

## Surgical Management of Giant Pituitary Adenomas

**Sandeep Kunwar, M.D.**

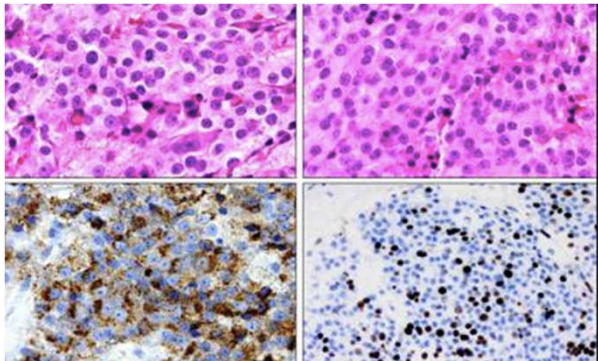
Surgical Director, California Center for Pituitary Disorders  
Associate Professor, University of California, San Francisco  
Co-Director, Gamma Knife Program, Washington Hospital



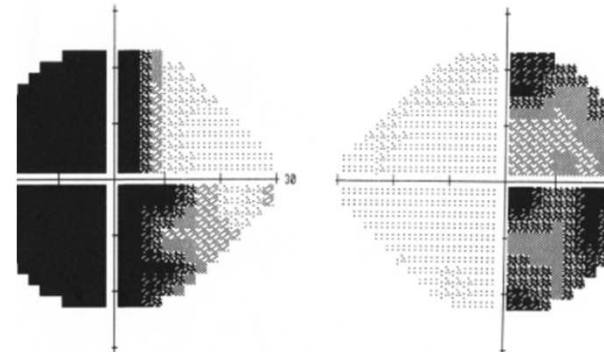
## Pituitary Adenomas

- Pituitary Adenomas are the third most common intracranial tumor
- The management of pituitary adenomas have exclusively transitioned to the transphenoidal approach
- Transcranial approaches are still being used in select cases for larger tumors (?)
- With improved techniques, imaging and visualization using the endoscope, the capabilities of the transsphenoidal approach is increasing

## We all see things differently: The world according to the Pathologist



## We all see things differently: The world according to the Ophthalmologist



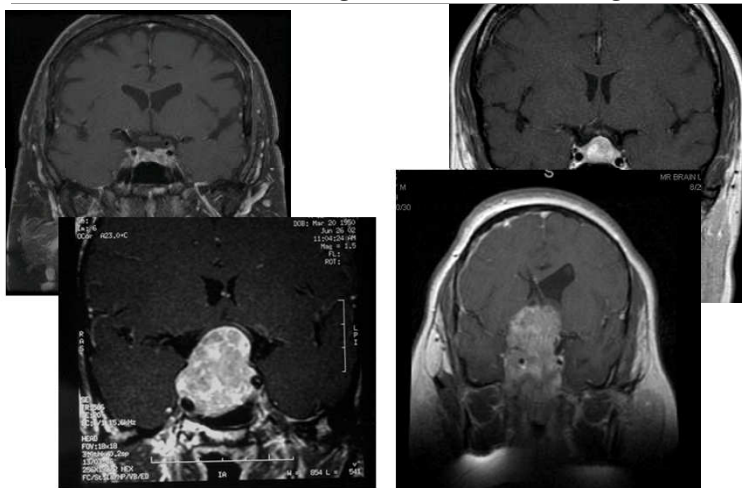
## We all see things differently: The world according to the Endocrinologist

	JUN 2012 (pre TRT)	AUG 2012 (at peak)	SEPT 2012 (at valley)	RANGES
TOTAL T	--	--	18.0	(5.6-30.4 nmol/L)
FREE T	48.6	112.5	65.7	(15.6-146 pmol/L)
E2	88	202	96	(40-161 pmol/L)
TSH	1.14	--	--	(0.35-4.94 mIU/L)
FREE T3	3.9	--	5.0	(3.8-6.0 pmol/L)
FREE T4	12	--	11	(8-15 pmol/L)
PSA	0.86	--	0.92	(<4 µg/L)
PROLACTIN	--	--	6.59	(2.6-13.1 µg/L)
CORTISOL AM	--	424	--	(185-624 nmol/L)
PROGESTERONE	0.55	--	--	(0-6nmol/L)

## We all see things differently: The world according to the Endocrinologist/Neurosurgeon



## We all see things differently: The world according to the Neurosurgeon



## Giant Pituitary Adenomas

- What are Giant Pituitary Adenomas?
- Do giant adenomas arise from more aggressive adenomas or are they just a delay in diagnosis?
- Best management for these tumors?

