

Journal Meeting

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#1 Original Article

ACCURACY OF SINGLE-PASS WHOLE-BODY
COMPUTED TOMOGRAPHY
FOR DETECTION OF INJURIES IN PATIENTS
WITH MAJOR BLUNT TRAUMA

Article data

- Original article
- Journal : *CMAJ* 2012. DOI:10.1503
- Authors : Dirk Stengel MD PhD et al.
- From : Germany

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背景

- 重大外傷常常靠whole body CT (pan-scan)來幫助診斷
- 若結果是negative，就真的沒問題嗎?

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研究目的

- Whole body CT 可以加速診斷，但會影響 survival 嗎?
- Major trauma病人送去做whole body CT到底有多少好處?

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方法

- 2006.07 ~ 2008.12
- 982 major trauma病人送至外傷中心接受 pan-scan
- PATRES (Pan-Scan for Trauma Resuscitation) study
- 依照不同身體部位計算whole body CT的 sensitivity和specificity
- 評估residual risk of missed injury
- ISS > 15 → multiple trauma

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結果

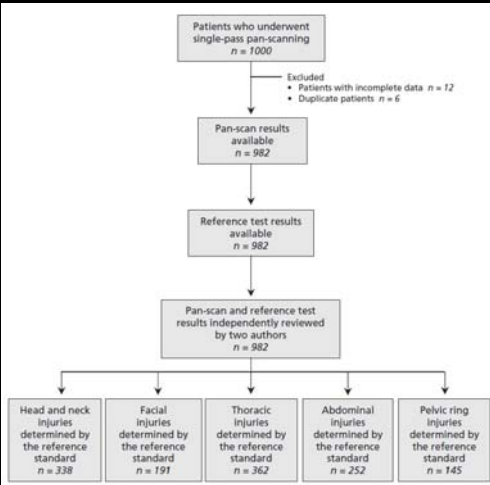


Table 1: Baseline characteristics and injury details of study patients

Characteristic	No. (%) ^a of patients n = 982	Characteristic (continued)	No. (%) ^a of patients n = 982
Age at injury, yr, mean (SD)	42.0 (19.4)	Time between admission and scanning, min, mean (SD)	55.8 (13.3)
Sex, male	730 (74.3)	Time between admission and scanning, min, median (IQR)	29 (20-46)
Covered by worker's compensation	231 (23.5)	Subsequent reference tests	
Mechanism of injury		Computed tomography	
Road traffic injury ^b	591 (60.2)	Cranial	257 (26.2)
Fall from height ^c	275 (28.0)	Chest	69 (7.0)
Fall on stairs	54 (5.5)	Abdominal	72 (7.3)
Other ^d	62 (6.3)	Pelvic	47 (4.8)
ISS, mean (SD)	14.1 (13.0)	Spine	112 (11.4)
ISS, median (IQR)	10 (4-21)	Ultrasound	331 (33.7)
Multiple trauma (ISS >15)	360 (36.7)	Magnetic resonance imaging	173 (17.6)
ISS, mean (SD)	27.7 (12.1)	Thoracotomy	5 (0.5)
ISS, median (IQR)	25 (18-33)	Laparotomy	37 (3.8)
Fracture of an extremity		Plain radiographs	711 (72.4)
Humeral shaft	45 (4.6)	Autopsy	5 (0.5)
F forearm	112 (11.4)	Patients with any reference test	816 (83.1)
Femoral shaft, any	117 (11.9)	Patients with ≥ 2 reference tests	522 (53.2)
Femoral shaft, bilateral	29 (3.0)	Patients with any conclusive reference test**	474 (48.3)
Tibia	169 (17.2)	Duration of follow-up, days, mean (SD)	293.7 (420.7)
Multiple, upper limb	24 (2.4)	Duration of follow-up, days, median (IQR)	39 (7-490)
Multiple, lower limb	78 (7.9)	Death	70 (7.1)

