Consent for life saving Decompressive craniectomy: An Objective model

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In 1783 Alexander Monro deduced that the cranium was a "rigid box" filled with a "nearly incompressible brain" and that its total volume tends to remain constant. The doctrine states that any increase in the volume of the cranial contents (e.g., brain, blood or cerebrospinal fluid), will elevate intracranial pressure.
Decompressive craniectomy

? Intervene ?

YOU have been pushed down the stairs!
(by friend at nightclub. Isolated head injury)
Fixed pupil at scene. Second pupil fixed in emergency department
EVD in ICU – 40 mmHg despite maximal medical management

Obliteration of basal cisterns
Petechial haemorrhage
Subarachnoid blood
Non-evacuated haematoma
Midline shift

Consent?

At 18 months

• Wheelchair
• Severe contractures
• Transfers with two
• Follows single stage commands
• Self feeds with help
• Incontinent
Decompressive Craniectomy

Consent

Informed Consent
- Clear understanding of the facts, implications, and future consequences of an action
- Competent

Surrogate decision makers
- Known wishes
- Substituted judgment
- Best interests

Cerebral Tumour

Severe traumatic brain injury
Traumatic brain injury

Western Australia
Traumatic brain injury
Western Australia
Neurotrauma admissions in WA
2004 / 2012

- Decompressive craniectomies (n = 270)
- Total neurosurgical admissions (n = 3,231)
Decompressive craniectomy
Surgical Technique / Indications - 2004/2012

n = 120

n = 123

n = 27
Decompressive Craniectomy
Western Australia 2004/12
Outcome at 6, 12 and 18 months

n = 270
MRC Crash Trial

CRASH collaborators – Lancet (2005) Corticosteroid randomisation after significant head injury – Outcome at 6 months

- 10,008 patients
- GCS 14 or less
- Randomised within 8 hrs
- 48hr infusion – Methylprednisolone or matching placebo
- 6 month outcome achieved for 9673 pts (96.7%)

Results

Risk of death higher in CORTICOSTEROID group
- 1248 (25.7%) vs 1075 (22.3%)

Risk of death or severe disability higher in CORTICOSTEROID group
- 1828 (38.1%) vs 1728 (36.3%)
MRC Crash Trial
Multivariable predictive models

Basic model
- Age
- Glasgow coma score
- Pupil reactivity
- Major extracranial injury

CT model
- Presence of petechial haemorrhages
- Obliteration of the III ventricle or basal cisterns
- Subarachnoid haemorrhage
- Midline shift
- Non-evacuated haematoma

High or low-middle income country

Prognostic model
- Mortality at 14 days
- Unfavourable outcome at 6 months
MRC Crash Trial
Web based predictive model

Head injury prognosis

These prognostic models may be used as an aid to estimate mortality at 14 days and death and severe disability at six months in patients with traumatic brain injury (TBI). The predictions are based on the average outcome in adult patients with Glasgow coma score (GCS) of 14 or less, within 8 hours of injury, and can only support - not replace - clinical judgment. Although individual names of countries can be selected in the models, the estimates are based on two alternative sets of models (high income countries or low & middle income countries).

Country: Australia
Age, years: ≤40
Glasgow coma score: 3
Pupils react to light: Both
Major extra-cranial injury? Yes
CT scan available?

Prediction
Risk of 14 day mortality (95% CI) 6.7% (4.9 - 9.1)
Risk of unfavourable outcome at 6 months 30.7% (25.8 - 36.1)

Reference:
The MRC CRASH Trial Collaborators. Predicting outcome after traumatic brain injury: practical prognostic models based on large cohort of international patients. BMJ 2007 doi:10.1136/bmj.39418.64340.25

Online calculator by Sealed Envelope Ltd
MRC Crash Trial
Web based predictive model

**Head injury prognosis**

These prognostic models may be used as an aid to estimate mortality at 14 days and death and severe disability at six months in patients with traumatic brain injury (TBI). The predictions are based on the average outcome in adult patients with Glasgow coma score (GCS) of 14 or less, within 8 hours of injury, and can only support - not replace - clinical judgment. Although individual names of countries can be selected in the models, the estimates are based on two alternative sets of models (high income countries or low & middle income countries).

