

PHAEOCHROMOCYTOMA IN CHILDHOOD: RADIOLOGICAL-PATHOLOGICAL CORRELATION

Gary Sudwarts
Student Number 0704343W

A research report submitted to the Faculty of Health Sciences, University of
the Witwatersrand, in partial fulfilment of the degree of

Master of Medicine in Radiology

Johannesburg 2012

Declaration

I, Gary Sudwarts declare that this research report is my own work. It is being submitted for the degree of Master of Medicine in Radiology at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at this or any other University.

Gary Sudwarts

on this 7th day of September 2012

Dedication

For Anli and our little girl Ellana

Publications and Presentations

This work has not been submitted for publication however it will be edited, reformatted and submitted to several international journals for publication.

Abstract

Phaeochromocytomas are exceptionally rare tumours in children. We describe a series of 15 children diagnosed with 16 phaeochromocytomas diagnosed over 21 years. The series was collected from the Johannesburg Academic Hospital Complex and Great Ormond Street Hospital in London. We describe the clinical presentation, imaging characteristics, histological findings and the outcome of this group.

Acknowledgements

I would like to thank:

Professor Victor Mngomezulu, Head of the Department of Radiology at Charlotte Maxeke Johannesburg Academic Hospital for supervising this MMed dissertation.

Professor Savvas Andronikou.

Dr Derek Roebuck Consultant Paediatric Radiologist; Dr Neil Sebire Consultant Histopathologist and Dr Kieran McHugh Consultant Radiologist at the Great Ormond Street Hospital in London, United Kingdom.

Dr Ernst Boshoff, Dr Linda Wainright, Professor Janet Poole, Dr Bernard Goodwin, Dr Parbhoo. Dr Khushica Purbhoo, Dr Alison Bentley and Professor Mala Modi.

Table of Contents

	Page
Declaration	ii
Dedication	iii
Publications and Presentations	iv
Abstract	v
Acknowledgements	vi
Table of Contents	vii
List of Figures	x
List of Tables	xi
1. Introduction	1
1.1. Purpose and objectives	1
1.1.1. Main objectives	1
1.1.2. Secondary objectives	1
1.2. Limitations	2
2. Literature review	4
2.1. Definition	4
2.2. Demographic and clinical	4
2.3. Biochemistry	6
2.4. Imaging	7
2.4.1. Ultrasound	7
2.4.2. Magnetic Resonance Imaging	7
2.4.3. Multidetector Computed Tomography	8
2.4.4. Nuclear Medicine	8
2.5. Histology	9

	Page
2.6. Management and follow up	10
3. Methods	12
4. Results	16
4.1. Clinical and demographic data	16
4.2. Biochemistry	18
4.3. Location	18
4.4. Imaging findings	20
4.4.1. Ultrasound	20
4.4.2. Multidetector Computed Tomography	22
4.4.3. Magnetic Resonance Imaging	26
4.4.4. Nuclear medicine	28
4.5. Surgical findings	29
4.6. Histo-pathological findings	29
4.7. Outcome and follow up	30
5. Discussion	31
5.1. Imaging of pheochromocytomas	31
5.2. Correlating imaging, histological and surgical findings with clinical outcome	35
5.3. Clinical symptomatology and demographic profile	37
5.4. Correlation of imaging features with the histological findings	39
6. Conclusion and recommendations	40
Appendix 1 Wits approval of title	42
Appendix 2 Ethics Clearance – University of the Witwatersrand	43

	Page
Appendix 3 Ethics clearance- Great Ormond Street Hospital	44
Appendix 4 Data Collection Table	45
Appendix 5 Data Summary Table	50
References	54

List of Figures

	Page	
Figure 1.1	Ultrasound image of a phaeochromocytoma	21
Figure 1.2	Ultrasound image of a phaeochromocytoma	21
Figure 2.1	Contrast enhanced MDCT of the abdomen	23
Figure 2.2	Contrast enhanced MDCT of the abdomen	23
Figure 3	Contrast enhanced MDCT of the abdomen	24
Figure 4.1	Contrast enhanced MDCT of the abdomen	24
Figure 4.2	Contrast enhanced MDCT of the abdomen	25
Figure 5	MRI of the abdomen, T2 WI fat saturation	27
Figure 6.1	MRI, FLAIR sequence of the brain	27
Figure 6.2	MRI, FLAIR sequence of the brain	27
Figure 7	MIBG with fused SPECT/CT of the abdomen	28

List of Tables

		Page
Table 1	Clinical Symptoms	17
Table 2	Tumour location	19
Table 3	MRI signal characteristics of pheochromocytomas	26
Table 4	Tumour size and histologically confirmed invasion	39