Note: IQR = interquartile range, ISS = Injury Severity Score, SD = standard deviation.
^aValues stated otherwise.
^bPatients with road traffic injuries included car occupants (n = 260), motorcyclists (n = 140), pedestrians (n = 90), bicycle riders (n = 78) and heavy vehicle drivers (n = 45). The injury mechanism was not specified in four cases.
^cThe mean height of falling was 2.2 (SD 2.0) metres.
^dOther injuries include (n = 14): explosion (n = 8), airplane crashes and skydiving injuries (n = 4), burns (n = 4), crashes and fall (n = 4), electric trauma (n = 4).
^eThe Injury Severity Score was computed as the sum of the squared anatomic Abbreviated Injury Scale (AIS) severity code (Brown) as the post-dict code of the AIS of the three most severe injuries located in the following anatomic regions: head and neck, face, chest, abdomen (including pelvic ring injuries), extremities (including pelvic ring injuries), and external (i.e., skin and soft tissue). The individual AIS severity code can be traced from the AIS Codebook.¹⁸ Although the AIS may reach values between 1 (minor) and 6 (fatal), the ISS ranges from 0 to 75, an ISS greater than 15 indicate the presence of multiple trauma.
^{**}Includes computed tomography or magnetic resonance imaging of any region, surgical intervention, or autopsy.

結果

Table 2: Diagnostic accuracy of single-pass pan-scanning, by group and body region

Region	No. of injuries	Prevalence of injuries, %	Sensitivity		Specificity		Positive predictive value, % (95% CI)	Negative predictive value, % (95% CI)
			No. of true positive pan-scan results / total number of injuries	% (95% CI)	No. of true negative pan-scan results / total number of negative results	% (95% CI)		
All patients, n = 982								
Head and neck	338	34.0	286/338	84.6 (80.3-88.3)	637/644	98.9 (97.8-99.4)	97.6 (95.1-99.0)	92.5 (90.2-94.3)
Face	191	19.0	150/191	79.6 (73.2-85.1)	786/791	99.1 (98.2-99.4)	95.6 (91.1-98.2)	95.3 (93.6-96.6)
Chest	362	37.0	314/362	86.7 (82.8-90.1)	613/620	98.9 (97.7-99.5)	97.8 (95.6-99.1)	92.7 (90.5-94.6)
Abdomen	252	26.0	216/254	85.7 (80.8-89.8)	712/770	97.5 (96.1-98.5)	92.3 (88.1-95.4)	95.2 (93.4-96.6)
Pelvis	145	15.0	125/145	86.2 (79.5-91.4)	835/837	99.8 (99.1-100)	98.4 (94.4-99.8)	97.7 (96.4-98.6)
Patients with multiple traumas, n = 360								
Head and neck	239	66.0	220/239	92.1 (87.9-95.1)	119/121	98.3 (94.2-99.8)	99.1 (96.8-99.9)	86.2 (79.3-91.5)
Face	102	28.0	87/102	85.3 (78.9-91.5)	253/258	98.1 (95.5-99.4)	94.6 (87.8-98.2)	94.4 (90.9-96.8)
Chest	220	61.0	197/220	89.5 (84.7-93.3)	137/140	97.9 (93.9-99.4)	98.5 (95.7-99.7)	85.4 (79.2-90.7)
Abdomen	141	39.0	125/141	88.7 (82.2-93.4)	209/219	95.4 (91.8-97.8)	92.6 (86.8-96.4)	92.9 (88.7-95.9)
Pelvis	84	23.0	75/84	89.3 (80.6-95.0)	274/276	99.3 (97.4-99.9)	97.4 (90.9-99.7)	96.8 (94.0-98.5)

77 (7.8%) pan-scans是不必要的 (ISS <6)

Table 3: Consequences of the 70 injuries (62 patients) that were missed by the initial pan-scan

