

Decompressive Craniectomy for Spontaneous intracerebral hematoma The KFHJ experience

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Background

- ✗ Management of spontaneous intra-cerebral hematomas(SICH):
- ✗ Options used are conservative medical management +/- ICP driven therapy.
- ✗ Surgical evacuation of SICH.
- ✗ Combination of evacuation of SICH and decompressive craniectomy (DC).
- ✗ DC alone: rarely used.

Review of Literature

- ✗ Mortality with hematoma volumes of >60 mls is upto 93% with conservative treatment. Broderick et al, Stroke 1993(987-993).

Hematoma evacuation

- ✗ Craniotomy and evacuation of hematoma.
- ✗ Alternatives : Minimal access e.g endoscopic evacuation, stereotactic aspiration, thrombolysis of hematoma.

Review of literature

- ✗ Luwig et al (Neurosurgery 1989) found no significant benefit with endoscopic evacuation of SICH vs conservative management except improved survival.

Review of literature

- ✗ STITCH trial conclusions: No significant difference between early surgery within 24 hours versus initial conservative management followed by surgical evacuation of hematoma with deterioration.
- ✗ In 77% of operations the patients had craniotomy and evacuation of SICH while the others had SICH removal by stereotactic aspiration, endoscopy or burr hole removal.
- ✗ Non-significant clinical benefit for SICH removal for superficial hematomas greater than 2 cm in size.

MISTIE

- ✗ **Minimally invasive Stereotactic surgery plus rTPA for ICH evaluation trial (MISTIE-2013)** instilled catheters and the rTPA to dissolve the hematoma within 24 hours of onset of ictus. However the hematoma has to be stable on CT scanning prior to instillation of rTPA .
- ✗ Some benefit reported as compared to conservative management on mobility and ADL scores at 365 days.
- ✗ Hematoma resolution is significant after 72 hours.
- ✗ Combination of ultrasonic clot disruption and rTPA may resolve SICH more quickly (**Newell et al J.Neurosurgery, Sept 2011;115(3):592-601.**

Surgical Dilemmas

- ✗ Deep thalamic and basal ganglia hematomas.
- ✗ Small hematomas with brain swelling.
- ✗ Dominant hemisphere hematomas.
- ✗ The approach via a corticotomy may further damage already compromised brain.
- ✗ Can decompressive craniectomy alone be useful to deal with an SICH causing mass effect and brain edema?

What is the role of Decompressive craniectomy with or without clot evacuation in SICH

- ✗ **Shimamura et al (Acta Neurochurgica 2011;111;415-9)** found no significant benefit combining DC with hematoma evacuation in SICH greater than 50 ml.
- ✗ **Zhang et al (Clin Neurol Neurosurg 2013)** found a survival advantage with SICH >60 ml putaminal hemorrhage operated for DC with hematoma evacuation.
- ✗ **Teleanu (Romanian journal of Neurology 13,(2)2014)** suggested that DC was a viable alternative for hemisphere thalamic and basal ganglia SICH as compared with conservative treatment.

Review of literature

× **Heuts et al Neurosurgical focus 2013:May 34(5).**

Dominant hemisphere SICH treated with DC without clot evacuation as compared to matched controls with dominant SICH treated with hematoma evacuation, all SICH patients treated with clot evacuation and cases managed conservatively-Favourable outcome on mRES.

× **Fung et al, Stroke 43:3207-3211-12 patients-DC without hematoma evacuation. 7 patients had SICH without a demonstrated lesion. Only 2/6 patients with hematoma volume >60 mls died after surgery but all 7 patients with SICH >60 mls managed conservatively died.**

× **Ramnarayan et al, Journal of Stroke and Cerebrovascular diseases, vol 18, 1,2009,1-10** reported 23 patients with putaminal hemorrhage who underwent DC only. No ICP monitoring was carried out post operatively.

× GOS at 3 months: Poor outcome in 10 and good outcome in 13.

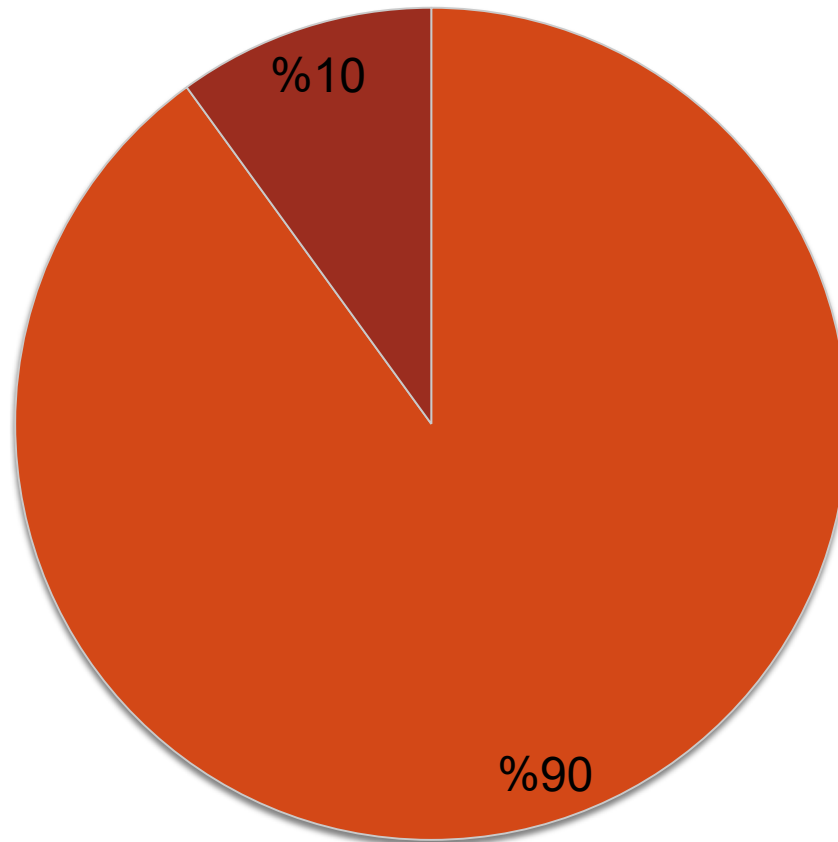
× Only 2/7 patients with hematoma volume > 60 mls had a good outcome. Good outcome was defined as independence at 1 month, GOS 5 .Less than GOS 5 was considered a poor outcome. DC was of small size in this series.

