**British Society of Neuroradiologists**  
Annual Scientific Meeting  

Friday 7th and Saturday 8th October 2016  
The Royal York Hotel  

**Local Organising Committee**  

Dr Tony Goddard, Consultant Neuroradiologist, The Leeds Teaching Hospitals NHS Trust  
Dr Ian Craven, Consultant Neuroradiologist, The Leeds Teaching Hospitals NHS Trust  
Dr Stuart Currie, Consultant Neuroradiologist, The Leeds Teaching Hospitals NHS Trust  
Dr Jeremy Macmullen-Price, Consultant Neuroradiologist, The Leeds Teaching Hospitals NHS Trust  
Dr John Straiton, Consultant Neuroradiologist  
Dr Daniel Warren, Consultant Neuroradiologist, The Leeds Teaching Hospitals NHS Trust  
Dr Tufail Patankar, Consultant Neuroradiologist, The Leeds Teaching Hospitals NHS Trust  

**Invited Faculty**  

Professor Martin Bland, Emeritus Professor, University of York Health Sciences  
Professor David Fiorella, Professor of Neurological Surgery and Radiology at Stony Brook School of Medicine, New York  
Professor Gary Green, Professor of Neuroimaging, Department of Psychology, University of York  
Dr Darren Hargrave, Co-Chair of the London Cancer Children and Young Person’s Specialist Board and Consultant Paediatric Oncologist, Great Ormond Street Hospital for Children, London  
Professor Jill V. Hunter, Professor of Radiology at Baylor College of Medicine and Staff Neuroradiologist at Texas Children’s Hospital, Houston, Texas  
Professor Susan Short, Professor of Clinical Oncology and Neuro-Oncology, Leeds Institute of Cancer and Pathology  
Professor Adam Waldman, Chair of Neuroradiology, The University of Edinburgh
A Message From The Organising Team Of BSNR 2016

Dear Delegate

The Leeds team welcomes you to the historic city of York for the annual meeting of the British Society of Neuroradiologists. Like the Society, York has a rich and proud history and the programme for this year’s meeting reflects these attributes.

Neuro-oncology remains a central and expanding core of neuroradiology practice. As our understanding of tumour biology improves, imaging advances reflect this and we have presentations from world leaders in tumour imaging, with access to world-leading imaging technology. Hyperpolarisation offers the potential to interrogate living cell biology non-invasively like never before and there is enormous potential for neuroradiology, and hence patients, to benefit from its use.

Interventional neuroradiology continues to expand its horizons and the inaugural Brian Kendall lecture delivered by Professor David Fiorella introduces a novel technique to manage parenchymal haemorrhage that until now has been a purely neurosurgical problem. In addition, there are important updates on key interventional trials and their impact on current and future practice.

Related to this, the James Bull lecture presented by Emeritus Professor Martin Bland will focus on quality of research statistics. It is good quality research that changes medical practice for the better.

We also have stimulating paediatric session updates on tumour biology and management, and neonatal ischaemia by leaders in their respective fields.

We have had a wide variety of high-quality oral and poster presentations. Delegates are strongly encouraged to view the posters which will be displayed outside the main meeting room.

The main meeting will conclude with what has previously been a very popular item: the ‘neuroradiology’ quiz.

Meetings are increasingly complex and expensive to organise and without the support of our sponsors and Aesculap Academia, this meeting would not be possible. Please take some time to visit our sponsors in the Oak Room during the refreshment and lunch breaks.

Finally, our social programme allows old friends and new, to mingle in historic and interesting environments with excellent food, drinks and entertainment.

Tony Goddard

Stuart Currie, Ian Craven, Jeremy Macmullen-Price, John Straiton, Tufail Patankar, Dan Warren

Local Organising Committee BSNR 2016
2nd BSNR Neuroradiology SpR Teaching Day Thursday 6th October 2016

09:00 Registration

09:30 Paediatric brain tumours - Diagnostic overview  Dr Stavros Stivaros, Manchester

10:15 Adult brain tumours - Diagnostic overview  Dr Stuart Currie, Leeds

11:00 Refreshments

11:30 Small group tutorials – 30 minutes each

Maximum number of 6 trainees per tutorial.

Groups of registrars will rotate to each tutorial either side of lunch

- Posterior fossa tumours in children  Dr Ruth Batty, Sheffield
- Midline supratentorial tumours  Dr Adam Thomas, Nottingham
- Advanced imaging techniques in tumour assessment  Dr Andrew Mackinnon, St George's
- Cystic tumours and cysts  Dr Ian Craven, Leeds
- The ring enhancing mass lesion  Dr Daniel Warren, Leeds
- Intraventricular tumours  Dr Tilak Das, Cambridge

13:10 Lunch

14:00 Tutorials – 30 minutes each

15:40 Refreshments

16:00 Diagnostic dilemmas in neuro-oncology  Dr Brynmor Jones, Charing Cross

16:40 The history of neuroradiology  Dr Stavros Stivaros, Manchester

17:10 Closing remarks

19:00 Trainee and faculty dinner
Welcome Dinner

Friday 7th October 2016

The Merchant Adventurers’ Hall
Fossgate
York
YO1 9XD

The BSNR committee would like to welcome you all to this historic venue for a welcome reception. Pre-dinner drinks are available in The Undercroft where there will also be a cash bar available (Cards not accepted. There is a cash machine quite close by).

Dinner will be served in The Great Hall.

18:00  Assemble in The Royal York Car Park
18:45  Prompt departure by bus
19:00  Drinks, The Undercroft
       Followed by dinner, The Great Hall
22:30  Return bus transfer (limited spaces)
23:00  Carriages

Menu

Starter

Brie and Caramelised Red Onion Filo Tart with Dressed Rocket and Wine: TBC
Confit Cherry Tomato Salad, Homemade Cumberland Sauce

Main

Fillet of Cod with Pea Puree, Fondant Potato, Tempura Scraps and Tartare Veloute served with Curly Kale and Greens,
Buttered Carrot Batons with Chives

OR

Vegetable Tagine with Chick Peas and Preserved Apricots,
Lemon and Coriander Cous Cous (v) served with Curly Kale and Greens, Buttered Carrot Batons with Chives

Dessert

Rich Chocolate Brownie and White Chocolate Blondie with Caramel Whipped Cream and Nutella Powder

Followed by freshly brewed tea, coffee and handmade chocolates
Saturday 8th October 2016

National Railway Museum
Leeman Road
York
YO26 4XJ

The BSNR committee would like to welcome you all to the perfect platform for this special black tie event. There is a shuttle bus service from the conference hotel for your convenience, however you may choose to walk to the conference dinner. The NRM can be accessed 24/7 via the footbridge in the railway station. Follow the signs to the NRM. All guests should please arrive via Leeman Road (main entrance). You will then be guided to the Great Hall for drinks with a chance to view the locomotives. A cash bar will also be available (cards accepted).

Dinner will be served in the Station Hall.
19.00 Shuttle bus service from 19:00
19:00 Drinks and canapes, Great Hall
20:15 Dinner, Station Hall
22:30 Return bus shuttle (limited spaces)
23:00 Carriages

Menu

Starter
Roasted pumpkin and butternut squash soup with curry spices, double cream and toasted seeds (v)  White Wine: Kleine Rust Chenin Sauvignon

Main
Yorkshire lamb rump roasted pink, black olive mash, fine ratatouille and char grilled aubergine, tomato herb jus  Red Wine: Argento Selccion Malbec
OR
Roasted potato gnocchi, olives, cherry tomatoes & oregano, creamy cheese sauce, crunchy pine nut crumble (please ensure that you have pre ordered your vegetarian meal)

Dessert
Yorkshire rhubarb crumble tart with stem ginger ice cream  Followed by tea and coffee served with Yorkshire Cream Fudge
Session 2

2.1 Inappropriate allocation of MRI services for investigation of cauda equina compression - A regional service delivery review?

2.2 Evaluation of response to stereotactic radiosurgery in brain metastases using multimodal MRI

2.3 FLAIR* to differentiate multiple sclerosis from small vessel disease

2.4 First experience of using a quantitative neuroimaging software tool for patients being assessed for memory loss

2.5 Diffusion tensor imaging in Parkinson's disease - ICICLE-PD study

Session 3

3.1 Audit of CT reporting standards in cases of intracerebral haemorrhage at a comprehensive stroke centre

3.2 Falling rates of hospital admission, case fatality, and population mortality of subarachnoid haemorrhage in England, 1999-2010 - A population based study.