## Giant Pituitary Adenomas

- Definition:
  - No general consensus to size
  - Several studies (Cappabianca, et al, Gondim, et al, Yang, et al, Goel, et al) defined this to be **4cm**, while other large studies have defined this to be **3cm** (Juraschka, et al)
- Microadenoma (<1cm)
- Macroadenoma (>1cm)
- Large adenoma (>3 cm)
- Giant adenoma (>4 cm)

## Giant Pituitary Adenomas

- Retrospective analysis of the first consecutive 1000 endonasal transsphenoidal surgeries performed
- Surgeries performed 2001-2008
- 159 patients operated on had tumors >3 cm
- 59 patients had tumors >4cm

## Giant Pituitary Adenomas

- Ages ranged from 9-80 yo
  - Mean age was 49 yo
- Tumor sizes were 40-72mm
  - Mean max tumor length was 45mm
- 41 M (69%), 18 F (31%)
- 7 patients had prior surgery
  - 6 prior transsphenoidal surgery
  - 1 prior transcranial surgery

## Giant Adenomas

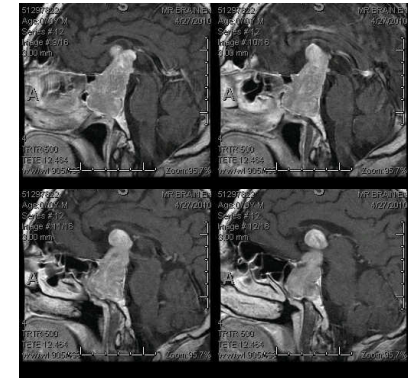
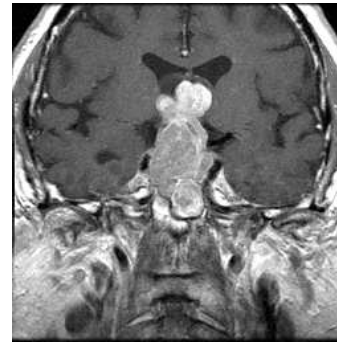
- 52 patients had Non-functioning adenomas (88%)
- 2 patients had acromegaly (3%)
- 2 patients had Cushing's disease (3%)
- 3 patients had prolactinomas
  - All 3 patients had failed medical therapy (cabergoline)

## Giant Adenoma – Presenting Symptoms

- Visual acuity loss was documented in 82% of patients
- Significant headaches were present in 17% of patients
- Diplopia was present in 5% of patients

## Case Presentation 1 - Giant Adenoma (5.5 cm)

- 70 yo male with bitemporal vision loss, headache, panhypopituitarism



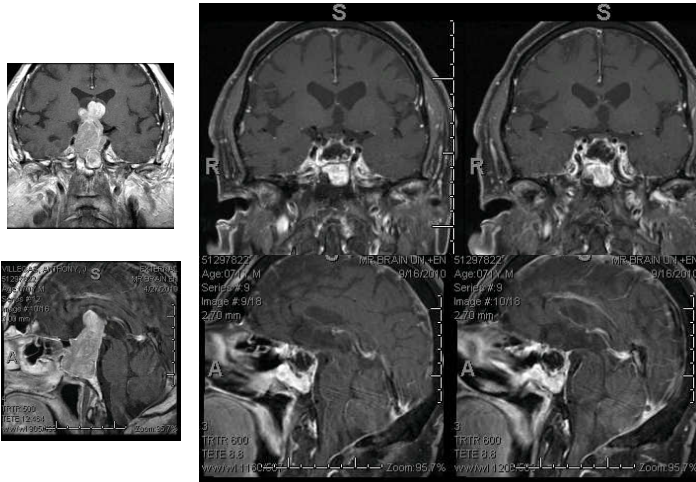
## Goals of therapy

- Decompress optic nerves
- Decompress neural tissue (hypothalamus)
- Minimize neural trauma
- Minimize field of radiation therapy if needed

## Case 1 - Outcome

- Patient underwent extended endonasal approach with endoscopic assist
- Patient had marked improvement in vision
- He had transient postoperative DI, but at 6 wk follow-up was not on DDAVP
- Discharge from the hospital on POD#2
- Pathology – pituitary adenoma with no atypical features

