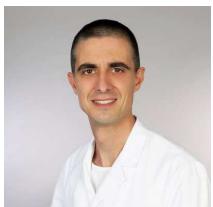


Complex Spine Symposium – Cervical Spine – Balgrist University Hospital

# Intradural cervical tumors

Prof. Dr. Luca Regli, Dr. David Bellut,  
Department of Neurosurgery, Clinical Neuroscience Center,  
University of Zurich



University Hospital  
Zurich



University of  
Zurich UZH

Complex Spine Symposium  
January 12th, 2018  
Balgrist University Hospital



Complex Spine Symposium – Cervical Spine – Balgrist University Hospital

# Intradural cervical tumors

Prof. Dr. Luca Regli, Dr. David Bellut,  
Department of Neurosurgery, Clinical Neuroscience Center,  
University of Zurich



University Hospital  
Zurich



University of  
Zurich UZH

Complex Spine Symposium  
January 12th, 2018  
Balgrist University Hospital



# The Good, the Bad and the Ugly...

Complex Spine Symposium  
January 12th, 2018  
Balgrist University Hospital



University Hospital  
Zurich

26.01.2018

3

## Classification of most frequent intradural tumors

Intradural, extramedullary

Benign (usually)

Meningeoma (WHO I)  
Schwannoma (WHO I)  
Myxopapillary Ependymoma WHO I

Intradural, intramedullary

Benign

Ependymoma (WHO II)  
Cavernoma (WHO I)  
Hemangioblastoma (WHO I)  
Astrocytoma (WHO II)

Malignant

Glioblastoma (WHO IV)  
Metastasis  
Lymphoma

# The Good

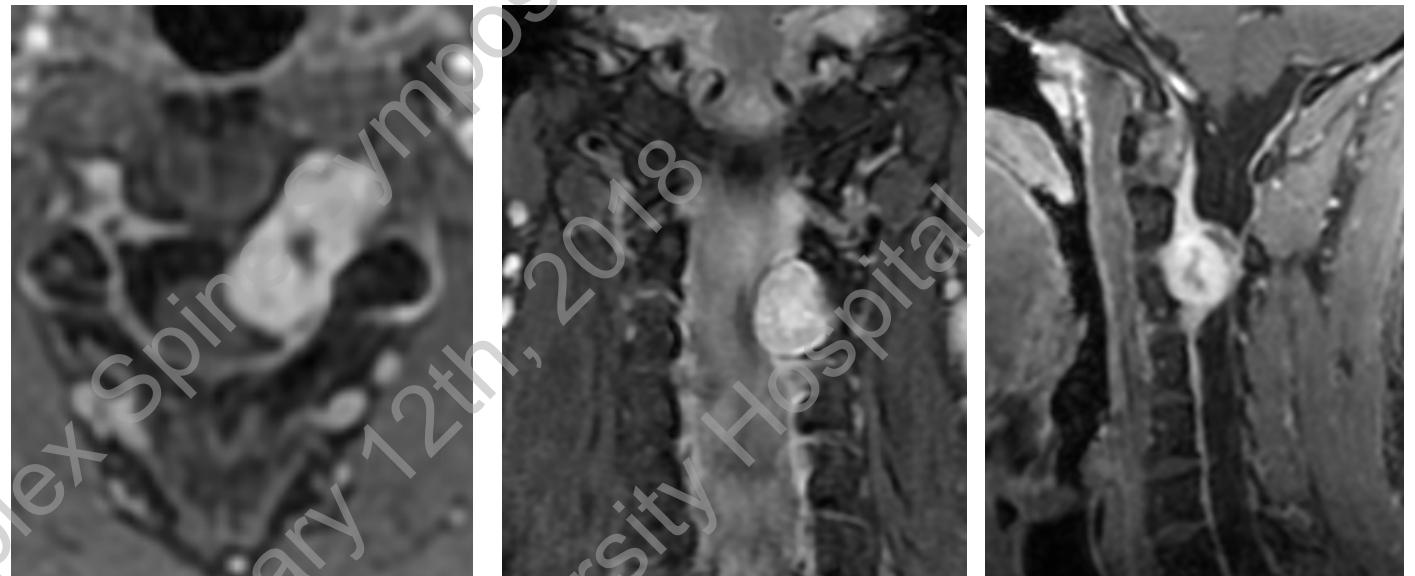
Complex Spine Symposium  
January 12th, 2018  
Balgrist University Hospital

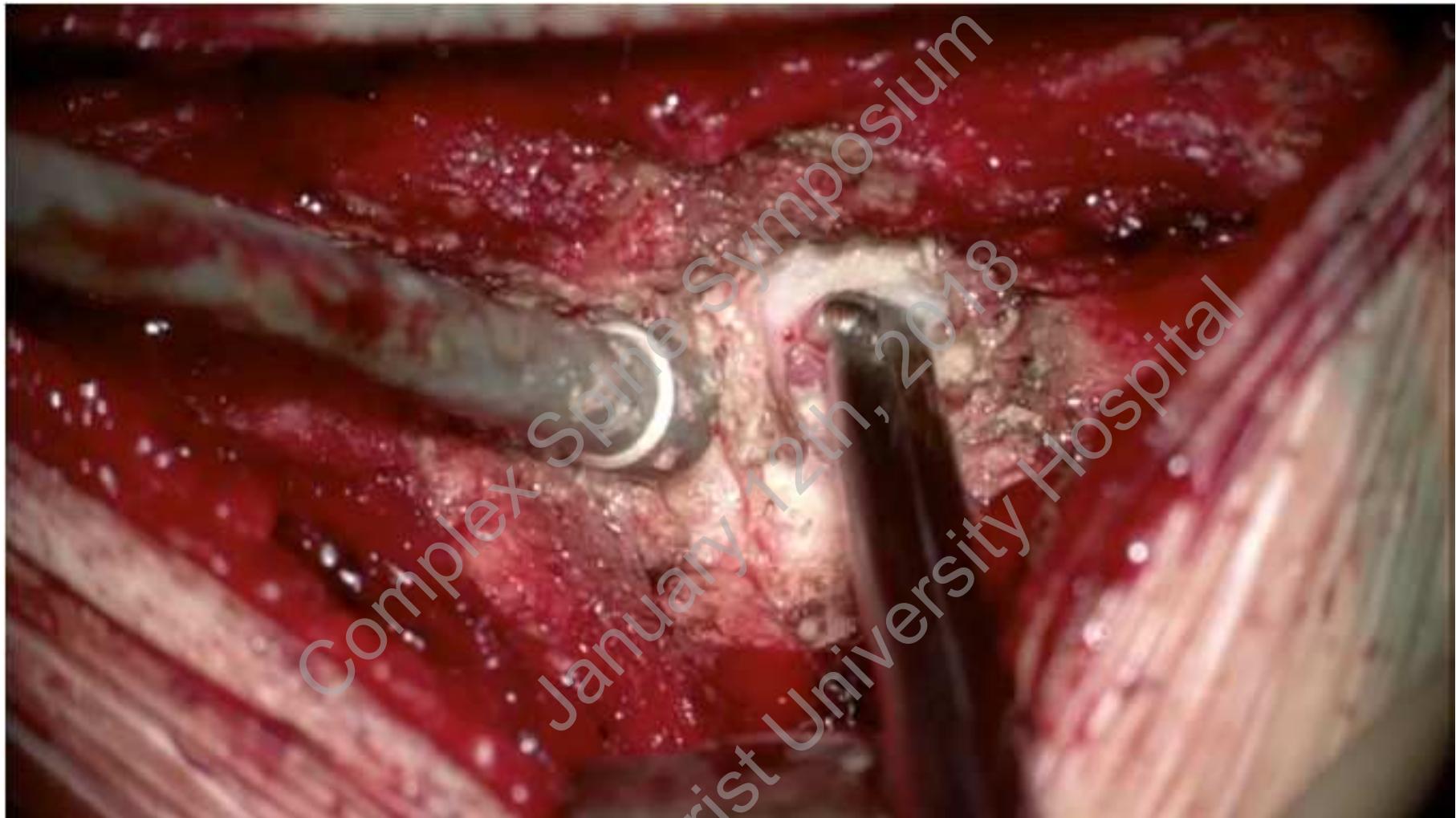


University Hospital  
Zurich

## 36 year-old male right-handed journalist:

- Sensation of pressure and submandibular swelling for one year
- ENT evaluation led to MRI scan of the neck -> tumor of C3 nerve root
- No motor deficit, no myelopathy, no pain
- Microsurgical resection w/ fluoroscopy, io high-definition US, io Neuromonitoring