3.3 Using a validated case archive to train radiology SpRs in reporting acute CT angiograms in patients with suspected ischaemic stroke due to large vessel occlusion

3.4 Development of a technical scoring tool to assess the predicted thrombectomy difficulty in patients with acute ischaemic stroke due to a large vessel occlusion

3.5 TOPSAT2 - Trial of poor grade subarachnoid aneurysm treatment

Session 5

5.1 ETMR - The GOSH Series

5.2 Foetal brain volumes derived from 3D iuMR imaging data - Reference values for clinical application

5.3 FIREFLY – A dedicated 3T MR scanner for the neonatal intensive care unit

5.4 The assessment of foetal brain growth in diabetic pregnancy using in utero magnetic resonance imaging

5.5 Towards an improved classification of relapsing demyelinating syndromes of the central nervous system in children

5.6 Classification of brain abnormalities in survivors of monochorionic twin pregnancy after single foetus demise
1. Enhancing multiple sclerosis care in an NHS hospital – Integrating brain atrophy measurements into routine care
2. Voice recognition software – A blessing or a curse?
3. Intra-axial imaging appearances of atypical fungal infection
4. Don’t ‘sella’ yourself short – A radiological review of non-neoplastic sella-based pathology
5. The clivus – A case-illustrated pictorial review of key pathologies
6. The role of follow-up imaging in patients with enhancing lesions in the cervical spine – A single centre experience
7. Framing bias in neuroradiological practice is a major cause of reporting discrepancy – A systematic study
8. Effectiveness of image-guided epidural blood patch for treatment of headache caused by intracranial hypotension
10. The variety and quality of mobile device applications in neuroradiology
11. Ironing out the details – Radiological differentiation of NBIA subtypes with clinicogenetic correlation
12. Audit of nerve root blocks and associated documentation performed by neuroradiologists at Sheffield Teaching Hospitals
13. An unexpected cause of back pain in a 7 year old
14. AMYVID – The what, why, when, who and how?
15. Post-thrombectomy CT appearances – The key to accurate diagnosis
16. The ideal radiology report – How do referring clinicians want us to report?
17. A-Z of spinal intervention – A single centre experience
18. Stereotactic Radiosurgery (STRS) for the treatment of vein of galen malformations – Case series and review
19. Use of volumetric and growth rate data in the classification of Low Grade Gliomas (LGG) by two neuroradiology consultants
20. Midbrain and hindbrain malformations – A pictorial review
21. Can fMRI reliably detect activation within the vicinity of an AVM?
22. Non-syndromic cranioyostosis – A radiological perspective
## Session 1  Neuro-oncology

**Moderators: Professor Adam Waldman, Dr Stuart Currie**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>09:10</td>
<td>Advances in imaging in neuro-oncology</td>
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<td>09:50</td>
<td>Advances in clinical neuro-oncology</td>
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<tr>
<td>10:30</td>
<td>Current techniques and future prospects for hyperpolarisation in MRI</td>
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<tr>
<td>11:00</td>
<td>Refreshments and industry exhibition</td>
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<td>11:00</td>
<td>TESC Meeting</td>
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## Session 2  Miscellaneous

**Moderators: Dr Gerardine Quaghebeur, Dr Jeremy Macmullen-Price**

### Free papers

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
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<tbody>
<tr>
<td>11:30</td>
<td>2.1 Inappropriate allocation of MRI services for investigation of cauda equina compression - A regional service delivery review?</td>
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<tr>
<td></td>
<td>Arpita Chattopadhyay</td>
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<td>11:40</td>
<td>2.2 Evaluation of response to stereotactic radiosurgery in brain metastases using multimodal MRI</td>
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<td>Vijay Sawlani</td>
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<tr>
<td>11:50</td>
<td>2.3 FLAIR* to differentiate multiple sclerosis from small vessel disease</td>
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<td>Tom Campion</td>
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<td>12:00</td>
<td>2.4 First experience of using a quantitative neuroimaging software tool for patients being assessed for memory loss</td>
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<td>Charles Romanowski</td>
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<td>12:10</td>
<td>2.5 Diffusion tensor imaging in Parkinson's disease - ICICLE-PD study</td>
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<td>Thias Minett</td>
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<th>Time</th>
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<tbody>
<tr>
<td>12:20</td>
<td>Standards subcommittee</td>
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<tr>
<td>12:40</td>
<td>Isherwood Prize Presentation</td>
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<tr>
<td>13:00</td>
<td>Lunch and industry exhibition</td>
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<tr>
<td>13:00</td>
<td>BSNR committee meeting, lunch provided</td>
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**Related events:**
- Registration: The Oak Room Foyer
- Refreshments and industry exhibition: The Oak Room
- Poster exhibition: The Event Centre Foyer
- Welcome address: Local Organising Committee
- Refreshments and industry exhibition: The Oak Room
- TESC Meeting: Minster Room
- Lunch and industry exhibition: The Oak Room
- BSNR committee meeting, lunch provided: The Minster Room
### Session 3: Interventional neuroradiology

**Moderators:** Dr Tony Goddard, Dr Christopher Rowland Hill

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Speaker</th>
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<tbody>
<tr>
<td>14:00</td>
<td>Brian Kendall Lecture introduction</td>
<td>Dr Christopher Rowland Hill</td>
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<tr>
<td>14:10</td>
<td>Brian Kendall Lecture: Minimally invasive surgery for intracranial haemorrhage – The next frontier in stroke</td>
<td>Professor David Fiorella</td>
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<tr>
<td>15:00</td>
<td>PISTE update</td>
<td>Professor Phil White</td>
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<td>15:20</td>
<td>VIST update</td>
<td>Dr Andrew Clifton</td>
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<tr>
<td>15:40</td>
<td>UK WEB audit update</td>
<td>Dr Tufail Patankar</td>
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<tr>
<td>15:55</td>
<td>Embolisation of facial vascular malformations</td>
<td>Dr Sal Lamin</td>
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<tr>
<td>16:10</td>
<td>Refreshments and industry exhibition</td>
<td>The Oak Room</td>
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### Free papers

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
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<tbody>
<tr>
<td>16:30</td>
<td>3.1 Audit of CT reporting standards in cases of intracerebral haemorrhage at a comprehensive stroke centre</td>
<td>Christen Barras</td>
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<tr>
<td>16:40</td>
<td>3.2 Falling rates of hospital admission, case fatality and population mortality of subarachnoid haemorrhage in England, 1999-2010 – A population based study</td>
<td>Andrew Molyneux</td>
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<tr>
<td>16:50</td>
<td>3.3 Using a validated case archive to train radiology SpRs in reporting acute CT angiograms in patients with suspected ischaemic stroke due to large vessel occlusion</td>
<td>Elena Adela Cora</td>
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<td>17:00</td>
<td>3.4 Development of a technical scoring tool to assess the predicted thrombectomy difficulty in patients with acute ischaemic stroke due to a large vessel occlusion</td>
<td>Elena Adela Cora</td>
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<td>17:10</td>
<td>3.5 TOPSAT II</td>
<td>Philip White</td>
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<th>Time</th>
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<tbody>
<tr>
<td>17:20</td>
<td>Close of day 1 conference</td>
<td>The Royal York Hotel Car Park</td>
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<td>18:45</td>
<td>Prompt departure by bus transfer</td>
<td>The Royal York Hotel Car Park</td>
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<tr>
<td>19:00</td>
<td>Welcome reception and dinner</td>
<td>Merchant Adventurers Hall</td>
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**Saturday 8th October 2016**

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<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
<th>Location</th>
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<tbody>
<tr>
<td>08:00</td>
<td>Registration</td>
<td>The Oak Room Foyer</td>
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<tr>
<td>08:00</td>
<td>Refreshments and industry exhibition</td>
<td>The Oak Room</td>
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<tr>
<td>08:00</td>
<td>Poster exhibition - Available to view throughout the day</td>
<td>The Event Centre Foyer</td>
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**Session 4  Paediatric neuroradiology**

**Moderator: Dr John Straiton**

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<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
<th>Speaker</th>
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<tbody>
<tr>
<td>09:00</td>
<td>Stratified/precision medicine in paediatric neuro-oncology</td>
<td>Dr Darren Hargrave</td>
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<tr>
<td>09:45</td>
<td>Update on imaging of neonatal hypoxic ischaemic injury</td>
<td>Professor Jill Hunter</td>
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<td>10:30</td>
<td>Refreshments and industry exhibition</td>
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**Session 5  Paediatric and foetal**

**Moderators: Dr Daniel Warren, Professor Jill Hunter**

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<th>Time</th>
<th>Event Description</th>
<th>Speaker</th>
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<tbody>
<tr>
<td>11:00</td>
<td>5.1 ETMR - The GOSH series</td>
<td>Deborata Bhattacharya</td>
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<tr>
<td>11:10</td>
<td>5.2 Foetal brain volumes derived from 3D iuMR imaging data - Reference values for clinical application</td>
<td>Debbie Jarvis</td>
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<tr>
<td>11:20</td>
<td>5.3 FIREFLY – A dedicated 3T MR scanner for the neonatal intensive care unit</td>
<td>Paul Griffiths</td>
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<td>11:30</td>
<td>5.4 The assessment of foetal brain growth in diabetic pregnancy using in utero magnetic resonance imaging</td>
<td>Rahim Akram</td>
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<td>11:40</td>
<td>5.5 Towards an improved classification of relapsing demyelinating syndromes of the central nervous system in children</td>
<td>Kshitij Mankad</td>
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<td>11:50</td>
<td>5.6 Classification of brain abnormalities in survivors of monochorionic twin pregnancy after single foetus demise</td>
<td>Nicholas Skipper</td>
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**James Bull Lecture introduction**

