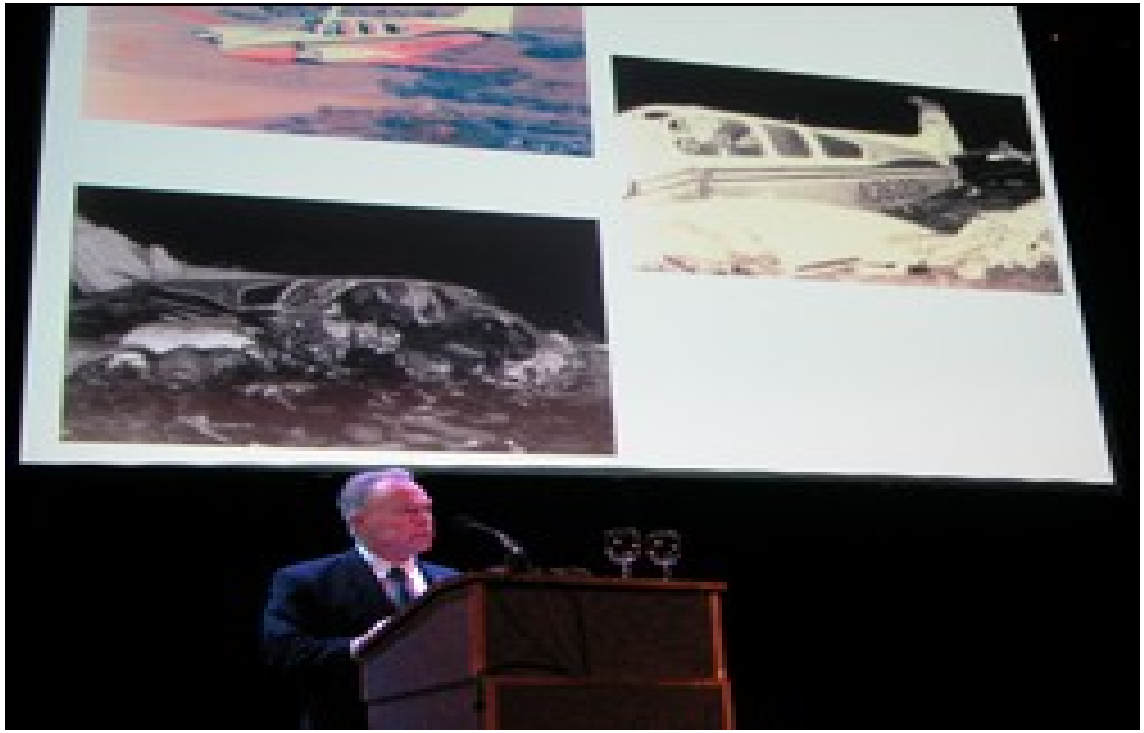
# Güncel Travma Lİteratürü

Dr. CENKER EKEN
Akdeniz Üniversitesi Tıp Fakültesi Acil Tıp AD.

# Hikaye

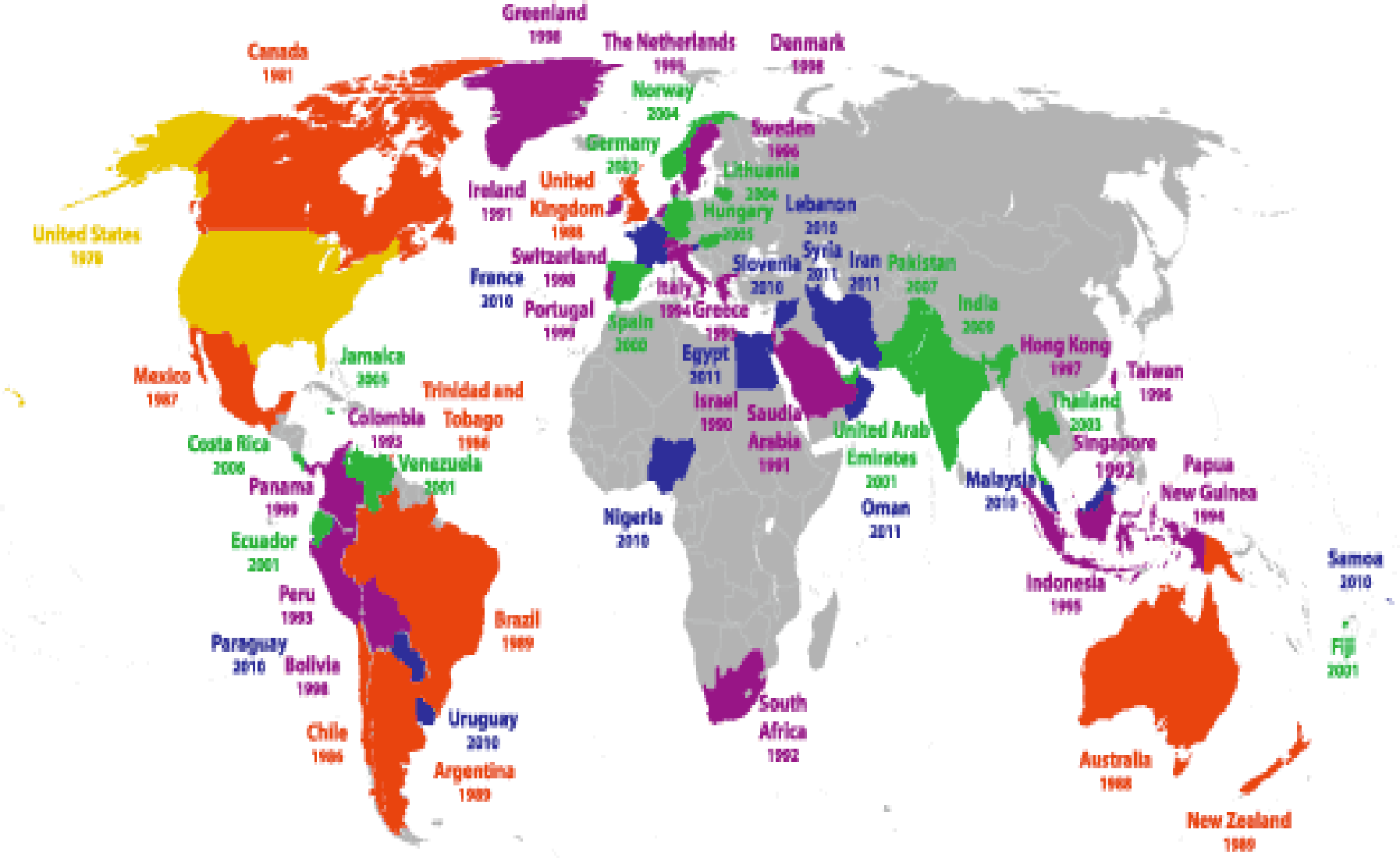
- Dr. James K. Styner



# Hikaye

- 1978 ile Advanced Trauma Life Support Kursu.
- 1980'de American College of Surgeons tarafından tüm ülke çapında ve uluslarası alanda sunulan bir kurs haline getiriliyor.
- Advanced Trauma Care for Nurses
- Prehospital Travma Life Support

# Advanced Trauma Life Support



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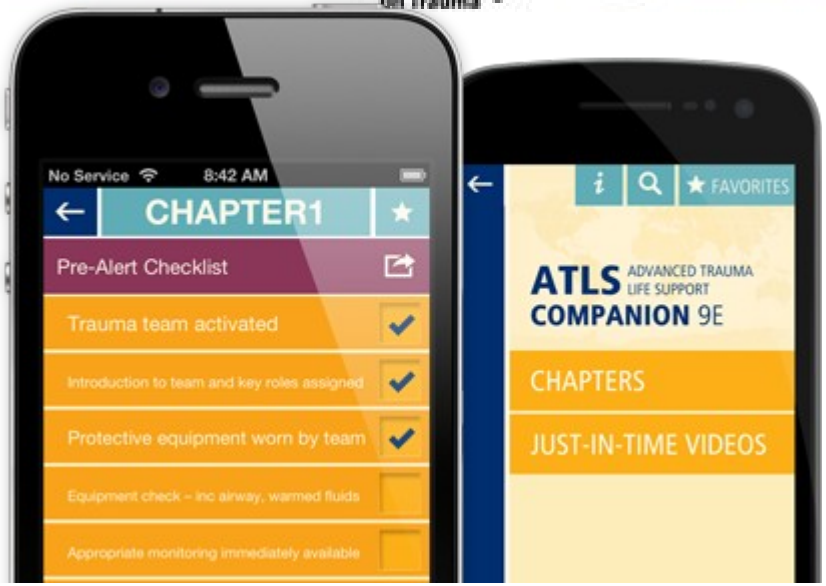

# Effects of tranexamic acid on death, vascular occlusive events, and blood transfusion in trauma patients with significant haemorrhage (CRASH-2): a randomised, placebo-controlled trial

*CRASH-2 trial collaborators**

## Summary

**Background** Tranexamic acid can reduce bleeding in patients undergoing elective surgery. We assessed the effects of early administration of a short course of tranexamic acid on death, vascular occlusive events, and the receipt of blood transfusion in trauma patients.

**Methods** This randomised controlled trial was undertaken in 274 hospitals in 40 countries. 20211 adult trauma patients with, or at risk of, significant bleeding were randomly assigned within 8 h of injury to either tranexamic acid (loading dose 1 g over 10 min then infusion of 1 g over 8 h) or matching placebo. Randomisation was balanced by centre, with an allocation sequence based on a block size of eight, generated with a computer random number generator. Both participants and study staff (site investigators and trial coordinating centre staff) were masked to treatment allocation. The primary outcome was death in hospital within 4 weeks of injury, and was described with the following categories: bleeding, vascular occlusion (myocardial infarction, stroke and pulmonary embolism), multiorgan failure, head injury, and other. All analyses were by intention to treat. This study is registered as ISRCTN86750102, Clinicaltrials.gov NCT00375258, and South African Clinical Trial Register DOH-27-0607-1919.

**Findings** 10096 patients were allocated to tranexamic acid and 10115 to placebo, of whom 10060 and 10067, respectively, were analysed. All-cause mortality was significantly reduced with tranexamic acid (1463 [14·5%] tranexamic acid group *vs* 1613 [16·0%] placebo group; relative risk 0·91, 95% CI 0·85–0·97; p=0·0035). The risk of death due to bleeding was significantly reduced (489 [4·9%] *vs* 574 [5·7%]; relative risk 0·85, 95% CI 0·76–0·96; p=0·0077).

