Retractorless Surgery with supine retrosigmoid approach

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Introduction

The suboccipital retrosigmoid approach is a fast and tissue sparing skull base module that is suitable for a vast array of infratentorial pathology. For this approach a variety of patient positions have been described from sitting, half-sitting, over lateral decubital to half supine and supine.
We use a dissection technique that circumvents the use of any brain retraction by combination of cisternal opening with well-known microneurosurgical principles in a simple supine patient position. We report on principles and advantages of the applied technique, and present the series.

Rationale

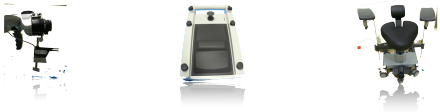
For usually deep-seated lesions self-retaining retractors are thought necessary to enable safe dissection corridors.
However retractors also exert **secondary pressure effects**[1,2] and necessitate larger openings and straight dissection planes.
Supine is **fast, secure and effective**, no compromise necessary.
CP angle surgery is demanding due to **confined space**, depth of field and immediate vicinity of brain stem, cranial nerves and posterior circulation vasculature. It is frequently **time consuming**. Cerebellar retraction quickly leads to brain bruises, as can be objectified by postop MRI; retractors crowd the handfield.
Implication - retractorless surgery as such has its merits in such a delicate and very confined space.
Question - Is it possible to implement a retractorless cp-angle technique without jeopardizing those delicate structures more than with retractors in place?

Surgical Method

In a single surgeon series all consecutive 87 cases that were operated via a retractorless retrosigmoid approach during a 7-year period were screened for practicability of retractorless surgery and for secondary insertion of a static retractor system.

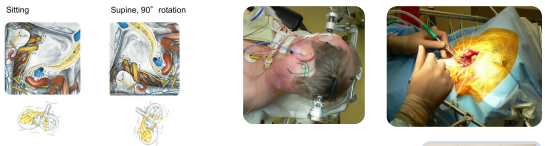
Retractorless technique

- Navigated retrosigmoid mini-craniotomy flush with transverso-sigmoid angle
- "Slack brain" measures, CSF drainage, positioning[1]
- Dynamic retraction with handheld instruments
- Bimanual alternating dissection
- Microscope mouthpiece & wireless foot pedal
- Armrest chair



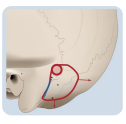
Supine Positioning

- Supine with head turned 60 to 70°, sometimes with bolster underneath shoulder
- Change of orientation of cranial nerves in relation to surgeon's view (see below, orientation of internal auditory canal in sitting and supine position)
- Mounted navigational reference and monitoring
- Iop movement of patient table in several axes
- risk of air embolism minimized
- Surgeon dissects downwards (as opposed to seated position)



Mini Craniotomy

- Navigated burr-hole at transverso-sigmoid angle (circle)
- Sigmoid line cut with craniotome drill without shoe
- Braking of flap along sigmoid line (blue dashed line)



Results

Results: 35 schwannomas, 13 meningiomas, 21 vascular pathologies, and 18 other pathologies were operated on (see table & figure series 1 & 2). The sagittal extension of pathology ranged from the supra/ infratentorial transition to foramen magnum level. In no case secondary placement of a retractor was necessary or found helpful for additional exposure. Use of a retractor blade was made initially as a shield for petrosal drilling, without exertion of actual retraction. The principles of retractorless surgery enabled for meticulous and tissue sparing dissection (CSF egress, bimanual arm-rested manipulation, mouthpiece and foot pedal, avoidance of excessive instruments and cotton patties).

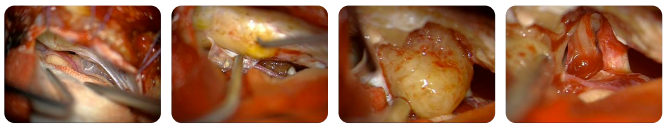


Figure series 1. Retractorless supine dissection: Preparation for drilling of IAM for VS.

Group	Pathology	number
Schwannoma x 35	Vestibular	32
	Glossopharyngeal	1
	Facial	1
	Trigeminal	1
Meningioma x 13	Petroclival	6
	Petrosal	5
	For mgnm	2
Vascular x 21	MVD for TN, FS, vest.cochl Vert.	18
	AVM	1
	DAVF	1
	Pontine cavernoma	1
Other x 18	Chondrosarcoma	2
	Epidermoid	6
	Metastasis	4
	GBM	1
	Branchiogenic cyst (IX/X)	1
	Hemangioblastoma	2
	Ependymoma	1
	Myofibroblastic Tu	1
overall		87

Table. Operated pathology with retractorless, supine retrosigmoid approach.

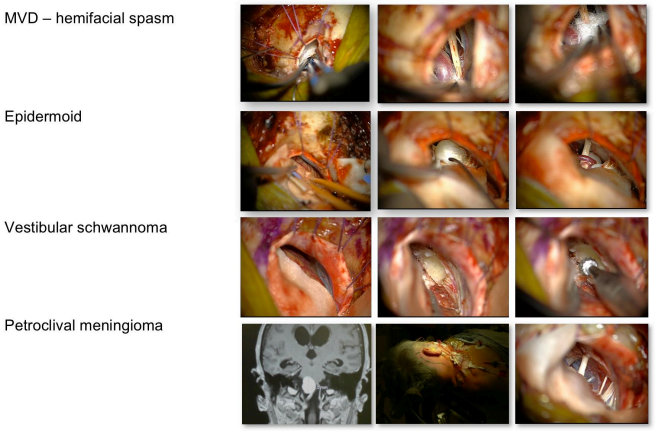


Figure series 2. Sample cases.

Advantages

The advantages of the detailed approach are comfortable surgeon position with rested and slightly flexed arms and minimized shoulder-girdle fatigue enabling for steady, secure and long-lasting bimanual microsurgical downward dissection. The view is not obtunded by brain parenchyma. Positioning of the patient is eased substantially. The obtained field of view is excellent. There is no congestion of CSF nor blood in this position; an argument often times used for preferential sitting or semi-sitting positioning.

Conclusion

We are quite satisfied with this supine and retractor free approach, and since long have completely adopted it.

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References

1. Kivisaari, R. P., Salonen, O., & Ohman, J. (2000). Basal brain injury in aneurysm surgery. Neurosurgery, 46(5), 1070–4– discussion 1074–6.
2. Andrews, R. J., & Muto, R. P. (1992). Retraction brain ischaemia: cerebral blood flow, evoked potentials, hypotension and hyperventilation in a new animal model. Neurological Research, 14(1), 12–18.
3. Hernesniemi, J. et al. (2006). Principles of microneurosurgery for safe and fast surgery. Surgical technology international, 15, 305–310.
4. Spetzler, R. F., & Sanai, N. (2012). The quiet revolution: retractorless surgery for complex vascular and skull base lesions. Journal of Neurosurgery, 116(2), 291–300.