

Favourable Influence of Opening the Lamina Terminalis and Lilliequist's Membrane on the Outcome of Ruptured Intracranial Aneurysms. A Study of 197 Consecutive Cases

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Summary

Opening of the lamina terminalis and Lilliequist's membrane — by facilitating CSF circulation in the basal cisterns — favourably influences the outcome in patients with ruptured intracranial aneurysms. This has been demonstrated by the analysis of a series of 197 consecutive cases of ruptured intracranial aneurysms.

Keywords: CSF circulation; pronostic factors; ruptured aneurysms; vasospasm.

Introduction

Vasospasm affecting the prognosis of ruptured intracranial aneurysms is known to be related to the amount of blood in the subarachnoid space and the basal cisterns. In past years a large number of attempts to extensively remove the clots and to improve cisternal drainage have been carried out, and related studies reported in the literature. A wide — if not exhaustive — review has been carried out in a recent article by Inagawa *et al.*³. Opening of the lamina terminalis (LT) and Lilliequist's membrane (LM) has been performed to increase the CSF circulation around the Circle of Willis. As far as we know the reported cases were associated with external cisternal drainage, so that there is no available study on the effects of LT and LM opening alone.

A comparative study of two consecutive series of patients operated on for ruptured intracranial aneurysms through the pterional approach by the same surgeon (one with LT and LM rarely opened, the other with LT and LM frequently incised) has shown that opening the lamina terminalis and Lilliequist's membrane (Fig. 1) had a favourable influence on the outcome, especially in patients with bad neurological status prior to surgery.

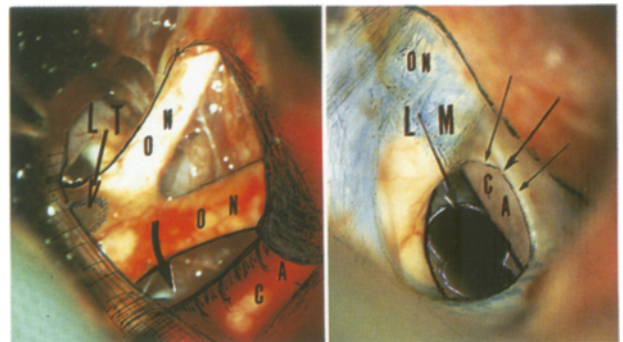


Fig. 1. Operative microsurgical views of the lamina terminalis and Lilliequist's membrane. Left: lamina terminalis (LT) (straight arrow) not yet opened and right inter-optico-carotidian space (curved arrow), through a right pterional-subfrontal approach. Right: magnified view of the right optico-carotidian triangle after opening the antero-lateral arachnoid of the opto-chiasmatic cistern (triple arrow). Below the optic nerve (ON) and the carotid artery (CA), one can see the fenestration of the Lilliequist's membrane (single arrow)

Material and Methods

Series I (126 consecutive patients) and Series II (71 consecutive patients) were totally similar as regards to clinical grades on admission and at surgery, quantities of blood on CT and degrees of vasospasm on angiography on admission. Pre-, intra-, and post-operative medical treatment and care was the same in the two series. Calcium-channel blockers were not administered in any of the series, neither pre- nor post-operatively. The usual day of surgery was the 11th postictally for Series I and the 7th for Series II.

Except for the usual day of surgery, the only difference in the management between the two series was an opening of both the lamina terminalis and Lilliequist's membrane, in series I in only 12% of cases but in 63% in Series II.

Results

Overall results (evaluated at one-year follow-up) were:

- excellent (i.e., normal activity resumed after surgery) in 59% of cases for Series I and 65% for Series II,
- good (i.e., pre-operative activity resumed, but at a lower level) in 12% and 21%, respectively,
- bad (i.e., pre-operative activity not resumed or death) in 29% (20% deceased) and 14% (10% deceased), respectively.

Study of the outcome in relation to clinical grades at surgery (Hunt and Hess classification²) shows that a favourable influence of opening the lamina terminalis and Lilliequist's membrane was more pronounced in patients with a more severe clinical status at surgery. As a matter of fact, results were excellent:

- in 74% of the 43 patients graded I at surgery in Series I and in 78% of the 36 patients also graded I in Series II,
- in 59% of the 68 patients graded II and III in Series I, and 57% of the 23 (II and III) in Series II,
- whilst in 7% of the 15 graded IV and V in Series I, and 42% of the 12 (IV and V) in Series II.

Hydrocephalus requiring shunting amounted to 11% in Series I and 15% in Series II.

Discussion

Our results are in favour of a positive role on the outcome of opening the lamina terminalis and Lillie-



Fig. 2. CT scan showing large quantity of blood in the basal cisterns

Table I. *Relationship Between Clinical Grade at Surgery and Degree of Blood on CT*

			Blood CT (Fisher scale)	
			I-II	III-IV
Clin. grade (Hunt and Hess scale)	I	Ia	88%	12%
	II	III	62%	38%
	IV	V	17%	83%

$p < 0.01$.

quist's membrane, especially in patients operated on in a poor clinical condition (i.e., graded IV or V according to Hunt and Hess classification). These patients generally correspond to those with a CT¹ showing significant quantity of blood in the basal cisterns (Fig. 2), as demonstrated by the correlation study we have done ($p < 0.01$), (Table I).

Opening of the lamina terminalis creates an anterior ventriculo-cisternotomy, and fenestration of the Lilliequist's membrane a communication between the optochiasmatic and the interpeduncular cisterns. By facilitating washing out the blood contained in the basal cisterns and the subarachnoid space, this would diminish the risk of vasospasm due to local blood cell lysis.

In the current discussion of the respective indications for a direct or an endovascular approach to ruptured intracranial aneurysms, the favourable influence of such an adjunct to the obliteration of the sac, which requires open surgery, should be considered.

References

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