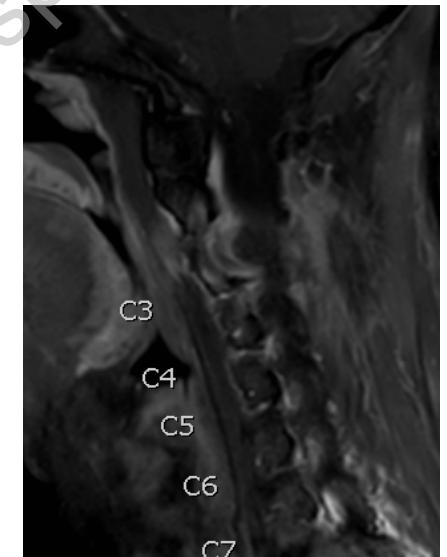
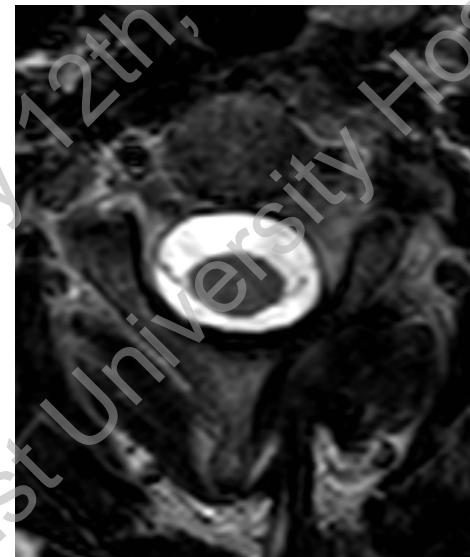
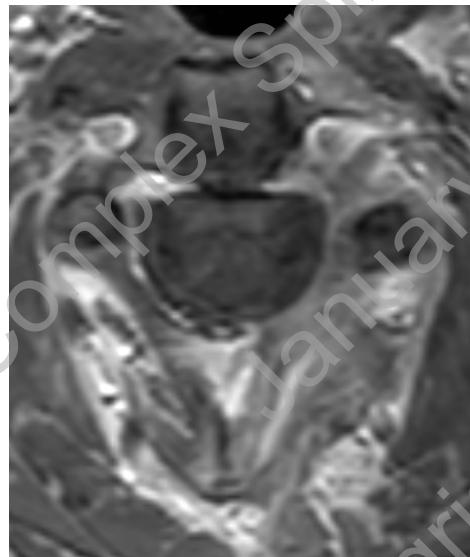
Complex Spine Symposium  
January 12th, 2018  
Balgrist University Hospital



University Hospital  
Zurich

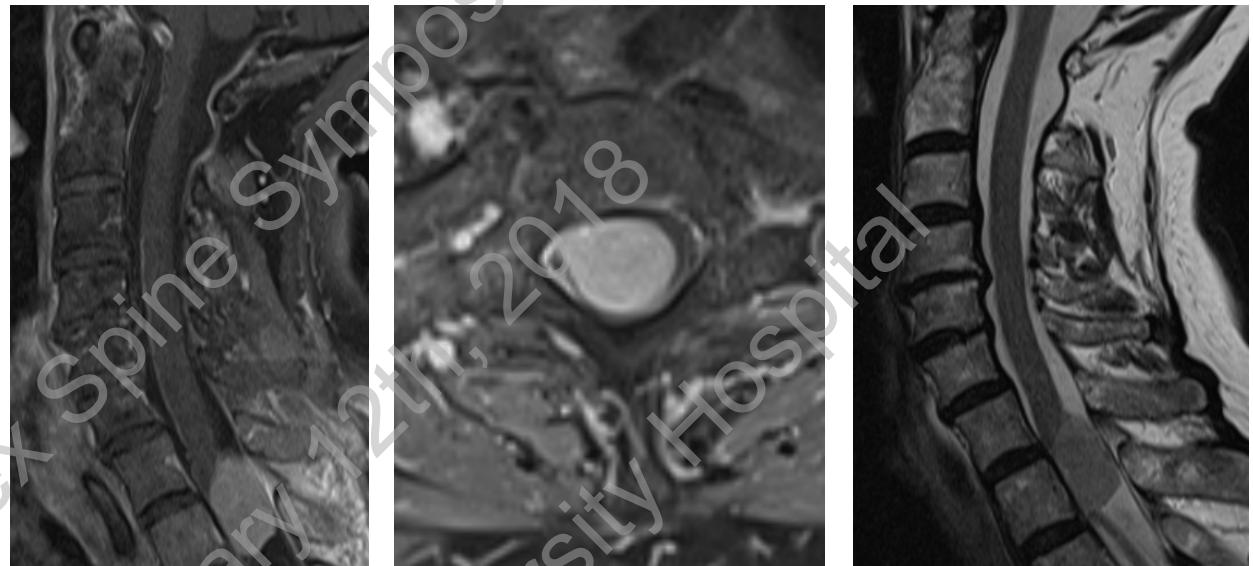
## 36 year-old male right-handed journalist:

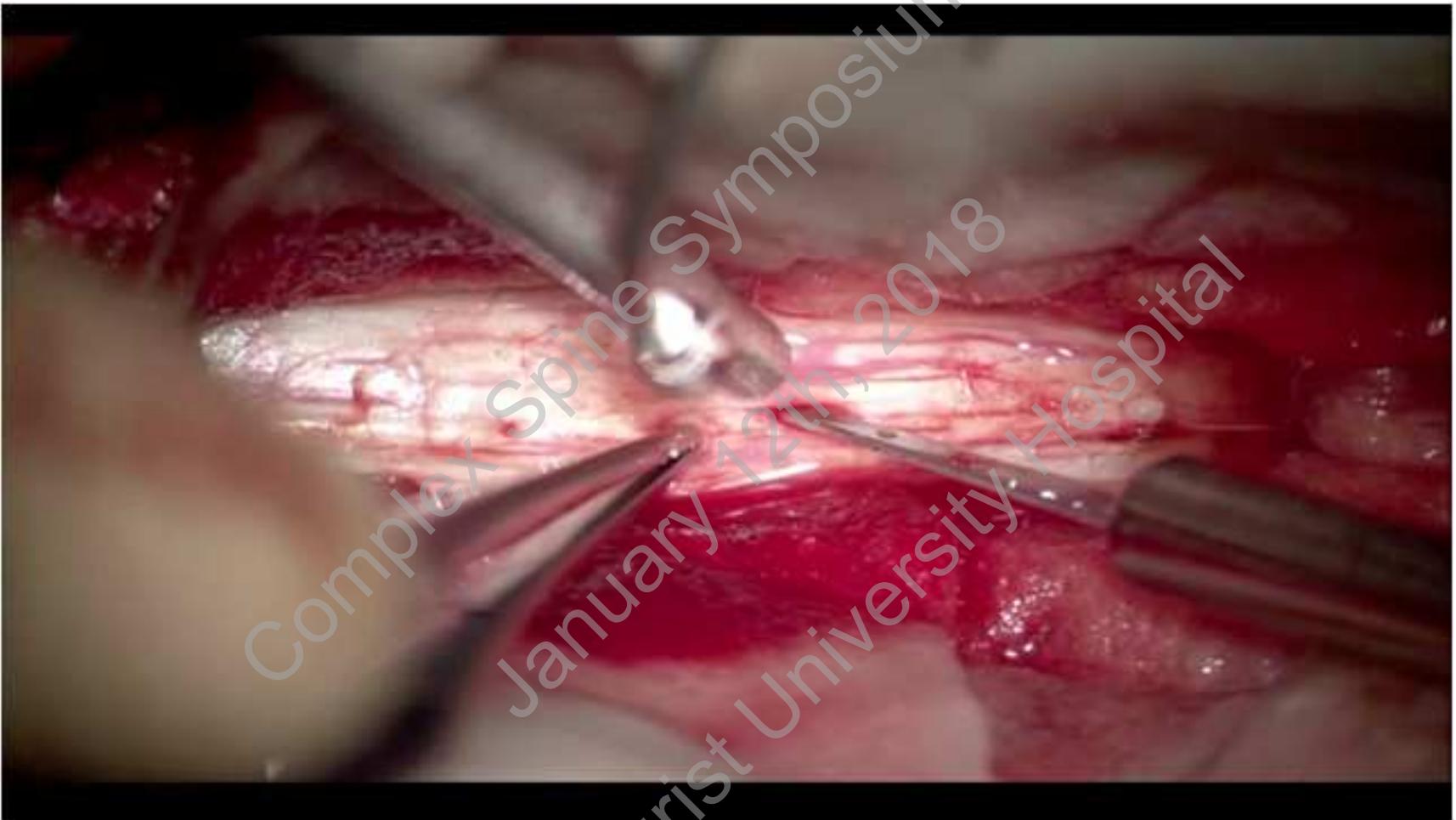
- Slight dysaesthesia after surgery
- F/U 3 months: asymptomatic, back to work, no residual tumor
- Histology: Schwannoma (WHO I)



## 77 year-old right-handed lady:

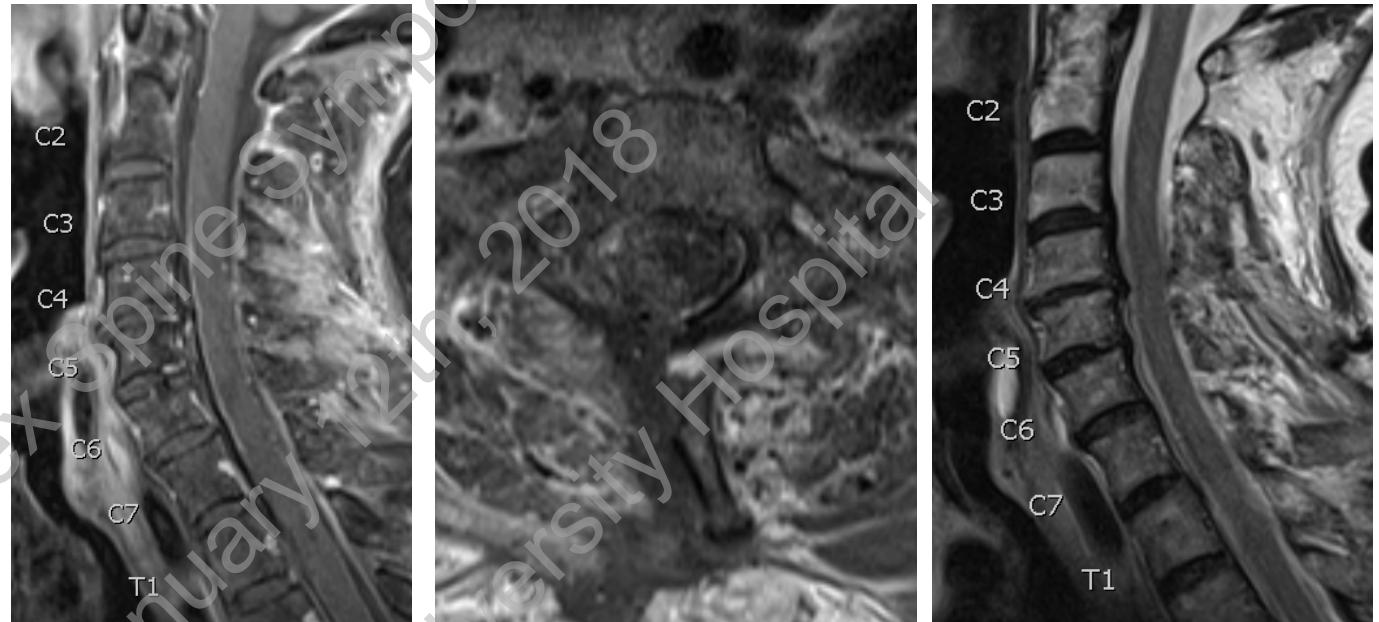
- 3 months history of tingling in both legs, 3-4 weeks gait disturbance and slight motor weakness M4/5, gait ataxia, walking sticks, loss of bladder control
- MRI spine → intradural extramedullary tumor of level C7/Th1
- Microsurgical resection w/ fluoroscopy, io high-definition US, io Neuromonitoring





## 77 year-old right-handed lady:

- Improved paraparesis (M5/5), walking without aid
- F/U 3 months: Walking back to normal, improved bladder function
- Histology: Meningeoma (WHO I)



## The Good:

### Epidemiology – Intradural, extramedullary tumors

- Schwannoma, Meningeoma, Myxopapillary Ependymoma most frequent
- Incidence 0.4-2.5/100.000/year -> 32-200/year in CH
- Comprise 40-45% of all spinal tumors and 80% of intradural spinal tumors
- Infrequently associated with Neurofibromatosis or Schwannomatosis
- Treatment of choice: Gross total resection
- Option of postoperative radiation in WHO II meningiomas
- Option of stereotactic radiosurgery for patients with contraindication for surgery

Neuroradiology (2008) 50:301–314  
DOI 10.1007/s00234-007-0345-7

#### DIAGNOSTIC NEURORADIOLOGY

#### Intradural spinal tumors: current classification and MRI features

Kasim Abul-Kasim • Majda M. Thurnher •  
Paul McKeever • Pia C. Sundgren

#### EXTRAMEDULLARY INTRADURAL SPINAL TUMORS: A REVIEW OF MODERN DIAGNOSTIC AND TREATMENT OPTIONS AND A REPORT OF A SERIES

KENAN ARNAUTOVIC\*, ASKA ARNAUTOVIC

Semmes-Murphy Clinic and Department of Neurosurgery,  
University of Tennessee, Memphis, TN, USA

\*Corresponding author

#### Spine

SPINE Volume 41, Number 24, pp 1925–1932  
© 2016 Wolters Kluwer Health, Inc. All rights reserved

#### OUTCOMES

#### Surgical Resection of Intradural Extramedullary Spinal Tumors

Patient Reported Outcomes and Minimum Clinically Important Difference

Scott L. Zuckerman, MD,\* Silky Chotai, MD,\* Clinton J. Devin, MD,\* Scott L. Parker, MD,\*  
David P. Stonko, BS,\* Joseph B. Wick, BA,\* Andrew T. Hale, BS,\* Matthew J. McGirt, MD,†  
and Joseph S. Cheng, MD, MS\*‡

