



UKS
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Medical Center

Neurosurgical Department

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Management of intraoperative hemorrhage in intraventricular neuroendoscopy

Introduction

- Reports of intraoperative hemorrhages during intraventricular neuroendoscopy range around **3 %**

Schroeder HW, Gaab MR. Endoscopic resection of colloid cysts. Neurosurgery 51:1441-1445, 2002

Hopf NJ, Grunert P, Fries G, Resch KD, Perneczky A. Endoscopic third ventriculostomy: outcome analysis of 100 consecutive procedures 44(4):795-804; discussion 804-6, 1999

Cinalli G, Spennato P, Ruggiero C, Aliberti F, Trischitta V, Buonocore MC, et al. Complications following endoscopic intracranial procedures in children. Childs Nerv Syst 23(6):633-44, 2007

- Meta analysis: 41 hemorrhages in 592 intraventricular biopsies -> **6.9%**

Barber SM, Rangel-Castilla L, Baskin D. Neuroendoscopic resection of intraventricular tumors: a systematic outcomes analysis. Minim Invasive Surg 2013:898753, 2013

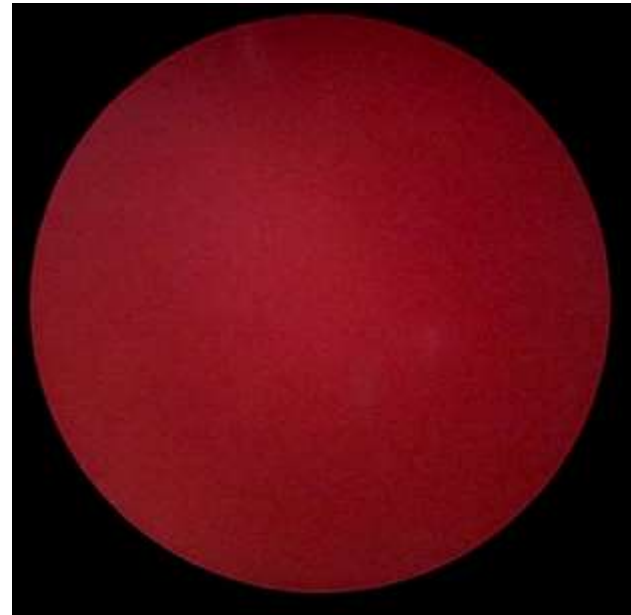
- Report of „**mild**“ bleeding in 221 of 293 patients; **severe** in **6%**

Constantini S, Mohanty A, Zymberg S, Cavalheiro S, Mallucci C, Hellwig D, et al. Safety and diagnostic accuracy of neuroendoscopic biopsies: an international multicenter study. J Neurosurg Pediatr 11:704-709, 2013

How to define a intraoperative hemorrhage?



Mild bleeding?



“Red out”

How to define a intraoperative hemorrhage?

- Short bleeding after biopsy unavoidable ? -> No complication
- Hemorrhages that causes an abortion and switch to open microsurgery ?
- Our Department's definition:

“Hemorrhages that causes a change in the surgical steps and/or change of the surgical strategy.”

Despite the lack of definition,
severe hemorrhages may be life threatening

Study on Hemorrhages during Colloid Cyst Resection

- Retrospective evaluation of all colloid cyst cases in our department from 2011 to 2016
- Analyses of pre-operative symptoms and outcome
- Intraoperative bleeding events, surgical measurements and bleeding time

Results

- 20 patients with a mean age of 41.7 ± 3.7 years (range 17-79 years)
- Main symptoms were headache (19/20), ataxia (6/20), impaired vision (3/20), memory deficits (1/20). Two patients presented with diagnosed depression and one with drug addiction.
- Two patients presented with a rapid onset of severe cephalgia within 24-48 hours. Another three patients showed progressive headaches over 8-14 days before they were admitted to our department.
- All patients were scheduled for endoscopic treatment

Intraoperative Results

- One conversion to microsurgical transcortical resection due to a technical fault of the working scope
 - Awareness of alternative surgical techniques

- Intraoperative hemorrhages in 12 of 20 cases

→ Minor hemorrhages in 2 cases (less than 3 minutes)

