Reducing Inappropriate Imaging Follow-up of Pituitary Incidentalomas on MRI

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Dr. William Mehan is a consultant for Kura Oncology (not related to present work)

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Introduction

- Incidental pituitary lesions found in 0.1-1.2% of MRI brain for unrelated reasons (Hoang et al., 2018). Inappropriate follow-up imaging of incidental pituitary lesions may result in:
  - Unnecessary/costly clinical work-up
  - Patient anxiety

- Natural history studies demonstrate (Fernández-Balsells, 2011):
  - Pituitary incidentalomas rarely have complications
  - Complications more likely in lesions >10 mm

- Imaging follow-up depends on:
  - Radiology recommendations/communication with clinician
  - Clinician education/agreement with recommendations

- Current guidelines:
  - Imaging: American College of Radiology (ACR) (Hoang, 2018)
  - Clinical: Endocrine Society Clinical Practice Guideline (Freda, 2011)
Purpose and Goals

1. Create Institutional Guidelines
   - Discuss ACR/Endocrine Society pituitary incidentaloma management guidelines
   - Include neuroradiology, neurosurgery, & endocrinology input
   - Specific to institutional needs

2. Template Intervention
   - Create radiology report template based on institutional guidelines
   - Body and impression macros

3. Educational Intervention
   - Present institutional guidelines and radiology report template to neuroradiology staff and trainees
   - Survey trainees before/after educational intervention

4. Application
   - Quality improvement initiative
   - Collect pre/post data
   - Goal: Reduce inappropriate MR examinations
Methods: Institutional Guidelines

• Societal incidentaloma management guidelines discussed with focus group
  • American College of Radiology (ACR) (Hoang, 2018)
  • Endocrine Society Clinical Practice Guideline (Freda, 2011)

• Include representatives from:
  • Neuroradiology department
  • Neurosurgery department
  • Endocrine department

• Create consensus guidelines based on institutional needs
### Methods: Current Guidelines

**American College of Radiology (ACR) (Hoang, 2018*)**

- **Incidentaloma < 10mm**
  - Clinical correlation/endocrine function tests
- **Incidentaloma > 10mm**
  - 6-12 month follow-up pituitary MRI

**Endocrine Society (Freda, 2011*)**

- **Pituitary MRI at**
  - 12 months for incidentaloma ≤ 10mm
  - 6 months for incidentaloma > 10mm

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*Please note images/figures from:
Methods: Interventions

• Template Intervention
  • Radiology report template created based on consensus institutional guidelines
    – Body macro: lesion size, MRI characteristics, and mass effect
    – Impression macro: Pick-list of imaging findings is linked with the appropriate clinical follow-up recommendation based on selected size and/or mass effect

• Education Intervention
  • Consensus institutional guidelines and report templates presented to neuroradiology staff and trainees

• Pre- and post- intervention MRI reports of incidentally found pituitary lesions retrospectively reviewed
  • Data collected: Lesion descriptors, mass effect, follow-up recommendations

• Pre- and post- intervention surveys distributed to 25 neuroradiology fellows
Results: Consensus Institutional Guidelines

Incidental Pituitary Lesion seen on CT or MRI

- Size < 10mm
  - Recommendation: Clinical correlation and assessment of endocrine function
  - Dedicated pituitary MRI in 12 months

- Size > 10mm
  - Recommendation: Clinical correlation and assessment of endocrine function
  - Dedicated pituitary MRI in 6 months

- Mass effect and/or involvement of surrounding structures
  - Recommendation: Neurosurgical/endocrine referral for further management
Results: Report Template

Body Template

- “Incidental finding of a [texture 1] [texture 2] [Enhancement pattern]
  - Texture 1: T1 hypointense/T1 hyperintense/T2 hypointense/T2 hyperintense/hypodense/hyperdense
  - Texture 2: cystic/solid/mixed cystic and solid
  - Enhancement pattern: focus of decreased enhancement/enhancing lesion

- in the pituitary gland measuring [size].
  - Size: in mm (series ___, image ____).