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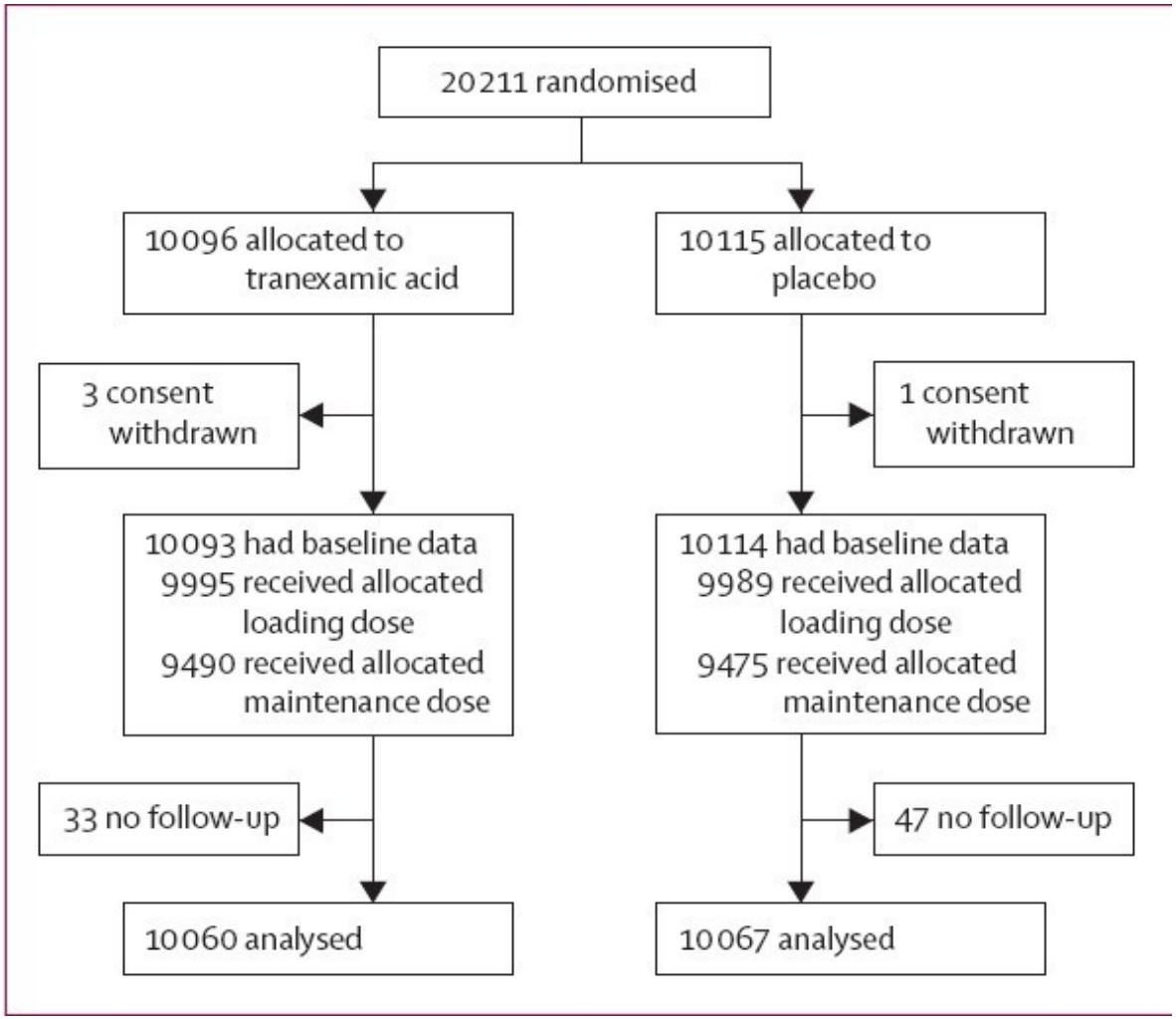
See Comment page 3

*Members listed at end of paper

Correspondence to:
Clinical Trials Unit, London School of Hygiene and Tropical Medicine, Keppel Street, London WC1E 7HT, UK
crash@lshtm.ac.uk

- Hasta: Sistolik kan basıncı <90 mmHg veya kalp hızı >110 atım/dk'nın üstünde olan yetişkin travma hastaları (İlk sekiz saatte)
- Uygulama: 1 gr tranexamik asit 10 dakikada, 1 gr sekiz saatlik infüzyon
- Karşılaştırma: Plasebo
- Sonuç: İlk bir ayda hastane içi ölüm


20211 randomised
10096 allocated to tranexamic acid
10115 allocated to placebo
3 consent withdrawn
1 consent withdrawn
10093 had baseline data
9995 received allocated loading dose
9490 received allocated maintenance dose
10114 had baseline data
9989 received allocated loading dose
9475 received allocated maintenance dose
33 no follow-up
47 no follow-up
10060 analysed
10067 analysed

| | Tranexamic acid (n=10 093) | Placebo (n=10 114) |
|---|---|---|
| Sex | | |
| Men | 8439 (83·6%) | 8496 (84·0%) |
| Women | 1654 (16·4%) | 1617 (16·0%) |
| Not known | 0 | 1 (0·01%) |
| Age (years) | | |
| Mean (SD) | 34·6 (14·1) | 34·5 (14·4) |
| <25* | 2783 (27·6%) | 2855 (28·2%) |
| 25–34 | 3012 (29·8%) | 3081 (30·5%) |
| 35–44 | 1975 (19·6%) | 1841 (18·2%) |
| >44 | 2321 (23·0%) | 2335 (23·1%) |
| Not known | 2 (0·02%) | 2 (0·02%) |
| Time since injury (h) | | |
| Mean (SD) | 2·8 (2·2) | 2·9 (2·6) |
| ≤1 | 3756 (37·2%) | 3722 (36·8%) |
| >1–≤3 | 3045 (30·2%) | 3006 (29·7%) |
| >3† | 3287 (32·6%) | 3380 (33·4%) |
| Not known | 5 (0·05%) | 6 (0·06%) |
| Type of injury | | |
| Blunt‡ | 6812 (67·5%) | 6843 (67·7%) |
| Penetrating | 3281 (32·5%) | 3271 (32·3%) |
| Systolic blood pressure (mm Hg) | | |
| ≤75 | 1566 (15·5%) | 1608 (15·9%) |
| 76–89 | 1615 (16·0%) | 1697 (16·8%) |
| ≥90 | 6901 (68·4%) | 6791 (67·1%) |
| Not known | 11 (0·11%) | 18 (0·18%) |
| Respiratory rate (per min) | | |
| <10 | 160 (1·6%) | 149 (1·5%) |
| 10–29 | 8355 (82·8%) | 8436 (83·4%) |
| >29 | 1491 (14·8%) | 1429 (14·1%) |
| Not known | 87 (0·86%) | 100 (0·99%) |
| Central capillary refill time (s) | | |
| ≤2 | 3432 (34·0%) | 3406 (33·7%) |
| 3–4 | 4665 (46·2%) | 4722 (46·7%) |
| >4 | 1699 (16·8%) | 1672 (16·5%) |
| Not known | 297 (2·9%) | 314 (3·1%) |
| Heart rate (beats per min) | | |
| <77 | 875 (8·7%) | 871 (8·6%) |
| 77–91 | 1727 (17·1%) | 1770 (17·5%) |
| 92–107 | 2556 (25·3%) | 2546 (25·2%) |
| >107 | 4872 (48·3%) | 4853 (48·0%) |

| | Tranexamic acid (n=10 060) | Placebo (n=10 067) | RR (95% CI) | p value (two-sided) |
|---|---|---|---|---|
| Any cause of death | 1463 (14·5%) | 1613 (16·0%) | 0·91 (0·85–0·97) | 0·0035 |
| Bleeding | 489 (4·9%) | 574 (5·7%) | 0·85 (0·76–0·96) | 0·0077 |
| Vascular occlusion* | 33 (0·3%) | 48 (0·5%) | 0·69 (0·44–1·07) | 0·096 |
| Multiorgan failure | 209 (2·1%) | 233 (2·3%) | 0·90 (0·75–1·08) | 0·25 |
| Head injury | 603 (6·0%) | 621 (6·2%) | 0·97 (0·87–1·08) | 0·60 |
| Other causes | 129 (1·3%) | 137 (1·4%) | 0·94 (0·74–1·20) | 0·63 |

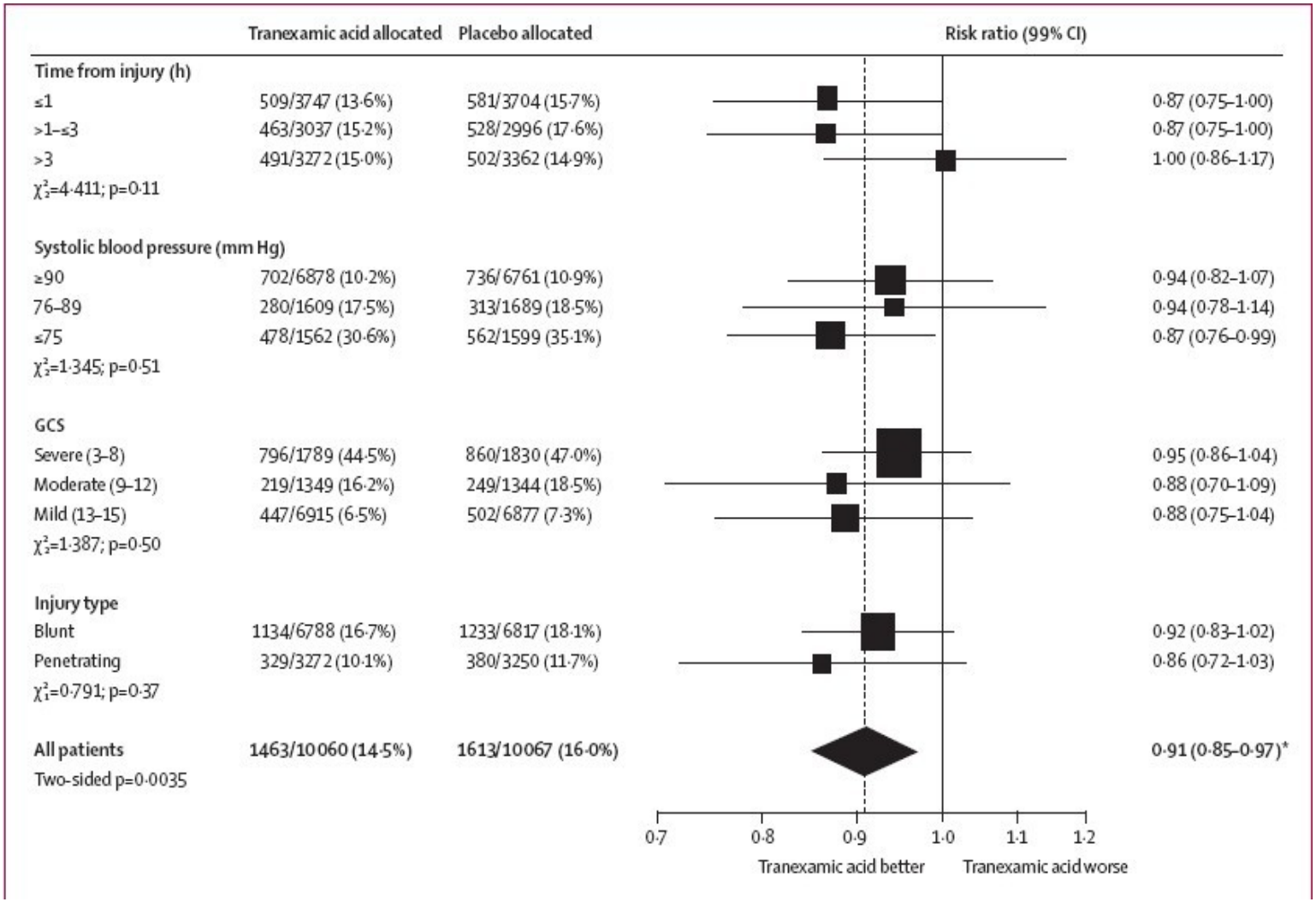
Data are number (%), unless otherwise indicated. RR=relative risk. *Includes myocardial infarction, stroke, and pulmonary embolism.