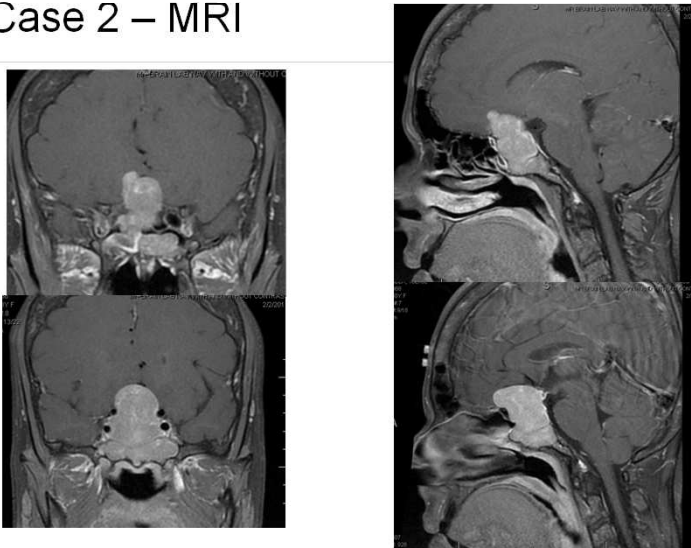
### Case 1 – Postop MRI scans (at 6 yr f/u pt had no recurrent disease)



### Case Presentation - 2

- 51 yo F presented with vision loss
- Clinical appearance classic for acromegaly
- Hormonal work-up
  - Prl – 55
  - GH – 10.9 ng/ml
  - IGF-1 – 662 ng/ml
- MRI showed a 4.7cm adenoma

### Case 2 – MRI



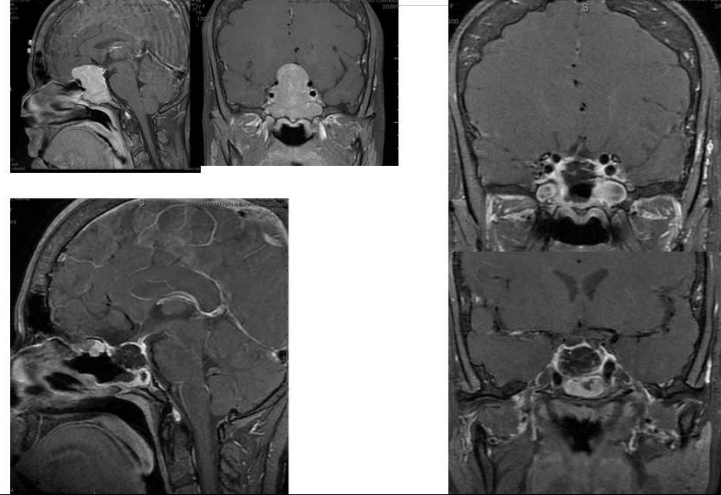
### Goals of treatment

- Decompress optic nerves
- Decrease/normalize IGF-1/GH
- Minimize neural trauma

## Case Presentation 2 - Outcome

- Patient underwent extended endonasal transphenoidal surgery with GTR
- Patient was discharged on POD#1
- At 12 week follow up
  - GH – 1.1 ng/ml
  - IGF-1 – 144 ng/ml
  - Prolactin – 7
- Pathology showed an atypical adenoma
  - + for GH and Prolactin
  - KI67 – 5%
  - P53 – 5%