**James Bull Lecture: Improving statistical quality in published research**

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<td>Dr Christopher Rowland Hill</td>
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<td>12:05</td>
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<td>Professor Martin Bland</td>
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<tr>
<td>13:00</td>
<td>Lunch</td>
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<td>13:00</td>
<td>TESC registrars meeting</td>
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<td>du Boulay</td>
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<tr>
<td>14:10</td>
<td>Preview</td>
<td>BSNR 2017 Cambridge</td>
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<td>14:20</td>
<td>BSNR</td>
<td>quiz</td>
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<td>15:30</td>
<td>Annual</td>
<td>business meeting of the BSNR</td>
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<td>Close of</td>
<td>conference</td>
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<td>Shuttle</td>
<td>bus transfer to National Railway Museum</td>
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<td>Drinks</td>
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<td>20:15</td>
<td>Conference</td>
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**Programme**

Ischemic Stroke Solution:
- Trevo XP
- AXIS Catalyst 6
- FlowGate
- Synchro

Hemorrhagic Stroke Solution:
- Target
- Neuroform Alpha
- Excelsior XT-17
- Transform
- Synchro
- Surpass Streamline
- AXIS Catalyst 5

solutions to advance Complete Stroke Care®
2.1 Inappropriate allocation of MRI services for investigation of cauda equina compression
- A regional service delivery review?

Arpita Chattopadhyay
N. Nicholas, J. Macmullen-Price, I. Craven, D. Warren, S. Currie

Background
Anecdotally, patients presenting out of hours (5pm-9am) to their local hospital with symptoms of cauda equina compression (CEC) are transferred to a tertiary neuroscience centre for neurosurgical and MRI evaluation. MRI provision at the local hospital may prevent unnecessary waste of resources especially as the positive rate for CEC on MRI varies widely among the published literature.

Purpose
Determine the number of lumbar spine MRI (LSMRI) performed in a tertiary centre (TC) on patients with clinically suspected CEC that had been transferred from district hospitals because of a lack of local out-of-hours (5pm - 9am) MRI provision.

Method
CRIS search of all LSMRI performed in TC over 3-yrs. Cohort divided into those with and without a postcode served by TC. Those patients without a TC postcode were cross-referenced with PPM to determine their mode of presentation to TC.

Result
679 LSMRI were performed in TC during 1st April 2012 – 31st March 2015 for CEC. Number of patients with suspected CEC with a non-TC postcode = 190, 28%. Of these, 25 (13%) were confirmed as presenting to a hospital remote from TC out of hours, and then transferred to TC for MRI. 4 of the 25 patients (16%) were positive for CEC.

Conclusion
Over a 3-year period TC performed 25 LSMRI out of hours on patients that initially presented to another hospital with suspected CEC. This number is likely an underestimate owing to confounding issues of data collection. A substantial proportion of this patient group (84%) had an MRI that was negative for CEC. If these patients had undergone MRI at their presenting hospital significant resources may have been saved. This study also highlights the need for a more robust system of identifying and storing data related to this important cohort.

2.2 Evaluation of response to stereotactic radiosurgery in brain metastases using multimodal MRI

Vijay Sawlani
R. Firtham, P. Sanghera, H. Benghiat, G. Cruickshank, S. Meade, N. Davies, A. Peet

Purpose
Conventional MRI is insufficient to differentiate local tumour recurrence and radiation induced necrosis following Stereotactic Radiosurgery (SRS) treatment for brain metastases. The aim of this preliminary study was to evaluate the use of perfusion, diffusion and spectroscopic imaging (multimodal MRI) for assessment of treatment response in brain metastases.

Method
10 multimodal MRI examinations were performed 6 weeks to 6 months after SRS for metastatic brain lesions in 7 patients with primary malignant diseases: melanoma, n=3; breast, n=3; small cell lung, n=1. Multimodal MRI examination consisted of dynamic susceptibility contrast (DSC) perfusion imaging, diffusion weighted imaging (DWI) and both single and multivoxel MR spectroscopy (MRS) (TE = 30 ms). Scanning was performed on a Siemens Verio 3T MRI. rCBV and ADC maps were analysed using Siemens syngo. MRS analysis was performed with Tarquin [4] and peak area ratio of choline to creatine (Cho:Cr) calculated. Correlations between rCBV ratio, ADC, Cho:Cr and radiological/clinical follow up were investigated.

Result
Cho:Cr demonstrates a strong positive correlation with rCBV ratio ($r = 0.89$, $p < 0.01$).
No significant correlations were observed between ADC and rCBV or Cho:Cr. Applying a reported threshold for rCBV ratio of 2.1 [1], patients were divided into two groups showing suspected tumour recurrence (n=4) and suspected radiation necrosis (n=3). For a single borderline case (rCBV ratio = 1.9), high Cho:Cr ratio and intermediate ADC (Cho:Cr = 3.6; ADC = 0.0000998 mm²/s) are observed. When all parameters are considered together, the impression becomes one of probable tumour recurrence. This demonstrates the value of multimodal MRI over any single parameter in isolation.

Conclusion
Preliminary results suggests that a combination of high rCBV, low ADC and high Cho:Cr can clearly identify local tumour recurrence and that multimodal MRI may improve accuracy compared with any technique in isolation.
2.3 FLAIR* to differentiate multiple sclerosis from small vessel disease

Tom Campion
RJP. Smith, GC. Brito, J. Evanson, BP. Turner, M. Miquel, K. Schmierer

**Purpose**
Diagnosis of multiple sclerosis (MS) by current criteria is hampered by the provision for ‘no better explanation’. A histological hallmark of MS, a vein within a lesion (VIL), has shown promise as a potential imaging biomarker. FLAIR* is a post-processing algorithm combining T2* with FLAIR to delineate veins within white matter lesions (WMLs). This prospective study aimed to determine whether the proportion of WMLs with intralesional veins detected in people with MS is increased compared to that in patients with small vessel disease (SVD).

**Method**
25 people with MS (14 men and 11 women; age 41±11.2 years) and 7 people with SVD (2 men and 5 women; age 60±9 years) underwent MRI. FLAIR* images were independently assessed by two observers. The proportion of WMLs per person demonstrating a VIL was recorded.

**Result**
Inter-observer agreement for the presence of a VIL was good ($\kappa$=0.7). The mean proportion of WMLs with a VIL in people with MS was significantly higher (88%, range 58-100) compared to those with SVD (32%, 0-48; $p$).

2.4 First experience of using a quantitative neuroimaging software tool for patients being assessed for memory loss

Charles Romanowski
J. Himsworth, P. Metherall, E. Lorenz, K. Harkness, D. Blackburn

**Purpose**
Imaging of the brain is essential in the assessment of patients with memory loss and cognitive decline. In particular, the assessment of the medial temporal lobes is important to detect early atrophy. Atrophy in the medial temporal lobes can be assessed by visual inspection. Recently software tools such as ‘NeuroreaderTM’ have become available. This is a CE marked/FDA cleared ‘cloud’ based software tool for automated volumetric analysis of the brain.

**Method**
We have had access to this software for a few months to evaluate what impact it may have to supplement the clinical neuroradiological report. The software has been integrated into the local PACS system and provides a numerical and graphical analysis of brain regions compared to age and sex matched normal individuals from the ADNI dataset.

**Result**
This presentation is a first report of the technical issues associated with linking the software to PACS. The initial opinions of reporting radiologists and the clinical referrers will be included. It does not aim to be a scientific validation of the software. It would however allow debate of the use of such software to supplement the clinical report.

2.5 Diffusion tensor imaging in Parkinson’s disease – ICICLE-PD study

Thais Minett
Li Su, Elijah Mak, Guy Williams, Michael Firbank, Rachael A. Lawson, Alison J. Yarnall, Gordon W. Duncan, Adrian M. Owen, Tien K. Khoo, David J. Brooks, James B. Rowe, Roger A Barker, David Burn, John T. O’Brien

**Background**
The risk of patients with Parkinson’s disease (PD) developing dementia is five times greater than the general population. Monitoring white matter microstructural integrity (WMMI) might help identify its role in mediating cognitive deficits in PD. Objective: To determine if WMMI differs between patients with PD with normal cognition (PD-NC), those with PD and mild cognitive impairment (MCI), and healthy volunteers.