*Table 2:* Death by cause

| | Tranexamic acid (n=10 060) | Placebo (n=10 067) | RR (95% CI) | p value |
|---|---|---|---|---|
| **Vascular occlusive events*** | | | | |
| Any vascular occlusive event | 168 (1·7%) | 201 (2·0%) | 0·84 (0·68–1·02) | 0·084 |
| Myocardial infarction | 35 (0·3%) | 55 (0·5%) | 0·64 (0·42–0·97) | 0·035 |
| Stroke | 57 (0·6%) | 66 (0·7%) | 0·86 (0·61–1·23) | 0·42 |
| Pulmonary embolism | 72 (0·7%) | 71 (0·7%) | 1·01 (0·73–1·41) | 0·93 |
| Deep vein thrombosis | 40 (0·4%) | 41 (0·4%) | 0·98 (0·63–1·51) | 0·91 |
| **Need for transfusion and surgery** | | | | |
| Blood product transfused | 5067 (50·4%) | 5160 (51·3%) | 0·98 (0·96–1·01) | 0·21 |
| Any surgery | 4814 (47·9%) | 4836 (48·0%) | 1·00 (0·97–1·03) | 0·79 |
| Neurosurgery | 1040 (10·3%) | 1059 (10·5%) | 0·98 (0·91–1·07) | 0·67 |
| Chest surgery | 1518 (15·1%) | 1525 (15·1%) | 1·00 (0·93–1·06) | 0·91 |
| Abdominal surgery | 2487 (24·7%) | 2555 (25·4%) | 0·97 (0·93–1·02) | 0·28 |
| Pelvic surgery | 683 (6·8%) | 648 (6·4%) | 1·05 (0·95–1·17) | 0·31 |
| Median (IQR) units of blood product transfused† | 3 (2–6) | 3 (2–6) | .. | 0·59‡ |
| **Dependency** | | | | |
| No symptoms | 1483 (14·7%) | 1334 (13·3%) | 1·11 (1·04–1·19) | 0·0023 |
| Minor symptoms | 3054 (30·4%) | 3061 (30·4%) | 1·00 (0·96–1·04) | 0·94 |
| Some restriction | 2016 (20·0%) | 2069 (20·6%) | 0·97 (0·92–1·03) | 0·36 |
| Dependent (not requiring constant attention) | 1294 (12·9%) | 1273 (12·6%) | 1·02 (0·95–1·09) | 0·63 |
| Fully dependent | 696 (6·9%) | 676 (6·7%) | 1·03 (0·93–1·14) | 0·57 |
| Alive (disability status not known) | 54 (0·5%) | 41 (0·4%) | .. | .. |
| Dead | 1463 (14·5%) | 1613 (16·0%) | 0·91 (0·85–0·97) | 0·0035 |

Data are number (%), unless otherwise indicated. Counts are for numbers of patients with at least one such event. RR=relative risk. *Includes both fatal and non-fatal events. †Transfused patients only. ‡Analysis used logarithmic transformation of mean units of blood products transfused.

***Table 3:*** **Vascular occlusive events, need for transfusion and surgery, and level of dependency**


Tranexamic acid allocated
Placebo allocated
Risk ratio (99% CI)
Time from injury (h)
≤1 509/3747 (13·6%) 581/3704 (15·7%) 0·87 (0·75–1·00)
>1–≤3 463/3037 (15·2%) 528/2996 (17·6%) 0·87 (0·75–1·00)
>3 491/3272 (15·0%) 502/3362 (14·9%) 1·00 (0·86–1·17)
$\chi^2_2$=4·411; p=0·11
Systolic blood pressure (mm Hg)
≥90 702/6878 (10·2%) 736/6761 (10·9%) 0·94 (0·82–1·07)
76–89 280/1609 (17·5%) 313/1689 (18·5%) 0·94 (0·78–1·14)
≤75 478/1562 (30·6%) 562/1599 (35·1%) 0·87 (0·76–0·99)
$\chi^2_2$=1·345; p=0·51
GCS
Severe (3–8) 796/1789 (44·5%) 860/1830 (47·0%) 0·95 (0·86–1·04)
Moderate (9–12) 219/1349 (16·2%) 249/1344 (18·5%) 0·88 (0·70–1·09)
Mild (13–15) 447/6915 (6·5%) 502/6877 (7·3%) 0·88 (0·75–1·04)
$\chi^2_2$=1·387; p=0·50
Injury type
Blunt 1134/6788 (16·7%) 1233/6817 (18·1%) 0·92 (0·83–1·02)
Penetrating 329/3272 (10·1%) 380/3250 (11·7%) 0·86 (0·72–1·03)
$\chi^2_1$=0·791; p=0·37
All patients 1463/10060 (14·5%) 1613/10067 (16·0%) 0·91 (0·85–0·97)*
Two-sided p=0·0035
0·7
0·8
0·9
1·0
1·1
1·2
Tranexamic acid better
Tranexamic acid worse

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Intervention Review

# Steroids for acute spinal cord injury

FREE

Michael B Bracken*

Database Title
The Cochrane Library

Editorial Group: Cochrane Injuries Group
Published Online: 18 JAN 2012
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**Analysis 2.2. Comparison 2 High-dose MPSS vs none, 24-hour regimen, Outcome 2 Motor function at six weeks, six months, and one year: <8 hours to treatment.**

Review: Steroids for acute spinal cord injury

Comparison: 2 High-dose MPSS vs none, 24-hour regimen

Outcome: 2 Motor function at six weeks, six months, and one year: <8 hours to treatment

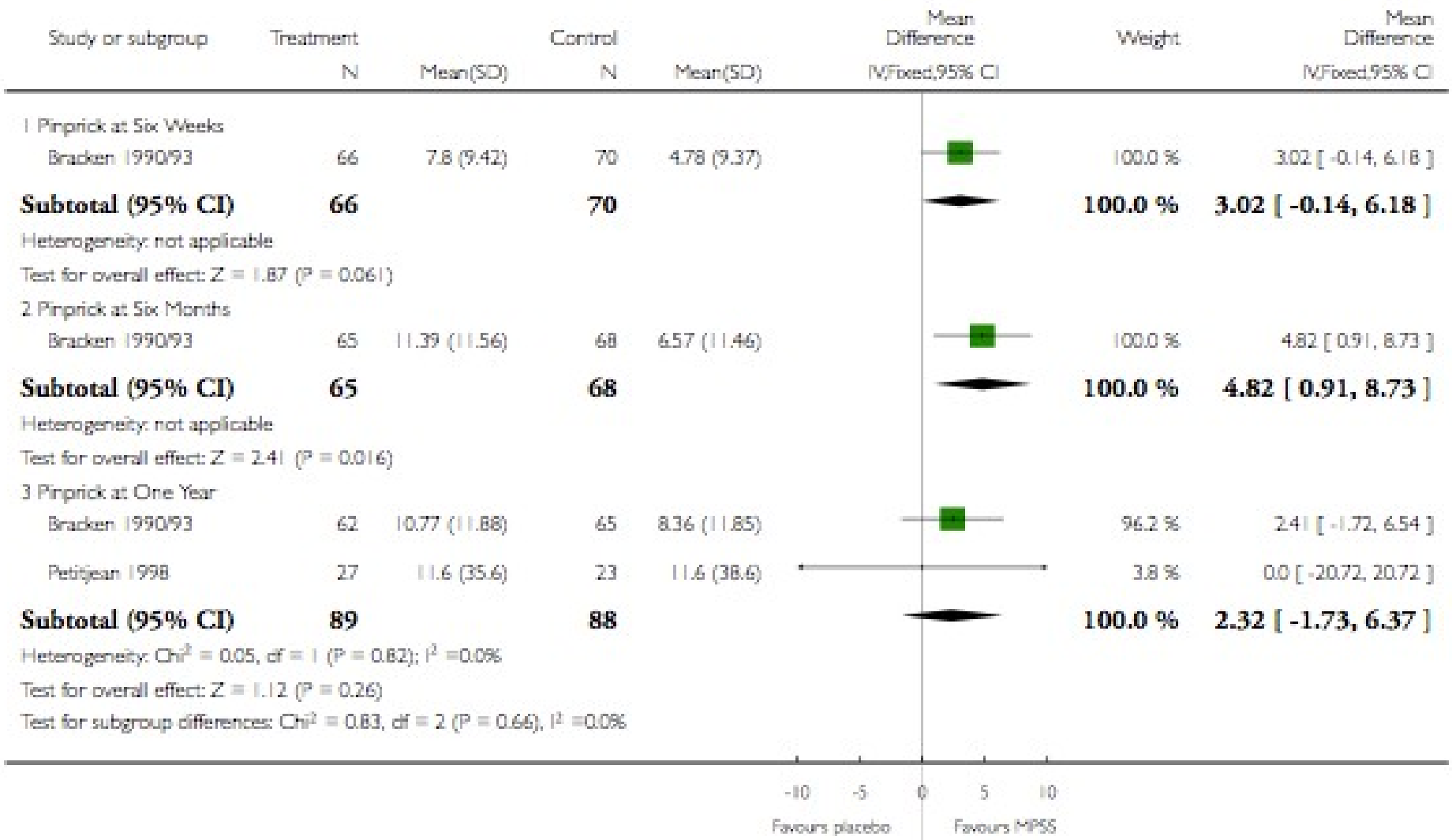
| Study or subgroup | Treatment N | Mean(SD) | Control N | Mean(SD) | Mean Difference IV,Fixed,95% CI | Weight | Mean Difference IV,Fixed,95% CI |
|---|---|---|---|---|---|---|---|
| 1 Motor function at six weeks | | | | | | | |
| Bracken 1990/93 | 66 | 10.64 (10.24) | 70 | 7.17 (10.29) | | 100.0 % | 3.47 [ 0.02, 6.92 ] |
| **Subtotal (95% CI)** | **66** | | **70** | | | **100.0 %** | **3.47 [ 0.02, 6.92 ]** |
| Heterogeneity: not applicable | | | | | | | |
| Test for overall effect: Z = 1.97 (P = 0.049) | | | | | | | |
| 2 Motor function at six months | | | | | | | |
| Bracken 1990/93 | 65 | 15.99 (13.06) | 68 | 11.21 (13.03) | | 61.7 % | 4.78 [ 0.34, 9.22 ] |
| Otani 1994 | 70 | 14.2 (15) | 47 | 10.3 (15.4) | | 38.3 % | 3.90 [ -1.73, 9.53 ] |
| **Subtotal (95% CI)** | **135** | | **115** | | | **100.0 %** | **4.44 [ 0.96, 7.93 ]** |
| Heterogeneity: $Chi^2$ = 0.06, df = 1 (P = 0.81); $I^2$ =0.0% | | | | | | | |
| Test for overall effect: Z = 2.50 (P = 0.012) | | | | | | | |
| 3 Motor function at one year | | | | | | | |
| Bracken 1990/93 | 62 | 17.2 (13.42) | 65 | 12 (13.41) | | 90.5 % | 5.20 [ 0.53, 9.87 ] |
| Petitjean 1998 | 27 | 18 (27.4) | 23 | 23.7 (24.6) | | 9.5 % | -5.70 [ -20.12, 8.72 ] |
| **Subtotal (95% CI)** | **89** | | **88** | | | **100.0 %** | **4.17 [ -0.27, 8.61 ]** |
| Heterogeneity: $Chi^2$ = 1.99, df = 1 (P = 0.16); $I^2$ =50% | | | | | | | |
| Test for overall effect: Z = 1.84 (P = 0.066) | | | | | | | |
| 4 Motor function at final (six-month or one-year) outcome | | | | | | | |
| Otani 1994 | 70 | 14.2 (15) | 47 | 10.3 (15.4) | | 38.3 % | 3.90 [ -1.73, 9.53 ] |
| Bracken 1990/93 | 62 | 17.2 (13.42) | 65 | 12 (13.41) | | 55.8 % | 5.20 [ 0.53, 9.87 ] |
| Petitjean 1998 | 27 | 18 (27.4) | 23 | 23.7 (24.6) | | 5.9 % | -5.70 [ -20.12, 8.72 ] |
| **Subtotal (95% CI)** | **159** | | **135** | | | **100.0 %** | **4.06 [ 0.58, 7.55 ]** |
| Heterogeneity: $Chi^2$ = 1.99, df = 2 (P = 0.37); $I^2$ =0.0% | | | | | | | |
| Test for overall effect: Z = 2.28 (P = 0.022) | | | | | | | |
| Test for subgroup differences: $Chi^2$ = 0.16, df = 3 (P = 0.98), $I^2$ =0.0% | | | | | | | |

**Analysis 2.4. Comparison 2 High-dose MPSS vs none, 24-hour regimen, Outcome 4 Pinprick sensation at six weeks, six months and one year: <8 hours to treatment.**

Review: Steroids for acute spinal cord injury

Comparison: 2 High-dose MPSS vs none, 24-hour regimen

Outcome: 4 Pinprick sensation at six weeks, six months and one year: <8 hours to treatment



J Neurosurg 76:23–31, 1992

# Methylprednisolone or naloxone treatment after acute spinal cord injury: 1-year follow-up data

## Results of the second National Acute Spinal Cord Injury Study

MICHAEL B. BRACKEN, PH.D., MARY JO SHEPARD, M.P.H., WILLIAM F. COLLINS, JR., M.D., THEODORE R. HOLFORD, PH.D., DAVID S. BASKIN, M.D., HOWARD M. EISENBERG, M.D., EUGENE FLAMM, M.D., LINDA LEO-SUMMERS, M.P.H., JOSEPH C. MAROON, M.D., LAWRENCE F. MARSHALL, M.D., PHANOR L. PEROT, JR., M.D., JOSEPH PIEPMEIER, M.D., VOLKER K. H. SONNTAG, M.D., FRANKLIN C. WAGNER, JR., M.D., JAMES L. WILBERGER, M.D., H. RICHARD WINN, M.D., AND WISE YOUNG, M.D.