Resources

- ✗ 10 patients with spontaneous basal ganglia hypertensive haemorrhage.
- ✗ SICH in 5/10 in the basal ganglia on the right and in 5/10 in the dominant hemisphere on the left.
- ✗ All patients were referred by the medical teams after initial resuscitation or conservative management.
- ✗ 2 patients were referred to neurosurgery on initial presentation by the medical team.
- ✗ Time to surgery from ictus varied from <1 day to 1 week in 8 patients. All these deteriorated on conservative management with hemispheric swelling.

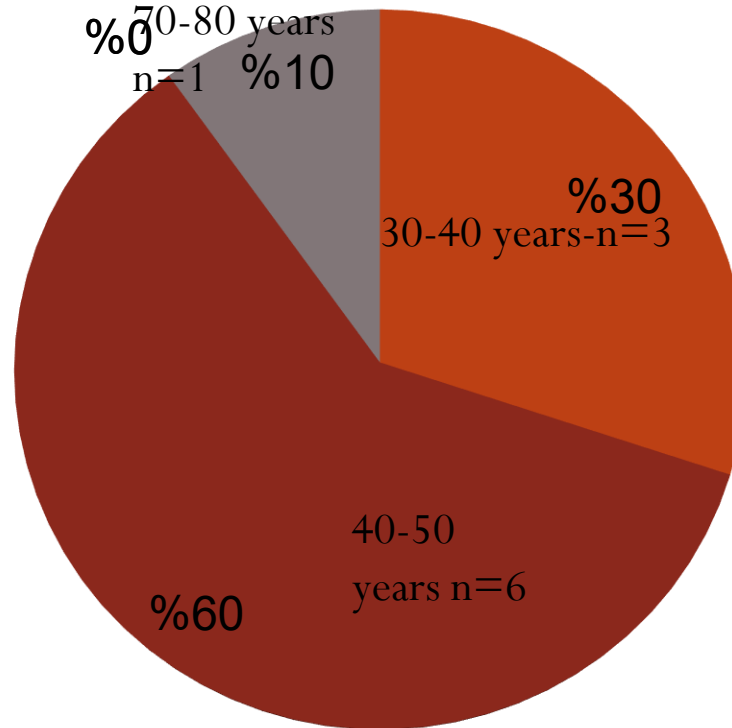
Demographics

✗ Male to female 9:1



Age range N:10

✗ Majority in the 40-50 year age group.



Management

- ✗ All 10 patients were operated for a decompressive craniectomy without any attempt to evacuate the hematoma.
- ✗ An ICP probe (Codman) was inserted in 9 patients and ICU management to keep the patients CPP at 60-65 mmHg was instituted.
- ✗ In one patient the ICP probe malfunctioned and was removed on the third post-op day but not replaced.
- ✗ Optimal medical measures to decrease high ICP were instituted as standard neuro-intensive practice.
- ✗ If no ICP probe was inserted, the MAP was always kept from 90-100mmHg.

Extended Glasgow outcome scale

1=Dead	
2=Vegetative state	Condition of unawareness with only reflex responses but with periods of spontaneous eye opening.
3=Low severe disability	Patient who is dependent for daily support for mental or physical disability, usually a combination of both.
4=Upper severe disability	If the patient can be left alone for more than 8h at home it is upper level of SD, if not then it is low level of SD.
5=Low moderate disability	Patient has some disability such as aphasia, hemiparesis or epilepsy and /or deficits of memory or personality but are able to look after themselves. They are independent at home but dependent outside.
6=Upper moderate disability	If they are able to return to work even with special arrangement it is upper level of moderate disability, if not then it is low level of MD.
7=Low good recovery	Resumption of normal life with the capacity to work even if pre-injury status has not been achieved. Some patients may have minor neurological or psychological deficits.
8=Upper good recovery	If these deficits are not disabling then it is upper level of GR, if disabling then it is lower level of GR.

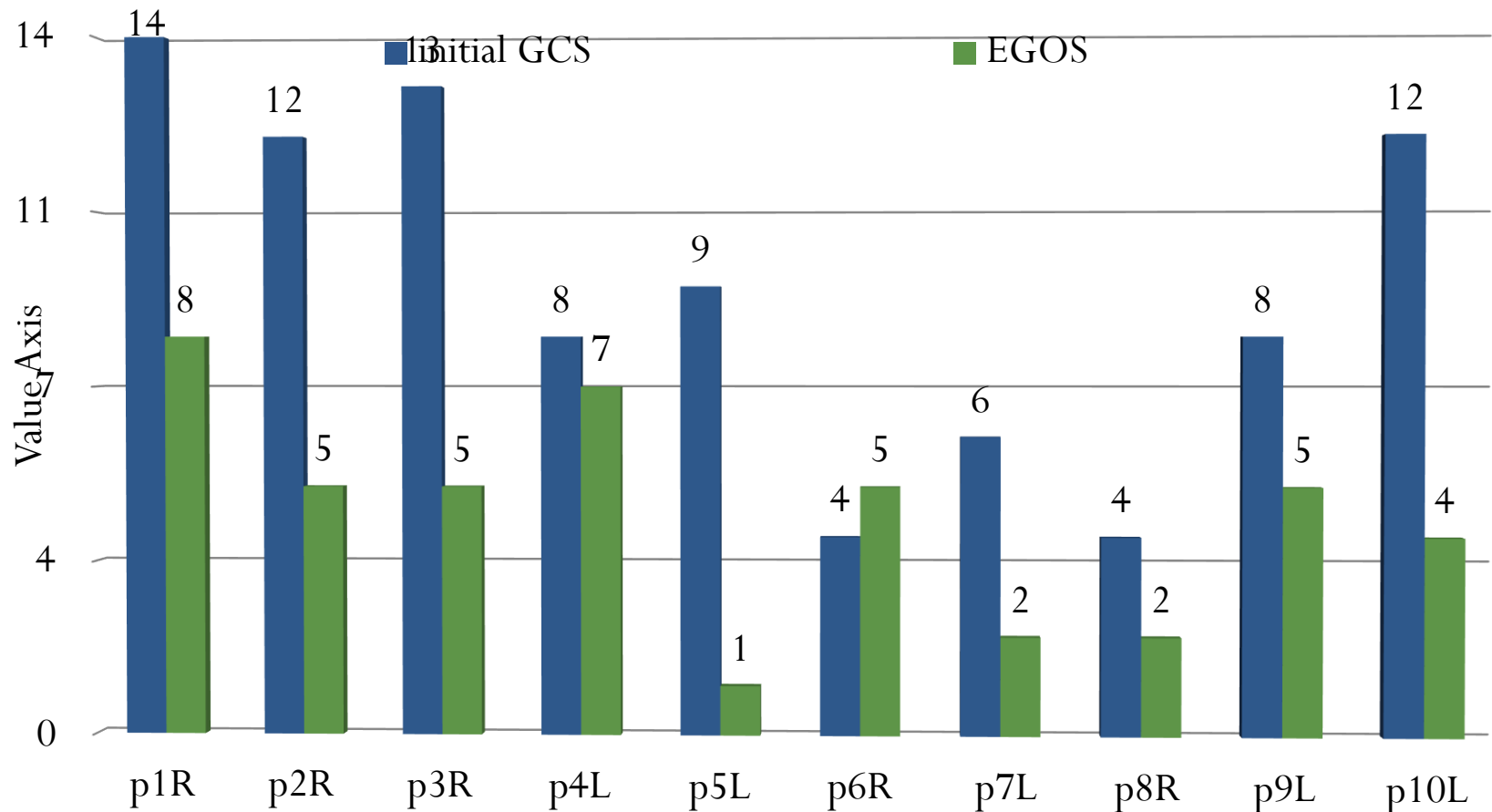
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Data chart N=10