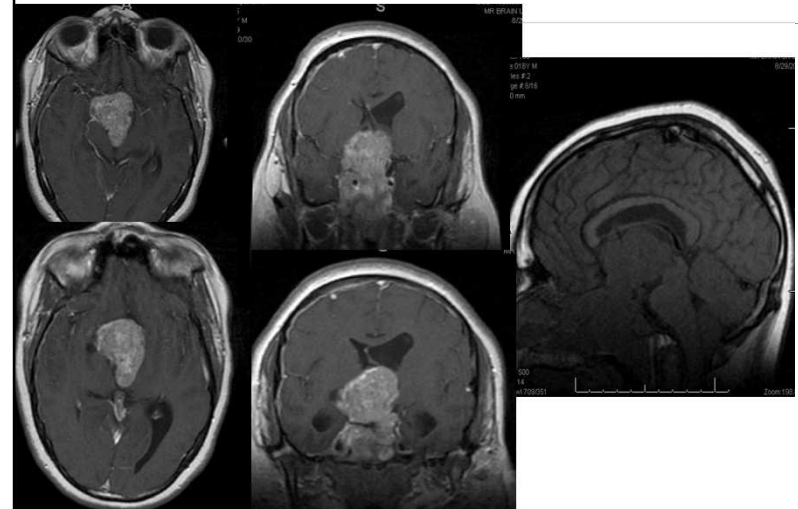
## Case 2 - Follow-up MRI



## Case Presentation - 3

- 18 yo M with progressive vision loss and obtundation
  - BTH and nasal field defect OD
- At presentation he was noted to have DI and panhypopituitarism (prolactin nl)
- Pt with DM-2, morbid obesity, metabolic syndrome
- Patient also had hydrocephalus and a VP shunt was placed prior to referral

## Case 3 - MRI scan



## Goals of treatment:

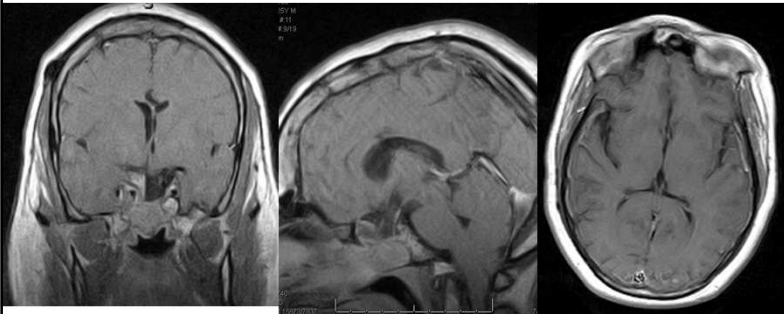
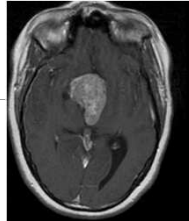
- Decompress optic nerves
- Decompress hypothalamus
- Minimize radiation field

## Case 3 - Treatment

- Patient underwent extended endonasal transphenoidal surgery (2006) for subtotal resection of his tumor
- Postoperatively, his DI was difficult to manage and was discharged on POD#7
- Vision improved OU
- Pathology showed atypical pituitary adenoma (KI-67 6%)
- Patient underwent radiation therapy 3 months after surgery

## Case 3 - Follow-up MRI

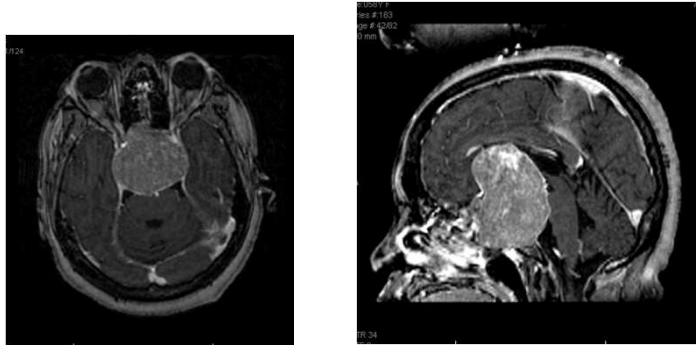
MRI stable at 8 yr follow-up



## Case Presentation - 4

- 58yo F with progressive vision loss
  - Blind OD, ¾ defect OS with LP
- No headaches
  