*Coordinating Center, National Spinal Cord Injury Study, Department of Epidemiology and Public Health, Yale University Medical School, New Haven, Connecticut*

TABLE 4

*Neurological scores in the emergency room for patients who received the study drug within 8 hours of injury**

| Neurological Score | Treatment Group | | | p Value |
|---|---|---|---|---|
| | Methylprednisolone | Naloxone | Placebo | |
| expanded motor | | | | |
| cases studied | 71 | 64 | 73 | |
| mean score | 21.1 ± 15.7 | 23.4 ± 17.9 | 23.8 ± 20.9 | 0.64 |
| expanded pinprick | | | | |
| cases studied | 71 | 64 | 73 | |
| mean score | 51.3 ± 16.8 | 52.8 ± 17.6 | 52.6 ± 17.6 | 0.86 |
| expanded touch | | | | |
| cases studied | 70 | 62 | 72 | |
| mean score | 53.3 ± 18.4 | 54.7 ± 18.1 | 55.0 ± 19.0 | 0.84 |

* Expanded motor score ranges from 0 (no contraction in any muscle) to 70 (all normal responses); expanded sensory scores range from 29 (absent sensation at all levels) to 87 (all levels normal). Mean values are expressed ± standard deviation.

TABLE 5

*Change in neurological function scores 1 year after injury in patients who received the study drug within 8 hours of injury**

| Neurological Function | Treatment Group | | |
|---|---|---|---|
| | Methylprednisolone | Naloxone | Placebo |
| plegic with total sensory loss | | | |
| cases studied | 45 | 34 | 43 |
| motor | 11.1 (0.019) | 8.1 (0.235) | 4.6 |
| pinprick | 8.0 (0.268) | 5.4 (0.917) | 5.1 |
| touch | 8.9 (0.203) | 7.4 (0.498) | 5.5 |
| plegic with partial sensory loss | | | |
| cases studied | 5 | 11 | 6 |
| motor | 25.8 (0.481) | 31.1 (0.971) | 31.3 |
| pinprick | 13.6 (0.764) | 15.0 (0.894) | 15.8 |
| touch | 6.4 (0.556) | 14.1 (0.610) | 10.8 |
| paretic with variable sensory loss | | | |
| cases studied | 12 | 11 | 16 |
| motor | 24.2 (0.024) | 14.6 (0.738) | 12.9 |
| pinprick | 14.5 (0.264) | 9.3 (0.996) | 9.2 |
| touch | 9.2 (0.204) | 5.8 (0.576) | 3.0 |

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# Decompressive Craniectomy in Diffuse Traumatic Brain Injury

D. James Cooper, M.D., Jeffrey V. Rosenfeld, M.D., Lynnette Murray, B.App.Sci., Yaseen M. Arabi, M.D., Andrew R. Davies, M.B., B.S., Paul D'Urso, Ph.D., Thomas Kossmann, M.D., Jennie Ponsford, Ph.D., Ian Seppelt, M.B., B.S., Peter Reilly, M.D., and Rory Wolfe, Ph.D., for the DECRA Trial Investigators and the Australian and New Zealand Intensive Care Society Clinical Trials Group*

## ABSTRACT

**BACKGROUND**

It is unclear whether decompressive craniectomy improves the functional outcome in patients with severe traumatic brain injury and refractory raised intracranial pressure.

**METHODS**

From December 2002 through April 2010, we randomly assigned 155 adults with severe diffuse traumatic brain injury and intracranial hypertension that was refractory to first-tier therapies to undergo either bifrontotemporoparietal decompressive craniectomy or standard care. The original primary outcome was an unfavorable

From the Departments of Intensive Care (D.J.C., L.M., A.R.D.) and Neurosurgery (J.V.R.), Alfred Hospital; the Departments of Epidemiology and Preventive Medicine (D.J.C., L.M., A.R.D., J.P., R.W.) and Surgery (J.V.R.), Monash University; the Neurosciences Clinical Institute (P.D.) and the Monash–Epworth Rehabilitation Research Centre (J.P.), Epworth Healthcare; and the Epworth Hospital (T.K.) — all in Melbourne, VIC; the Department of Intensive Care Medicine

- Hasta: 15-59 yaş arası ciddi non-penetran kafa travması olan hastalar, GKS: 3-8
  - Dışlama kriterleri: aktif tedavi için uygun olmayan hastalar, dilate ve cevapsız pupiller olması, spinal kord yaralanması, arrest hastalar
- Uygulama: Dekompresyon cerrahisi + standart bakım
- Karşılaştırma: Standart bakım
- Sonuç: Altı ay sonra ölüm, vejetatif durum, ciddi nörolojik sekel (Extended Glasgow Outcome Scale: 1-4).

**Table 1. Baseline Characteristics of the Patients.***

| Characteristic | Decompressive Craniectomy (N=73) | Standard Care (N=82) | P Value† |
|---|---|---|---|
| Age — yr | | | 0.89 |
| Median | 23.7 | 24.6 | |
| Interquartile range | 19.4–29.6 | 18.5–34.9 | |
| Male sex — no. (%) | 59 (81) | 61 (74) | 0.44 |
| Systolic blood pressure — mm Hg | 135.4±32.0 | 135.7±27.6 | 0.95 |
| Glasgow Coma Scale | | | |
| Overall score‡ | | | 0.31 |
| Median | 5 | 6 | |
| Interquartile range | 3–7 | 4–7 | |
| Motor score§ | | | 0.49 |
| Median | 3 | 3 | |
| Interquartile range | 1–4 | 1–5 | |
| Maximum score for head injury on Abbreviated Injury Scale — no. (%)¶ | | | 0.52 |
| 3 or 4 | 35 (48) | 44 (54) | |
| 5 | 38 (52) | 38 (46) | |
| Injury Severity Score‖ | | | 0.88 |
| Median | 33 | 32 | |
| Interquartile range | 25–38 | 24–41 | |
| Trauma Score–Injury Severity Score ** | | | 0.46 |
| Median | 0.74 | 0.72 | |
| Interquartile range | 0.42–0.88 | 0.51–0.90 | |
| Reactivity of pupils — no./total no. (%) | | | 0.04 |
| Neither pupil | 19/71 (27) | 10/80 (12) | |
| One or both pupils | 52/71 (73) | 70/80 (88) | |
| Hypotension — no. (%) | 24 (33) | 25 (30) | 0.93 |
| Hypoxemia — no. (%) | 18 (25) | 24 (29) | 0.55 |
| Traumatic subarachnoid hemorrhage — no. (%) | 42 (58) | 48 (59) | 0.90 |
| Cause of injury — no./total no. (%) | | | 0.72 |
| Motor-vehicle or motorcycle accident | 45/70 (64) | 55/81 (68) | |
| Bicycle accident | 4/70 (6) | 2/81 (2) | |
| Pedestrian accident | 5/70 (7) | 4/81 (5) | |

Table 1. (Continued.)

| Characteristic | Decompressive Craniectomy (N=73) | Standard Care (N=82) | P Value† |
|---|---|---|---|
| Time from injury to hospital — hr | | | 0.90 |
| Median | 1.0 | 1.2 | |
| Interquartile range | 0.8–1.8 | 0.7–1.9 | |
| Time from injury to randomization — hr | | | 0.60 |
| Median | 35.2 | 34.8 | |
| Interquartile range | 23.3–52.8 | 25.8–45.4 | |
| Marshall class — no. (%)†† | | | 0.39 |
| Diffuse injury II | 17 (23) | 27 (33) | |
| Diffuse injury III or IV | 53 (73) | 53 (65) | |
| Nonevacuated mass lesion (VI) | 3 (4) | 2 (2) | |

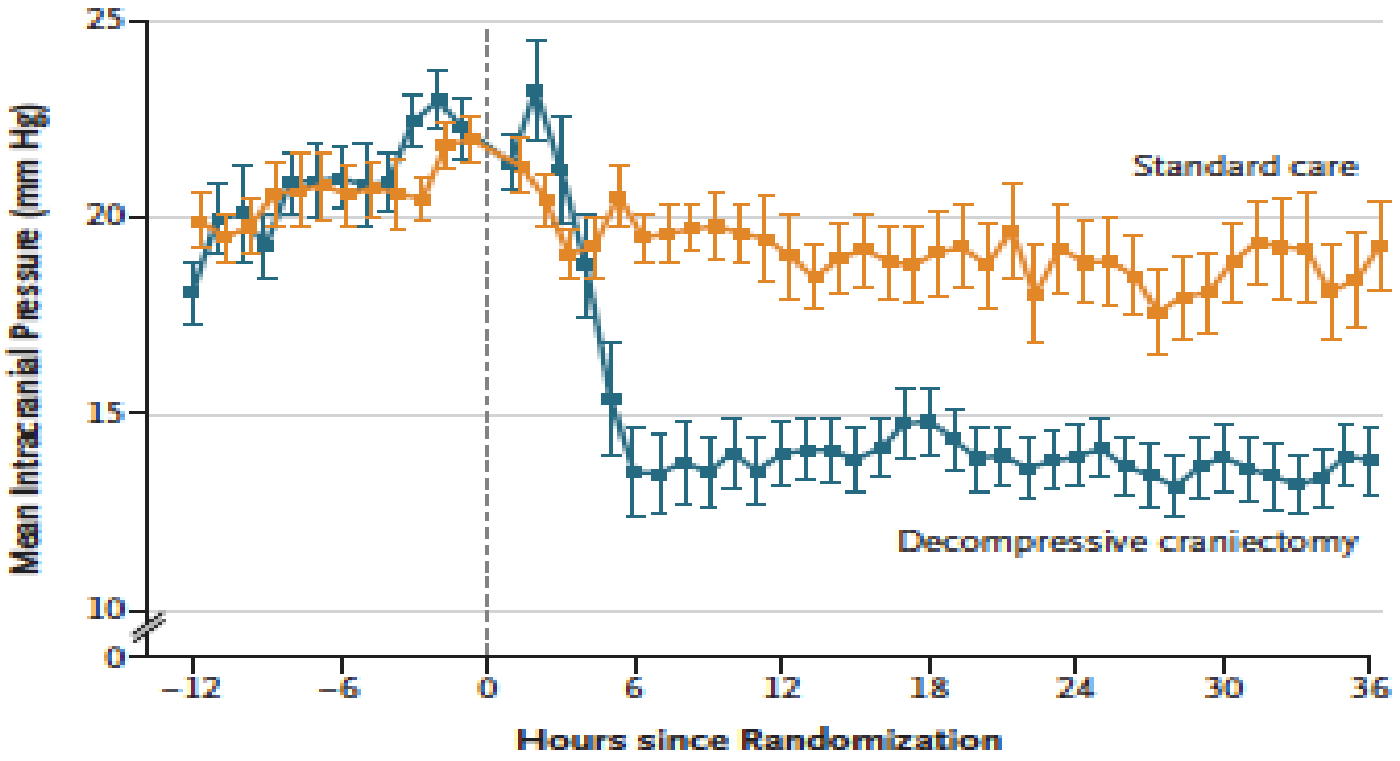



**Figure 1. Intracranial Pressure before and after Randomization.**

Shown are the mean measurements of intracranial pressure in the two study groups during the 12 hours before and the 36 hours after randomization. The I bars indicate standard errors.