S No	Age	ICH Vol	Side	Adm GCS	GCS -Det	shift-ini-mm	shift-det mm	EG OS	pre-op-icp	post op-icp	ICH-S
1	36	24	R	14	4	4.2	5.0	8	n	y	1
2	36	72	R	12	8	6.2	13.2	5	n	y	3
3	48	65	R	13	8	6.1	7.0	5	n	y	1
4	39	96	L	8	8	6.3	6.3	6-7	n	y	3
5	45	105	L	9	4	9.2	9.2	1	n	n	3
6	73	67.5	R	7	4	5.3	15.9	5	n	y	3
7	44	52.6	L	4	6-4	7.2	13.7	2	n	y	4
8	41	41	R	4	4	7.7	8.2	2	41	y	4
9	45	72	L	12	8	13.3	13.3	5	n	y	3
10	48	76	L	12	7	3.5	12	4	n	y	3

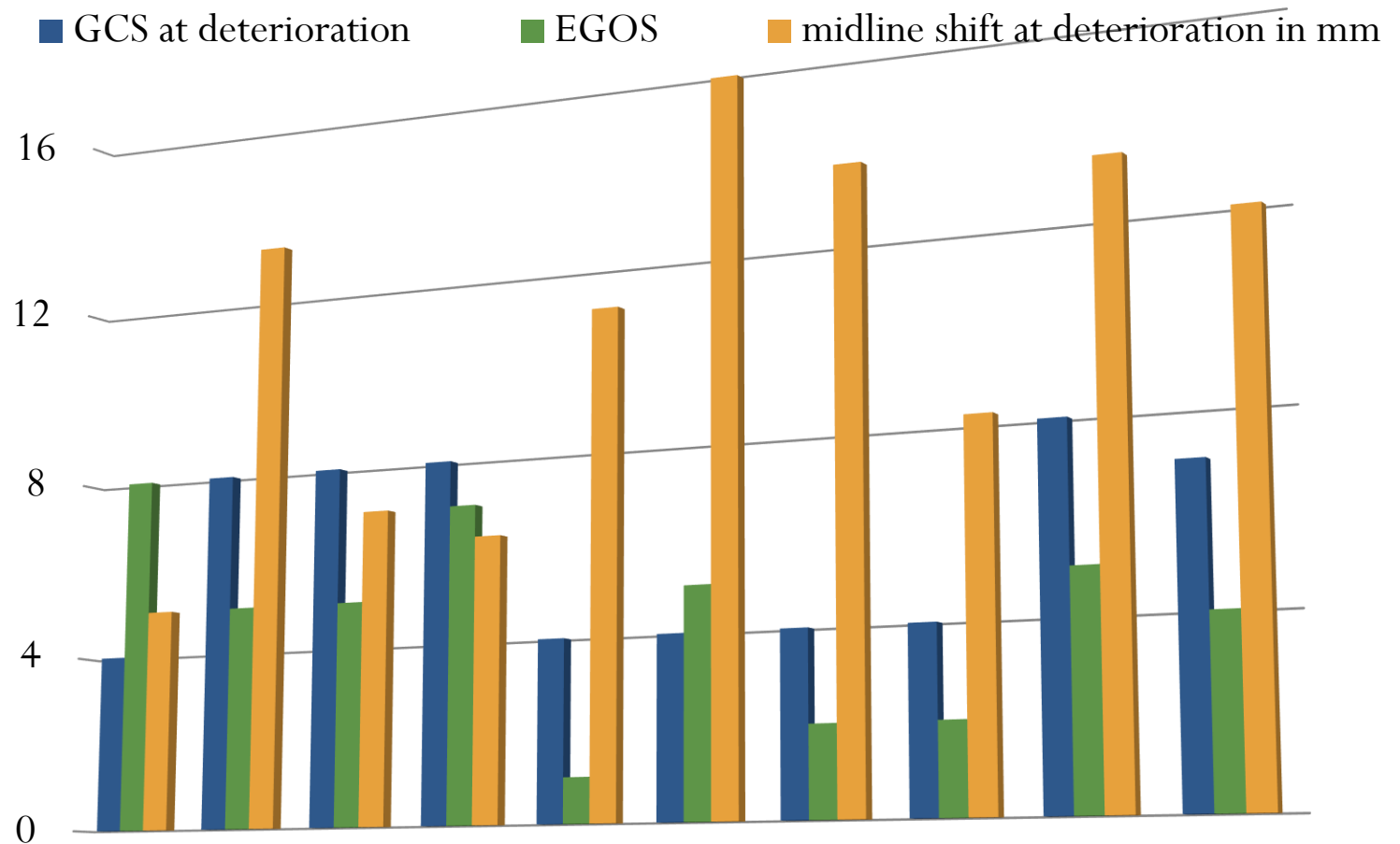
Presenting GCS versus EGOS

✗ Higher initial GCS seems to correlate with better EGOS at discharge.



GCS at deterioration vs EGOS

- ✗ GCS >7/15 associated with higher EGOS and negative association with midline shift.
- ✗ Low GCS with high midline shift associated with low EGOS.



ICH score versus EGOS

Projected mortality:

Score 0=0%

1=13%

2=26%

3=72%

4=97%

5=100%

6=100%estimated.

ICH score of 1: 2/10 patients- EGOS=5,8.

ICH score of 3: 6/10 patients-EGOS=5(3), 7(1), 1(1), 4(1).

ICH score of 4: 2/10 patients-EGOS=2(2).

