Intracerebral hemorrhage evacuation

Intracerebral hemorrhage (ICH) evacuation refers to a neurosurgical procedure in which blood that has accumulated within the brain tissue is removed. This procedure is typically performed when there is a significant amount of bleeding causing pressure on the brain and potential neurological damage. The decision to perform ICH evacuation is made based on factors such as the size and location of the hemorrhage, the patient's clinical condition, and other medical considerations.

Here are key points about intracerebral hemorrhage evacuation:

Indications for Surgery:

Intracerebral hemorrhage evacuation is considered in cases where the bleeding within the brain is causing increased intracranial pressure, leading to neurological symptoms and impairment. Large hematomas or hematomas in critical areas of the brain may prompt surgical intervention. Surgical Techniques:

There are different surgical techniques used for intracerebral hemorrhage evacuation, and the choice of approach depends on the location and characteristics of the hematoma. Common approaches include craniotomy, stereotactic aspiration, and minimally invasive techniques. Craniotomy:

In a craniotomy, a portion of the skull is temporarily removed to access the hematoma directly. This allows the surgeon to visually identify and remove the clot. Craniotomy provides direct access to the bleeding site and allows for effective evacuation. Stereotactic Aspiration:

Stereotactic aspiration involves using imaging guidance, such as CT scans, to precisely locate the hematoma. A catheter is then inserted through a small hole in the skull to aspirate or suction out the clot. This is a less invasive approach compared to a craniotomy. Minimally Invasive Techniques:

Advances in neurosurgery have led to the development of minimally invasive techniques, such as endoscopic surgery or the use of catheters and thrombolytic agents. These approaches aim to reduce the invasiveness of the procedure and minimize trauma to surrounding brain tissue. Postoperative Care:

After the evacuation of intracerebral hemorrhage, patients typically require close monitoring in an intensive care unit. Postoperative care may include measures to control intracranial pressure, prevention of complications, and rehabilitation. Risks and Complications:

Surgical evacuation of intracerebral hemorrhage carries inherent risks, including the possibility of infection, bleeding, or damage to surrounding brain tissue. The overall success of the procedure and patient outcomes depend on various factors, including the patient's overall health and the timing of the intervention. Timing of Surgery:

The timing of surgery is an important consideration. In some cases, early intervention may be beneficial, while in others, a more conservative approach is preferred. The decision is often made based on the individual patient's condition and the characteristics of the hemorrhage. Intracerebral hemorrhage evacuation is a complex neurosurgical procedure that requires careful consideration of various factors. The decision to perform surgery is often made collaboratively by a multidisciplinary team, including neurosurgeons, neurologists, and critical care specialists. The goal is to optimize outcomes and minimize neurological deficits for patients with significant intracerebral hemorrhage.

Based on the MIMIC-III database, Yi et al. from the Guangzhou Overseas Chinese Hospital firstly described the dissimilarities in survival probability, mortality, and neurological recovery among mainstream treatments for intracerebral hemorrhage; secondly, patient classification was determined by important clinical features; and outcome variations among treatment groups were compared. The 28-day, 90-day, and in-hospital mortality in the craniotomy group were significantly lower than minimally invasive surgery (MIS) and non-surgical group patients; and, the medium/long-term mortality in the MIS group was significantly lower than the non-surgical group. The craniotomy group positively correlated with short-term GCS recovery compared with the MIS group; no difference existed between the non-surgical and MIS groups. The craniotomy group's 90-day survival probability and short-term GCS recovery were superior to the other two treatments in the subgroups of first GCS 3-12; this tendency also presented in the MIS group over the non-surgical group. For milder patients (first GCS > 12), the three treatment regimens had a minimal effect on patient survival, but the non-surgical group showed an advantage in short-term GCS recovery. Craniotomy patients have lower mortality and a better short-term neurological recovery in an ICH population, especially in short-to-medium term mortality and short-term neurological recovery over MIS patients. In addition, surgical treatment is recommendable for patients with a GCS ≤ 12. [1)].

STITCH

see STITCH.

Randomized controlled trials

see Intracerebral hemorrhage treatment randomized controlled trials.

A better understanding of the pathophysiology of intracerebral hemorrhage (ICH) has led to the identification of several new mechanisms of injury that could be potential therapeutic targets [2)].

Minimally invasive surgery (MIS) for the treatment of ICH is the main clinical method that is currently used, despite the lack of large-scale, clinical, multi-center, randomized controlled trials [3)].

Indications

see Intracerebral hemorrhage surgery indications.

Techniques

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 [4) 5)].

Intracerebral hemorrhage minimally invasive surgery

see Intracerebral hemorrhage minimally invasive surgery

Endoscopic surgery for intracerebral hemorrhage

see Endoscopic surgery for intracerebral hemorrhage

Decompressive hemicraniectomy

see Decompressive craniectomy for intracerebral hemorrhage

Meta-analysis

Intracerebral hemorrhage surgery meta-analysis

References

1)
Yi Y, Che W, Cao Y, Chen F, Liao J, Wang X, Lyu J. Prognostic data analysis of surgical treatments for intracerebral hemorrhage. Neurosurg Rev. 2022 Apr 19. doi: 10.1007/s10143-022-01785-5. Epub ahead of print. PMID: 35441246.
2)
Aiyagari V. The clinical management of acute intracerebral hemorrhage. Expert Rev Neurother. 2015 Dec;15(12):1421-32. doi: 10.1586/14737175.2015.1113876. Epub 2015 Nov 13. PubMed PMID: 26565118.
3)
Wang WM, Jiang C, Bai HM. New Insights in Minimally Invasive Surgery for Intracerebral Hemorrhage. Front Neurol Neurosci. 2015 Nov;37:155-65. doi: 10.1159/000437120. Epub 2015 Nov 12. PubMed PMID: 26588789.
4)
Hersh EH, Gologorsky Y, Chartrain AG, Mocco J, Kellner CP. Minimally Invasive Surgery for Intracerebral Hemorrhage. Curr Neurol Neurosci Rep. 2018 May 9;18(6):34. doi: 10.1007/s11910-018-0836-4. Review. PubMed PMID: 29740726.
5)
Hanley DF, Thompson RE, Muschelli J, Rosenblum M, McBee N, Lane K, Bistran-Hall AJ, Mayo SW, Keyl P, Gandhi D, Morgan TC, Ullman N, Mould WA, Carhuapoma JR, Kase C, Ziai W, Thompson CB, Yenokyan G, Huang E, Broaddus WC, Graham RS, Aldrich EF, Dodd R, Wijman C, Caron JL, Huang J, Camarata P, Mendelow AD, Gregson B, Janis S, Vespa P, Martin N, Awad I, Zuccarello M; MISTIE Investigators. Safety and efficacy of minimally invasive surgery plus alteplase in intracerebral

haemorrhage evacuation (MISTIE): a randomised, controlled, open-label, phase 2 trial. Lancet Neurol. 2016 Nov;15(12):1228-1237. doi: 10.1016/S1474-4422(16)30234-4. Epub 2016 Oct 11. PubMed PMID: 27751554; PubMed Central PMCID: PMC5154627.