**Table 2. Primary and Secondary Outcomes.***

| Outcome | Decompressive Craniectomy (N=73) | Standard Care (N=82) | P Value† |
|---|---|---|---|
| Intracranial pressure and cerebral perfusion pressure | | | |
| Intracranial pressure after randomization — mm Hg | 14.4±6.8 | 19.1±8.9 | <0.001 |
| No. of hr of intracranial pressure >20 mm Hg — median (IQR) | 9.2 (4.4–27.0) | 30.0 (14.9–60.0) | <0.001 |
| Intracranial hypertension index — median (IQR)‡ | 11.5 (5.9–20.3) | 19.9 (12.5–37.8) | <0.001 |
| Cerebral hypoperfusion index — median (IQR)§ | 5.7 (2.5–10.2) | 8.6 (4.0–13.8) | 0.03 |
| Duration of hospital intervention | | | |
| Days of mechanical ventilation — median (IQR) | 11 (8–15) | 15 (12–20) | <0.001 |
| Days of ICU stay — median (IQR) | 13 (10–18) | 18 (13–24) | <0.001 |
| Days of hospitalization — median (IQR) | 28 (21–62) | 37 (24–44) | 0.82 |
| Extended Glasgow Outcome Scale | | | |
| Score — no. (%) | | | |
| 1 (dead) | 14 (19) | 15 (18) | |
| 2 (vegetative state) | 9 (12) | 2 (2) | |
| 3 (lower severe disability) | 18 (25) | 17 (21) | |
| 4 (upper severe disability) | 10 (14) | 8 (10) | |
| 5 (lower moderate disability) | 13 (18) | 20 (24) | |
| 6 (upper moderate disability) | 6 (8) | 13 (16) | |
| 7 (lower good recovery) | 2 (3) | 4 (5) | |
| 8 (upper good recovery) | 1 (1) | 3 (4) | |
| Median score (IQR) | 3 (2–5) | 4 (3–5) | 0.03 |
| Unfavorable score of 1 to 4 — no. (%) | 51 (70) | 42 (51) | 0.02 |

# Utility of routine follow-up head CT scanning after mild traumatic brain injury: a systematic review of the literature

Martina Stippler,[1] Carl Smith,[2] A Robb McLean,[2] Andrew Carlson,[1] Sarah Morley,[3] Cristina Murray-Krezan,[4] Jessica Kraynik,[5] George Kennedy[2]

[1]Department of Neurosurgery, University of New Mexico, Albuquerque, New Mexico, USA
[2]Department of Emergency Medicine, University of New Mexico, Albuquerque, New Mexico, USA
[3]Health Sciences Library and Informatics Center, University of New Mexico, Albuquerque, New Mexico, USA
[4]Clinical and Translational Science Center, University of New Mexico, Albuquerque, New Mexico, USA
[5]School of Medicine, University of New Mexico, Albuquerque

## ABSTRACT

**Objective** To evaluate the efficacy of routine follow-up CT scans of the head after complicated mild traumatic brain injury (TBI).

**Methods** 74 English language studies published from 1999 to February 2011 were reviewed. The papers were found by searching the PubMed database using a combination of keywords according to Cochrane guidelines. Excluding studies with missing or inappropriate data, 1630 patients in 19 studies met the inclusion criteria: complicated mild TBI, defined as a GCS score 13–15 with abnormal initial CT findings and the presence of follow-up CT scans. For these studies, the progression and type of intracranial haemorrhage, time

CT scan of the head in patients with risk factors[4 5] and follow-up CT scans for patients with complicated mild TBI are the standard of care in many US hospitals. However, studies of one million emergency department visits for mild TBI found that neurosurgical intervention was required in only 0.13–0.3% of these patients.[4 6–9] The National Institute for Health and Clinical Excellence (NICE) guidelines on head injury estimate the number of neurosurgical interventions in the UK at between 0.5% and 0.7%. The guidelines also state that only 1–3% of patients admitted in the UK for head injury will go on to require neurosurgery.[10] Over the past several years, evidence has suggested that the

- Hasta: komplike hafif travmatik beyin yaralanması, ilk BT'si anormal olan GKS 13-15 olan hastalar
- Dışlama kriterleri: kontrol BT'si olmayan hastalar, ilk BT'si normal olan hastalar, travma öyküsü olmayanlar, akut inkranyal yaralanması olmayanlar, ikinci BT'den önce kranyotomiye alınan hastalar, GKS<13

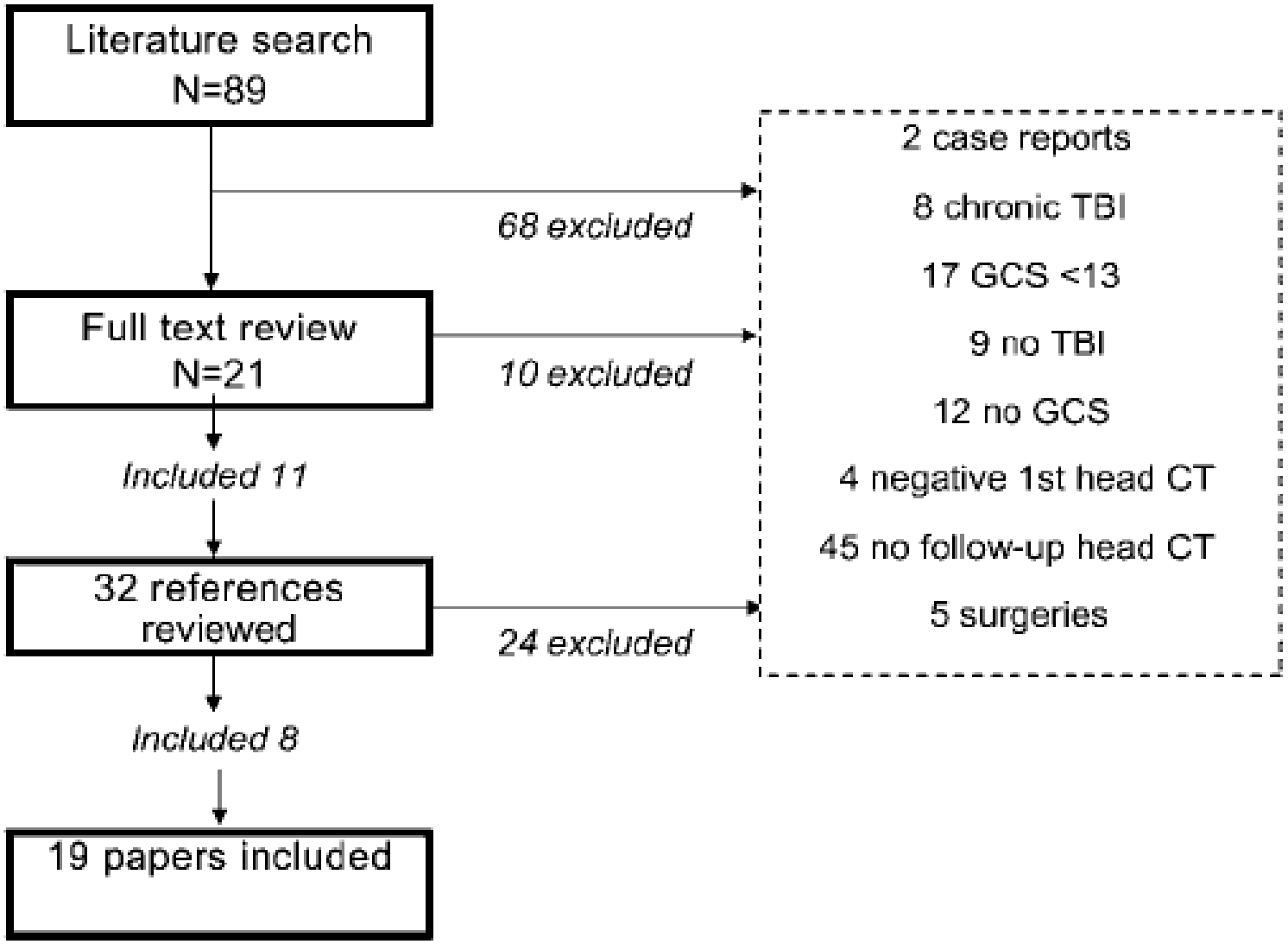



**Figure 1** Study design. GCS, Glasgow Coma Scale; TBI, traumatic brain injury.

**Table 1** Overview of included papers

| Author | Year | N | Follow-up head CT scan worse | Operating room | Level of evidence |
|---|---|---|---|---|---|
| Borovich[18] | 1985 | 2 | 2 | 2 | C4 |
| Knuckey[19] | 1989 | 18 | 4 | 4 | C4 |
| Mertol[20] | 1991 | 1 | 1 | 0 | C4 |
| Chen[21] | 1993 | 12 | 4 | 0 | C4 |
| Nagy[6] | 1999 | 39 | 0 | 0 | C4 |
| Brown[22] | 2004 | 26 | 1 | 1 | C4 |
| Sifri[23] | 2004 | 202 | 31 | 2 | C4 |
| Chieregato[24] | 2004 | 84 | 41 | 0 | C4 |
| Fainardi[25] | 2004 | 141 | 30 | 0 | C4 |
| Huynh[13] | 2006 | 56 | 4 | 0 | C4 |
| Sifri[12] | 2006 | 130 | 26 | 2 | C4 |
| Velmahos[11] | 2006 | 179 | 37 | 2 | C4 |
| Brown[26] | 2007 | 142 | 27 | 5 | C4 |
| Hollingworth[27] | 2007 | 257 | 53 | 3 | C4 |
| Karasu[28] | 2008 | 16 | 4 | 4 | C4 |
| Roka[16] | 2008 | 32 | 3 | 2 | C4 |
| Turedi[29] | 2008 | 41 | 0 | 0 | C4 |
| Bee[30] | 2009 | 207 | 54 | 12 | C4 |
| Alahmadi[31] | 2010 | 45 | 2 | 2 | C4 |
| | | 1630 (100%) | 324 (19.9%) | 39 (2.4%) | |

- %2.4 (n=39) hastanın %61.5'uğu (n=24) kontrol BT'den önce nörolojik olarak kötüleşmişler.
- %28'inde (n=11) ise nörolojik olarak değişiklik olmamış.
- 11/1574 (%0.7).

# Diagnostic Accuracy of Ultrasonographic Examination in the Management of Shoulder Dislocation in the Emergency Department

Saeed Abbasi, MD; Hooshyar Molaie, MD; Peyman Hafezimoghadam, MD; Mohammad Amin Zare, MD; Mohsen Abbasi, MD; Mahdi Rezai, MD; Davood Farsi, MD

**Study objective:** Emergency physicians frequently encounter shoulder dislocation in their practice. The objective of this study is to assess the diagnostic accuracy of ultrasonography in detecting shoulder dislocation and confirming proper reduction in patients presenting to the emergency department (ED) with possible shoulder dislocation. We hypothesize that ultrasonography could be a reliable alternative for pre- and postradiographic evaluation of shoulder dislocation.

