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Test Characteristics of Focused Assessment of Sonography for Trauma for Clinically Significant Abdominal Free Fluid in Pediatric Blunt Abdominal Trauma

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背景

- 小孩(<15歲)組成約20%的急診病患
- 意外傷害造43%死亡，其中車禍、墜落佔大多數，機制常為腹部鈍傷(BAT)
- 成人FAST的positive與negative likelihood ratio分別為98與0.02
- 在小孩族群研究未明

研究目的

- 利用FAST決定小孩BAT的治療方針
- 探討腹部鈍傷(BAT)的小兒病患腹腔中液體(FF)在FAST下的診斷特性，並用CT或手術結果來佐證

研究方法

- Prospective, descriptive, observational
- 收集2004-2007年，0-17歲腹部鈍傷在Level 1 Trauma Center啟動Trauma Team之小兒病患
- 由EM Resident，EM Physicians，US Fellow，Surgeons做FAST

研究方法

- 到院做FAST，30分鐘內做CT或剖腹探查(n=1)
- FAST: 在hepatorenal, splenorenal, suprapubic有液體即有臨床意義
- CT: 放射科報告moderate以上有臨床意義
- 手術: 有FF即有臨床意義

結果

- 收錄357名病患
- 15%病患ISS>15(Major Trauma)
- 共16位病患手術
- PICU(29%)、SICU(3%)、一般病房(68%)

Table 1
Patient Characteristics (n = 357)

Characteristic	n	% of Patients (95% CI)
Age, years		
0-2	34	9 (7-13)
2-6	88	25 (20-29)
7-12	79	22 (18-27)
13-17	156	44 (38-49)
Sex		
Male	230	64 (59-69)
Female	127	36 (31-41)
Mechanism of injury		
Automobile vs. pedestrian/bicycle	144	40 (35-46)
Traffic collision	125	35 (30-40)
Fall	52	15 (11-19)
Blunt other (sports, animal, object)	24	7 (4-10)
Battery	7	2 (1-4)
Unknown	5	1 (0.5-3)

Table 2
Level of Sonographer Performing FAST

Level of Sonographer	n	% of Patients	True-positive FAST*
Attending physician	69	19	8
Surgery resident (all levels)	35	10	0
US fellow	28	8	1
EM3 resident	173	48	13
EM2 resident	27	8	0
Unknown (including EM1 residents)	25	7	0

EM = emergency medicine year of training; FAST = focused assessment with sonography in trauma; FF = free fluid; US = ultrasound.
*For clinically important FF.

Positive FAST比例與operator level之p=0.10

Table 3
FAST results by Clinically Significant Hemoperitoneum

FAST	Clinically Significant Hemoperitoneum		Total
	Present	Absent	
Positive	12	13	25
Negative	11	321	332
Total	23	334	357

FAST = focused assessment with sonography in trauma.

- 12/23為true positive FAST(sensitivity=52%)
- 321/334為true negative FAST(specificity=96%)
- PPV為12/25=48% , NPV為321/332=97%
- Positive Likelihood Ratio為13.4
- Negative Likelihood Ratio為0.50
- Accuracy為333/357=93%

Table 4
FAST Results for Any Level of Hemoperitoneum (Large, Moderate, Small, Trace)

FAST	CT Positive or Odds Ratio	CT Negative	Total
Positive	19	6	25
Negative	74	258	332
Total	93	264	357

FAST = focused abdominal sonographic exam for trauma.