Our results:

Mortality 10%(Presenting ICHS 3)

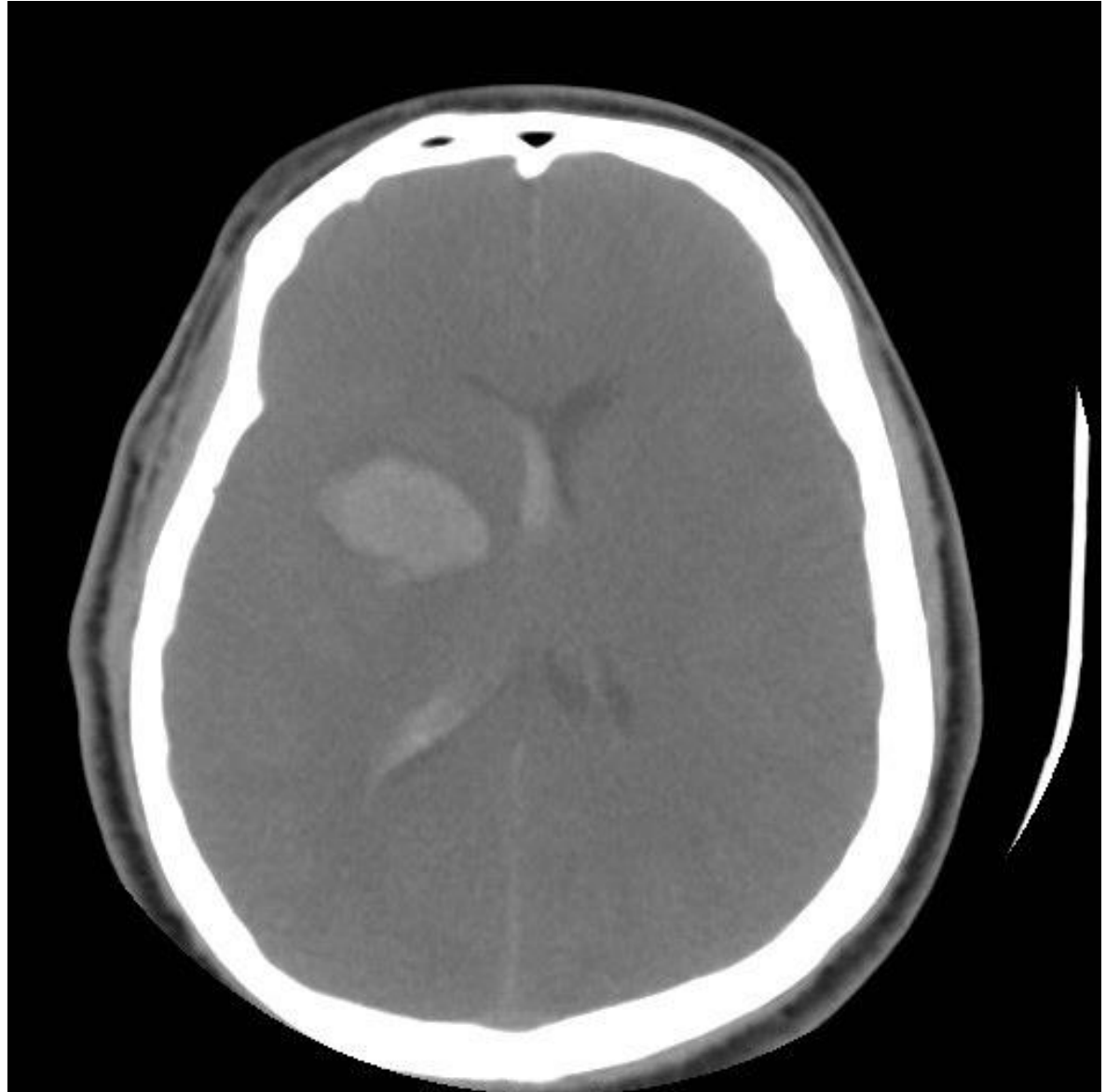
Inference:

1. There is a distinct survival advantage for decompressive craniectomy without hematoma evacuation for patients with SICH of hypertensive origin.

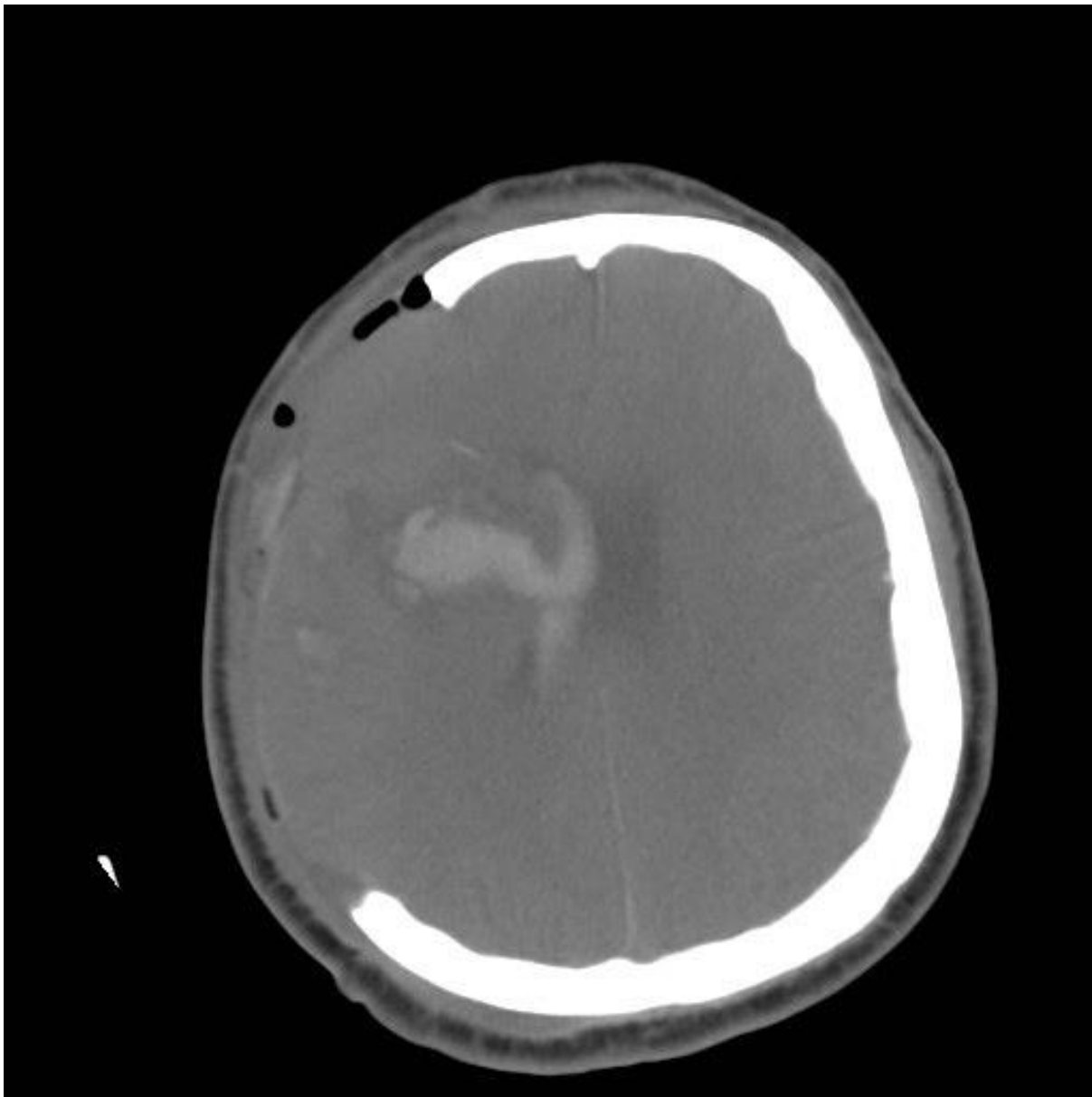
2. 60% good prognosis with lower moderate disability.