**Methods:** This was a prospective observational study. A convenience sample of patients suspected of having shoulder dislocation was enrolled in the study. Ultrasonography was performed before and after reduction procedure with a 7.5- to 10-MHz linear transducer. Shoulder dislocation was confirmed by taking radiographs in 3 routine views as a criterion standard. The operating characteristics of ultrasonography to detect dislocation in patients with possible shoulder dislocation and to confirm reduction in patients with definitive dislocation were calculated as the primary endpoints.

**Results:** Seventy-three patients were enrolled. The ultrasonography did not miss any dislocation. The results of ultrasonography and radiography were identical and the sensitivity of ultrasonography in detection of shoulder dislocation was 100% (95% confidence interval 93.4% to 100%). The sensitivity of ultrasonography for assessment of complete reduction of the shoulder joint reached 100% (95% confidence interval 93.2% to 100%) in our study as well.

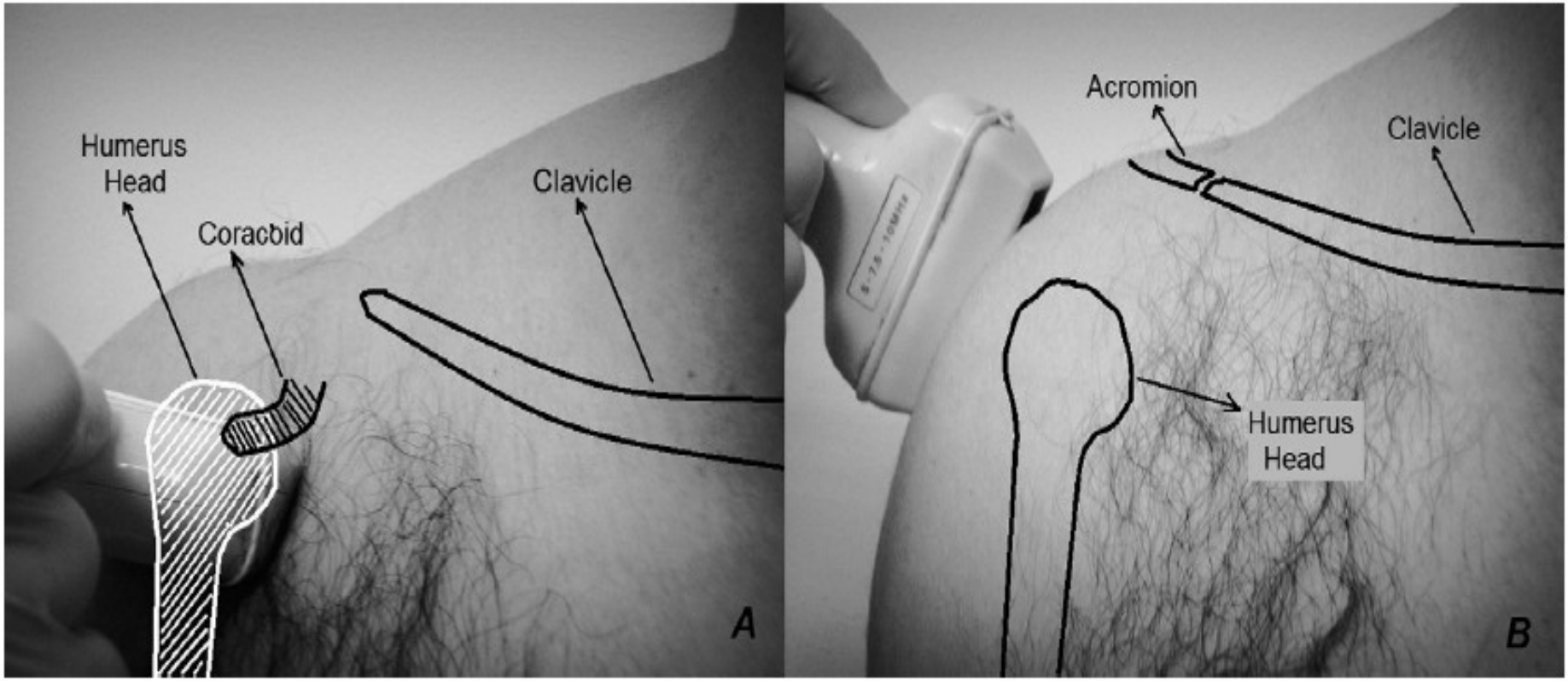
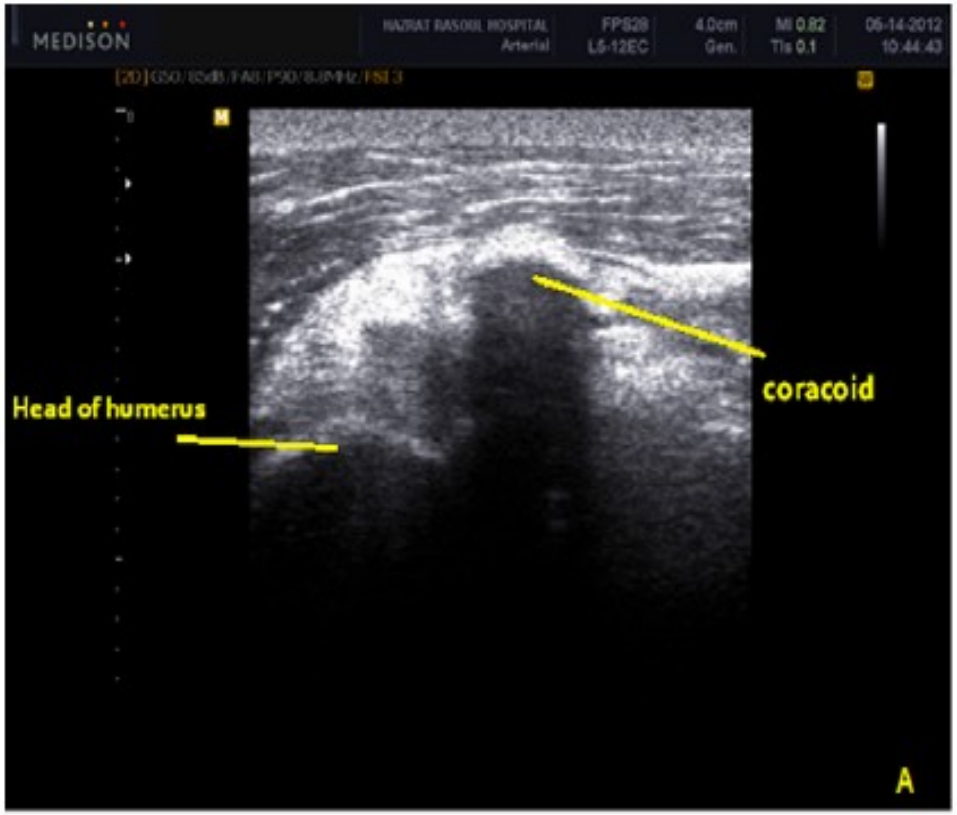
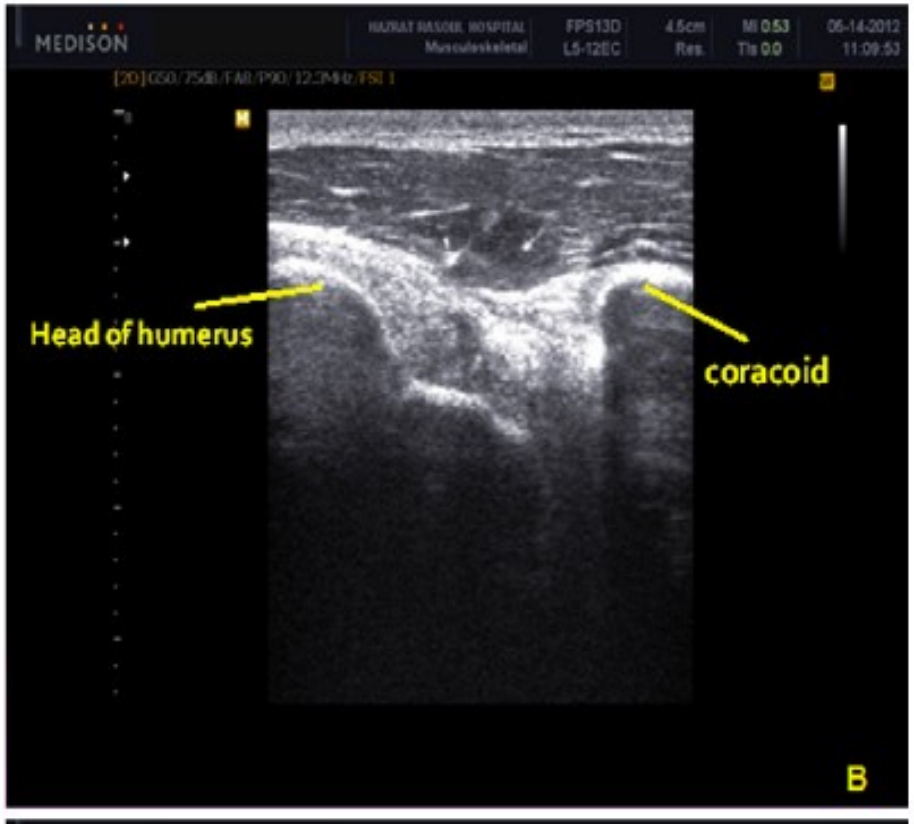



**Figure 1.** Probe placement and orientation. *A*, Anterior approach; the probe was placed transversely directly over the coracoid process. *B*, Lateral approach; the probe was placed longitudinally just below the acromion.




A. Disloke omuz B.Postredüksüyon dönem

**Table 2.** Performance of ultrasonography (test) for identifying shoulder dislocation in 73 patients and confirmation of shoulder reduction in 69 patients.

| Ultrasonographic Findings | Shoulder Dislocation Detection | | | Shoulder Reduction Confirmation | | |
|---|---|---|---|---|---|---|
| | Radiographic Results | | | Radiographic Results | | |
| | Positive | Negative | Total | Positive | Negative | Total |
| Positive | 69 | 0 | 69 | 67 | 0 | 67 |
| Negative | 0 | 4 | 4 | 0 | 2 | 2 |
| **Total** | 69 | 4 | 73 | 67 | 2 | 69 |

- 11 hastada kırık varmış ve USG tüm kırıkları tanımış.

**Alrajhi K, Woo MY, VaillancourtC. Test characteristics of ultrasonographyfor the detection of pneumothorax:a systematic review and analysis. *Chest*. 2012;141:703-708.**

| Test | Studies/ Patients | Sensitivity (95% CI), % | Specificity (95% CI), % | Positive Likelihood Ratio | Negative Likelihood Ratio |
|---|---|---|---|---|---|
| Ultrasonography | 8/1,048 | 90.9 (86.5–93.9) | 98.2 (97.0–99.0) | 50.5 | 0.09 |
| Supine/semierect radiography | 7/864 | 50.2 (43.5–57.0) | 99.4 (98.3–99.8) | 83.7 | 0.50 |

# Management of Minor Head Injury in Patients Receiving Oral Anticoagulant Therapy: A Prospective Study of a 24-Hour Observation Protocol

Vincenzo G. Menditto, MD, Moira Lucci, MD, Stefano Polonara, MD, Giovanni Pomponio, MD, Armando Gabrielli, MD

*From the Emergency Department, Ospedali Riuniti di Ancona, Ancona, Italy (Menditto, Polonara); and the Department of Internal Medicine, Università Politecnica delle Marche, Ancona, Italy (Lucci, Pomponio, Gabrielli).*

**Study objective:** Patients receiving warfarin who experience minor head injury are at risk of intracranial hemorrhage, and optimal management after a single head computed tomography (CT) scan is unclear. We evaluate a protocol of 24-hour observation followed by a second head CT scan.

