

Initial Data From The Intracranial Tumour Registry Of The University Of The West Indies: Radio-Pathological Correlation Of Meningiomas

P Johnson, J Jaggon, C Bruce, J Campbell, I Crandon, G Char, D Eldemire-Shearer

Citation

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Abstract

INTRODUCTION: Meningiomas are the most common primary intracranial tumors. Despite the majority being benign, they can have a significant impact on morbidity and mortality due to mass effects. This paper seeks to utilize data from the newly instituted Intracranial Tumor Registry (ITR) at the University Hospital of the West Indies (UHWI) to report on the radio-pathologic correlation of meningiomas seen at that institution, the first in the region with the capability of performing such an analysis. **METHOD:** A review of all the cases entered in the ITR between the years 2006 and the present day was performed. Only patients with initial Magnetic Resonance Imaging (MRI) reports from the UHWI Radiology Department were included in this study, and these findings were correlated with the pathological findings from the surgical specimens reviewed at the UHWI. **RESULTS:** Of a total of 138 cases with imaging suggestive of meningioma, 85 had UHWI pre-operative imaging reports. 24 of these patients had a pathologic assessment and 18 (75%) were confirmed as meningioma, with demographic features in keeping with other studies. Of the remaining 6 patients, 4 had a malignancy diagnosed on histologic evaluation. **CONCLUSION:** Despite a relatively large number of patients undergoing imaging with a presumed diagnosis of meningioma, few (17%) had pathological confirmation; the major reasons for this are discussed. There was positive radio-pathologic correlation in 75% of the patients who had histologic appraisal of their intracranial lesions. This seems low in comparison to existing work regarding sensitivities and specificities of MRI in diagnosing meningioma. The actual images were not reviewed in this study. A further study reviewing the images involved in these cases may prove helpful.

INTRODUCTION

Meningiomas are primary intracranial tumors that arise from the arachnoid cap cells of the meninges. They are the most common primary intracranial tumors, and account for about 34% of all primary intracranial tumors (1). While the majority are benign, they have a significant impact on morbidity and mortality due to raised intracranial pressure and other results of mass effect.

Data on meningiomas in Jamaica is scant. There has been one paper previously published describing the epidemiologic profile of meningiomas in Jamaica (2). There are, to date, no studies from the English speaking Caribbean documenting radio-pathological correlation. This paper seeks to utilize data from the newly instituted ITR to report the first such radio-pathological correlation from this region.

METHOD

A retrospective review of all the cases entered into the ITR was done using the search string "meningioma". Only patients with initial MR imaging done at the UHWI were included in the study. The actual images were not reviewed. Pathological findings were retrieved from the files in the Pathology Department at the UHWI. The World Health Organization (WHO) 2007 criteria were employed for pathological grading.

The following data was retrieved:

A review of the radiological findings was performed, and a correlation with pathological findings was made.

RESULTS

138 cases were initially identified from the ITR based on MRI reports suggesting a diagnosis of meningioma. Fifty-

three cases were excluded, as the pre-operative scan was not performed at the UHWI. Of the remaining 85 cases with available UHWI pre-operative MRI scans, surgical pathology reports were found for 24 patients; fifty-five patients had no evidence of surgical biopsy/resection, while 5 patients were treated at another institution. In one case, a reason for a lack of histology could not be determined. Of the 24 patients with histology of their intracranial masses, 18 were confirmed as meningiomas. The pathological findings of the final cohort of 24 patients are outlined in Table 1.

Figure 1

Table 1. Pathological diagnoses and grade of lesions of final cohort of patients

Diagnosis	Number of patients	WHO* Grade1	WHO Grade2	WHO Grade3	WHO Grade4	No Grade assigned
Transitional meningioma	9	9	-	-	-	-
Meningothelial meningioma	7	5	2	-	-	-
Metaplastic meningioma	2	2	-	-	-	-
Glioblastoma multiforme	2	-	-	-	2	-
Pituitary adenoma NOS	1	-	-	-	-	1
Metastases	1	-	-	-	-	1
Non-Hodgkin's Lymphoma	1	-	-	-	-	1
Sample inadequate	1	-	-	-	-	1
TOTAL	24	16	2		2	4

*WHO- World Health Organization

Of the 18 patients with a confirmed diagnosis of meningioma, only twelve had their ages recorded; these ranged between 33 years and 76 years. Overall, there were seven males and eleven females, thus achieving a Male: Female ratio of 1:1.6. The size of the meningiomas ranged between 6.4 mls and 248 mls, based on imaging measurements. Two cases were described as “en-plaque” and no measurements given. The larger tumours occurred in males (range: 12.8mls – 248 mls) compared to females (range: 6.4 mls – 113 mls).

Three histological subtypes of meningioma were identified:

The most common location was the convexities (Table 2).

Figure 2

Table 2. Location of subtypes of meningioma

Location	No. of cases (%)	Transitional meningioma	Meningothelial meningioma	Metaplastic meningioma
Convexity	6 (33%)	1	3	2
Parasagittal	3 (17%)	3	-	-
Sphenoidal	5 (28%)	3	2	-
Frontobasal	2 (11%)	1	1	-
Posterior fossa	1 (5.5%)	1	-	-
Other	1 (5.5%)	-	1	-
TOTAL	18 (100%)	9	7	2

The imaging features for the patients with confirmed meningioma are given in Table 3.

