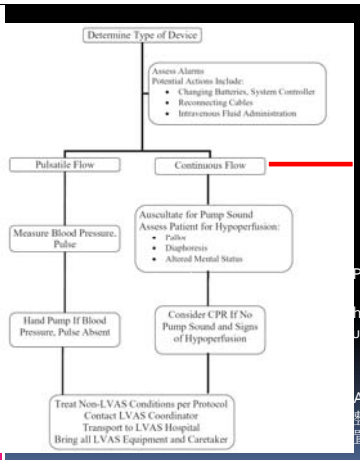
- 可分為病人因素與機器因素
- 病人因素 : neurologic events, hemorrhage, and arrhythmias
- 機器因素 : Infection , suction events, device malposition, and thrombus formation,機器本身

併發症

TABLE 2. Complications Encountered in Left Ventricular-Assist Device Patients

Infection
Bleeding
Stroke/transient ischemic attack
Hemolysis
Arrhythmias
Volume overload
Dehydration
Hypertension
Hypotension
Cardiac tamponade
Recurrence of heart failure
New right ventricular failure
Aortic insufficiency

緊急處理



Mechanical humming sound
不適用 hand pump

PR執行:A,B→不變
C → 多方討論
hest compression可能導致
ump內產生血栓

Antiarrhythmics : 可以使用
整流,去顫 : 可以使用,但要避開裝
置及拔除電線

結論

- EMS遇到病人裝有LVADs的機會越來越多,這種狀況必須充分準備才不會手足無措
- 希望EMS 系統能夠針對這類病人發展一套處理原則和訓練課程
- EMS ,醫院以及LVAD需要有一個溝通平台
- EMS 需要定期更新LVAD的新知以及處理方法