**Methods:** In this prospective case series, we enrolled consecutive patients receiving warfarin and showing no intracranial lesions on a first CT scan after minor head injury treated at a Level II trauma center. We implemented a structured clinical pathway, including 24-hour observation and a CT scan performed before discharge. We then evaluated the frequency of death, admission, neurosurgery, and delayed intracranial hemorrhage.

**Results:** We enrolled and observed 97 consecutive patients. Ten refused the second CT scan and were well during 30-day follow-up. Repeated CT scanning in the remaining 87 patients revealed a new hemorrhage lesion in 5 (6%), with 3 subsequently hospitalized and 1 receiving craniotomy. Two patients discharged after completing the study protocol with 2 negative CT scan results were admitted 2 and 8 days later with symptomatic subdural hematomas; neither received surgery. Two of the 5 patients with delayed bleeding at 24 hours had an initial international normalized ratio greater than 3.0, as did both patients with delayed bleeding beyond 24 hours. The relative risk of delayed hemorrhage with an initial international normalized ratio greater than 3.0 was 14 (95% confidence interval 4 to 49).

**Conclusion:** For patients receiving warfarin who experience minor head injury and have a negative initial head CT scan result, a protocol of 24-hour observation followed by a second CT scan will identify most occurrences of delayed bleeding. An initial international normalized ratio greater than 3 suggests higher risk. [Ann Emerg Med. 2012;59:451-455.]

- Soru: Warfarin kullanan hastalarda 24 saat sonra çekilen kontrol BT gecikmiş kanamaları açığa çıkarır mı?
- Çalışmaya dahil etme kriterleri: 14 yaş ve üstü olmak, GKS 14-15, travma süresi son 48 saat, en az bir haftadır warfarin kullanıyor olmak, Injury Severity Score'ın 15'in altında olması
- Dışlama kriterleri: ilk BT'de intrakranyal lezyon olması,

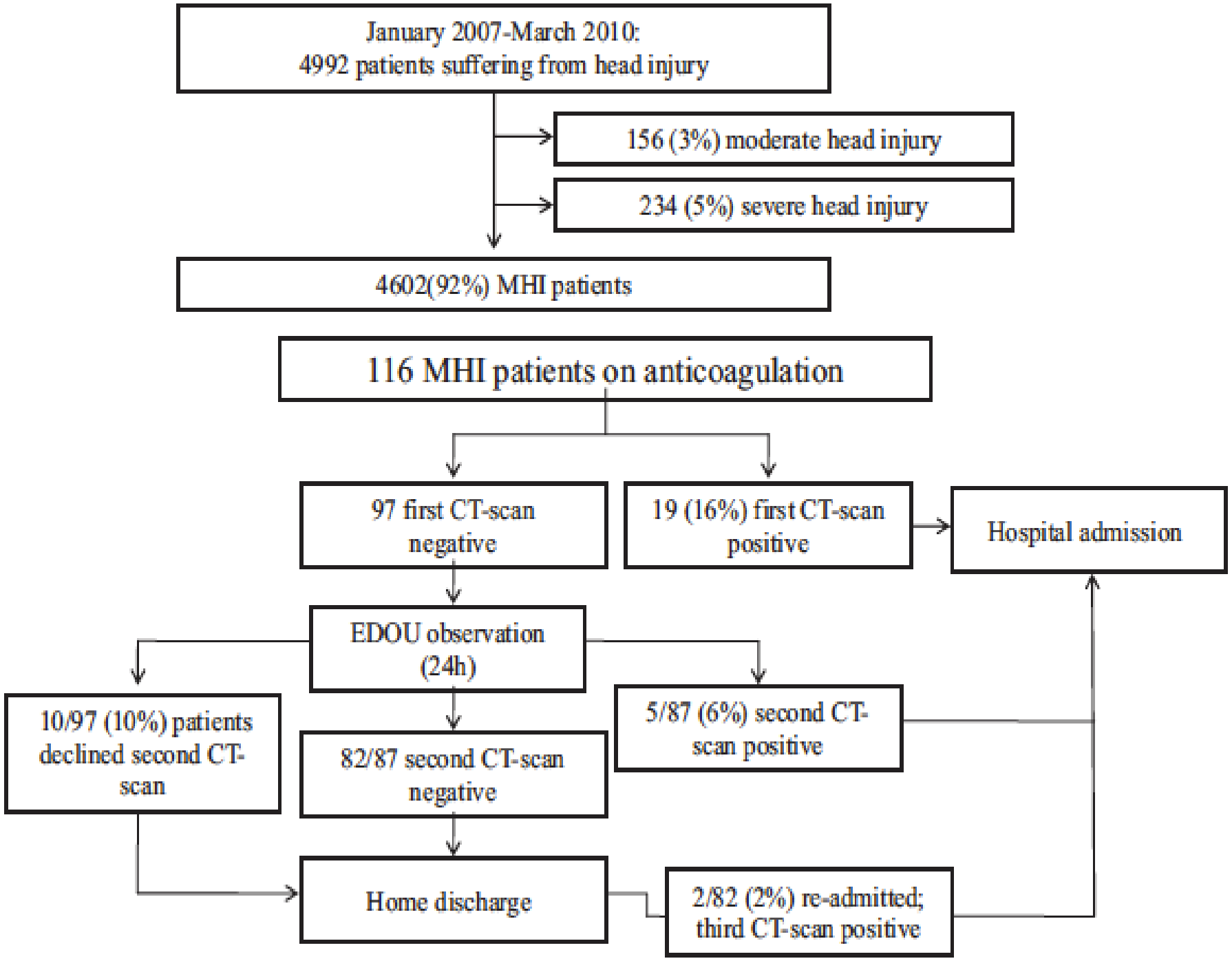

January 2007-March 2010:
4992 patients suffering from head injury
156 (3%) moderate head injury
234 (5%) severe head injury
4602(92%) MHI patients
116 MHI patients on anticoagulation
97 first CT-scan negative
19 (16%) first CT-scan positive
Hospital admission
EDOU observation (24h)
10/97 (10%) patients declined second CT-scan
82/87 second CT-scan negative
5/87 (6%) second CT-scan positive
Home discharge
2/82 (2%) re-admitted; third CT-scan positive

**Table 2.** Characteristics of patients with minor head injury and clinically important CT scan abnormality on second or third CT scan.

| Patient | Age, Years | Sex | Mechanism of Injury | Indication for Warfarin | INR | CT Scan | Admission Because of Head Trauma | Neurosurgery |
|---|---|---|---|---|---|---|---|---|
| 1 | 68 | Female | Accidental trauma | AF | 3.8 | IC | No* | No |
| 2 | 78 | Male | Accidental trauma | VRS | 2.4 | IC | Yes | Yes |
| 3 | 87 | Male | Accidental trauma | AF | 3.1 | SH | Yes† | No |
| 4 | 77 | Female | Syncope | AF | 3.2 | SH | Yes† | No |
| 5 | 88 | Male | Syncope | AF | 1.4 | IC | Yes | No |
| 6 | 78 | Male | Syncope | AF | 2.1 | IC | No* | No |
| 7 | 87 | Female | Accidental trauma | AF | 3.3 | IC | Yes | No |

*AF*, Atrial fibrillation; *IC*, intracranial bleeding; *VRS*, valve replacement surgery; *SH*, subdural hematoma.
*Minimal intracranial bleeding.
†These patients, discharged after 24 hours of observation with no evidence of intracranial lesions, were readmitted to the ED because of symptoms related to the head injury (see text).

**Table 3.** Characteristics of patients with minor head injury with or without clinically important CT scan abnormality on second or third CT scan.

| Characteristics | Value (%) | |
|---|---|---|
| | Repeated CT Scan Result Negative (n=80) | Repeated CT Scan Result Positive (n=7) |
| Severe headache | 3 (4) | 1 (14) |
| Vomiting | 3 (4) | 1 (14) |
| Loss of consciousness | 15 (19) | 3 (43) |
| Posttraumatic amnesia | 3 (4) | 1 (14) |
| Physical evidence of trauma | 68 (85) | 6 (86) |
| Syncope | 16 (20) | 3 (43) |
| Subsequent neurologic deterioration | 0 | 1 (14) |
| INR>3 | 4 (5) | 4 (57) |
| Admission because of head trauma | 0 | 5 (71) |
| Neurosurgery | 0 | 1 (14) |

# S100-B Protein as a Screening Tool for the Early Assessment of Minor Head Injury

Drissa Zongo, MD, MPH, Régis Ribéreau-Gayon, MD, Françoise Masson, MD, Magali Laborey, MSc, Benjamin Contrand, MSc, Louis Rachid Salmi, MD, PhD, Danièle Montaudon, MD, PhD, Jean Louis Beaudeux, MD, PhD, Antoine Meurin, MD, Vincent Dousset, MD, PhD, Hugues Loiseau, MD, Emmanuel Lagarde, PhD

*From the Service des Urgences Adultes (Zongo, Ribéreau-Gayon), the Service d'Anesthésie-Réanimation (Masson), the Service de Neuroradiologie diagnostique et thérapeutique, the Laboratoire de Biochimie (Montaudon), the Service de Neuroimagerie (Meurin, Dousset), and the Service de Neurochirurgie (Loiseau), Hôpital Pellegrin, and the Service d'information médicale (Salmi), Centre Hospitalier Universitaire de Bordeaux, Bordeaux, France; the Institut de Santé Publique, d'Epidémiologie et de Développement, Université Bordeaux Segalen, Bordeaux, France (Zongo, Laborey, Contrand, Salmi, Lagarde); the Equipe "Prévention et Prise en Charge des Traumatismes," Institut National de la Santé et de la Recherche Médicale Unité 897, Bordeaux, France (Zongo, Ribéreau-Gayon, Masson, Laborey, Contrand, Salmi, Lagarde); and the Laboratoire de Biochimie, Hôpital Charles Foix (APHP), Paris, France (Beaudeux).*

**Study objective:** A computed tomography (CT) scan has high sensitivity in detecting intracranial injury in patients with minor head injury but is costly, exposes patients to high radiation doses, and reveals clinically relevant lesions in less than 10% of cases. We evaluate S100-B protein measurement as a screening tool in a large population of patients with minor head injury.

**Methods:** We conducted a prospective observational study in the emergency department of a teaching hospital (Bordeaux, France). Patients with minor head injury (2,128) were consecutively included from December 2007 to February 2009. CT scans and plasma S100-B levels were compared for 1,560 patients. The main outcome was to evaluate the diagnostic value of the S100-B test, focusing on the negative predictive value and the negative likelihood ratio.

- Çalışma sorusu: S100-B protetini nörolojik yaralanmayı etkin biçimde gösterebilir mi?
- Çalışmaya alınma kriterleri: 15 yaş ve üstü olmak, son altı saatte kafa travması, GKS 13-15 arası olması ve aşağıdaki risk faktörlerinden birisinin olması:
  - Bilinç kaybı, post-travmatik amnezi, tekrarlayan kusma, ciddi baş ağrısı, dizines, vertigo, alkol overdozu, antikoagülan kullanımı, 65 yaş üstü olmak.
- Ciddi yaralanması ve non-travmatik nörolojik hasarı olanlar çalışmadan dışlanmış.