**Method**
Participants from the ICICLE-PD study (48 PD-MCI, 75 PD-NC and 49 controls) underwent clinical, cognitive and diffusion tensor imaging (DTI) investigations. DTI parameters were analysed using Tract Based Spatial Statistics. Generalised linear models with fractional anisotropy (FA) and mean diffusivity (MD) were used as dependent and disease status as independent variables, controlling for sex, age, education and L-dopa dose.

**Result**
All patients with PD had significantly higher widespread MD relative to controls regardless of cognitive status. No differences were found between patients with PD-NC and PD-MCI. FA did not differ significantly between groups. Conclusion: In early PD, DTI offers potential as a noninvasive biomarker reflecting WMMI in PD.
Safety Results from Treatment of 109 Cerebral Aneurysms using the Woven EndoBridge Technique in the United Kingdom: Preliminary Results

Andy Molyneux, Robin Sellar, Saleh Lamin, Allan Thomas, Jo Battacharya, Anil Gholkar, Tufail Patankar

Background
The Woven EndoBridge (WEB) device has been in clinical use for the treatment of brain aneurysms for the past 4 years. The authors present a multi-center series providing a detailed safety analysis.

Method
A database was set up to collect anonymous information across the UK (14 centers). Complications and clinical outcome were analyzed for the initial 109 patients. The modified Rankin scale (mRS) was used as a marker of clinical outcome.

Result
109 patients had a pre-procedure and discharge mRS score recorded. 100 patients had >3m F/U mRS score recorded. 40/109 patients had events recorded. Events related to the WEB device numbered 17/109 patients (2/109 symptomatic). 1/109 had persisting clinical sequelae. Thromboembolism was the most prevalent event affecting 17/109 patients (7/109 symptomatic). The overall mortality of this series before discharge was 0/109 and at >3m F/U was 5/100. The overall morbidity at discharge was 2/109 and at >3m F/U was 6/100.

Conclusion
The WEB device is safe for clinical use. Thromboembolic complication adds risk that should be minimized with appropriate anticoagulation and correct sizing of the device.
3.1 Audit of CT reporting standards in cases of intracerebral haemorrhage at a comprehensive stroke centre

Christen Barras
Hamed Asadi, Pramit M Phal, Brian M Tress, Stephen M Davis, Patricia M Desmond

Purpose
Multiple CT biomarkers of ICH growth and outcome have been demonstrated, but the extent of inclusion in radiology reports is unknown. The aim of this retrospective process audit was to determine which of the known predictors of ICH outcome was recorded in reports of the disease.

Method
CT report of patients diagnosed with ICH presenting to a metropolitan comprehensive stroke centre between 1.3.2013 and 28.2.14. Each report was assessed for: the number of measurement ICH dimensions; volume; location; hydrocephalus; shape; density; ‘CTA spot sign’ (where performed).

Result
100 patients were included. At least one ICH dimension was recorded in 90% of reports. 39% did not include the measurements in three dimensions and volume was reported in just 6%. No ICH dimension was recorded in 10% of reports. With the exception of density and shape, reporting of other CT features exceeded 95%. Where CTA was performed (58%), 14 (24%) of 58 reported the ‘CTA spot sign’ status.

Conclusion
In this audit, volume was the most under-reported of the established ICH prognostic features. Density, shape and CTA spot sign status also need more reporting attention.

3.2 Falling rates of hospital admission, case fatality, and population mortality of subarachnoid haemorrhage in England, 1999-2010 – A population based study

Andrew Molyneux
Toqir Mukta Mary Sneade, Alison Clarke, Michael Goldacre

Purpose
To examine the trends in population-based hospital admission rates, patient-level case fatality rates (CFRs), and population-based mortality rates for spontaneous subarachnoid hemorrhage (SAH) in England.

Method

Result
Hospital admission rates for SAH per million population declined by 18.3%, from 100.4 (95% CI 97.6-103.1) in 1999 to 82.0 (95% CI 79.7-84.4) in 2010. Case Fatality Rates at less than 30 days per 100 patients decreased by 18.2%, from 29.7 (95% CI 28.5-31.0) in 1999 to 24.3 (95% CI 23.2-25.5) in 2010. Population-based mortality rates per million population, where SAH was recorded as underlying cause of death on the death certificate, declined by 39.8%, from 41.2 (95% CI 39.5-43.0) in 1999 to 24.8 (95% CI 23.6-26.1) in 2010. Neurosurgical clipping declined by 68%; between 1999 and 2010 from 19.9 to 6.3 per million. The change in trend lines of mortality followed the publication of the International Subarachnoid Aneurysm Trial (ISAT) results in 2002.

Conclusion
Population-based hospital admission rates, patient-level CFRs, and population-based mortality rates all declined between 1999 and 2010. Part of the decline in mortality rates for SAH is likely to be attributable to a decline in incidence. It is also, in part, attributable to improved survival after SAH. The available data do not allow us to compare the effects of different treatment methods for SAH on case fatality and mortality. During the period of study, population mortality rates declined by almost 40%. It is likely that there are a number of factors contributing to this substantial improvement.
3.3 Using a validated case archive to train radiology SpRs in reporting acute CT angiograms in patients with suspected ischaemic stroke due to large vessel occlusion

Elena Adela Cora
Dr E A Cora, Prof P White, Dr D Minks, Dr Ramaswamy, Dr A Gholkar, Dr J Hall, Prof G Ford

Purpose
The STABILISE trial, a thrombectomy study, has highlighted the need to improve diagnosis of large vessel occlusion (LVO) in patients with acute ischaemic stroke (AIS). Local district general hospitals also need to perform and interpret CTA studies before referring patients to a tertiary centre for thrombectomy.

Method
Guidelines for performing acute CTA in patients with suspected AIS were developed locally and an audit was performed to assess compliance. From the local audit data, 50 patient cases were selected and a validated case archive of CTAs was developed. The scans and the clinical details of every patient were reviewed and the clinical presentation, scan findings, treatment and long term outcome were collated. We developed a full day CTA course consisting of short lectures and simulated radiology training which was approved by the RCR. Six courses were run successfully and this is now being developed into an online course.

Result
To assess the efficiency of the course we analysed 252 CTA reports performed by the on-call radiology registrars before and after their training. The results showed a significant improvement in major errors from 12% to 4%, which is statistically significant.

3.4 Development of a technical scoring tool to assess the predicted thrombectomy difficulty in patients with acute ischaemic stroke due to a large vessel occlusion

Elena Adela Cora
E Cora, P White, G Ford, A Gholkar, D Mitra, J DuPlessis, D Minks, D Flynn, C Price

Purpose
Several recent trials have proven the efficacy of thrombectomy in large vessel occlusive stroke. Multiple factors will affect the final outcome, but it is generally agreed that earlier reperfusion correlates with improved outcomes. Performing a fast and safe procedure is of paramount importance.

Method
We developed a technical index of thrombectomy which assesses key factors important in the planning and delivery of thrombectomy: the aortic arch elongation and atheroma classification, target vessel tortuosity, target vessel stenosis and the clot burden score. We have also allowed for any other less common anatomical variations or other pathology to be taken into account. This scoring tool can be performed on CTA, MRA or DSA images and can be used to assess either the anterior or posterior circulation. The final result is on a three point qualitative scale, from minimal to severe predicted case difficulty.

Conclusion
This is a promising tool to evaluate predicted case difficulty, consider potential problems and whether a modified technique should be considered during the procedure. The validity of this scoring tool is currently being assessed and full results will be presented at the meeting.

3.5 TOPSAT2 – Trial of poor grade subarachnoid aneurysm treatment

Philip White
D Mitra, R Kirilos, P Brennan, A Jackson, E McColl, J Byrne

TOPSAT 2 compares the efficacy of a strategy of early aneurysm treatment (within 72h of ictus) in a population of World Federation of Neurosurgical Societies grade 4-5 (high grade) aneurysmal subarachnoid haemorrhage (aSAH) patients in comparison with a strategy of treatment of aneurysm after neurological improvement (to WFNS grade 1–3). It is a randomised, controlled, parallel group international study of 346 patients with blinded outcome evaluation (PROBE). Primary outcome is functional outcome at 12 months determined by ordinal shift analysis of modified Rankin score (mRS) based on improvement of mRS of at least 1 point. Subjects 18–80 year admitted to neuro ITU with WFNS grade 4 or 5 aSAH. It incorporates an exploratory MRI substudy (100 participants) to establish whether brain MRI markers in patients with high (4–5) grade aSAH are related to outcome and might be used to stratify the management of grade 4–5 aSAH. Randomisation commences August 2016. An update on progress will be presented.

