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Title:

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Date:

2018-05-01

Citation:

Dhillon, R. S., King, J. A., Goldschlager, T. & Wang, Y. Y. (2018). Synoptic reporting of pituitary magnetic resonance imaging. *ANZ Journal of Surgery*, 88 (5), pp.460-463. <https://doi.org/10.1111/ans.14489>.

Persistent Link:

<https://hdl.handle.net/11343/283905>

Full title:

Synoptic reporting of pituitary magnetic resonance imaging.

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Declarations:

The corresponding author is not currently the recipient of a research scholarship, though he has received research scholarships in the past administered by the Royal Australasian College of Surgeons and the Neurosurgical Society of Australasia.

Manuscript details:

Abstract word count: 249.

Text word count: 1568.

Number of tables: 3.

This is the author manuscript accepted for publication and has undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the [Version of Record](#). Please cite this article as doi: [10.1111/ans.14489](https://doi.org/10.1111/ans.14489)

Introduction

Pituitary adenomas are common tumours with a prevalence of 22.5% in radiological studies.¹ Data from the Organisation of Economic Co-operation and Development (OECD) show that the number of MRI scans being ordered per capita over the period 1995-2014 has doubled in Australia and more than trebled in the United States.² It stands to reason then that the number of new diagnoses of pituitary adenomas based on MRI studies will also continue to increase. Whilst there is consensus about what constitutes an essential data set amongst radiologists, the variability in reporting styles of radiologists has been well documented.^{3,4} It is also well documented that radiologists and surgeons identify different parameters as being more important than others.⁵ Synoptic reporting consists of using structured checklists to standardise communication. It has been shown to be of benefit in the surgical pathology literature⁶ and is now adopted as standard of care by the College of American Pathologists when reporting tumour excisions.⁷ More recently, it has been adopted by the radiology community and in particular the breast imaging field, where it has been shown to improve reporting quality.⁸ The purpose of this study was to assess what parameters of a pituitary MRI report were useful to surgeons. In doing so, we propose a template for synoptic reporting of pituitary MRIs that surgeons find useful.

Materials and methods

We used the Delphi technique to obtain group consensus. The Delphi technique is a structured process which avoids domination of the process by any one particular expert. We surveyed three neuroradiologists, three otolaryngologists and three anterior skull base neurosurgeons across three tertiary Melbourne hospitals that service a population of approximately 4 million people. Participants were blinded to the identities and professions of other participants. We focussed on 10 key areas; MRI sequences and planes, pituitary adenoma, optic chiasm, cavernous sinus, internal carotid artery complex, sphenoid sinus, nasal cavity, pituitary stalk, differential diagnosis and common grading systems. Round one of the Delphi process consisted of an open ended questionnaire asking clinicians to list the characteristics in each of the 10 key areas that they found most useful. Round two of the Delphi process consisted of taking the most common answers from round one and asking clinicians to rank them in order of most to least important. Round three then asked clinicians to raise objections to the final ranked list of characteristics.

Answers from the three speciality groups were then converted into numerical scores. Within a category, the features deemed most important was assigned a score of one, the

feature deemed next most important was assigned a score of two and so on until all features were assigned a score. Results were analysed using PASW Statistics GradPack 18 (SPSS software, formerly Chicago, Illinois, USA. Now owned by IBM Corporation, Armonk, New York, USA). We applied a parametric one-way analysis of variance (ANOVA). We pre-determined a significance level (alpha) of 0.05, such that a difference was deemed significant if there was less than a 5% chance of a null hypothesis being rejected when it was in fact true.

Results

There was statistically significant consensus between specialties over which characteristics were deemed most important (*Table 1*). These are summarised as follows; T1 pre and post contrast sequences in the coronal and sagittal planes, the degree of displacement of the optic chiasm, invasion of the medial wall of the cavernous sinus, the size and pneumatization pattern of the sphenoid sinus, and the differential diagnosis of aneurysm.

There was also statistically significant consensus between specialties over which features were deemed unimportant (*Table 1*). In particular, diffusion weighted imaging to assess for cellularity, the presence of necrosis, thinning of the optic chiasm, size of the cavernous sinus, stenosis of the ICA, position of the sphenoid os and arachnoid cyst as a differential diagnosis.