Patient 1 pre-deterioration

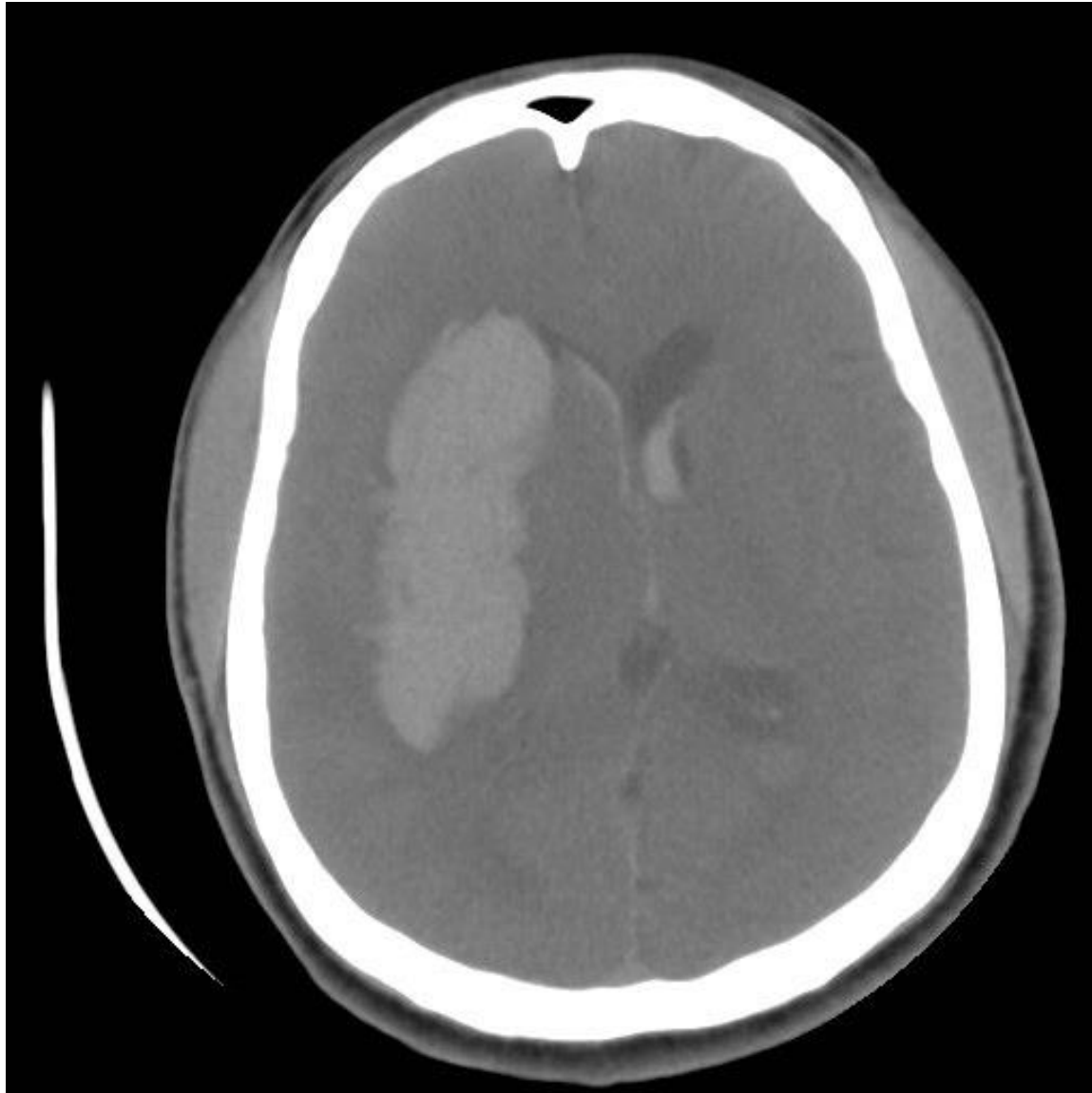




Patient 1 post deterioration



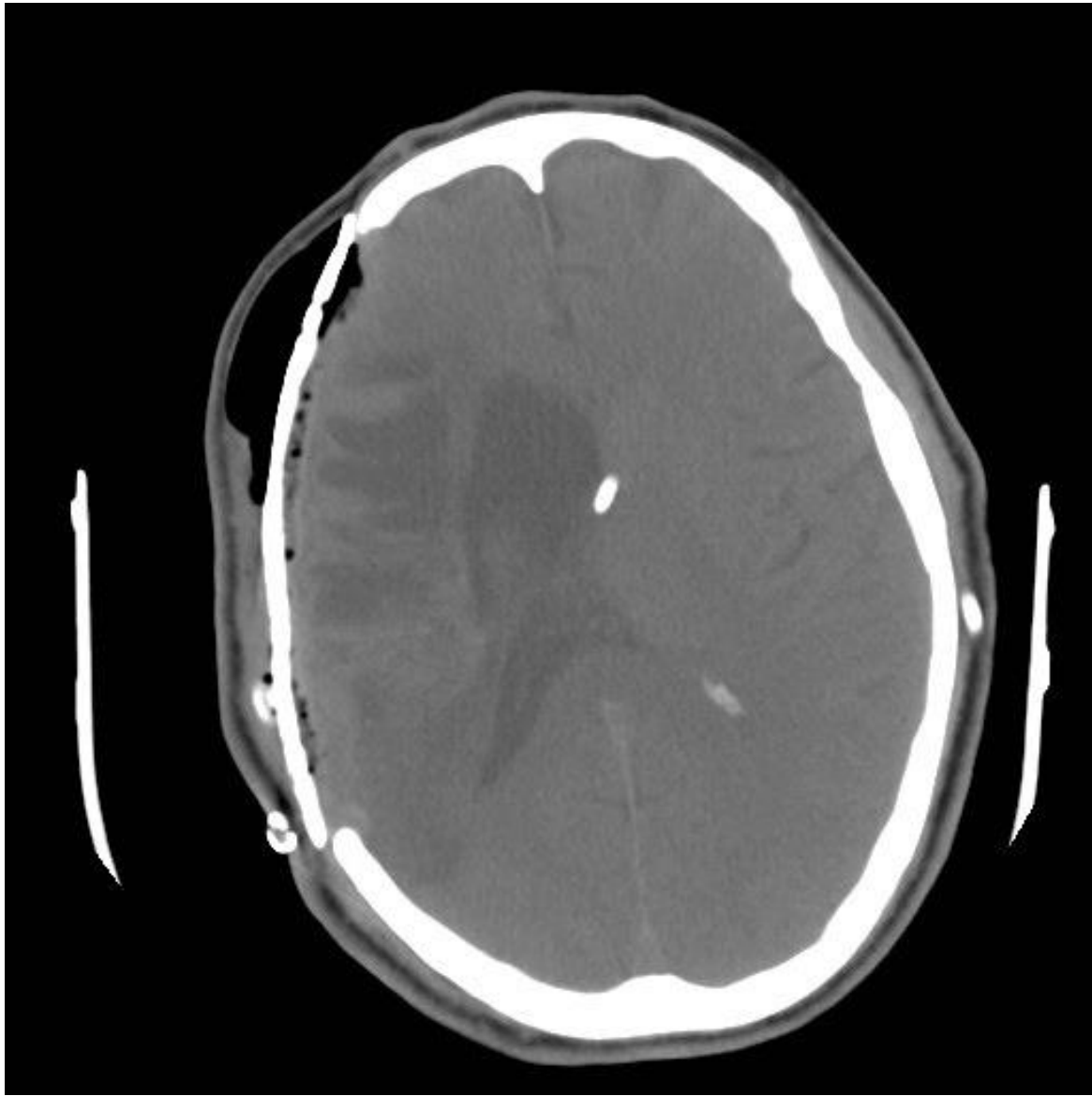
Patient 1 post Decompressive Craniectomy