**Table 1.** Demographic and clinical characteristics of patients with minor head injury by CT scan findings and participant status.

| Demographic and Clinical Characteristics | No. (%) | | | |
|---|---|---|---|---|
| | All, n=1,560 | CT Scan Result Positive, n=111 | CT Scan Result Negative, n=1,449 | Excluded Patients, n=568 |
| Age, y, median (IQR) | 57 (32–82) | 59 (31–82) | 57 (32–82) | 56 (31–81) |
| **Sex** | | | | |
| Male | 870 (55.8) | 72 (64.9) | 798 (55.1) | 317 (55.8) |
| **Trauma history** | | | | |
| Traffic accident | 221 (14.2) | 15 (13.5) | 206 (14.2) | 71 (12.5) |
| Fall | 594 (38.1) | 41 (36.9) | 553 (38.2) | 206 (36.3) |
| Fall from height | 75 (4.8) | 11 (9.9) | 64 (4.4) | 20 (3.5) |
| Assault | 161 (10.3) | 5 (4.5) | 156 (10.8) | 75 (13.2) |
| Other or unknown | 509 (32.6) | 39 (35.1) | 470 (32.4) | 196 (34.5) |
| **Symptom** | | | | |
| Loss of consciousness | 627 (40.2) | 62 (55.9) | 565 (39.0) | 204 (35.9) |
| Amnesia | 552 (35.4) | 61 (55.0) | 491 (33.9) | 158 (27.8) |
| Convulsion | 26 (1.7) | 2 (1.8) | 24 (1.7) | 10 (1.8) |
| Confusion | 230 (14.7) | 23 (20.7) | 207 (14.3) | 74 (13.0) |
| Headache | 273 (17.5) | 24 (21.6) | 249 (17.2) | 99 (17.4) |
| Vomiting | 83 (5.3) | 10 (9.0) | 73 (5.0) | 24 (4.2) |
| **Risk factors** | | | | |
| Anticoagulation | 390 (25.0) | 78 (29.7) | 357 (24.6) | 105 (18.5) |
| Alcohol poisoning | 374 (24.0) | 28 (25.2) | 346 (23.9) | 104 (18.4) |
| Age >65 y | 690 (44.2) | 48 (43.2) | 642 (44.3) | 238 (41.9) |
| **GCS score** | | | | |
| 13 | 39 (2.5) | 7 (6.3) | 32 (2.2) | 25 (4.4) |
| 14 | 335 (21.5) | 30 (27.0) | 305 (21.0) | 94 (16.5) |
| 15 | 1186 (76.0) | 74 (66.7) | 1112 (76.7) | 449 (79.0) |
| **S100-B protein (μg/l)** | | | | |
| ≤0.12 | 292 (18.7) | 1 (0.9) | 291 (20.1) | 39 (21.7) |
| 0.12–0.16 | 193 (12.4) | 5 (4.5) | 188 (13.0) | 29 (16.1) |
| 0.16–0.20 | 192 (12.3) | 4 (3.6) | 188 (13.0) | 28 (15.6) |
| >0.20 | 883 (56.6) | 101 (91.0) | 782 (54.0) | 84 (46.7) |

**Table 4.** Basic demographic data of patients with a clinically important traumatic brain injury.

| Patients Whose MHI Became Complicated | Age, Years | Sex | Trauma History | S100-B, μg/L | Traumatic Brain Injuries on CT | Type of Complication |
|---|---|---|---|---|---|---|
| 1 | 79 | Male | Fall from own height | 2.22 | Subarachnoid hematoma<br>Subdural hematoma | Death caused by MHI |
| 2 | 60 | Male | Fall from height | 0.68 | Cerebral contusion | Loss of 2 points in GCS score<br>Sedation |
| 3 | 63 | Male | Fall from own height | 1.15 | Subarachnoid hematoma<br>Subdural hematoma<br>Epidural hematoma | Prolonged confusion<br>Sudden death 3 weeks after discharge (patient also with cardiac problems) |
| 4 | 70 | Female | Fall from own height | 1.24 | Cerebral contusion<br>Subarachnoid hematoma<br>Subdural hematoma<br>Skull cap fracture | Loss of 2 points in GCS score<br>Sedation |
| 5 | 69 | Female | Traffic accident (pedestrian) | 0.63 | Cerebral contusion<br>Subarachnoid hematoma<br>Subdural hematoma | Loss of 2 points in GCS score<br>Sedation<br>Neurosurgery |
| 6 | 46 | Female | Fall from own height | 0.93 | Cerebral contusion<br>Subarachnoid hematoma | Death caused by MHI |
| 7 | 80 | Male | Fall from own height | 0.70 | Subdural hematoma | Loss of 2 points in GCS score<br>Neurosurgery |
| 8 | 22 | Male | Sport accident (rollerblades) | 0.72 | Skull base fracture<br>Cerebral contusion<br>Epidural hematoma | Loss of 2 points in GCS score |
| 9 | 40 | Male | Traffic accident (pedestrian) | 0.46 | Subdural hematoma | Death caused by MHI |
| 10 | 22 | Male | Assault | 0.53 | Subarachnoid hematoma<br>Skull cap fracture<br>Pneumocephalus | Sedation<br>Neurosurgery |
| 11 | 33 | Male | Fall from height (roof) | 0.77 | Cerebral contusion<br>Subarachnoid hematoma<br>Subdural hematoma | Prolonged confusion |
| 12 | 19 | Male | Assault | 0.14 | Skull base fracture<br>Cerebral contusion | Loss of 2 points in GCS score |

**Table 5.** Accuracy and performance parameters of S100-B measurement.

| | Cutoff Value, μg/L | | |
|---|---|---|---|
| | **0.10** | **0.12** | **0.14** |
| Sensitivity | 99.1 (95.0–100)* | 99.1 (95.0–100) | 97.3 (92.3–99.4) |
| Specificity | 12.2 (10.6–14.0) | 19.7 (17.7–21.9) | 26.8 (24.5–29.1) |
| Negative predictive value | 99.4 (96.9–100) | 99.7 (98.1–100) | 99.2 (97.8–99.8) |
| Positive predictive value | 8 (6.6–9.5) | 8.6 (7.1–10.3) | 9.2 (7.6–11.0) |
| LR+ | 1.13 (1.10–1.16) | 1.24 (1.20–1.28) | 1.33 (1.27–1.39) |
| LR– | 0.07 (0.01–0.50) | 0.04 (0.006–0.32) | 0.06 (0.03–0.31) |
| No. of false-negative results | 1 | 1 | 3 |
| No. with clinically important traumatic brain injury among false negative results | 0 | 0 | 0 |
| CT scan potentially avoided, %† | 12 | 19 | 25 |

*LR+*, Positive likelihood ratio; *LR–*, negative likelihood ratio.
*Numbers in parentheses are 95% CI.
†CT scan potentially avoided—number of patients with an S100-B measurement below the cutoff divided by the total number of samples.

**Figure 2.** Negative predictive value versus proportion of positive CT scan results (prevalence).

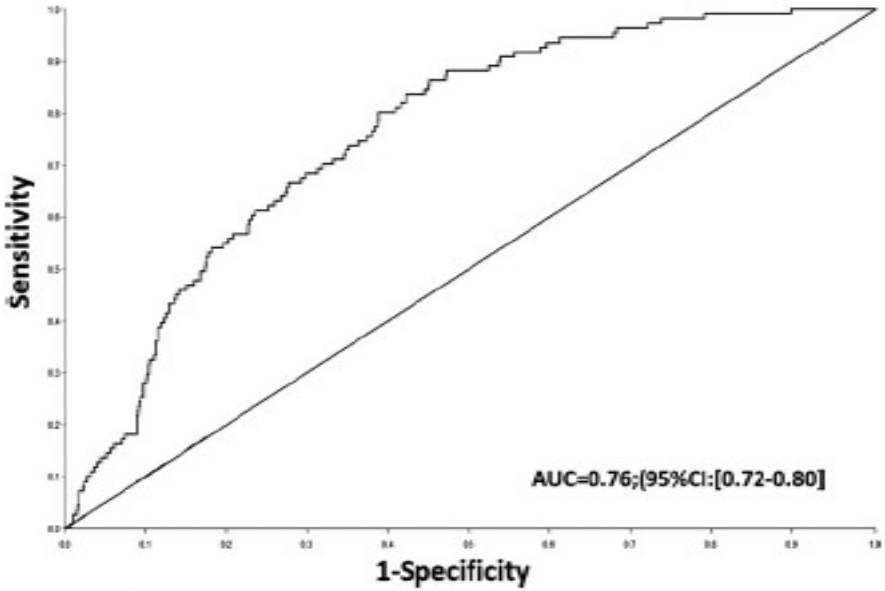



**Figure 3.** Receiver operating characteristic curve of S100-B measurement for discrimination between positive and negative CT scan results.

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ORIGINAL RESEARCH CONTRIBUTION

# The Effect of Ketamine on Intraocular Pressure in Pediatric Patients During Procedural Sedation

Sarah M. Halstead, MD, Sara J. Deakyne, MPH, Lalit Bajaj, MD, MPH, Robert Enzenauer, MD, MPH, and Genie E. Roosevelt, MD, MPH

## Abstract

***Objectives:*** Ketamine is one of the most commonly used procedural sedation and analgesia (PSA) agents in pediatric emergency departments (PEDs). It is considered a very safe and reliable agent, with limited respiratory suppression, hemodynamic effects, and adverse outcomes. However, physicians are often reluctant to use ketamine for patients with eye injuries due to a concern that ketamine might increase intraocular pressure (IOP). The objective was to measure IOP in previously healthy children receiving ketamine for PSA for a reason other than eye injury.

***Methods:*** This was a prospective noninferiority study of patients seen in an academic tertiary care children's hospital emergency department (ED) who required ketamine for PSA. The authors measured IOP in the right eye as soon as possible after ketamine had been administered and then at 2.5, 5, and 10 minutes after ketamine had been administered.

Table 1
Demographic Characteristics, Procedures Performed, and Medication Administration

| Variable | Overall (*n* = 80) | 1–5 yr (*n* = 28) | 6–10 yr (*n* = 26) | 11–15 yr (*n* = 26) |
|---|---|---|---|---|
| Male, *n* (%) | 49 (61) | 16 (57) | 15 (58) | 18 (69) |
| Procedures, *n* (%) | | | | |
| Fracture/dislocation reduction | 50 (63) | 5 (18) | 21 (80) | 24 (92) |
| Abscess incision and drainage | 13 (16) | 10 (36) | 2 (8) | 1 (4) |
| Laceration repair | 9 (11) | 7 (25) | 2 (8) | 0 |
| Dental abscess incision and drainage/tooth extraction | 5 (6) | 5 (18) | 0 | 0 |
| Other | 3 (4) | 1 (3) | 1 (4) | 1 (4) |
| Mean total dosage of ketamine, mg/kg (95% CI) | 1.6 (1.4–1.7) | 1.6 (1.4–1.8) | 1.7 (1.3–2.0) | 1.4 (1.2–1.6) |
| Other medications, *n* (%) | | | | |
| Glycopyrolate | 9 (11) | 8 (29) | 0 | 1 (4) |
| Midazolam | 1 (1) | 0 | 1 (4) | 0 |
| Ondansetron | 1 (1) | 0 | 1 (4) | 0 |
| Other | 2 (3) | 0 | 2 (8) | 0 |

Table 2
Mean IOP Measurements (mm Hg)

| Age Group (yr) | Initial IOP (95% CI) | 2.5-minute IOP (95% CI) | 5-minute IOP (95% CI) | 10-minute IOP (95% CI) |
|---|---|---|---|---|
| 1–5 | 19.1 (16.9–21.4) | 20.5 (18.4–22.7) | 20.6 (18.2–22.9) | 18.6 (16.5–20.7) |
| 6–10 | 16.5 (14.7–18.3) | 18.5 (16.9–20.1) | 18.7 (16.5–20.9) | 17.6 (15.9–19.3) |
| 11–15 | 16.8 (14.9–18.6) | 17.5 (16.2–18.8) | 18.2 (16.7–19.6) | 17.5 (16.3–18.8) |

Teşekkürler.