- There is [mass effect]”
  - Mass effect: no mass effect on the adjacent structures/mass effect on the optic chiasm/mass effect on the optic nerves/mass effect on the optic chiasm/mass effect on the adjacent cavernous sinus.

- Recommendation [size]:
  - Size: Pituitary lesion <10 mm
  - Based on the incidental pituitary lesion size <10 mm, consider correlation with clinical history of pituitary hypersecretion, endocrine function tests and dedicated pituitary MRI in 12 months.
  - RECOMMENDATION: Consider correlation with clinical history, endocrine function tests and dedicated pituitary MRI in 12 months.

- Size: Pituitary lesion >10 mm
  - Based on the incidental pituitary lesion size >10 mm, consider correlation with clinical history of pituitary hypersecretion, endocrine function tests and dedicated pituitary MRI in 6 months.
  - RECOMMENDATION: Consider correlation with clinical history, endocrine function tests and dedicated pituitary MRI in 6 months.

- Size: Pituitary lesion with mass effect
  - Given the presence of mass effect and/or invasion into surrounding structures, consider Neurosurgical/Endocrine referral for further management.
  - RECOMMENDATION: Consider neurosurgical/endocrine consultation for further management of the incidental pituitary lesion.

- References: MGH Pituitary Incidentaloma Guidelines 2021, modified from:
Results: Baseline Data

• Pre-template/educational interventions, brain MRI reports describing pituitary incidentalomas were serially reviewed (n=52)
  • Lesion size described in 88% (n=46)
  • Mass effect described in 29% (n=15)
  • Follow-up imaging recommended in 75% (n=39)
  • Based on ACR size criteria, 23% (n=12) recommended correct imaging follow-up
Results: Post-interventional Data

- Post-template/educational interventions, brain MRI reports describing pituitary incidentalomas were retrospectively reviewed (n=11 in 3 months)
  - All used the template or with minor modifications (ie wording, order, etc)
  - Lesion size described in 100% (n=11) of reports
  - Mass effect described in 100% (n=11)
  - Based on institutional guidelines, 91% (n=10) reports recommended correct follow-up
Results: Fellow Survey

Pre- Educational Intervention (n=21; response rate 84%)

• 24% of fellows felt comfortable providing follow-up pituitary incidentalomas recommendations

Post- Educational Intervention (n=22; response rate 88%)

• 91% of fellows felt comfortable providing follow-up pituitary incidentalomas recommendations
Discussion

- Management criteria for pituitary incidentalomas on MRI formally provided by societal guidelines (Freda, 2011; Hoang, 2018)
  - Require both education and agreement/buy-in by both the clinician and radiologist
  - Societal guidelines may be at odds with institutional/individual needs, reducing compliance

- Trainees may be unsure of the management of pituitary incidentalomas
  - Direct educational intervention may improve comfort levels and utilization (Shaughnessy, 2012)

- Radiology report templates as a quality improvement tool (Cook, 2022; Schnitzer 2021; Sistrom, 2005)
  - Improved the inclusion of lesion size, mass effect, and appropriate follow-up in our study
  - Can be modified to institutional/individual needs and reporting styles
    - Radiologist checklist
    - Follow-up management does not need to be memorized/looked-up

• Shaughnessy AF, Gupta PS, Erlich DR, Swanson DC. Ability of an information mastery curriculum to improve residents’ skills and attitudes. Fam Med. 2012 Apr;44(4):259-64. PMID: 22481155.
Conclusions

- Appropriate imagining follow-up of pituitary incidentalomas dependent on:
  - Clinician buy-in
    - Societal guidelines versus specific institutional needs
  - Radiologist buy-in
    - Educating individuals on guidelines
    - Improve trainee comfort on providing recommendations
  - Clear communication between radiologist and primary team
    - Radiology report template
      - Dropdown choices for follow-up based on guideline criteria
      - Consistent/appropriate follow-up recommendations
Thank you

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