Surgical Management of Giant Pituitary Adenomas

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

<table>
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We all see things differently: The world according to the Endocrinologist/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)

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

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

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 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

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 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
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 transphenoidal 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 transphenoidal 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 - 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 - 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

- 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 1 cm 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

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California Center for Pituitary Disorders

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<th>Department of Neurosurgery</th>
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