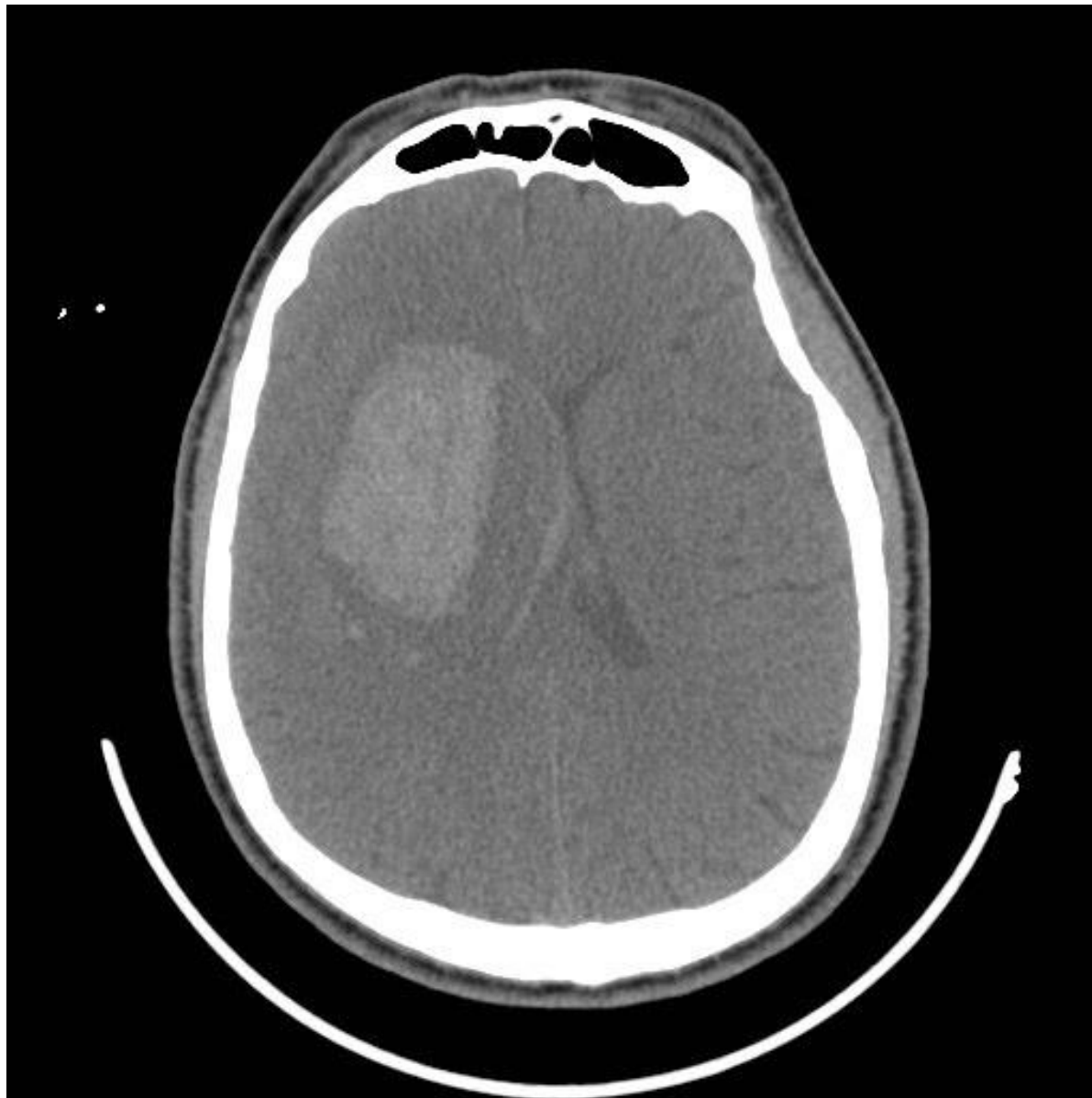
Patient 2 pre-deterioration



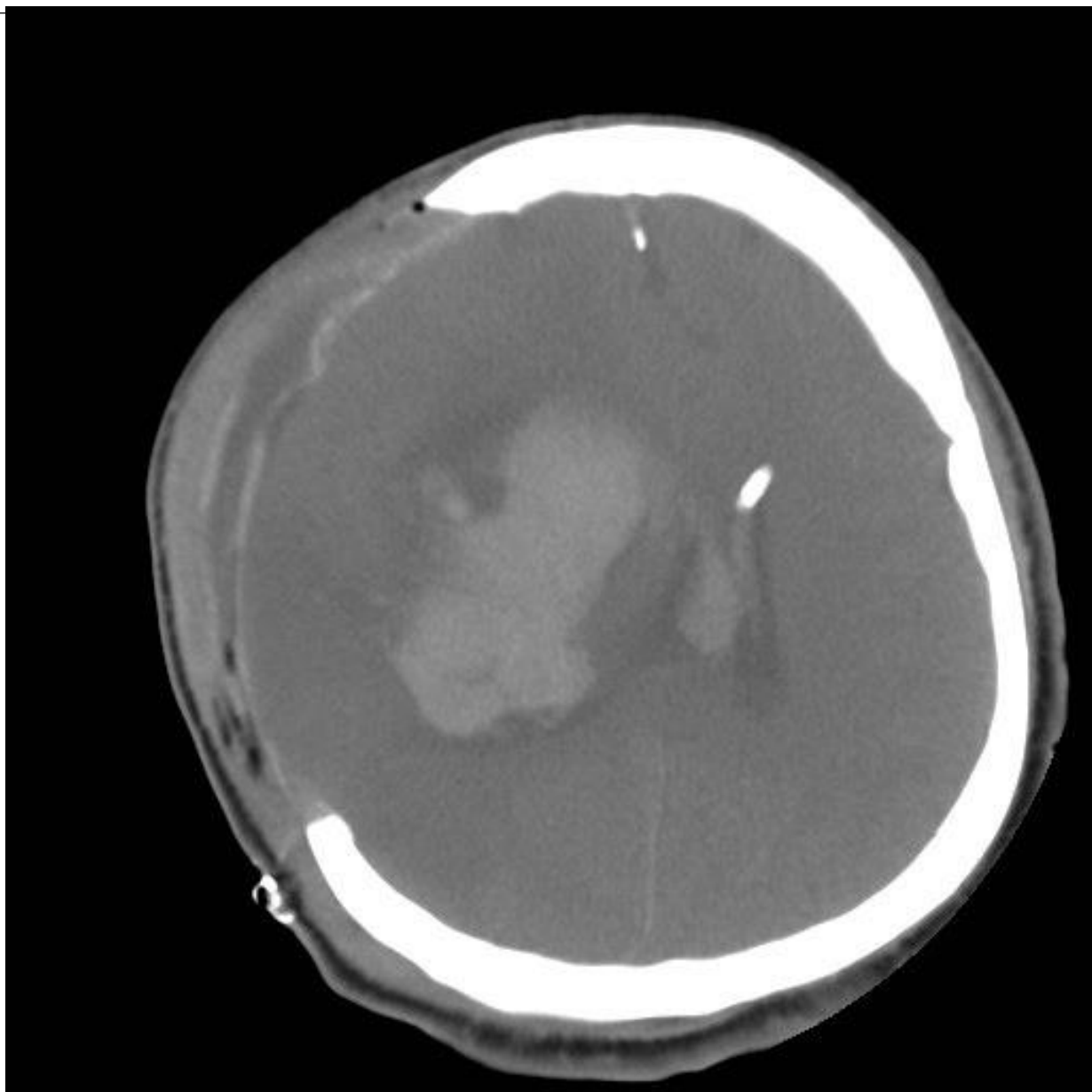