There was good concordance between specialties as to which features of the cavernous sinus were relevant, but there was little consensus between or within specialties about the relevant features of the pituitary stalk.

Some features showed differences between specialties that reached statistical significance (*Table 2*). Radiologists found T1 dynamic post contrast views for suspected microadenomas and the consideration of lymphocytic hypophysitis as a differential important whereas surgeons did not. Conversely, surgeons felt that sphenoidal septal deviation was important whereas radiologists did not. Neurosurgeons and radiologists found the presence of a cavernous aneurysm important whereas otolaryngologists did not. Conversely, otolaryngologists found sphenoidal mucosal disease important whereas the other specialties did not. Neurosurgeons felt that grading systems, and the position of the chiasm relative to the stalk (pre vs post fixed) were useful whereas other specialties did not.

Based on the results of the Delphi interview process we have proposed a template upon which pituitary MRI reporting could be based in such a way as to provide information that is useful to the surgical team (*Table 3*)

Discussion

The results showed both similarities and differences between clinicians in terms of what was deemed important.

The fact that there are strong similarities show that neuroradiologists understand the radiological data set required by clinicians when deciding whether or not to treat a pituitary adenoma. For example, information regarding the degree of displacement of the optic chiasm is an important consideration in deciding to treat a patient with a nonfunctional adenoma without visual failure. It also shows a good understanding of information required to make decisions about surgical safety and ease of access. For example, deviation of the nasal septum and pneumatization pattern of the sphenoid sinus determine ease of access, inter-carotid distance determines safety of access to the sella and invasion of the medial cavernous sinus wall determines feasibility of gross total resection. This clinical insight on behalf of the radiologists may be a product of experience, or of the collaboration with clinicians that occurs within multidisciplinary meetings. Regardless, it shows a good understanding by radiologists of the fundamentals that influence decision making by pituitary surgeons.

The presence of differences suggests that there are subtleties not routinely included in pituitary MRI reports that surgeons find useful. For example, the presence of sphenoidal mucosal disease can make access difficult and increase the risk of post operative infection, whilst the position of the chiasm relative to the pituitary stalk can influence the decision to approach transcranially or transnasally. The fact that surgeons do not view T1 dynamic post contrast views for suspected functional microadenomas as an essential inclusion perhaps reflects that this sequence is not routinely encountered by them and requires subspecialist radiologist interpretation.

The literature from other surgical fields supports these findings. A Belgian study of 873 clinicians and radiologists found that there are key differences in what the two groups deem as important. Furthermore, almost 85% of clinicians in this study preferred structured itemised reports, though only 55% of radiologists felt the same.⁵

The fact that these differences exist between groups affirms the need for a consistent language to improve communication. Synoptic reporting provides such a language, and may therefore facilitate discussion between speciality groups, and encourage audit and peer review.

There are several limitations with this study. Firstly, the sample size is small, though we feel it is a representative sample of key opinion leaders in the field from a single city.

Secondly, the Delphi process does not allow for debate. Though this is seen as a strength by some as it prevents a single voice from dominating the conversation, others would argue that consensus should be weighted more towards experienced voices. Lastly, the study was limited to MRI whilst the findings showed that otolaryngologists in particular find CT a more useful modality for surgical planning.

Conclusion

This study aims to clarify what parameters of a pituitary MRI report are useful to surgeons and in doing so, highlights the similarities and differences in what neuroradiologists and their surgical counterparts deem as important. Synoptic reporting has been shown in the pathology and breast imaging fields to result in reports that clinicians find more useful. Furthermore, by providing a consistent lexicon it may improve communication between specialty groups and facilitate peer review. This study proposes a structured itemised form for the reporting of pituitary MRI. Should such a form be adopted, the authors feel this would improve the quality of communication between clinicians, and ultimately the quality of outcomes for patients.

Acknowledgements

Dr Rana Dhillon has been the recipient of the Reg Worcester Research Fellowship administered by the Royal Australasian College of Surgeons, and a Neurosurgical Society of Australasia Research Scholarship. The funds from these scholarships was not used to fund this research.

Disclosures

The authors have no conflicts of interests to declare.

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