- Sensitivity=19/93=20%, Specificity=258/264=98%
- PPV=19/25=76%, NPV=258/332=78%
- LR+=9.0, LR-=0.81
- Accuracy=277/357=78%

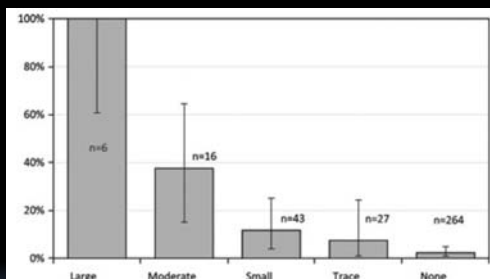


Figure 1. Percentage* of patients with positive FAST by FF on CT. *Excludes one patient who went to surgery with unquantified FF (n = 356; p < 0.0005). CT = computed tomography; FAST = focused abdominal sonographic exam for trauma; FF = free fluid

討論

- CT仍是腹部鈍傷的standard，但不穩定的病患可能有害
- FAST在不穩定的病患中較方便，但無法偵測Retroperitoneal fluid或無FF的bowel injury
- 高Specificity與先前研究相同

討論

- FAST偵測到FF很有可能為True positive
 - 本研究pretest probability為23/357=6.4%有significant FF
 - LR+=13.4, posttest probability=48%
 - LR-=0.5, posttest probability=3%
- FF存在與否無法辨別是否有器官損傷

Table 5
Statistics* for FF on CT and Results of FAST and Presence of Organ Injury, Regardless of Presence of FF on CT

FF by CT	Positive FAST		Negative FAST		Total
	CT		CT		
	Showing Organ Injury	No Organ Injury	Showing Organ Injury	No Organ Injury	
Large	6	0	0	0	6
Moderate	6	0	7	3	16
Small	5	0	11	27	23
Trace	0	2	5	20	27
None	2	4	10	248	264
Total	19	6	33	298	356

CT = computed tomography; FAST = focused abdominal sonographic exam for trauma; FF = free fluid.
*Excludes one patient with a negative FAST who went to surgery with unquantified FF.

討論

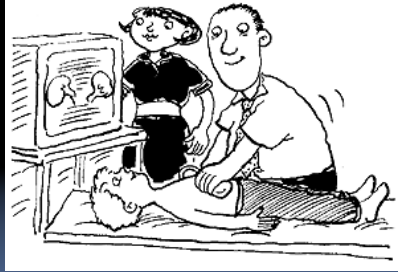
- 出血量可能在FAST與CT間的30分鐘有變化
- 較嚴重的病患家屬較不同意參加研究，造成sensitivity與PPV與LR+下降
- 有嘗試用Trendelenberg position與暗房，但研究中compliance太差

限制

- 操作定義的困境，無法用FF代表器官損傷
- FAST與CT間的時距，且無re-FAST
- 沒有建立放射報告的reliability
- 較嚴重病患參與研究的比例較低，造成研究可能只反映到較不嚴重之病患

結論

- 於腹部鈍傷之小兒病患
 - FAST對於腹腔中Free Fluid的敏感性低，特異性高
 - 若FAST為positive，可懷疑有臨床上有意義之hemoperitoneum
 - 若FAST為negative，對於臨床上判斷較無幫助



Prehospital delay and its impact on time to treat in ST-elevation myocardial infarction

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背景

- STEMI仍舊是全世界造成死亡的重大原因
- 過去研究已證明
 - 及早PCI與死亡率之關係
 - 症狀出現至治療之時間與死亡率之關係
- 目前Door-to-Balloon為處理病人之QC
- 對於到院前的時間細節目前沒有Guideline

目的

- 分析到院前所費時間與病患之Outcome
 - 症狀出現→叫救護車
 - EMS反應時間(從打電話到現場)
 - 現場處理病患
 - 離開現場到醫院
 - 總prehospital time: 打911→到院
 - Door to Balloon time
 - Total time to treat

方法

- 共60名STEMI病患
 - 現場懷疑症狀，EKG確認，送達可PCI社區醫院
- Time to treat=prehospital+D-to-B
 - Prehospital time取30分鐘為界線
 - Time to treat取120分鐘為界線