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5.1 ETMR – The GOSH Series
Debarata Bhattacharya
Saahil Chhabra, Carolina Kachramanoglou, Thomas Jaques, Kshitij Mankad

Purpose
Embryonal tumour with Multilayered Rosettes or ETMR is a recently described malignant neoplasm of the central nervous system. It forms part of the larger embryonal tumour subgroup, as described by the WHO Classification of CNS tumours 2016. It includes a range of entities including ependymoblastomas, some medulloepitheliomas and the tumours previously termed as Embryonal Tumours with Abundant Neuropil and True Rosettes (ETANTR). In the 2016 WHO Classification of CNS tumours, ETMR is defined by the presence of an amplification of the C19MC locus. The largest series of ETMR/ETANTRs published so far have included reports by Gessi et al., who described 22 new cases, and a series of 25 patients by Horwitz et al., which were clinico-histopathological descriptions of these tumours. In our series, we describe the clinical course of 5 patients diagnosed with ETMR at Great Ormond Street Hospital for Children, along with detailed imaging and histopathological findings. We also review the published literature describing these tumours and compare the salient imaging features of our cohort with published data.

Method
We reviewed the clinical histories of 5 patients with confirmed histopathological and genetic diagnoses of ETMR treated at the Great Ormond Street Hospital for Children. The imaging, which had been initially reported, was reviewed by an experienced consultant paediatric neuroradiologist. We also performed a detailed review of literature published to date about ETMRs, with special attention to the morphological and imaging features of the individual tumours. Comparison was then made to the imaging characteristics of our own cohort of patients.

Result
All the patients in the GOSH cohort had infratentorial tumours, of which 2 had supratentorial components (1 pineal/3rd ventricular; 1 temporal/thalamic involvement). The tumours were all of low T1 and high T2 signal intensity, compared to grey matter. All the tumours demonstrated unequivocally strong diffusion restriction. Morphologically all the tumours were solid, with 1 demonstrating gross physical appearances very similar to a Diffuse Intrinsic Pontine Glioma (DIPG). None of the primary tumours demonstrated contrast enhancement at presentation; 2 patients demonstrated enhancing spinal metastases at initial presentation, one of whom also had enhancing leptomeningeal disease. All the patients had obstructive hydrocephalus at presentation. Prognosis in our group of patients was uniformly poor, all patients died with a mean survival of approximately 6 months. Fewer than 100 patients with ETANTR/ETMR have been reported in literature; out of which imaging and morphological description have been described in 16 patients. In this group, 8 were purely supratentorial in location; 7 were exclusively infratentorial, with 1 tumour extending across both compartments. Diffusion characteristics were poorly commented on in published literature, with only 2 out of 16 patients shown to demonstrate restricted diffusion. Interestingly only 4 out of the published 16 patients were believed to show no contrast enhancement, with varying degrees of enhancement in 9 patients, no comment being made in the rest. In published literature, 3 patients were described to have spinal metastases at presentation. In published literature, a few patients have demonstrated survival periods ranging from 13–41 months from the time of initial diagnosis.

Conclusion
To our knowledge, our series of 5 patients with proven diagnosis of ETMR, is the single largest series to describe simultaneously the clinical, imaging and histopathological findings of this relatively rare tumour. In our description of the imaging and morphological appearances of ETMR and subsequent comparison to published literature, we found that a strong association of infratentorial location, poor contrast enhancement and unequivocal diffusion restriction in our cohort. Although not all of these characteristics have been well described in previously published literature, we propose that a diagnosis of ETMR should be considered in paediatric tumours demonstrating a combination of these particular imaging features.

5.2 Foetal brain volumes derived from 3D iuMR imaging data – Reference values for clinical application
Debbie Jarvis
Rahim Akram, Paul Griffiths

Purpose
MR Imaging the foetal brain in utero is primarily undertaken using 2D imaging to depict anatomical structures which may provide additional information to ultrasound when there is suspicion of an abnormality. Quantifying brain growth of the foetus may be useful in some cases when diagnosis is equivocal.

Method
The aim of our work was to provide reference values of foetal brain volumes derived from a cohort of normally developing foetuses. Pregnant women were recruited as part of several research studies using iuMR at our institution. MR imaging of the foetal brain was performed after the second trimester ultrasound scan had confirmed normal foetal development.

Result
This presentation will describe our method for acquiring and processing the MR data and the results of brain volumes of 130 foetuses ranging from 18 to 36 weeks gestation. We will also present how this additional information has been applied to clinical cases.
5.3 FIREFLY – A dedicated 3T MR scanner for the neonatal intensive care unit
Paul Griffiths
Martyn Paley, Deborah Jarvis, Elizabeth Filling, Pauline Bayliss, Julie Cook, Dan Connolly

Purpose
Neonatal MR imaging of the brain is difficult on many levels. One of the most demanding practical issues arises from the need to transfer the new born baby out of the NICU into the MR unit, which is usually some distance from the NICU in the same hospital or even at another hospital.

Method
We describe our long term project to create a physically small but high field (3T) MR scanner that can be used on a NICU and hence removing the requirement for transferring the baby away from the intensive care environment. The project was technically developed by GE Healthcare and funded by the Wellcome Trust – two systems were built, one based on the NICU on the Jessop Wing in Sheffield and the other at Boston Children’s Hospital.

Result
In this presentation I will discuss the fundamental characteristics of the MR system, the space requirement for siting and the results of our early work in assessing the safety and technical performance of the scanner.

5.4 The assessment of foetal brain growth in diabetic pregnancy using in utero magnetic resonance imaging
Rahim Akram
Michael Paddock, Paul D Griffiths

Purpose
Prospective longitudinal pilot study. Objective: to assess the difference in total parenchymal foetal brain volume (TPBV) and rate of growth (RG) between type 1 diabetic (T1D) and gestational diabetic (GD) pregnancies in the third trimester using in utero magnetic resonance (iuMR).

Method
Inclusion criteria: normal anomaly scan at 20 gestational weeks (GW); no iuMR contraindications. Consecutive scans were performed at 28±1, 31±1 and 34±1 GW. Image acquisition: 1.5T scanner using 3D FIESTA sequences. 3D models were constructed to obtain volumetric measurements.

Result
36 data sets (3 scans/participant) were included for analysis (29 GD, 7 T1D). t-tests were used to analyse differences in TPBV and RG between GD and T1D. Visit 1: TPBV (cm3), mean T1D=132 (SD=9); GD 144 (SD=13); p=0.036. Visit 2-3: RG (cm3/week), T1D 19.2 (SD=1.5); GD 22.2 (SD=5.0); p=0.008. Visit 2 and 3 volumes, and RG between visits 1-2 and 1-3 were not significant.

Conclusion
Two statistically significant differences found. Limitations: high attrition rates; small T1D sample size, no type 2 diabetics. 3D construction using iuMR is an innovative technique that can assess foetal brain growth.

5.5 Towards an improved classification of relapsing demyelinating syndromes of the central nervous system in children
Kshitij Mankad
Yael Hacohen, Kshitij Mankad, W. Kling Chong, Frederik Barkhof, Ming Lim, Evangeline Wassmer, Olga Ciccarelli, Cheryl Hemingway

Purpose
Paediatric relapsing-demyelinating-syndromes (RDS) define a group of diseases with different phenotypes. We investigated a cohort of paediatric RDS using clinical assessments, MRIs and laboratory tests to explore whether the diagnostic process of RDS could be improved.

Method
Children were recruited from 3 centres. Clinical findings, laboratory results were reviewed by an adjudication panel. MRI scans were blindly reviewed by a Neuroradiologist.

Result
56.4%(N=110) children were diagnosed with MS while others as follows: 25.4%NMOSD, 12.7%MDEM, 5.4%RION. MRI revealed abnormalities typical of adult MS in 97% paediatric MS cases, absent in all children with non-MS RDS. MOG and AQP4-Abs were found exclusively in the non-MS group. AQP4-Abs were seen only in the NMOSD group, while MOG-Abs were seen in 58%NMOSD,100%MDEM and 33%RION patients. MOG-Ab cases presented with ill-defined lesions often involving cerebellar peduncles. The AQP4-Ab cases showed involvement of the area postrema in 88%.

Conclusion
Paediatric MS has similar MRI features as adult MS, but differs from other paediatric RDS. MOG-Ab cases differ in their presentation and MRI patterns from MS/AQP4.
5.6 Classification of brain abnormalities in survivors of monochorionic twin pregnancy after single foetus demise

Nicholas Skipper
MS Igra, G Conte, MD Kilby, PD Griffiths, C Parazzini, L Pinelli, A Righini

**Purpose**
Monochorionic (MC) multifetal pregnancies are generally associated with more complications than singleton pregnancies. The risk of foetal demise is increased & there is a high rate of brain injury in surviving twins. This abstract describes the early stages of an international collaboration to classify types of brain injury encountered.

