



LETTER TO THE DIRECTOR

Markwalder technique in the treatment of chronic subdural hematoma: still in the epicenter of the debate

Técnica de Markwalder en el tratamiento del hematoma subdural crónico: aún en el epicentro del debate

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Mr. Director:

Chronic subdural hematoma (CSDH) is a neurological condition characterized by the accumulation of blood in the subdural space, usually as a result of mild or repeated head trauma. It is one of the most common neurosurgical entities, especially in the elderly population. Although CSDH is a treatable entity, the recurrence rate can be up to 28 %, and up to 20 % of patients with CSDH end up with a poor neurological outcome.⁽¹⁾ Treatment of HSDC often involves surgical evacuation using various techniques, one of which is that developed by Otto Markwalder in the 1970s.⁽²⁾ This involves trephination and placement of a drainage system to evacuate the hematoma, but the technique itself has undergone multiple variations.⁽¹⁾ The issues at the center of the debate are the use of one or two burr holes/drains, the performance of membranectomies or the use of irrigation the CSDH cavity.

Some neurosurgeons believe that performing two burr holes can remove the CSDH more effectively and reduce the recurrence rate compared to a single burr hole, because of the ease of evacuation and flushing of the cavity. In addition, it can allow a better distribution of intracranial pressure and reduce the risk of brain damage during the procedure. However, in theory, the double burr-hole would have a higher mortality compared with the single one, due to the two trephinations in the skull, double incisions, and longer durations of surgery and anesthesia. However, in terms of recurrence, postoperative morbidity and complications, a meta-analysis conducted by Wan et al.,⁽³⁾ in 2019, which included 12 studies (1723 patients in total), but only three of which were randomized studies, showed no differences between both surgical techniques.

Membranectomy refers to the complete or partial removal of the membrane that covers the CSDH, initially recommended by Markwalder et al.⁽²⁾ There are different opinions about it. Some surgeons believe that may reduce the risk of recurrence, while others believe that removal of the membrane may increase the risk of complications (infection, bleeding, and longer length of hospital stay) and not significantly affect the rate of recurrence.⁽⁴⁾

Irrigation of the cavity after evacuation of CSDH is partially accepted too. Some investigators said that saline irrigation may reduce the risk of infection and recurrence, while others defended that it may increase the risk of injury during the procedure. However, a systematic review by Meliawan et al.,⁽⁵⁾ did not demonstrate differences. This study included seven retrospective cohort studies from 2002 to 2017 with a total of 635 samples. The incidence of hematoma recurrences between burr hole irrigation and burr hole drainage was 14,7 % and 12,0 %, respectively.

The use of drains has been considered superior to no drains after evacuation of CSDH.⁽¹⁾ Single drain placement may be sufficient for most cases of CSDH. However, Wu et al.,⁽⁶⁾ as a result of a randomized study, it suggested that the placement of two drains (in opposite directions: frontal and occipital) may have some benefits in terms of reduced hospitalization time and a decrease in recurrences. In this study with 331 patients, those with two drains had a lower percent of hematoma change after surgery and much more residual subdural air than those with only one. Postoperative complications and clinical outcome between the two groups showed no significant differences. In a retrospective correlational study in Cuba, the two-drains group were less complications during the 30-days follow-up.⁽⁷⁾

In the technique described by Markwalder, the drain is generally placed within the subdural cavity to aspirate accumulated fluid and reduce intracranial pressure. However, from the physical point of view, when performing the craniostomy, a wide communication is established between the subdural space and the subgaleal or subperiosteal space, which is why in recent years the latter space has been recommended as the final drainage destination.⁽⁸⁾ This technique may have advantages in terms of lower risk of brain damage, lower risk of hemorrhage, seizures, and lower intracranial infection rate.

The optimal duration of drainage after surgery is yet another controversial issue in the management of CSDH. A study examining the length of the subdural drain in CSDH treated with burr holes found that neither the incidence of infection nor recurrence is significantly impacted by the period of drainage. In patients who received a single burr hole for CSDH, a nationwide Danish randomized clinical research compared 24-h postoperative subdural drainage to 48-h postoperative subdural drainage and found similar results. Patients with postoperative drainage lasting one or two days have similar recurrence rates (6,4 vs 8,4 %, respectively), according to a subgroup analysis of the United Kingdom Multicenter Prospective Cohort Study. However, a 2017 retrospective study that looked at the length of drainage in 90 patients came to the conclusion that closed system drainage for two- four days after burr hole craniotomy can be a useful option, but it is related with a higher risk of recurrence compared to preserving the drainage for five- seven days.⁽¹⁾

From the authors' point of view, the selection of one or another variant rests on the patient's own characteristics and intraoperative findings, without minimizing the experience and preference of each surgeon. Those cases with decompensation of their underlying diseases or neurological deterioration and therefore higher anesthetic morbidity and mortality, can benefit from faster surgery through a unique burr-hole. The cytoarchitecture of the CSDH, in previous tomographic studies, influences whether or not membranectomy is performed: a septate hematoma or one with thick internal membranes can hinder the expansion of an atrophic brain.

Irrigation may offers a great advantage, making the final visualization of the cavity easier, the dragging of residual elements from the periphery and the elimination of those resulting from the degradation of the blood and cytokines.

On the other hand, the placement of one or two subgaleal drains for 24-48 hours offers less chance of parenchymal injury through small burr-holes (reducing the diameter of the craniostomies should be a prerequisite) and in that cases have shown almost total brain expansion during surgery.

Therefore, almost half a century after its description, the Markwalder technique continues to be the workhorse in the surgical treatment of CSDH, and its adaptability must depend on the patient's particularities and surgical context, based on less invasive surgery and with a low risk of recurrences.

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Conflict of interests

The authors have no conflict of interest.