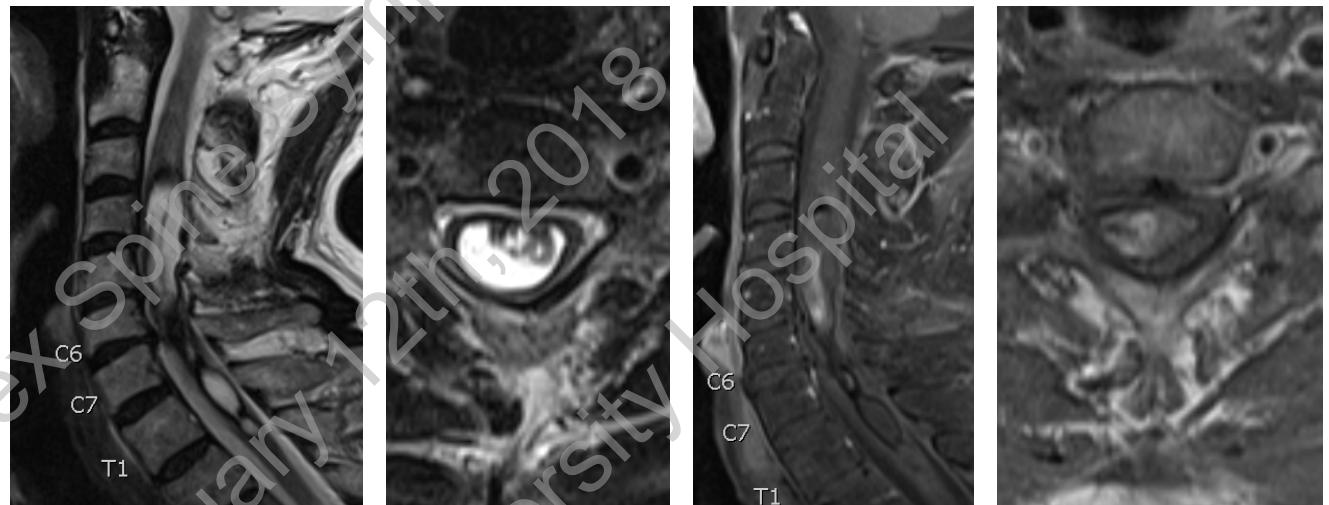
# the Intermediate...

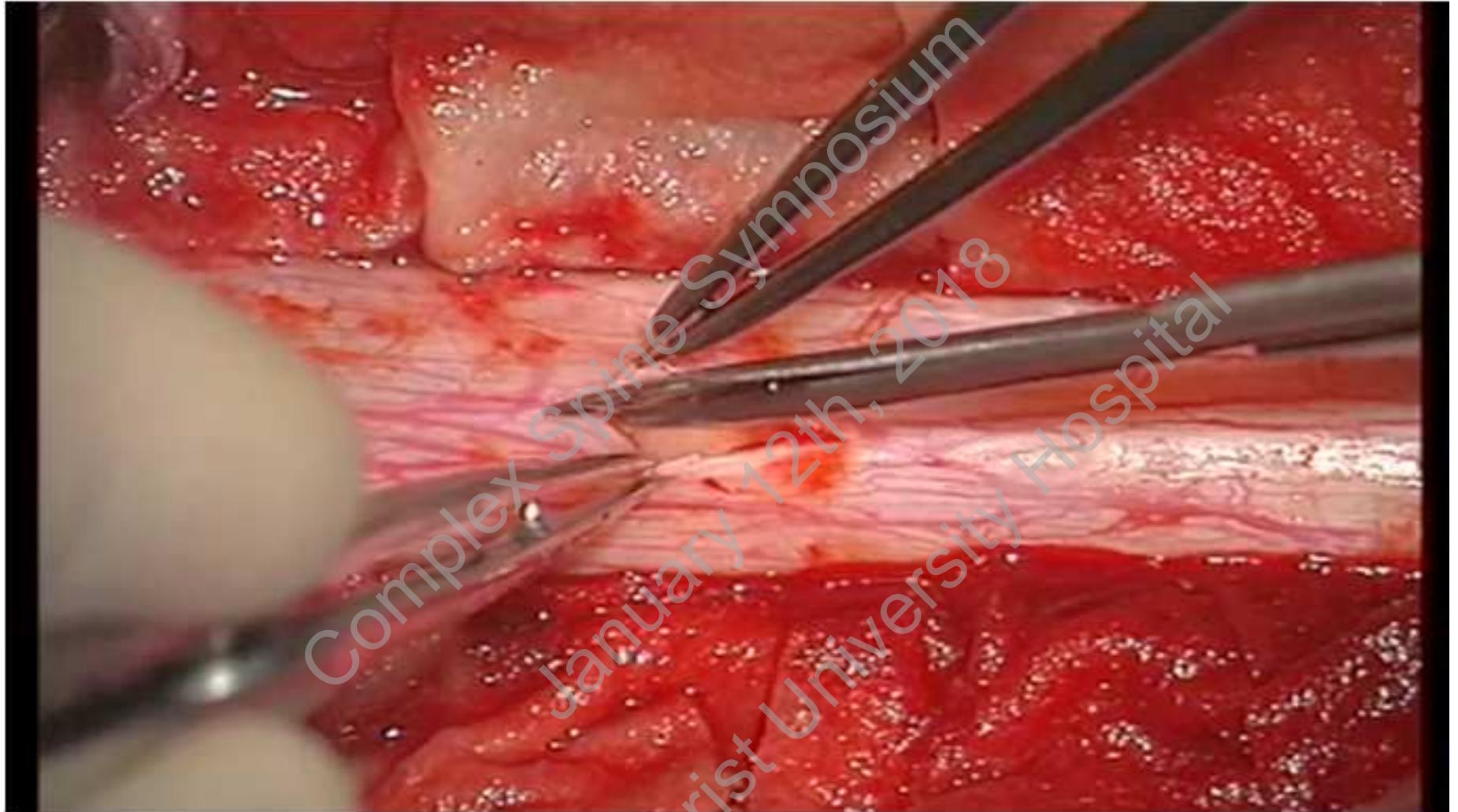
Complex Spine Symposium  
January 12th, 2018  
Balgrist University Hospital



## 66 year-old male right-handed diplomat:

- 10 months history of right arm numbness and subjective weakness of intrinsic muscles right hand, 3 month history of numbness right side sub Th1
- MRI study revealed intramedullary tumor C3-7
- Microsurgical resection w/ fluoroscopy, io high-definition US, io Neuromonitoring