Table 1 Clinical and baseline characteristics of study population

	Mean ± SD
Age (y)	63 ± 13
Women (%)	28%
Smoker (%)	27%
Diabetes (%)	32%
Hypertension (%)	68%
Previous coronary artery bypass graft (%)	5%
Previous myocardial infarction (%)	37%
Left ventricular systolic dysfunction (%)	54%
Cardiac arrest (%)	7%
STEMI during night (%)	35%
Self-transport (%)	20%
Ejection fraction	43 ± 14
Systolic blood pressure (mm Hg)	137 ± 43
Diastolic blood pressure (mm Hg)	85 ± 25
Heart rate (beat/min)	76 ± 21
EMS response time (min)	10 ± 5
On-scene time (min)	18 ± 9
Departure to door time (min)	11 ± 8
Total prehospital time (min)	38 ± 15
Door to balloon time (min)	109 ± 60
Total time to treatment (min)	134 ± 55
Length of stay (days)	7 ± 11

Table 2 Patient characteristics and risk factor profile according to categories of total time to treatment

Variables	Total time to treatment of ≤ 120 min	Total time to treatment of > 120 min	P
Age (y)	62	63	.86
Diabetes (%)	39	61	.49
Hypertension (%)	43	57	.49
Smokers (%)	29	71	.22
Prior myocardial infarction (%)	38	62	.43
Systolic blood pressure (mm Hg)	142	136	.50
Diastolic blood pressure (mm Hg)	86	85	.89
Heart rate (beat/min)	78	76	.71
Ejection fraction	44	42	.53
Length of stay (d)	8.3	6	.46

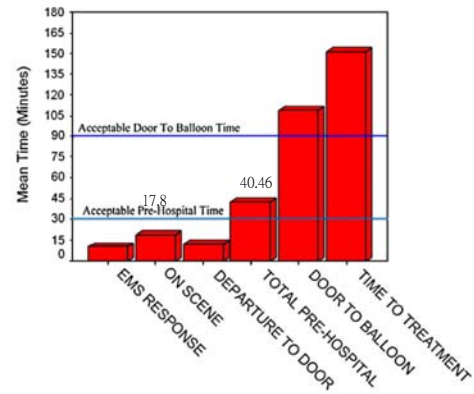


Fig. 1 Mean times according to each category of prehospital time and total time to treatment.

Table 3 Complications in 2 categories of time to treatment

Complications	Total time to treatment of ≤ 120 min	Total time to treatment of > 120 min
1. Deaths	0	4
2. Transfer to tertiary care hospital for complications of myocardial infarction	1	3
3. Cardiac arrest	1 (Survived)	2 (Survived)

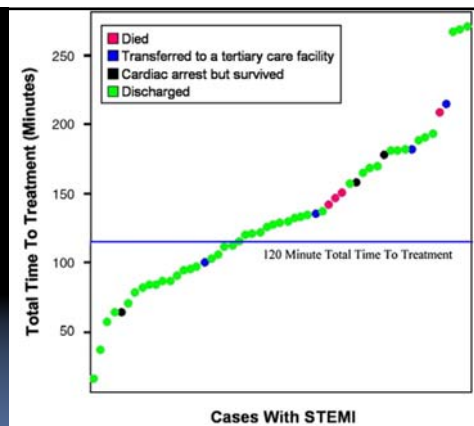


Fig. 2 Complications according to time to treatment.

結果

- Prehospital Time中，現場處理時間佔最大
- Prehospital Time佔Time-to-Treat時間一大部份
- Time-to-Treat大於120分的Outcome較差

討論

- 建議使用Time-to-Treat來取代D-to-B
- 在現場幾乎沒有能幫助血管打通的方法
 - 建議只需做EKG(MONA可至車上再給)
- 過去使用D-to-B的方法過度低估缺血時間
- 減低到院前時間的觀念早已存在，但ACC/AHA的Guideline仍使用D-to-B為準則

限制

- 研究群體小
- 研究機構只有一個社區醫院
- 只限於搭救護車來的病患

結論

- 大部份的到院前時間花在現場處理
- 建議：
 - 用叫119時間為起算時間
 - 使用Time-to-Treat來當取代Door-to-Balloon作為STEMI病患之處理的品質監測

Thank You!!!!