**Prediction**

- **Risk of 14 day mortality (95% CI)**: 48.6% (34.3 - 63.1)
- **Risk of unfavourable outcome at 6 months**: 72.9% (60.9 - 82.3)

**Prediction**

- **Risk of 14 day mortality (95% CI)**: 14.6% (9.3 - 22.3)
- **Risk of unfavourable outcome at 5 months**: 43.6% (32.8 - 54.0)
Decompressive craniectomy

Outcome at 18 months - 2004/2012

Good  Moderate  Severe  Vegetative  Dead

$n = 270$
Does access to reliable outcome data influence consent


Method

- Two part structured interview
- Opinion regarding “life saving” decompressive surgery in various scenarios
- Opinion both before and after knowing the objective risk of unfavourable outcome
- 500 healthcare workers with variable experience, age, background
Decompressive craniectomy

Surgical intervention?

Should this patient have a decompressive craniectomy?

- No family of friends present
- Parents requesting/demanding all treatment
- Advance directive available

This is you
Would you provide consent?

Case No 1

A fifty-two-year-old female motorcyclist was involved in a motor vehicle accident. Initial GCS score was recorded as eleven (E3, M6, V2). Pupils were equal and reactive. Major pelvic fractures were noted.

Prediction of unfavourable outcome: 72.4%
A fifty nine year old male - a fall. Initial GCS was recorded as six (E1, M4, V1). His right pupil was unreactive. Left pupil was reactive. There were no other injuries.
Would you provide consent?

*Case No 3*

**Before prediction**

**After prediction**

1.55  2.83

**Forty two year old 42 Male assault**
Initial GCS was recorded as 4 (E1M2V1)
Small unreactive pupils / No other injuries

**Prediction of unfavourable outcome: 94.4%**
Decompressive craniectomy

Consent

• Reliable objective prognostic data influenced opinion
• Consistent findings amongst all respondents despite the wide variation in age, background and clinical experience
• Participants were of the opinion that for themselves survival with severe neurological disability would be unacceptable

Significant limitations when making abstract statements such as “I would rather that die that survive with severe disability” (SUPPORT study JAMA 1995)

Criteria for informed consent:
- The circumstances of the injured party and the severity of the injury were clearly outlined
- The observed outcome data at eighteen month provided the necessary information regarding the implications and future consequences of surgical intervention
- Participants were competent
Injury Severity
LOW

Injury Severity
HIGH

Family / clinicians wishes, beliefs

Consent ?

Unwilling to risk survival with disability

Life at any cost

Surgery

NO Surgery

Decompressive craniectomy
Consent
Decompressive Craniectomy in severe traumatic brain injury: An Inconvenient Truth?

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Decompressive Craniectomy

An Inconvenient Truth

“It is DIFFICULT to get a man to understand something when his SALARY depends upon his NOT UNDERSTANDING IT.”

Upton Sinclair
Decompressive Craniectomy

An ethical decision

Whilst we have an obligation to act in what we feel to be the patient’s best interests, feeling is not enough.

Our actions need to be not only reasonable but informed by the evidence.

Any decision to be ethical, must be one that can be included in the narratives of those involved with integrity so that for the person whose life may end and for those who are left grieving there is closure and a sense of having done what is right in a tragic situation.

03.00 am
You have been pushed downstairs by friend at nightclub
Isolated head injury
Fixed pupil at scene. Second pupil fixed in emergency department
What is the most difficult ethical dilemma facing science today?

*Sir David Attenborough:* How far do you go to preserve an individual human life?

*Stephen Hawkins:* That’s a good one, yes