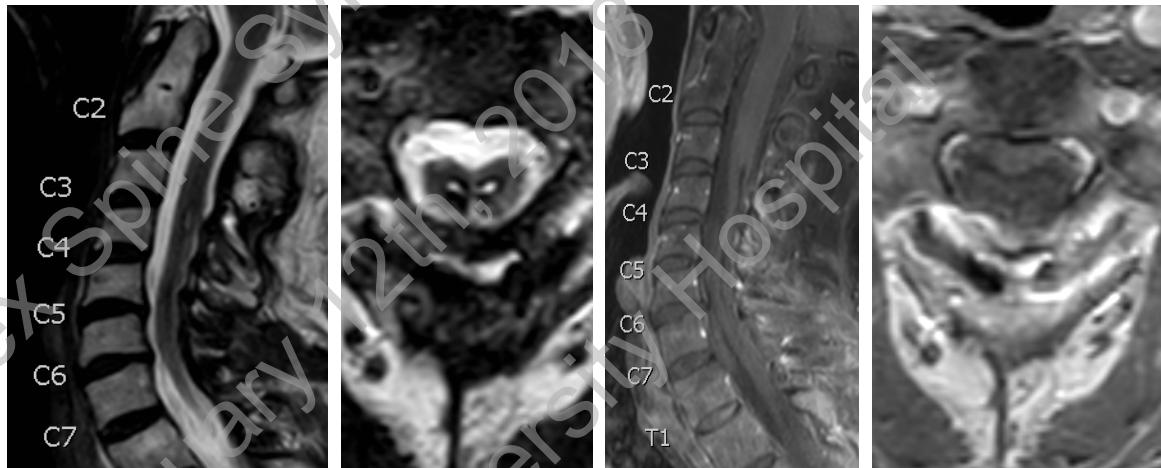


University Hospital  
Zurich

Complex Spine Symposium  
January 12th, 2018  
Balgrist University Hospital

## 66 year-old male right-handed diplomat: February 2017

- Slight persisting numbness C7/C8 right side, persisting slight motor weakness
- F/U 9 months: no residual tumor
- Histology: Ependymoma (WHO II)



46 year-old male C6-C7 cavernoma

Complex Spine Symposium  
January 12th, 2018  
Balgrist University Hospital



University Hospital  
Zurich

26.01.2018

17

# The Intermediate: Epidemiology – Intradural, intramedullary, benign tumors / Cavernoma

- Incidence 0.08-0.5/100.000/year (all intramedullary tumors)
- Ratio benign/malignant (4/1)
- Most frequent: Low grade Astrocytoma (30%), Ependymoma (WHO II) (30%), Hemangioblastoma (15%)
- Hemangioblastoma (33% of pts will have von Hippel-Lindau disease)
- Lipoma, Dermoid and Epidermoid very rare
- Oligodendrogloma – case reports only
- Incidence of Cavernoma 5-20% of all intramedullary tumors (increasing)
- Treatment choice:
  - Gross total resection for symptomatic Ependymoma, Cavernoma and Hemangioblastoma recommended
  - Extended biopsy or tumor debulking for low grade Astrocytoma

**Journal of Neurosurgical Sciences 2018 Jan 04**

DOI: 10.23736/S0390-5616.18.04305-9

Copyright © 2018 EDIZIONI MINERVA MEDICA

Language: English

**The current management of spinal cord cavernoma**

Julia VELZ,<sup>1,2</sup> Oliver BOZINOV,<sup>1,2</sup> Johannes SARNTHEIN,<sup>1,2</sup> Luca REGLI,<sup>1,2</sup> David BELLUT<sup>1,2</sup> 

<sup>1</sup> Department of Neurosurgery, University Hospital Zurich, Zurich, Switzerland; <sup>2</sup> Clinical Neuroscience Center, University of Zurich, Zurich, Switzerland



**J Neurosurg Spine 21:662–676, 2014  
©AANS, 2014**

Surgical outcomes and natural history of intramedullary spinal cord cavernous malformations: a single-center series and meta-analysis of individual patient data

Clinical article

JETAN H. BADHIWALA, B.H.Sc.,<sup>1</sup> FOROUGH FARROKHVAR, PH.D.,<sup>2</sup> WALEED ALHAZZANI, M.D.,<sup>2</sup> BLAKE YARASCWITCH, M.D.,<sup>1</sup> MOHAMMED AREF, M.D.,<sup>1</sup> ALMUNDEF ALGIRD, M.D.,<sup>1</sup> NARESH MURTY, M.D.,<sup>1</sup> EDWARD KACHUR, M.D.,<sup>1</sup> ALEKSA CENIC, M.D.,<sup>1</sup> KAVYA REDDY, M.D.,<sup>1</sup> AND SALEH A. ALMENAWER, M.D.<sup>1,2</sup>

<sup>1</sup>Division of Neurosurgery, Department of Surgery, and <sup>2</sup>Department of Clinical Epidemiology and Biostatistics, McMaster University, Hamilton, Ontario, Canada

**Neuroradiology (2008) 50:301–314  
DOI 10.1007/s00234-007-0345-7**

**DIAGNOSTIC NEURORADIOLOGY**

**Intradural spinal tumors: current classification and MRI features**

Kasim Abul-Kasim • Majda M. Thurnher •  
Paul McKeever • Pia C. Sundgren



**University Hospital  
Zurich**

# the Bad.

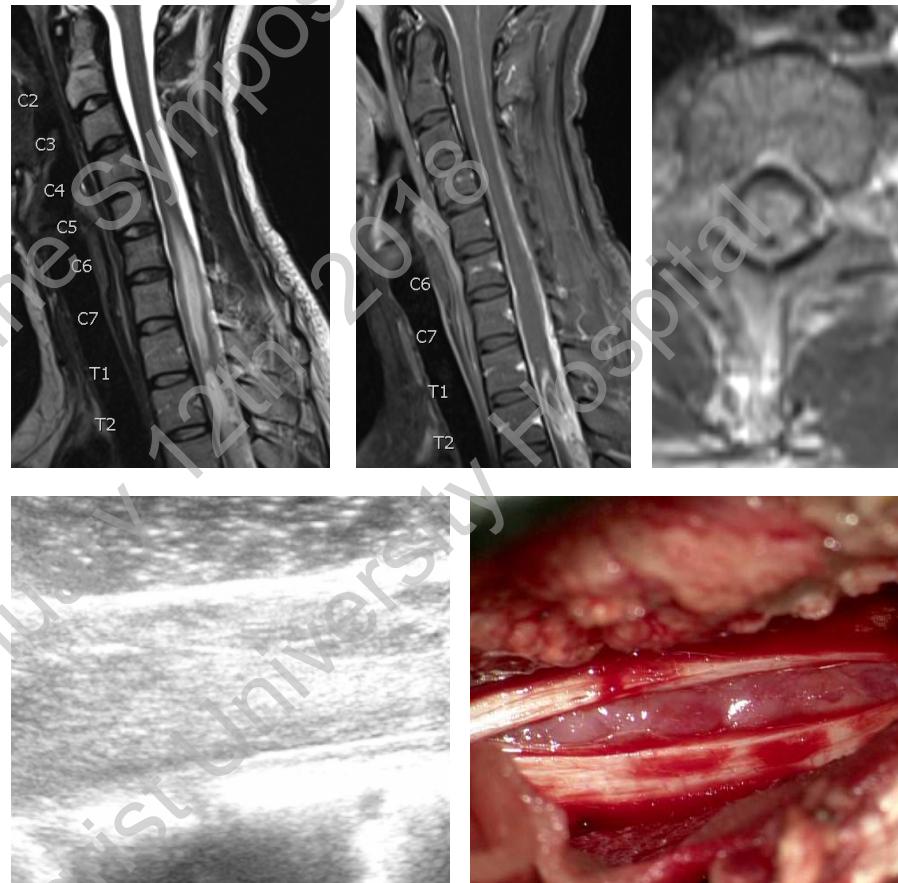
Complex Spine Symposium  
January 12th, 2018  
Balgrist University Hospital



University Hospital  
Zurich

## 25 year-old female right-handed accountant

- 2 months history of headache, neck pain and progressive numbness of both legs
- Initially treated for basal meningitis due to elevated CSF cell count
- MRI spine revealed tumor of cervicothoracic junction
- Microsurgical biopsy w/ fluoroscopy, io high-definition US, io Neuromonitoring
- Slight improvement with steroids
- Histology: Glioblastoma
- Palliative treatment with radiation and CCNU starting 2 days after surgery
- Passed away 1 month after diagnosis and 4 months after onset of symptoms



## The Bad:

### Epidemiology – Intradural, intramedullary, malignant tumors

- Incidence 0.08-0.5/100.000/year (all intramedullary tumors)
- Ratio benign/malignant (4/1)
- Most frequent: High grade Astrocytoma/Glioblastoma (10-50%), Metastasis (10%)
- Evidence of literature low – case reports and small case series
- Lymphoma – case reports only (all non-Hodgkin type)
- No benefit of radical resection
- High frequency of hydrocephalus
- Biopsy, radiation and chemotherapy recommended

J Neurosurg 70:50-54, 1989

**Malignant astrocytomas of the spinal cord**

ALAN R. COHEN, M.D., JEFFREY H. WISOFF, M.D., JEFFREY C. ALLEN, M.D., AND FRED EPSTEIN, M.D.