**Method**
Cases were collected retrospectively from 4 Italian & 2 English centres over a 15 year period. Entrance criteria were: MC pregnancy, death of one twin & brain injury in the surviving twin on iuMR. Injuries were classified by an expert panel as follows:

**Result**
45 cases are currently undergoing analysis.

**Conclusion**
Vascular anastomoses between foetal circulations are unique to MC multifetal pregnancies & provide an additional route for vascular insult. Studying MC pregnancies may provide insight into the pathogenesis of certain brain injuries as many of the injuries found are likely attributable to vascular mechanisms.
1. Enhancing multiple sclerosis care in an NHS hospital
- Integrating brain atrophy measurements into routine care

Vijay Sawlani
SoniaKumari, Sabena Fareedi, Barnaby Waters, Richard Gagen, Anand Sastry, Kal Natarajan, Gordon Mazibrada

Purpose
To integrate whole brain volume (WBV) measurements into the routine clinical care of patients with multiple sclerosis (MS).

Background
Multiple sclerosis is now increasingly recognised as both an inflammatory and neurodegenerative condition. WBV measurement is currently the best-known predictor of disability but is not used in the routine assessment of MS in the UK. It is measured using 3D T1 magnetic resonance imaging (MRI). This pilot project will be the first to integrate WBV measurements in to the routine clinical imaging environment in an NHS hospital and therefore provide advanced analysis of atrophy in MS patients.

Method
T1-weighted 3D MR clinical imaging datasets are sent from Agfa IMPAX PACS system to a computer system running the CorTechs Labs NeuroQuant software for automatic calculation of whole brain, lateral ventricles and thalami volumes. A report giving the WBVs and colour coded MR datasets showing the brain, lateral ventricles and thalami are automatically sent back to the PACS system and appear as extra series within the original MR study for the requesting clinician to review on PACS.

Result
In collaboration with CorTechs Labs, neuroradiologists and MS clinicians the NeuroQuant pilot looks promising as a tool for measuring whole brain volume measurement in MS patients. Measuring brain atrophy provides an objective measurement which is invaluable and can help clinicians and patients in managing their disease. This work is also relevant to neuroradiologists, clinicians, commissioners and pharmaceutical companies as it allows us to objectively determine the effectiveness of expensive MS treatments. It guides PACS teams in the safe integration with external analysis software. In the future we hope to integrate WBV into clinical use within our Trust and make it available to wider NHS Trusts.

2. Voice recognition software – A blessing or a curse?

Jonathan Chia
T. Vamadevan, S. Vundavalli and T. Good

Method
We audited the accuracy of 439 radiological reports produced using Dragon Voice Recognition (VR) software in a busy teaching hospital over a one week period against criteria adapted from the audit recipes section of the Royal College of Radiologists website. Errors were classified as mild, moderate or severe. The standard set was a severe/major error rate of 0% and an overall error rate of less than 5%.

Result
The overall error rate was 11% (50/439). 29/439 (6.6%) were attributable to general radiologists and 21/439 (4.8%) to neuroradiologists. Errors in CT and MR reports accounted for 6.6% (29/439) and 3.9% (17/439) of all errors. Ultrasound and Fluoroscopy accounted for 0.68% (3/439) and 0.23% (1/439).

Conclusion
The audit standards were partially met. We have identified areas and patterns which increased the incidence of errors on voice recognition. We would like to conduct a prospective arm for this study that would help us re-audit in the future to overcome these issues. The data will be presented in detail.

References
1. https://www.rcr.ac.uk/audit/voice-recognition-system-report-accuracy
3. Intra-axial imaging appearances of atypical fungal infection

David Saunders  
B Adams, H Cliffe, S Currie, I Craven, J Macmullen-Price, D Warren

**Purpose**

Aspergillosis is an uncommon infection which predominantly affects immunocompromised subjects. Intracranial infection is rare but carries significant morbidity and mortality. Early diagnosis is key to prompt initiation of appropriate, potentially lifesaving treatment; yet the clinical presentation is often non-specific and the reporting radiologist may be first to suspect a fungal aetiology. We present the temporal imaging changes in a case of successfully treated intracranial aspergillosis.

**Method**

We present the case of a five year old male undergoing chemotherapy for acute lymphocytic leukaemia who whilst admitted with febrile neutropenia developed flaccid right arm weakness. Initial imaging demonstrated multiple non-specific intracranial lesions but none to account for his symptoms. Aspergillus was the only positive culture. Despite high dose antibiotic/antifungal therapy there was an initial, significant deterioration in imaging and clinical symptoms with progression to quadriplegia and associated respiratory compromise. Following a protracted admission there was almost complete neurological recovery with only minor residual weakness, mirrored by on-going radiological improvement.

**Result**

Initial cross sectional imaging demonstrated multiple poorly-enhancing intracranial and intramedullary lesions with a wide differential. Repeat MRIs performed 8 and 27 days later demonstrated multiple, widespread ring enhancing lesions with a low T2 peripheral double rim showing restriction, inherent high T1 and concomitant ring of susceptibility. Several of the lesions contained a central, non-enhancing crenation highly suspicious for atypical infection. Following 2 months of high dose antifungal therapy follow-up MRI demonstrated interval improvement with abscess maturation including thickening of the capsule, decreased diffusion restriction and increased peripheral T1 signal.

**Conclusion**

The incidence of intracranial aspergillosis is increasing, carrying significant morbidity and mortality. Awareness of the suggestive imaging findings is an important adjunct to maintaining a high index of suspicion which is essential to optimise the chance of successful management.

4. Don’t 'sella' yourself short – A radiological review of non-neoplastic sella-based pathology

Arpita Chattopadhyay  
H. Cliffe, J. Macmullen-Price, I. Craven, D. Warren, S. Currie

**Purpose**

Being familiar with the radiological features of non-neoplastic pathology involving the sella region allows timely clinical and biochemical correlation and permits better treatment stratification.

**Method**

Using cases from our institution we explore the imaging differentials including inflammatory, congenital, infectious and vascular conditions.

**Result**

This review will provide readers with a framework for recognising a wide range of lesions and will aid neuroradiological contribution to patient management.

5. The clivus – A case-illustrated pictorial review of key pathologies

Hefina Whiteley-Jones  
CD Good

**Method**

The clivus, crucially and centrally positioned in the skull base, can be involved in a wide array of disease processes. In this poster, we will demonstrate the main pathologies involving the clivus, using both magnetic resonance imaging (MRI) and computed tomography (CT) to illustrate key imaging findings from cases at our institution, both to aid differential diagnosis, and to show the optimal imaging approach for each case. The clinical features and management of these cases are also discussed, with a short review of the literature.

**Result**

Cases include: trauma; benign neoplasms e.g. meningioma and pituitary macroadenoma; benign bony abnormalities e.g. fibrous dysplasia; benign notochordal cell tumours and more aggressive lesions such as chordoma; chondrosarcoma; primary osseous lymphoma and metastases; as well as infection.
6. The role of follow-up imaging in patients with enhancing lesions in the cervical spine – A single centre experience

Samantha Mills
Alice Mackay

Purpose
MRI is important in the diagnosis intra-medullary cord lesions & gadolinium is essential in determining radiological diagnosis. This study reviews the role of follow-up imaging in patients with intra-medullary enhancement on cervical spine MRI.

Method
Retrospective review of contrast cervical spine MRI studies over a 2 year period identified patients with enhancing intra-medullary lesions. Radiological diagnosis was split into; mechanical compression, vascular, post-surgical, inflammatory, tumour & indeterminate diagnosis. Individual patient clinic letters & radiology reports were reviewed to determine the subsequent clinical pathway.

Result
347 patients were scanned in the time period. 89 patients had enhancing intra-medullary lesions. 20 patients with an initial unknown radiological diagnosis had follow-up imaging and this clarified the radiological diagnosis in 15 cases. A selection of representative imaging cases are presented.

Conclusion
Solitary enhancing lesions within the cervical spine can pose a diagnostic dilemma on the initial imaging. Follow-up imaging is of value determining the underlying aetiology allowing patients to be appropriately managed.

7. Framing bias in neuroradiological practice is a major cause of reporting discrepancy – A systematic study

Vias Demetriou
Daniel Birchall, A Thiele

Background
Diagnostic errors in Radiology are a major cause of patient mismanagement. Up to 75% of these errors are thought to relate to cognitive factors. We sought to demonstrate prospectively whether the clinical setting a particular image set is presented within (Framing Bias) had the potential to introduce significant diagnostic errors.

Method
20 neuroradiological MRI studies were reported by 10 radiologists who were blinded as to the aims of the project. 4 studies had normal findings; 4 had important secondary findings with a clinical history that was appropriate to the demonstrated abnormality; and 12 had important secondary findings that were accompanied by a leading clinical vignette.

Result
Where leading clinical information had been provided, nearly 90% of reports had highly significant missed secondary findings especially aneurysms and extracranial tumours.