Type of injury	Total no. Surgery [†]	Consequence [‡] , no. of injuries		
		Chest tube [‡]	Interventional procedure	Anti-coagulation [‡]
Intracranial bleeding	11	1	2	1
Lung contusion	11			
Hemothorax	10	1	9	
Unstable spine fracture	7	7		
Stable spine fracture	7	3		
Liver rupture	5	3		
Kidney injury	4		1**	
Visceral tear	3	3		
Acetabular fracture	3	2		
Serial rib fractures	2			
Extracranial vessel injury	2			2
Facial fracture	2	1		
Retroperitoneal bleeding	1			
Pelvic ring fracture	1	1		
Pneumothorax	1	1		
Total	70	22	10	3

Residual risk 6.3% (4.9-8.0%)

[†]In addition to monitoring in the intensive care unit.
[‡]Injuries that required surgical intervention (e.g., trepanation, thoracotomy, laparotomy, or external fracture fixation) in addition to usual care.
[§]Additional chest drains because of progressive hemothorax or pneumothorax that was not visible on the pan-scan scan.
^{**}Anticoagulation with heparin for internal dissection of the cerebral artery detected by follow-up computed tomography angiography ordered because of neurologic deterioration.
^{††}Intracranial pressure monitor.
^{†††}Radiologic, colling intervention for massive kidney bleeding.

討論

- 單一次的whole body CT有高specificity但sensitivity有待加強
- 若ISS>15, sensitivity也會提升
- Sensitivity和specificity的最佳平衡點是在入院30分鐘左右去切CT

限制

- 單一trauma center study
- 沒將CT前的評估及PE考量進去
- 沒算入非外傷的incidental findings(佔1/3)

結論

- CT看到positive result → 確診
- CT negative不代表沒事→需要後續的檢查
確認排除
- Whole body CT可以“降低”，但無法“消除”
missed injury的risk
- CT無法取代close monitor和clinical follow up
的地位

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#2 Original Article

**ASSOCIATION OF ONSET TO BALLOON AND
DOOR TO BALLOON TIME WITH
LONG TERM CLINICAL OUTCOME IN PATIENTS
WITH ST ELEVATION ACUTE MYOCARDIAL
INFARCTION HAVING PRIMARY
PERCUTANEOUS CORONARY INTERVENTION:
OBSERVATIONAL STUDY**

15/28

Article data

- Original article
- Journal : *BMJ* 2012;344:e3257
- Authors : Hiroki Shiomi MD/PhD et al.
- From : Kyoto, Japan

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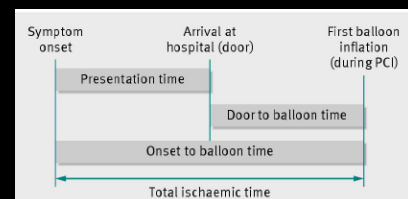
背景

- AHA 和 European Society建議door to
balloon time < 90 min for STEMI patients
- 先前的研究：
 - Delayed onset to balloon time不會增加in-
hospital mortality
 - 較短的door to balloon time可降低in-hospital
mortality
- 到底時間有沒有差？

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研究目的

- 評估STEMI病人從symptom onset to balloon
time及door to balloon time及日後的
outcome



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方法

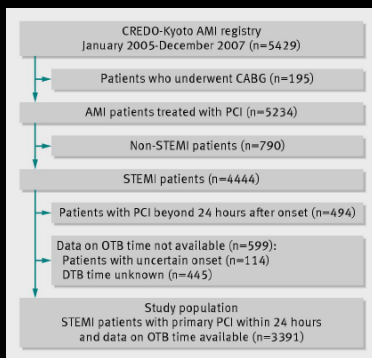
- Observational large cohort study
- 2005.01-2007.12
- 26 tertiary hospital in Japan
- 3391 AMI patients s/p PCI in 24 hrs
- Outcome :
 - Death
 - CHF

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- Subgroup : adjust with
 - Heart failure
 - Advanced age
 - Anterior myocardial infarction
 - Renal insufficiency
 - Multivessel disease
- D to B (< 90 min vs. > 90 min)
 - Short presentation (< 2 hr)