*Department of Neurosurgery, Division of Pediatric Neurosurgery and Division of Pediatric Neuro-Oncology, New York University Medical Center, New York, New York*

---

Neuroradiology (2008) 50:301–314  
DOI 10.1007/s00234-007-0345-7

DIAGNOSTIC NEURORADIOLOGY

**Intradural spinal tumors: current classification and MRI features**

Kasim Abul-Kasim · Majda M. Thurnher · Paul McKeever · Pia C. Sundgren

---

ORIGINAL ARTICLE

Management of Patients with Primary Intramedullary Spinal Cord Glioblastoma

Bejan Behmanesh<sup>1</sup>, Matthias Setzer<sup>1</sup>, Juergen Konczalla<sup>1</sup>, Patrick Harter<sup>2</sup>, Johanna Quick-Weller<sup>1</sup>, Lioba Imoehl<sup>1</sup>, Kira Franz<sup>1</sup>, Florian Gessler<sup>1</sup>, Volker Seifert<sup>1</sup>, Gerhard Marquardt<sup>1</sup>

**and the Ugly... .**



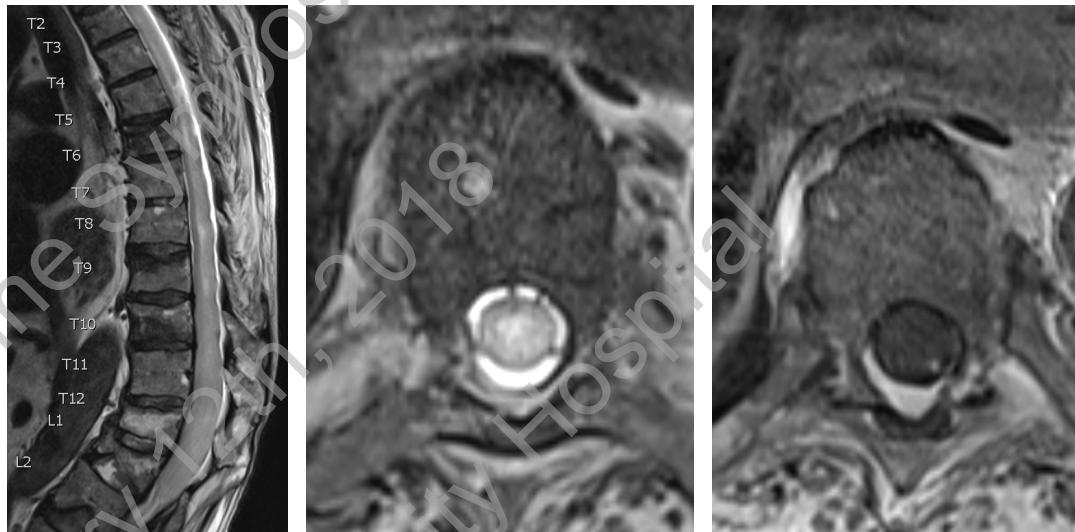
## 26 year-old right-handed male student

- 12 months history of back pain, worse lying down
  - 10 months history of partial loss of vision
  - Few weeks of troubles ambulating with motor weakness of lower extremities
  - MRI revealed lumbarsacral tumor and hydrocephalus
  - VP Shunt placement (Oct 2013)
- 
- Microsurgical resection w/ fluoroscopy, io high-definition US, io Neuromonitoring (Dec 2013)
  - F/U dec 2017: No gait difficulties, persisting slight numbness of Les,
  - Works full time lawyer
  - Histology: Myxopapillary Ependymoma (WHO I)



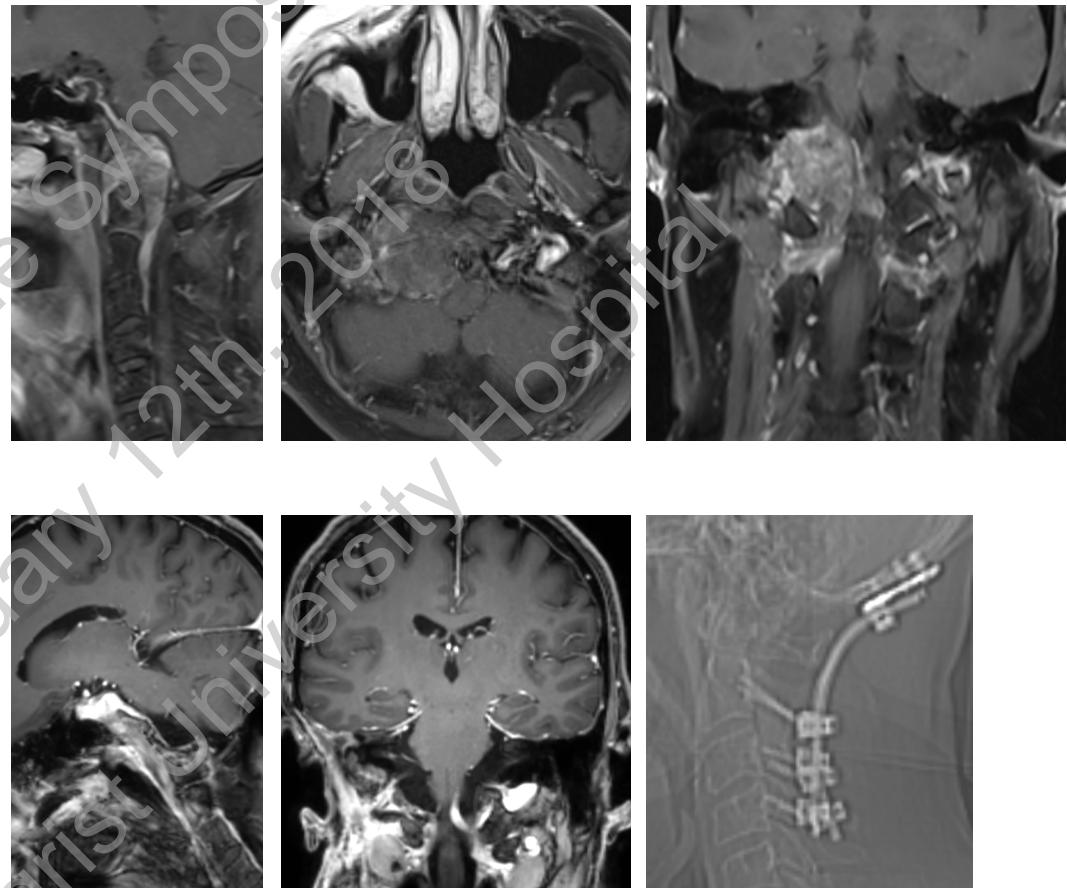
## 83 year-old right-handed retired accountant: October 2017