Conclusion
This study prospectively demonstrates the adverse effect of Framing Bias on the accuracy of neuroradiological reporting, leading to a dramatic error rate of nearly 90%, and supports the urgent need for developing effective metacognitive strategies to minimize this risk.

8. Effectiveness of image-guided epidural blood patch for treatment of headache caused by intracranial hypotension

Timothy Woo
Changez K Jadun

Background
Intracranial hypotension is caused by CSF leak, usually into the epidural space. This is either iatrogenic (post dural puncture headache, PDPH) or idiopathic (spontaneous intracranial hypotension, SIH). Epidural blood patching is an established treatment for this condition in which autologous blood is injected into the epidural space aiming to seal the defect.

Purpose
To retrospectively analyse cases treated with epidural blood patch at our institution to assess safety, success rate and the association of clinical results with imaging appearances.

Result
28 patches on 20 patients were done within the period Oct 2010 – Sept 2015. No complications were observed. All SIH patients fulfilled the diagnostic criteria. Treatment response rate was 71% (SIH 63%, PDPH 84%). Radiological signs in patients re-imaged after patching always mirrored clinical symptoms.

Conclusion
Epidural blood patching is a safe treatment of low pressure headache, but better response rates were seen in patients with PDPH as expected. Advanced techniques such as MR gadolinium myelography and use of hypertargeted fibrin glue may improve response rates and prolong symptomatic remission.
Sahil Chhabda
V. Schonstedt, R. Robinson, E. Wraige, A. Siddiqui, K. Mankad

Background
Alexander disease (AD) is a non-familial metabolic leukodystrophy. Typical imaging findings in AD have been described in the literature and are primarily supratentorial in distribution. AD presenting as a tumour-like lesion within the brainstem is rare.

Method
In this exhibit we focus on the imaging findings of juvenile AD presenting as a focal tumour-like lesion within the brainstem in two genetically confirmed cases and highlight how the imaging features can help distinguish this rare entity from other pathologies which may present in the brainstem in this age group.

Result
In both cases the brainstem imaging abnormalities were isolated within the dorsal medulla oblongata. The brainstem lesions were symmetrical and bilobed in appearance with high T2 signal and avid homogenous contrast enhancement. Minimal associated oedema was observed. There was no supratentorial abnormality in one case. In the second case there was periventricular leukodystrophy with cystic elements, a more typical finding in AD.

Conclusion
These above described imaging findings in the context of the clinical presentation can help distinguish this rare entity from other pathologies which may present in the brainstem in this age group.

10. The variety and quality of mobile device applications in neuroradiology
Jeremy Lynch
Emily Guilhem, Sara Sciacca

Background
Mobile devices are widespread, contain powerful processors and often have large amounts of storage. For these reasons they have potential for utilisation in neuroradiology. We assess the variety and quality of mobile “apps” specifically developed for neuroradiology.

Method
All of the major mobile-device marketplaces were searched systematically for terms relating to neuroradiology. Data including cost, ratings, downloads, health care involvement and target audience were recorded.

Result
47 apps were identified. On the iTunes, Android, Blackberry, and Windows Mobile stores there were respectively 26, 16, 3, and 3 apps (non in the Nokia store). 45/47 (96%) of apps were targeted at medical professionals. All apps had clinical expert involvement in their development. 24 (51%) apps were entirely free. The most popular category was clinical education and conferences (both 14 apps), followed by clinical reference (13) and journals (4).

Conclusion
Despite android mobile devices being the most widespread there are more neuroradiology apps for Apple devices. The vast number of apps target healthcare professionals.

11. Ironing out the details – Radiological differentiation of NBIA subtypes with clinicogenetic correlation
Helen Cliffe
A Chattopadhyay, S Currie, J Macmullen-Price, D Warren, I Craven

Background
Neurodegeneration with brain iron accumulation (NBIA) represents a group of heterogeneous inherited disorders characterised by iron accumulation in the basal ganglia and neuronal death. The clinical presentation of NBIA is often non-specific, but magnetic resonance imaging (MRI) facilitates pre-mortem and even pre-symptomatic diagnosis.

Method
Radiological identification of specific NBIA subtypes guides prognosis and appropriate use of genetic counselling. However, adding such value depends upon the neuroradiologist applying knowledge of the differing imaging manifestations of the various syndromes.

Result
Using cases from our institution we will explore imaging differentials and diagnostic pitfalls and correlate radiological findings with clinicogenetic subtypes. Cases discussed include pantothenate kinase-associated neurodegeneration (PKAN) and beta-propeller protein-associated neurodegeneration (BPAN).

Conclusion
The concepts reviewed will provide readers with a framework for recognising NBIA subtypes in order to maximise the neuroradiological contribution to the patient pathway.
12. Audit of nerve root blocks and associated documentation performed by Neuro-Radiologists at Sheffield Teaching Hospitals

Benjamin Rea
Nicholas Skipper

Background
Often within radiology, the only documentation and record of an interventional procedure is via the hospital’s reporting system. Thus reports must be accurate and include pertinent procedural details. Furthermore, accompanying safety checklists and consent forms are scanned onto the system, to serve as an electronic record.

Method
This year we audited all departmental nerve root injections by Neuro-Radiologists over a 5-month period. We assessed the reports and reviewed the electronic record of legal documents. “Complete” reports needed to record the side and level of injection, and dose of drugs administered.

Result
Completed safety checklists and consent forms were electronically recorded in 90.3% and 72.6% of cases respectively. “Complete” reports occurred in 93.5% of cases. The regular rotation of radiographers and human error potentially explained our results.

Conclusion
We fed back the results to the team and have instigated the following actions. Firstly, the team is identified during the Surgical Safety “Sign In” and reminded about documentation. Secondly, the radiographers’ booking out form has been redesigned to prompt the scanning of documentation. Re-audit will occur in 1 year.

13. An unexpected cause of back pain in a 7 year old

Yu Jin Lee
Sara Sciacca, Robert Barker

Background
A 7-year old boy presented with a one-week history of gradually worsening lower back pain. There was no history of trauma and he had previously been fit and well.

Method
MRI of his lumbar spine was performed, which showed extensive spinal subdural haematomas. Due to the absence of trauma or clotting disorders, MRI of the remainder of the neural axis was obtained to elucidate a cause.

Result
This revealed a large arachnoid cyst in the left middle cranial fossa complicated by intracystic and subdural haemorrhage. Gravity-dependent migration of intracranial blood into the lumbar dural sac had occurred, eventually leading to the presentation with back pain.

Conclusion
This case highlights the importance of imaging the entire neuraxis when a spinal subdural haematoma is seen, as it may be of intracranial origin. The key MRI features of spinal subdural haematomas and arachnoid cysts are also highlighted.

14. AMYVID – The what, why, when, who and how?

Maureen Dumba
Sarah Khan, Gemma Dawe, Zarni Win

Background
As the population ages, the number of people living with dementia is increasing. A conclusive diagnosis often takes years to be reached, but can aid treatment decisions and is often beneficial to patients and their families.

‘Dementia’ is a broad term encompassing symptoms such as memory loss and cognitive decline. A number of conditions fall under this umbrella with Alzheimer’s disease (AD) being the most common. Structural imaging is sought to help confirm the presence of dementia and determine the specific subtype, in addition to excluding other structural causes. Advances in neuroimaging, namely nuclear medicine (NM), employ novel techniques to assist with the diagnostic pathway. An Amyvid™ scan is a PET-CT using the tracer florbetapir to estimate the density of beta-amyloid neuritic plaques, meaning it is sensitive to AD.

Method and Result
This poster presentation describes the indications, technique and common findings of an Amyvid™ scan, as well as examples of positive NM imaging with MRI correlation.
15. Post-thrombectomy CT appearances – The key to accurate diagnosis

Hamed Nejadhamzeigilani
T Patankar, A Goddard

Background
Since the publication of the NICE guidelines on mechanical clot retrieval for treating acute ischaemic stroke in February 2016, we anticipate an increase in the frequency of such procedures. As per national guidelines a 24 hour post intervention CT head is performed as routine practice. Subsequent imaging is initiated if there is clinical concern.

Purpose
We aim to provide a pictorial review of a 2 year cohort of patients from a tertiary centre who underwent percutaneous endovascular thrombectomy, in order to: demonstrate normal radiological features post-thrombectomy, highlight the CT characteristics of post-thrombectomy complications and discuss approaches to differentiate between normal evolitional changes and complications.

Method
Between June 2014 and June 2016, 35 patients underwent endovascular thrombectomy at our centre. We reviewed all post-operative CT imaging in order to determine the accuracy of reporting with regards to reported complications as opposed to normal changes.

Conclusion
Normal post-thrombectomy changes can mimic the appearances of complications such as haemorrhage. Familiarity with the evolving post-thrombectomy changes is paramount in enabling accurate diagnosis of life-threatening complications.