- Hormonal workup revealed normal prolactin with panhypopituitarism

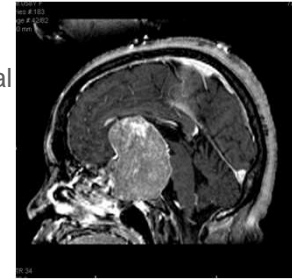
## Case 4 - MRI scan



Tumor measured: 60x70x40 mm in size

## Case 4 - Treatment

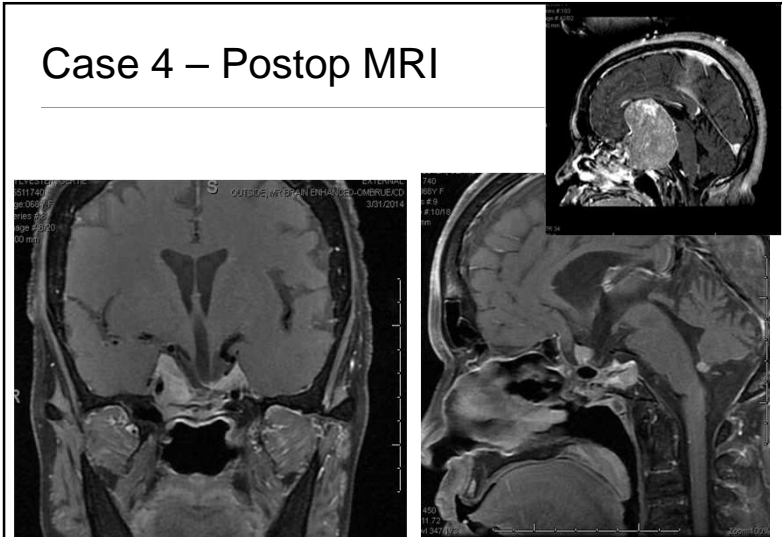
- Goals:
  - Decompress hypothalamus/Frontal lobes
  - Decompress Optic nerves
  - Minimize neural trauma
- Approach?
  - Transcranial
  - Transsphenoidal
  - Both?



## Case 4 -Treatment

- Patient underwent extended endonasal transsphenoidal surgery (2004) with resection of 80% of the tumor
- She was discharged to home on POD#2
  - No DI
- Her 3 month postop MRI showed a residual tumor in the cavernous sinus and suprasellar region, left optic nerve decompressed, right was decompressed but still distorted
  - OS – finger counting
  - OD – NLP
- She underwent another endonasal transsphenoidal surgery at 6 months (2005)
- Pathology – pituitary adenoma, no atypia

## Case 4 – Postop MRI



MRI 3/31/2014 – stable residual disease (no XRT)



## Giant Pituitary Adenomas - Complications

- There were no deaths in this series
- Complications:
  - Sinus infection: 14%
  - CSF leak: 5%
  - Permanent DI: 5%
  - Carotid injury: 0%
  - Stroke: 0%

## Giant Pituitary Adenomas

- Surgical Tips:
  - Intraoperative navigation
  - Use of lumbar subarachnoid drain to assist in descent of suprasellar capsule
  - Develop margins early and debulk centrally to facilitate descent of suprasellar capsule
  - Use of endoscope
  - Use of a suction on suction technique to tease capsule down

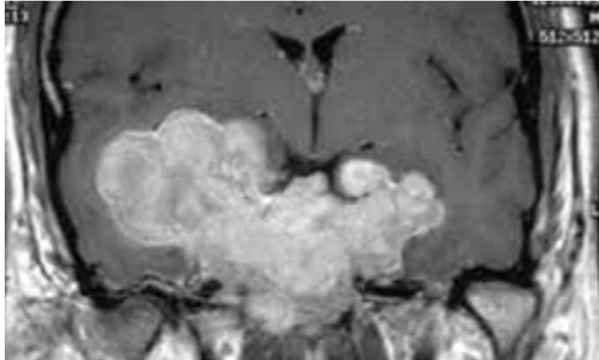
## Giant Pituitary Adenomas - Conclusion

- Treatment decision is based on goals
  - Since majority of tumors present with vision loss, surgery is warranted
  - All patients must undergo hormonal and ophthalmological evaluation prior to treatment including prolactin levels
  - Prolactinomas should only be considered for surgery if:
    - They have failed medical therapy
    - Have rapid onset of vision loss with hemorrhage
    - Develop a spontaneous CSF leak with medical therapy

## Giant Pituitary Adenomas - Conclusion

- Transsphenoidal surgery is safe and effective in this population with low morbidity
- Allows rapid decompression of the optic nerves and hypothalamus
- Should only be considered if:
  - tumor does not extend 1cm lateral to the ICA
  - There are no vessels invaginating/wrapped into the outer margins of the suprasellar tumor
- Residual tumor may apoplex postop (particularly with “mickey mouse” ears)

## No transphenoidal surgery!



## Giant Pituitary Adenomas - Conclusion

- In certain cases, complete resection may be possible
  - No cavernous sinus invasion, smooth tumor margins
- Goals of surgery should be determined in advance
  - Subtotal resection is ok
  - Radiation therapy is an effective postsurgical treatment

## California Center for Pituitary Disorders

### Department of Neurosurgery

Manish Aghi  
 Phil Theodosopolous  
 Tarun Arora  
 Gwen Stanhope  
 Lewis Blevins

### Division of Neuropathology

Andrew Bollen  
 Tarik Tihan  
 Airie Perry

### Division of Endocrinology

Lewis Blevins  
 Blake Tyrell

### Division of Neuroradiology

William Dillon  
 Chris Hess