Irrigation

→ Extended hemorrhages in 9 cases

in 5 cases: 6-10 minutes

in 4 cases: 14-22 minutes

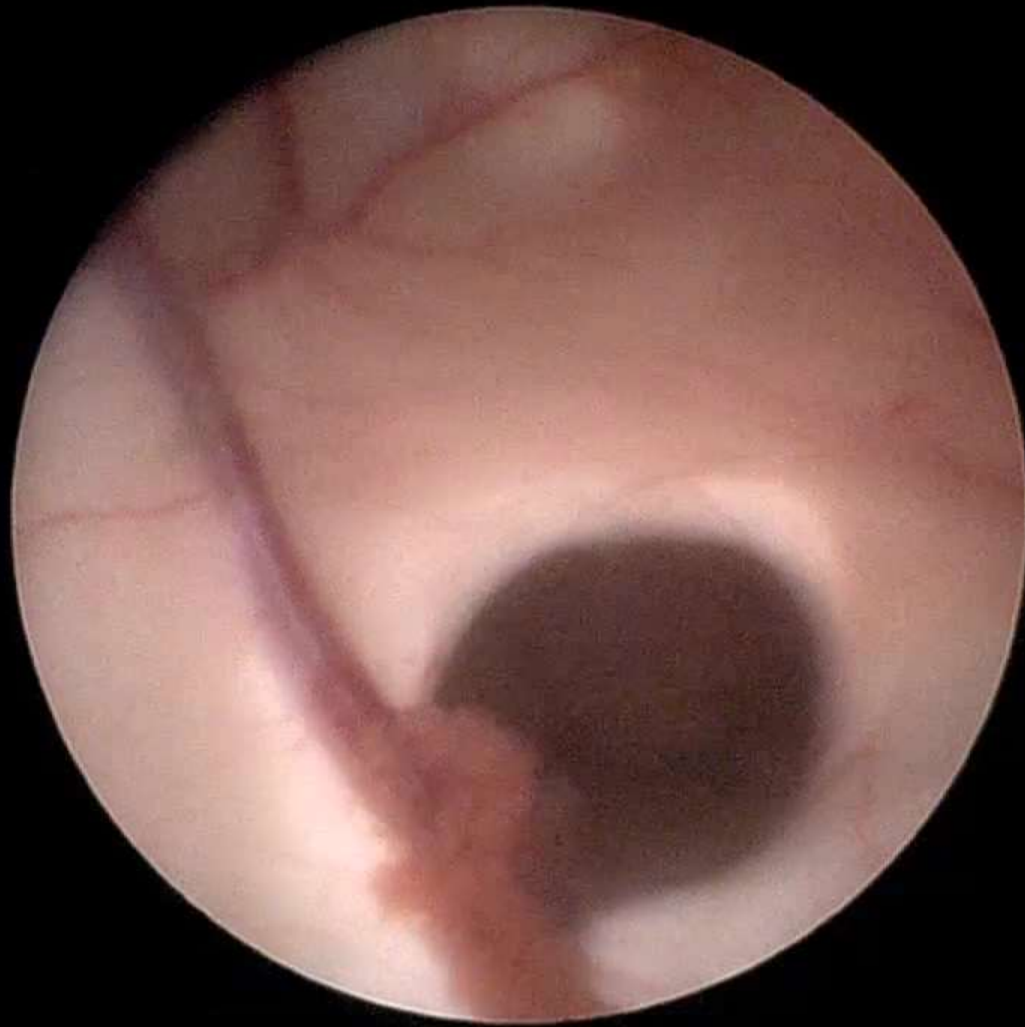
Irrigation/
Coagulation

→ Severe hemorrhage in 1 case (more than 30 minutes)

Dry field

Management if a hemorrhage occurs

- Do not pull back the endoscope -> Loss of orientation!
- Ensure constant irrigation -> ensure outflow to avoid increased intracranial pressure
- If irrigation is not successful use the bipolar
 - > consider thermal damage to adjacent tissue



Recommended options in the literature

- **Conversion to microsurgical approach**

Chowdhry SA, Cohen AR. Intraventricular neuroendoscopy: complication avoidance and management. *World Neurosurg* 79(2):S15.e1-10, 2013

da C F Pinto PH, Nigri F, Caparelli-Daquer EM. Conversion technique from neuroendoscopy to microsurgery in ventricular tumors: Technical note. *Surg Neurol Int* 7(31):S785-S789, 2016

Li C, Zong X, Wang X, Gui S, Zhang Y. Intraoperative Hemorrhage in Ventriculoscopic Surgery: Experience of a Single Chinese Neurosurgery Center. *World Neurosurg* 88:548-551, 2016

- Loss of minimally invasive approach

- **Tamponade by small cottonoids**

Cappabianca P, Cinalli G, Gangemi M, Brunori A, Cavallo LM, de Divitiis E, et al. Application of neuroendoscopy to intraventricular lesions. *Neurosurgery* Feb;62(2):575-598, 2008