- 3 years history of back pain
  - Progressive incontinence for one year
  - Progressive numbness and motor deficit in lower extremities, difficulties ambulating for 3-4months
- 
- Microsurgical biopsy w/ fluoroscopy io high-definition US, io Neuromonitoring
  - No new deficit after surgery
  - Histology: Astrocytoma (WHO II)
  - Radiation 22x1.8Gy -> 39.6Gy
  - Inpatient rehabilitation



## 57 year-old right-handed architect

- 2 months history of swallowing difficulties, hoarseness and neck pain
- GP requested MRI scan of the spine
- Revealed tumor or craniocervical junction
  
- 2 stage surgical therapy: Microsurgical resection w/ neuronavigation, US, neuromonitoring; OC-fusion
- Postop: Facial palsy grade 3, facial numbness, swallowing difficulties
- Postoperativ Proton-beam radiation planned
- Histology: Chordoma (WHO I)
- 3 months F/U: Small residual tumor at Odontoid, improving cranial nerve palsies



# and the **Incidental...**

and long-term stable disease

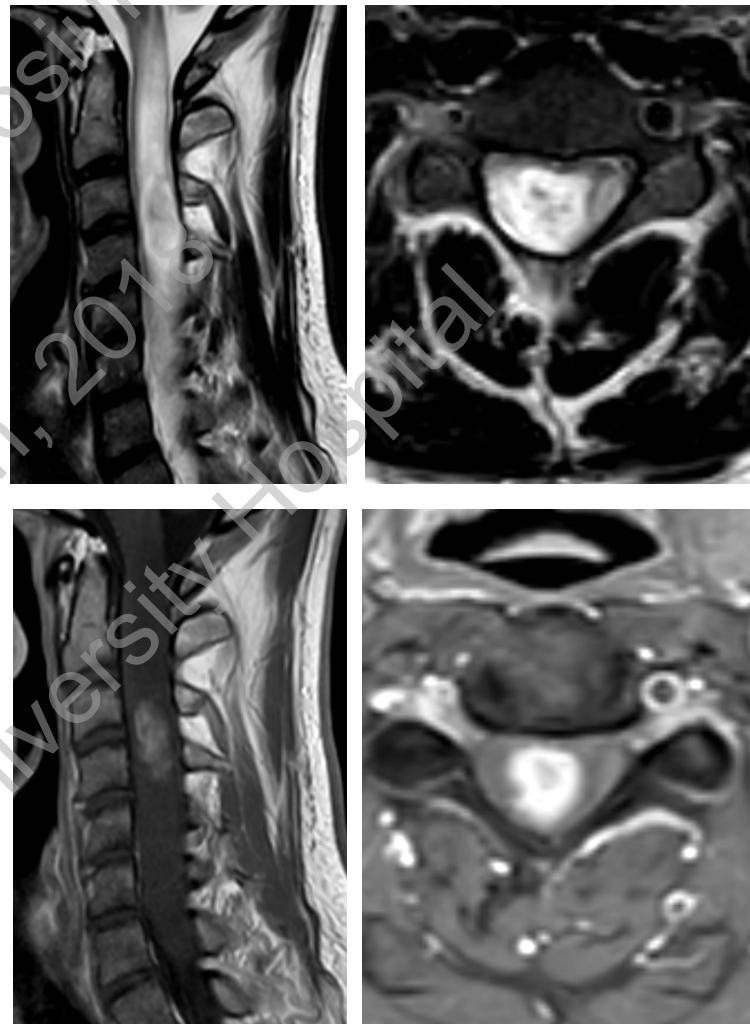


University Hospital  
Zurich

Complex Spine Symposium  
January 12th, 2018  
Balgrist University Hospital

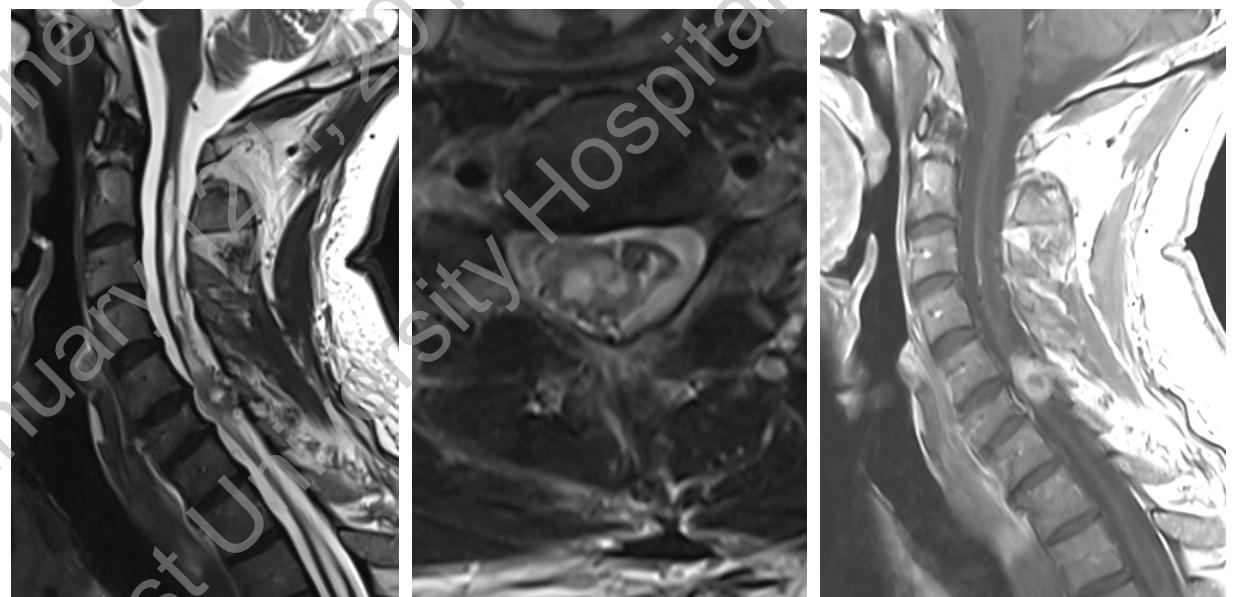
## 42 years-old male right-handed paramedic

- History of intermittent neck pain
- GP ordered MRI scan of the cervical spine
- No motor deficit, no myelopathy, no pain at presentation
- Medication: Tylenol as needed
- Suspected diagnosis: Ependymoma
- F/U 12 month: clinically and radiologically unchanged