In only 6 cases did the reports mention T1 and T2 features of the tumours.

Three of the 9 transitional meningiomas had recorded T1/T2 signal changes. Two demonstrated T1 isointensity and one T1 hypointensity. Two demonstrated T2 hyperintensity and one demonstrated T2 isointensity.

Two of the 7 meningothelial meningiomas had recorded T1/T2 signal changes. Both cases demonstrated T1 isointensity and T2 hyperintensity.

One case of metaplastic meningioma had recorded T1/T2 signal changes. This tumour also demonstrated T1 isointensity and T2 hyperintensity.

Figure 3

Table 3. Imaging features of histologically confirmed meningiomas

Type	Enhancement	Oedema	Cystic Change	Necrosis
Transitional	8 (89%)	0	1 (11%)	1 (11%)
Meningothelial	7 (100%)	4 (57%)	1 (14%)	0
Metaplastic	2 (100%)	1 (50%)	0	0

Of the 6 patients whose masses were histologically proven not to be meningiomas (as suggested by imaging) four had a malignant diagnosis (Table 1).

DISCUSSION

The total number of cases with a final pathologic diagnosis of meningioma was 18. Of these, 50% were transitional, 39% meningothelial and 11% metaplastic. The majority of meningiomas were located in the convexities. This corresponds to other published data (2, 3).

T1 enhancement post administration of chelated gadolinium contrast was seen in all except one case (a transitional meningioma). This is typical of meningiomas (4,5,6).

Unfortunately, T1 and T2 characteristics were reported in

only 6 cases overall. Despite this low number, meningiomas were predominantly T1 isointense and T2 hyperintense. This correlates with other published data (7, 8, 9).

The number of cases finally included in this study (n=24) represents only 18% of the total possible cases (n=138). The reasons for this include:

Patients with original scans originating from an external institution (38%)

Patients who had not yet had surgical resection/biopsy (39%)

Patients who had treatment elsewhere (3.6%)

The low final number of cases (n=24) raises concerns regarding patient management. We were not able to obtain reasons for those patients not having a pathological diagnosis. While the cause of this is unclear, it may be one of the following:

Long waiting times for surgery given the limited access to functional operating rooms at the UHWI

Patients refusing surgery

Patients lost to clinical follow-up

Six (25%) of the final cohort of 24 patients with histology had a pathologic diagnosis other than meningioma (Table 1); four of these had a pathologic diagnosis of a malignancy, including two who were diagnosed with glioblastoma multiforme (GBM), a WHO grade IV glioma. This relatively large number of false positives raises concern for other patients who had a presumptive imaging diagnosis of meningioma but who may in fact have a malignant lesion. Of the two GBMs, none were reported to have associated oedema, but both demonstrated enhancement. One was reported to have cystic changes and haemorrhage. The single non-Hodgkin's lymphoma (NHL) was located in a parasagittal location and demonstrated enhancement and T1 and T2 isointensity, which are typical findings for NHL (10, 11). Peripheral locations of GBM and NHL are more common; this may also have contributed to the false positive findings (11, 12). GBMs may demonstrate "atypical features" which may have also contributed to additional false positive MRI findings.

One patient with a sellar mass was eventually confirmed to have a pituitary adenoma instead of a meningioma; these are two of the most common differential diagnoses for this

location. Both may demonstrate similar MRI features (13). Review of the previous MR images in this case should prove useful.

A single patient underwent surgery whose specimen was reported as "sample not sufficient for diagnosis". Evidence of re-biopsy was not found.

Given the retrospective nature of this study, true correlation of imaging and pathologic findings is suboptimal. This is largely due to the non-standardized reporting done by radiologists. Though diffusion weighted imaging is routinely performed on all brain MRI studies done at the UHWI, these findings were not recorded in the reports.

Image guided stereoscopic surgery is available at the UHWI. The MR dataset for this stereoscopic imaging is routinely invoked for all intracranial tumours undergoing biopsy or resection. To date, no study has been published evaluating its efficacy at this institution. Advanced MRI studies such as MR tractography, MR perfusion, multivoxel spectroscopy and fBold imaging are not currently offered at the UHWI. However, these techniques are usually reserved for intra-axial tumours and not routinely employed for meningiomas.

A follow-up prospective study reviewing patients in the registry utilizing a standardized format of reporting may prove useful.

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Author Information

P Johnson

Department of Surgery, Radiology, Anaesthetics & Intensive Care, University of the West Indies

JR Jaggon

Department of Pathology, University of the West Indies

C Bruce

Department of Surgery, Radiology, Anaesthetics & Intensive Care, University of the West Indies

J Campbell

Department of Surgery, Radiology, Anaesthetics & Intensive Care, University of the West Indies

I Crandon

Department of Surgery, Radiology, Anaesthetics & Intensive Care, University of the West Indies

G Char

Department of Pathology, University of the West Indies

D Eldemire-Shearer

Department of Community Health and Psychiatry, University of the West Indies