- Not practical with all endoscope systems

- **The “small chamber technique”**

Manwaring JC, El Damaty A, Baldauf J, Schroeder HW. The small-chamber irrigation technique (SCIT): a simple maneuver for managing intraoperative hemorrhage during endoscopic intraventricular surgery. *Neurosurgery* 10 Suppl 3:375-9; discussion 379, 2014

The „Dry field“ technique

- Applied in 6 cases of over 500 procedures

pat. nr.	age	sex	pathology	initial symptoms	surgical procedure	outcome	additional procedures
1	62	female	hemangioma of the side ventricle	organic mental disorder	tumor resection	symptom-free	none
2	60	female	intraventricular hemorrhage	comatose	clot removal ventricular lavage	unchanged	EVD
3	61	male	colloid cyst	headache memory disturbance	cyst resection septostomy	symptom-free	none
4	48	male	plexus papilloma 3 rd ventricle	seizure	tumor resection	symptom-free	none
5	48	female	glioblastoma of thalamus	hydrocephalus memory disturbance	tumor biopsy ETV	improved	VP-Shunt after 1month
6	56	male	colloid cyst	headache depression	cyst resection	improved	EVD

The „Dry field“ technique

A transparent sucking device introduced in the working channel

Aspiration of the complete CSF

Identification of the presumptive bleeding source.

gravity and air environment supports the clot formation.

Vision is no longer impaired

Identification of the injured vessel

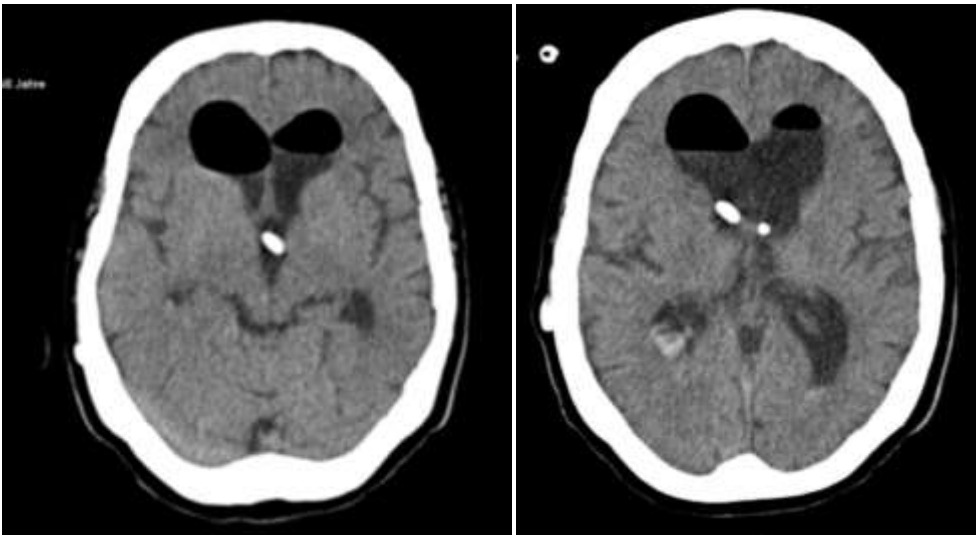
Coagulation is performed.

After hemostasis final inspection should guarantee free-floating CSF without any obstructions at the aqueduct or new-formed stoma.

An additional external ventricular drainage might be helpful, if postoperative increased ICP is expected or additional clearance of the CSF is necessary



Postoperative CT scans



24h



72h

Discussion

- Low postoperative complications rate
- No collapse of the ventricle/ postoperative subdural hematoma were seen
- “Dry field” can be considered for elective intraventricular tumor resection
- Intraoperative complications can be managed with patience and experience

Thank you



Department of Neurosurgery
WORKSHOPS 2018

We are proud to announce our workshops for 2018 with a focus on neuroendoscopic techniques, live surgeries and hands-on parts.
We are looking forward to welcoming you in Homburg-Saar.

Sincerely yours,

Prof. Dr. Joachim Döbel

SAVE THE DATE

What our participants said about the Course:
"Very organized informative program, would like to come again"
"Wonderful course"
"Overall excellent"

The following courses will take place:

March 2018: (Exact date will be announced soon):
Clinical Workshop of Endoscopic Neurosurgery

September 3-6, 2018:
The 7th Homburg Neuroendoscopy Week

September 7-8, 2018:
ISMISS 2018

November 2018: (Exact date will be announced soon):
Clinical Workshop of Endoscopic Neurosurgery

The courses include:

- Live operations
- Hands-on parts
- Industrial exhibition
- Lectures by national / international experts

More information about the registration can be found on the following page!
Or contact us: congress.neurosurgery@uks.eu

10 % Discount for IFNE Members