**Intracerebral hemorrhage surgery indications**

Hematoma evacuation has been extensively studied because of the good results obtained by the procedure \(^1\); nevertheless, the results of the Surgical Trial in Intracerebral Hemorrhage (STICH) and some randomized controlled trials suggest that surgery does not appear to offer any great advantage over conservative medical management in these patients \(^2\) \(^3\) \(^4\). Other randomized studies and several meta-analyses \(^5\) \(^6\) \(^7\) \(^8\) \(^9\) \(^10\), have not yet been able to clearly elucidate the role of surgical management for this condition. Most recently, the STICH II trial data suggests that early surgery may have a small but clinically relevant survival advantage for patients with superficial hemorrhages without intra-ventricular hemorrhage (IVH) \(^11\).

Decompressive hemicraniectomy without hematoma evacuation has not received as much attention \(^12\).

**Intracerebral hemorrhage surgery** is controversial; some patients may benefit, but indications for surgical treatment have not been conclusively defined \(^13\).

In patients with CT-proven primary supratentorial intracerebral haemorrhage, surgery added to medical management reduces the odds of being dead or dependent compared with medical management alone, but the result were not very robust. Hence, further randomised trials to identify which patients benefit from surgery and to evaluate less invasive methods are indicated \(^14\).

Reserve surgical therapy for patients with life-threatening mass effect from supratentorial ICH, individualizing treatment decisions based on assessments of prognosis with and without surgical therapy. Limited data suggest that supratentorial hematoma evacuation might reduce mortality for patients who are comatose, have a large hematoma with significant midline shift, or have elevated intracranial pressure (ICP) refractory to medical management \(^15\).

Because of the questionable efficacy of surgery, it should only be considered as a life saving procedure to treat refractory increases in ICP; even in these instances, decisions should be addressed on a per patient basis:

- **Surgery should not be considered for patients who are either fully alert or deeply comatose. Patients with intermediate levels of arousal (obtundation-stupor) are more appropriate candidates.**

- **Features that support performing surgery include a recent onset of hemorrhage, ongoing clinical deterioration, involvement of the nondominant hemisphere, and location of the hematoma near the cortical surface.**

- **Features in favor of less aggressive therapy include serious concomitant medical problems, advanced age, stable clinical condition, remote onset of hemorrhage, involvement of the dominant hemisphere, and inaccessibility of the hemorrhage.**

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Surgical hematoma evacuation for supratentorial ICH is controversial; some patients may benefit, but indications for surgical treatment have not been conclusively defined \(^16\) \(^17\) \(^18\) \(^19\) \(^20\) \(^21\) \(^22\) \(^23\) \(^24\) \(^25\) \(^26\).
The guidelines of 2010 suggested consideration of standard craniotomy only for those who have lobar clots >30 mL (see ABC/2) within 1 cm of the surface. No other patient group is recommended for surgery, and no surgical method other than standard craniotomy is supported. The routine evacuation of supratentorial ICH in the first 96 hours is not recommended.

Open craniotomy is the most widely studied surgical techniques in patients with supratentorial ICH. Other methods include endoscopic hemorrhage aspiration, use of fibrinolytic therapy to dissolve the clot followed by aspiration, and CT-guided stereotactic aspiration. Studies of these less invasive techniques are in progress.

Further studies are required to conclusively determine which patients should receive surgical therapy.

There is at present no clear indication for surgical removal of intracerebral haemorrhage (ICH) in the majority of patients. With deterioration from an initially good level of consciousness, many surgeons would agree that removal is life saving. The question is whether or not surgical removal of clot improves the ultimate outcome in patients who are stable or even improving. Improvement in function is based on the concept of a penumbra around an ICH. There is now mounting evidence that there is a penumbra of functionally impaired, but potentially reversible, neuronal injury surrounding a haematoma. A pro-active approach must, therefore, be maintained in the management of these patients to salvage as much of this brain as possible. Alert patients with small (< 2 cm) haematomas and moribund patients with extensive haemorrhage may not require surgical evacuation. Indications for clot removal in patients between these extremes are controversial. Current practice favours surgical intervention in the following situations: (i) superficial haemorrhage; (ii) clot volume between 20-80 ml; (iii) worsening neurological status; (iv) relatively young patients; (v) haemorrhage causing midline shift/raised ICP; and (vi) cerebellar haematomas > 3 cm or causing hydrocephalus. A large multicentre prospective randomised controlled trial (International Surgical Trial in Intracerebral Haemorrhage) is currently underway to determine if early clot evacuation will lead to a better neurological outcome in patients with spontaneous supratentorial, non-aneurysmal ICH.

Intracerebral hemorrhage surgery is probably indicated for patients with superficial spontaneous lobar supratentorial intracerebral hemorrhage (ICH) when the level of consciousness drops below Glasgow coma scale 13 within the first 8 h of the onset of the haemorrhage.

Haematoma volume is a very important factor in the surgical indication of clot evacuation. Early surgery may reduce the volume of ICH, local mass effect, herniation, and secondary injury due to ischemia.

Meta-analysis of 10 trials that have previously assessed the effects of surgery plus routine medical management, compared with routine medical management alone, in patients with primary supratentorial ICH have included 2059 patients.

Once the level drops below 9, it is probably too late to consider craniotomy for these patients, so...
clinical vigilance is paramount. While this statement is only backed up by evidence that is moderately strong, meta-analysis of available data suggests that it is true in the rather limited number of patients with ICH. Meta-analyses like this can often predict the results of future prospective randomised controlled trials a decade or more before the trials are completed and published. Countless such examples exist in the literature, as is the case for thrombolysis in patients with myocardial infarction in the last millennium: meta-analysis determined the efficacy more than a decade BEFORE the last trial (ISIS-2) confirmed the benefit of thrombolysis for myocardial infarction.

References


Minematsu K. Evacuation of intracerebral hematoma is likely to be beneficial. Stroke 2003; 34:1567.

Hankey GJ. Evacuation of intracerebral hematoma is likely to be beneficial—against. Stroke 2003; 34:1568.