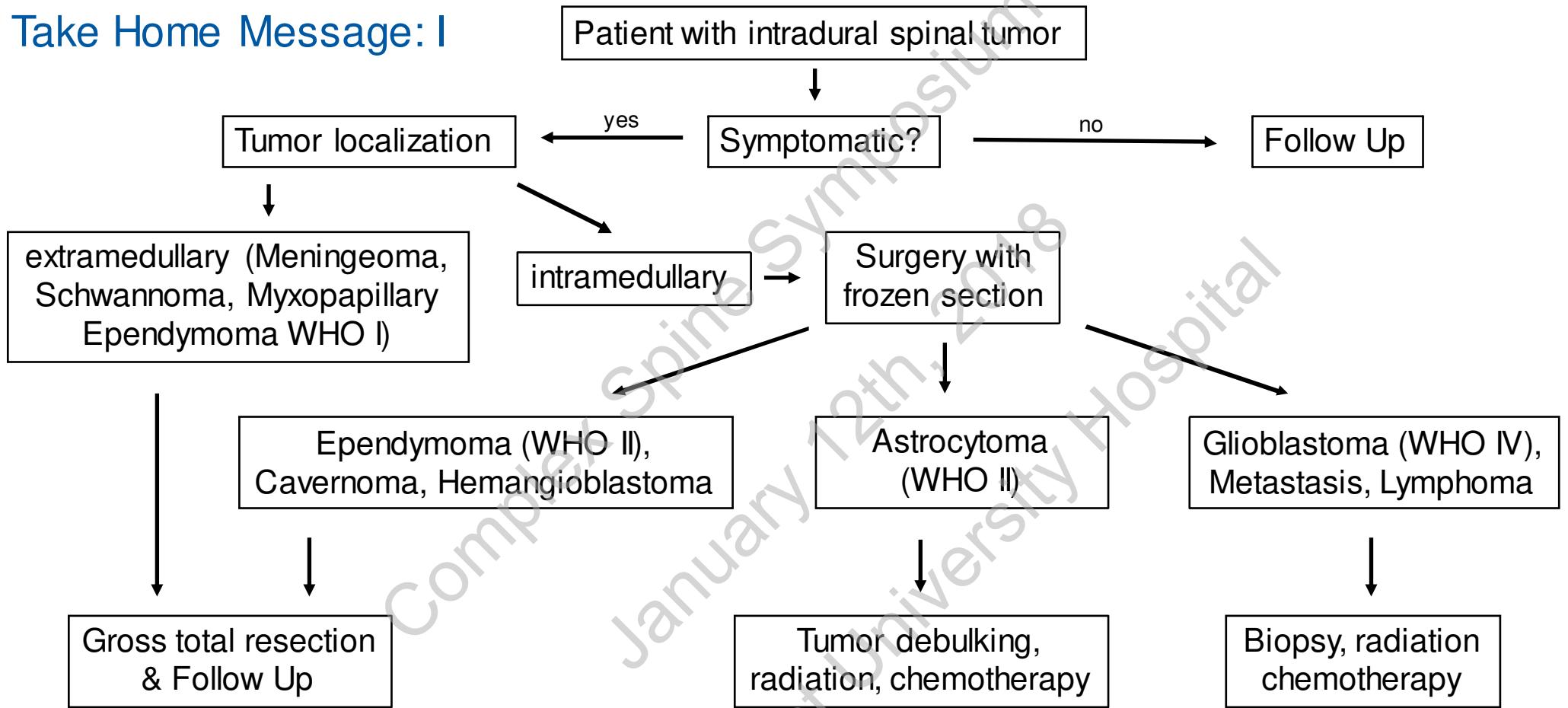


## 66 years-old male right-handed retired engineer

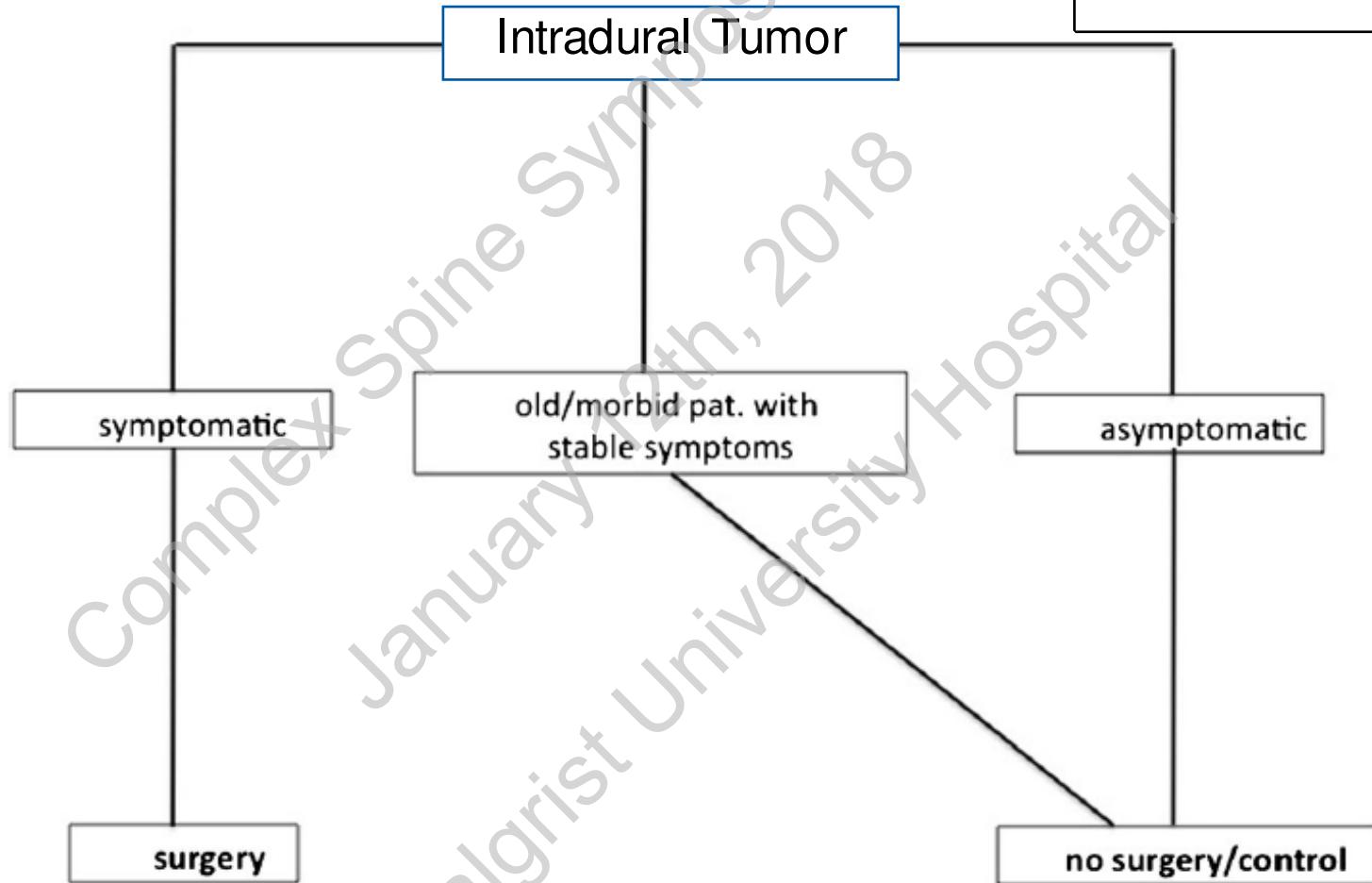
- Diagnosis of tumor of the cervical spine in 1989 due to tingling, numbness and slight motor weakness of right lower extremity
- Decision against surgical therapy and improved symptoms till 2013
- Progressive symptoms in 2013 in regards to function of right arm with numbness and motor weakness
- Improved symptoms with steroids and decision against surgical therapy
- Suspected diagnosis: Hemangioblastoma
- F/U 48 months: clinically and radiologically unchanged



## Take Home Message: I



## Take Home Message: II



Journal of Neurosurgical Sciences 2018 Jan 04

DOI: 10.23736/0390-5616.18.04305-9  
Copyright © 2018 EDIZIONI MINERVA MEDICA  
language: English

**The current management of spinal cord cavernoma**

Julia VELZ<sup>1,2</sup>, Oliver BOZINOV<sup>1</sup>, Johannes SARNTHEIN<sup>1,2</sup>, Luca REGLI<sup>1,2</sup>, David BELLUT<sup>1,2</sup>

<sup>1</sup> Department of Neurosurgery, University Hospital Zurich, Zurich, Switzerland; <sup>2</sup> Clinical Neuroscience Center, University of Zurich, Zurich, Switzerland



University Hospital  
Zurich

Complex Spine Symposium – Cervical Spine – Balgrist University Hospital

Thank you **very much**  
for your attention



University Hospital  
Zurich



University of  
Zurich UZH

Complex Spine Symposium  
January 12th, 2018  
Balgrist University Hospital