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結果



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	Entire cohort (n=3391)	Onset to balloon time ≤3 hours (n=964)	Onset to balloon time >3 hours (n=2427)	P value
Baseline characteristics				
Mean (SD) age (years)	67.5 (12.2)	65.3 (12.0)	68.3 (12.2)	<0.001
Male sex	2512 (74)	768 (80)	1744 (72)	<0.001
Mean (SD) body mass index (kg/m ²)	23.5 (3.4)	23.8 (3.4)	23.5 (3.4)	0.01
Hypertension	2660 (78)	741 (77)	1919 (79)	0.16
Diabetes mellitus	1066 (31)	311 (32)	755 (31)	0.51
Treated with insulin	145 (4.3)	41 (4.3)	104 (4.3)	0.97
Current smoker	1380 (41)	445 (46)	935 (39)	<0.001
Heart failure	1050 (31)	304 (32)	746 (31)	0.65
Mean (SD) ejection fraction	52.6 (12.6)	53.6 (12.7)	52.1 (12.6)	0.005
Previous myocardial infarction	293 (8.6)	101 (10)	192 (7.9)	0.02
Previous stroke (with symptoms)	288 (8.5)	84 (8.6)	204 (8.2)	0.01
Peripheral vascular disease	102 (3.0)	25 (2.6)	77 (3.2)	0.37
Median (IQR) eGFR (mL/min/1.73m ²)	69.4 (54.2-85.4)	68.0 (53.4-82.0)	70.3 (54.5-86.5)	0.03
Atrial fibrillation	314 (9.3)	98 (10)	216 (8.9)	0.26
Anaemia (haemoglobin <11.0 g/dL)	309 (9.1)	83 (8.5)	246 (10)	<0.001
Chronic obstructive pulmonary disease	106 (3.1)	27 (2.8)	79 (3.3)	0.49
Presentation				
Median (IQR) hours from onset to presentation	2.4 (1.1-5.1)	0.9 (0.6-1.3)	3.4 (2.0-7.0)	<0.001
Median (IQR) hours from onset to balloon	4.2 (2.9-7.3)	2.4 (2.0-2.7)	5.5 (4.0-9.2)	<0.001
Hours from onset to balloon:				
<3	964 (28)	964 (100)	0 (0)	<0.001
3-6	1359 (40)	0 (0)	1359 (56)	
6-12	659 (19)	0 (0)	659 (27)	
12-24	409 (12)	0 (0)	409 (17)	
Median (IQR) minutes from door to balloon	90 (60-132)	78 (54-102)	102 (66-150)	<0.001
≥90 minutes from door to balloon	1720 (51)	635 (66)	1085 (45)	<0.001

3 year risk

- Short O₂B 13.5% (123/964)
- Delayed O₂B 19.2% (429/2427), P<0.001
- Relative risk reduction 29.7%

D ₂ B	< 90 min	> 90 min
Median time	60 min	132 min
O ₂ B time	3.7 hr	4.7 hr
Death/CHF	16.7%	18.4% p = 0.54

Death / CHF	< 90 min	> 90 min
< 2 hr O ₂ B	11.9 %	18.1 % p = 0.01
> 2 hr O ₂ B	19.7 %	18.7 % p = 0.44

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討論

- Short O₂B time → short total ischemic time → better outcome
- 30 days內的outcome在short O₂B和delayed O₂B兩組沒差，3年才有差
- 綜合本study和先前研究，short D₂B可以改善病人日後outcome，但只侷限在early presentation的人
- 單純縮短D₂B時間其實幫助不大

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- 如果症狀發生後很早就來醫院的人，應更積極縮短送去PCI的時間
- 但更好的方式是，如何讓病人知道，疑似AMI時應該盡早求救、就醫，以縮短O2B time，提高預後
 - 民眾衛教
 - 消防系統

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研究限制

- 病人回想Symptom onset時間的誤差
- 將連續變項用二分法來看
- Baseline condition在early reperfusion 和 late reperfusion 兩組的差異

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結論

- 較短的onset to balloon time (<3hr)3年內有較好clinical outcome
- 縮短door to balloon time在early presentation (< 2 hr)的病人是有意義的
- 重點不是door to balloon time，是發作後多久來到醫院，如何縮短這個時間才是該努力的方向

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Thanks for your listening!



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