Patient 2 post deterioration



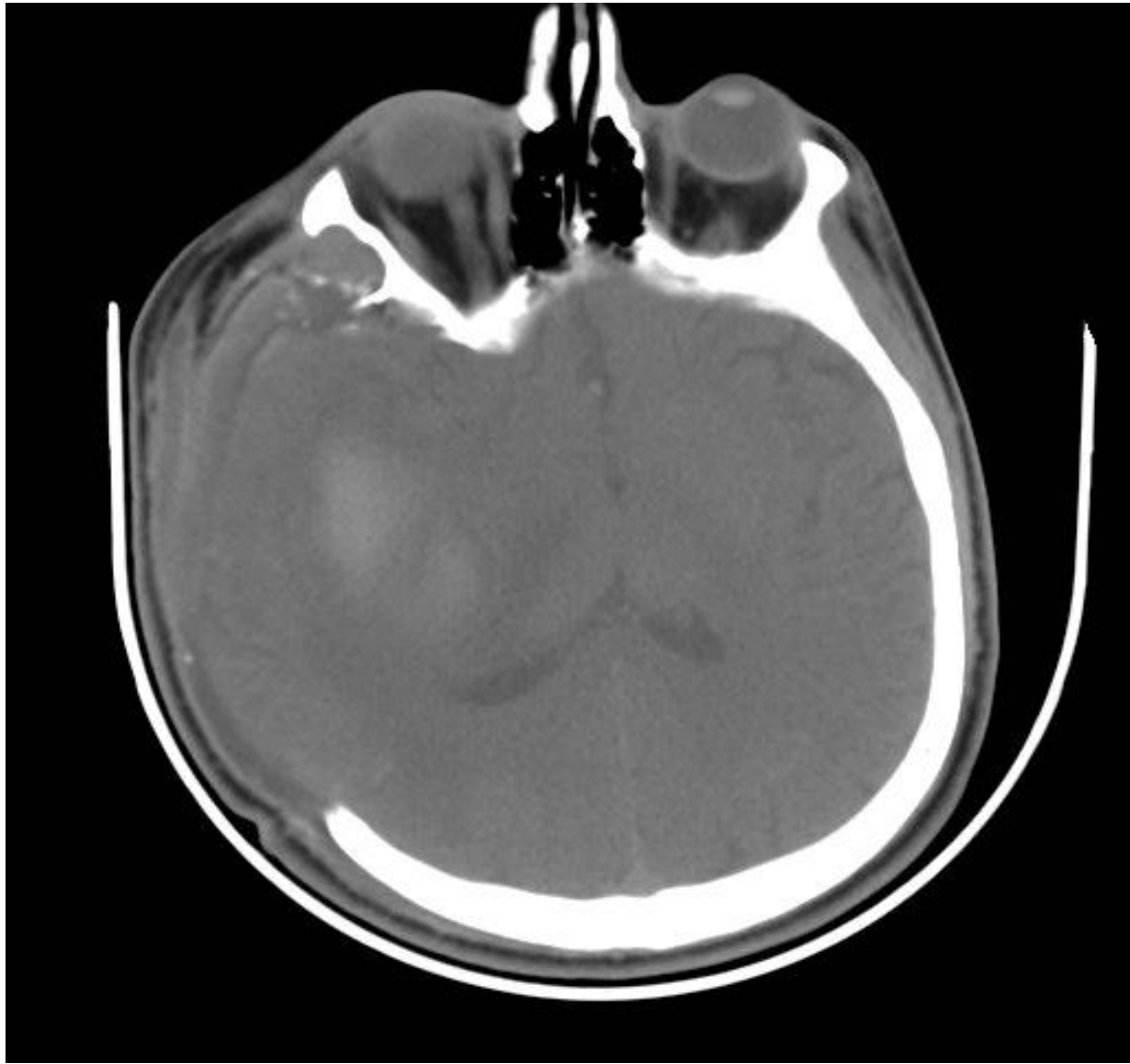
Patient 2 post –cranioplasty and VP shunt