16. The ideal radiology report – How do referring clinicians want us to report?

Nikhil Birdi
Andrew Crockett, Daniel Birchall

Purpose
The radiological report determines the radiologist’s true value. And yet, there is no universal agreement on how should radiologists report. In our study we sought to answer this question by analysing our referring clinicians’ responses to two reports, deliberately created to be identical in content but polar opposites in style.

Method
Two reports were issued for a MRI lumbar spine by the same Consultant Neuroradiologist. Report A: 4 lines. Report B: 40 lines. The reports were evaluated by Consultant Neurosurgeons to compare the opinions and expectations and to identify trends, discordance, and discontent.

Result
n=10, 100% response rate. 100% clinicians more satisfied with Report A. 9/10 clinicians felt findings in Report B were lost in the discussion. Was additional information in Report B helpful? Only 30% clinicians agreed. Readability: 6/10 clinicians more likely to read Report B conclusion only.

Conclusion
Clinicians prefer reports that are clinically orientated. A truly valuable report is one that is action-orientated, although, of course, this demands considerable experience and clinical foresight from the radiologist.

17. A-Z of spinal intervention – A single centre experience

Stephen Sammut
Z Hashim, CK Jadun

Method
Pathologies affecting the spine and surrounding structures are varied and can be challenging to diagnose and treat. Various approaches can be used with regards to CT/Fluoroscopy guided diagnostic and therapeutic spinal interventions. We reviewed more than a hundred spinal interventional procedures performed at the University Hospital of North Midlands and compiled an A to Z approach for spinal interventional techniques.

Result
Our series of cases include diagnostic procedures such as spinal (cervical, thoracic and lumbar) vertebral body and Para spinal soft tissue biopsy, discitis aspiration, challenging biopsies such as soft tissue biopsy around the dens and pre-vertebral trans-orofacial cervical pre-vertebral biopsies. Therapeutic procedures e.g. synovial cyst rupture, sacroplasty, vertebroplasty, and insertion of a pigtail drain into a Para spinal abscess associated with discitis are illustrated.

Conclusion
The choice of needle (e.g. Jamsheidi, boneopty, Co-axial Temno) and approach varies depending on the nature of the lesion and its location. Our case series will be of interest to the diagnostic and interventional colleagues.
18. Stereotactic Radiosurgery (STRS) for the treatment of vein of galen malformations - Case series and review

Jennifer Larsen
D. Bhattacharyya, K. Hunt, T. Hodgson, R. Dyde and D. Connolly

Background
Vein of Galen malformations (VGM) present early in childhood, in the neonatal period with cardiac failure or in infancy with increasing head circumference, hydrocephalus, prominent scalp veins and neurological symptoms. Effective treatment is important to reduce haemorrhage risk, vascular steal and progressive enlargement.

Method
Retrospective review of 12 patients with VGM treated with STRS between 1987 and 2012 to determine if STRS is an effective treatment and longer-term clinical outcome. Complete pre- and post-STRS imaging available in 7 patients.

Result
Median age at STRS was 32 months. Mean marginal dose received was 23.5 Gy. Post-STRS imaging was advised two years after treatment. STRS successfully obliterated VGM in 2 patients (16.7%), one with a single treatment, one after repeat STRS. A further 2 patients (16.7%) had partial responses (reduction in size/flow rate). 50% (6 patients) showed little or no change. Data currently unavailable in 2 patients.

Conclusion
STRS does not appear to be an appropriate first line treatment for VGM and other treatment methods, such as embolization, are therefore recommended where appropriate. STRS may be useful if other treatments are unsuccessful.

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19. Use of volumetric and growth rate data in the classification of Low Grade Gliomas (LGG) by two neuroradiology consultants

Jennifer Larsen
Charles Romanowski, Nigel Hoggard

Background
Patients with LGG in our institution undergo 3T MRI surveillance. This study investigates the accuracy of growth rate (GR) in categorising LGG into non-transforming (NT) vs. transforming (T) tumours by two experienced neuroradiology consultants.

Method
Retrospective review of GR in 51 patients with LGG by two neuroradiologists independently categorised tumours into NT, T or indeterminate. Neuro-oncology MDT opinion determined accuracy. 19 patients were reviewed twice for assessment of intra-rater reliability.

Result
Consultant 1 had an accuracy of 64.7% (68% NTs and 61.5% T correct) whereas consultant 2 had an accuracy of 54.9% (92% NTs and 19.2% T correct), giving positive predictive values of 89.5 and 83.3% respectively. Good inter-rater agreement (60.78%, Kendall =0.415, p<.001) and intra-rater reliability (80%). Disagreement occurred in 20 cases, resolved by consensus. Consultant 1 was better at identifying Ts, whereas consultant 2 was superior at NTs.

Conclusion
GR can be useful in categorising NTs vs. Ts, however opinion differences exist even between experienced consultants. These disparities may reflect the personalities of the individuals. Double reporting of LGG MRIs is therefore recommended.

20. Midbrain and hindbrain malformations – A pictorial review

Brook Adams
D Saunders, J Macmullen-Price, IJ Craven, DJ Warren, S Currie

Purpose
Recent genomic and imaging advances have greatly advanced our understanding of the pathogenesis of posterior fossa malformations. Whilst the spectrum of encountered imaging findings is varied there are certain features, which may alert the radiologist to suggest certain specific disorders, facilitating targeted genetic investigation. This topic is therefore ripe for a review of interesting cases.

Method and Result
Our educational exhibit will begin with a refresher of the basic embryology of the mid and hindbrain before moving on to some interesting and rare case studies. We present a number of contemporary cases that have come through our tertiary centre for paediatric neuroimaging. These focus on both congenital and acquired conditions resulting in abnormal brainstem morphology, including, PTF1A-related pontocerebellar hypoplasia (PCH), rhomboencephalosynapsis and Dandy-Walker malformations as well as Joubert syndrome and the dystroglycanopathies.

Several further conditions have been described that lead to midline “clefts” in the brainstem of differing morphology. We present two such cases; one associated with ROBO3 and POMT mutations. These rare and interesting conditions occur when the genetic mutation has led to disordered neuronal migration of decussating fibres in the brainstem.

Conclusion
Neuroradiologists with an interest in paediatric neuroimaging need to be aware of what they may encounter in this rapidly evolving area. Our case review illustrates the breadth of appearances that you may be confronted with together with the relevant underlying genetics.

References
21. Can fMRI reliably detect activation within the vicinity of an AVM?
Shubhabrata Biswas
Christine Denby, Ellie Walsh, Harry Das, Kumar Das

Purpose
To determine whether fMRI can demonstrate brain function near an AVM.

Method
20 patients with AVMs underwent motor, visual or language fMRI paradigms dependent on AVM location. fMRI data was analysed using SPM12. AVM size and lesion to activation distance (LAD) were recorded.

Result
11 patients underwent a motor function paradigm and all displayed activation of motor cortex. 6 had AVMs in motor cortex, 2 of whom had activations next to the lesion, 1 had activation distant from the lesion, and 3 had LADs of 27, 32 and 38mm respectively. 8 patients underwent a visual paradigm. 7 had AVM located in the visual cortex and all the 7 displayed visual cortex activation. 3 had activations covering the lesion, 3 next to the lesion and 1 had an LAD of 16.5mm. 11 underwent a language paradigm. 8 had AVM located in language areas, 4 of whom demonstrated activations in both Broca's and Wernicke's areas, 4 had activation in the Wernicke's area alone and none had Broca's area activation alone. LADs recorded for the language paradigm ranged from activation next to the AVM to distant activations (136mm in contralateral hemisphere).

Conclusion
The fMRI paradigms employed in our AVM patients can successfully demonstrate areas of activation. Activations recorded as distant from the lesion may be due to brain plasticity.
22. Non-syndromic craniosynostosis – A radiological perspective
Hamed Nejadhamzeezigilani
T Buende, D Shastin, UJ Craven, DJ Warren, S Currie, P Chumas, J Macmullen-Price

Purpose
We aim to provide an educational pictorial review of a 5 year cohort of patients from a quaternary centre, in order to: demonstrate radiological features of non-syndromic craniosynostosis, highlight the role of imaging in the pre and post-operative management, provide an insight into the different surgical approaches and illustrate post-surgical appearances.

Background
Craniosynostosis is a condition which is characterised by the premature fusion of one or more cranial sutures, often resulting in a skull deformity. If left untreated, it can lead to cosmetic deformity and in some cases to increased intracranial pressure. It can be categorised according to the suture(s) involved which determines the morphological appearances and the subsequent surgical management.

Method
Between January 2010 and January 2015, 103 patients with non-syndromic craniosynostosis underwent surgical management at our centre. This entailed 108 active or passive repairs.

Conclusion
Despite the rarity of this condition, it is important to know the common imaging pathways with which patients should be investigated, in order to promptly diagnose and initiate management.

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