Patient 3 Pre-deterioration

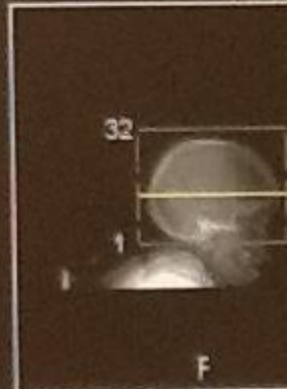


Patient 3 post DC

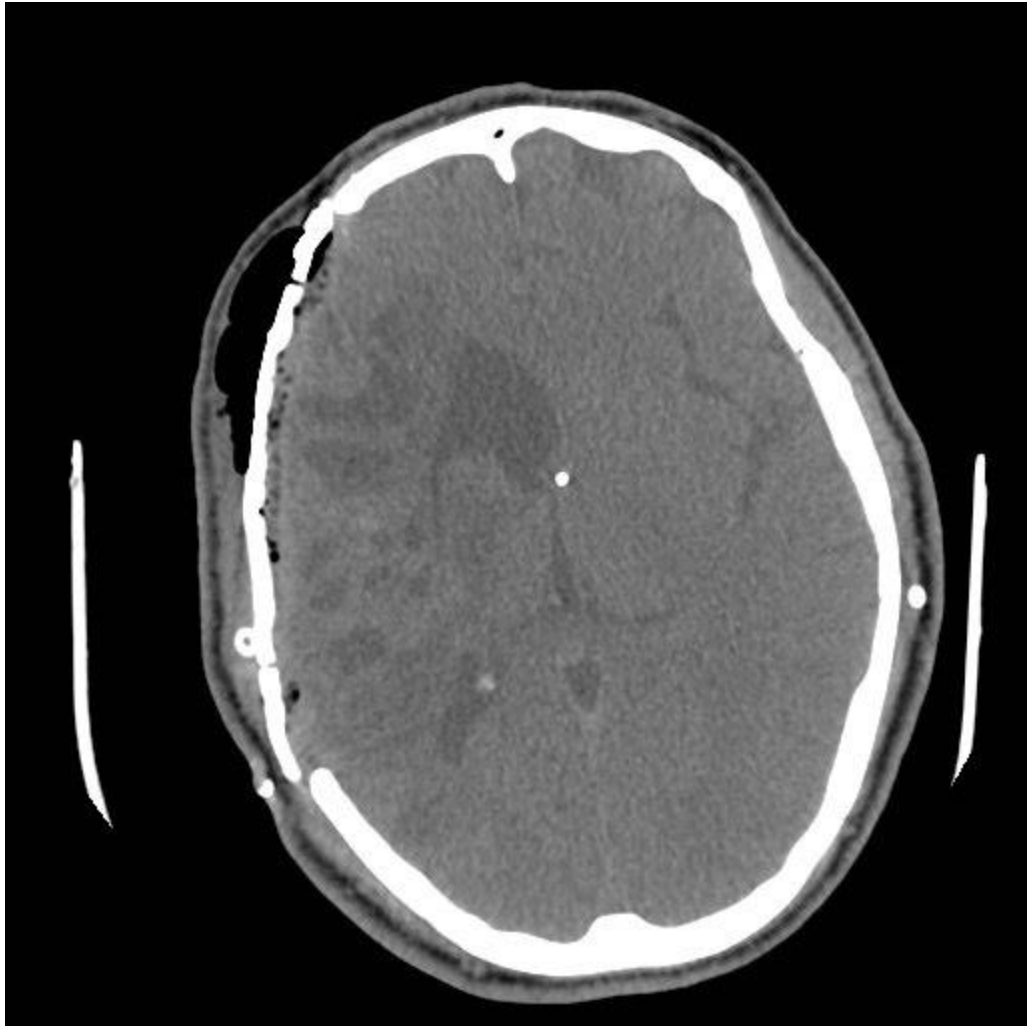


Resolution of ICH by 3 weeks.









Outcome

Patient	EGOS score	Deficit
Patient 1	8	nil
Patient 2	5	Hemiparesis grade 2
Patient 3	5	Hemiparesis Grade 2
Patient 4	6-7	Mild dysphasia which improved .
Patient 5	1	Died
Patient 6	5	Wheelchair bound but able to maintain ADLs at home. Not independent to cope outside.Communicating well.
Patient 7	2	Spontaneous eye opening, localising but not obeying.
Patient 8	2	Spontaneous eye opening, flexion to pain, no communication.
Patient 9	5	Hemiplegic but in a wheelchair, feeding by himself, maintaining ADLs with mild help. Not back at work.
Patient 10	4	Obeying commands, right hemiparesis, dysphasic.

Complications

- × CSF diversion before cranioplasty in 2 patients.
- × One had a temporary EVD.
- × Two required a permanent VP shunt for post hemorrhagic hydrocephalus.
- × One patient had to have aspiration of a subgaleal fluid collection.
- × One patient had a sub-cranioplasty bone flap fluid collection which was treated initially with evacuation and on recurrence with a VP shunt which improved it significantly.



Discussion

- ✗ Small sample suggests an acceptable outcome in this selected group of patients.
- ✗ Most patients were less than 50 years of age.
- ✗ Correlation with earlier reports suggests benefit of DC alone without SICH evacuation.

Conclusion

- ✗ Is hematoma removal really essential or should we concentrate more on dealing with the mass effect of the hematoma and brain swelling by methods not involving invading the brain itself?
- ✗ Would older patients also benefit from DC?
- ✗ One patient 73 years of age did improve and now has an EGOS of 5 which suggests that DC may be useful in selected patients.
- ✗ Question?
- ✗ Do we need a randomised trial for evaluating DC alone in SICH?

Thank you.