Neuro-intervention: who should do it?

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NO CONFLICT OF INTEREST TO DECLARE
How strong is the evidence for the use of thrombectomy to treat acute ischaemic stroke and how do we introduce it into routine clinical practice?
The Evidence So Far

• Benefit shown for previously independent patients with proximal anterior occlusion, not responsive to IV tPA, within about 4.5 hours of stroke

• All procedures undertaken in experienced centres by experienced interventional neuroradiologists

• One completed trial and remainder stopped early

• Less than 2000 patients worldwide included in trials
So still lots of unanswered questions which are likely to remain unanswered

- What is the time window when treatment effective?
- Is the effectiveness of the intervention similarly time dependent to intravenous tPA?
- Is there a differential impact according age of patients?
- Were the patients treated in the trials representative of the trial ‘selection criteria’ or were they a specially selected subgroup?
- Can we treat people with prior disability?
- Is it safe to treat patients on anticoagulants or who have had recent surgery?
Core principles for delivery of thrombectomy

• Treatment should be by a team with the necessary skills – diagnosis and decision to treat, interventionist, anaesthetist, theatre technicians, theatre nurse, post op care, hyperacute stroke unit occasionally ITU

• Only perform procedure in lab equipped with the appropriate equipment (not the same as cardiac)

• Treatment should be available for all patients who might benefit regardless of time or geography

• Patients should only be treated routinely if fit the criteria used in the trials. Anyone else should not treat or enter into trials
The operator must have the skills and experience to operate independently and rapidly.
The operator will need to detect and manage their complications

- Vessel spasm
- ENT
- Dissection
- Vessel rupture
- Equipment failure
- Reperfusion events
What skills are needed?

- Neurosciences/stroke
- Image interpretation
- Case selection
- Operative techniques
- Supporting clinical skills
Current training for Interventional Neuroradiology

- Core radiology: 36 months
- Diagnostic neuroradiology: 12 months
- Interventional neuroradiology: 24 months

- About half of current neuroscience centres have NIR trainees
- Currently 6 trainees a year in NIR
- In order to expand INR consultant body from 90 to 170 within 5 years training capacity would have to expand by 3-4
What do we currently have to deliver thrombectomy?

- 90 interventional neuro-radiologists in UK
  - <5 new trainees qualify each year and some existing consultants retire
- Virtually no services providing 24/7 cover
- 9/4273 (0.02%) cases entered on to SSNAP in November 2015 received thrombectomy
- 26 neuroscience centres with some interventional radiology in England
What do we need?

• Enough centres to achieve clot removal 24 hours a day, 7 days a week to all patients who need it within a maximum of 4.5 hours of onset of symptoms (same time as for IV thrombolysis)

• 5-6 consultants capable or performing the procedure in each centre

• Plus additional nurses, anaesthetists, technicians for the interventional suite and nurses to accompany patients on transfer from outlying centres

• Beds on HASU’s, some ITU beds

• Response ambulance services for drip and ship transfers
How Many Patients are Going to be Treated?

- Suitable for IV thrombolysis – 12.6% according to RCP criteria
- Prior Rankin 2 or less – 81%
- Arrive within 0-3 hours of onset symptoms 80% of thrombolysed
- Don’t respond to IV thrombolysis - 86%
- Have proximal vessel occlusion – approx. 25% unresponsive to IV tPA
  
  = 1.75% of stroke admissions
- Plus those not suitable for IV tPA because recent surgery or on anticoagulants – maybe 3% (guess)

If 5% of the total = 4000 in England/yr. With NNT of 4-8 between 500-1000 patients will benefit
How many centres?

- Currently about 150 acute hospitals delivering IV thrombolysis
- Suggested we could manage with just the 26 neuroscience centres (in comparison 119 PCI centres in UK)
- Inconceivable travel times could be achieved (accepting there will have to be a ‘drip and ship’ policy)
- 50 centres seems more feasible – therefore about 300 interventionists
Neuroscience centres England, Northern Ireland and Wales
Maintaining skills

• Assume 4000 procedures/yr (compared with 96,143 PCI procedures/yr in UK)
• If 50 centres each with 6 interventionists each person would perform 13 cases/yr
• If 24 centres with 6 interventionists each person would treat 28/yr
Therefore.....

• Either we limit treatment to those times of day and centres where there happens to be an interventional neuroradiologist available and accept that it will be a few generations before we have sufficient for universal coverage

• Or we rapidly expand the number of training places – minimum of 5 years before start being delivered and there is not way the money will be made available

• Or we ship in people from other countries to run the service

• Or we use alternative specialists
Interventional Neuroradiologists

• No debate that if there were enough we would choose to use them exclusively

• But
  • Need an additional 200 consultants
  • We are not going to get another 200
    • Money
    • Training
Getting Interventional Neuroradiologists from Outside the UK

• There is no pool of unemployed well trained clinicians queuing up to come to the UK
What would we do with more Neuroradiologists?

• Need for on call duties but what would they do for the rest of the time?
  • Could provide more comprehensive subarachnoid coiling service
  • Could do more neuroradiology reporting but what evidence we need another 200 consultants to do this?
  • Could train them to do general vascular intervention
Interventional Radiology

• 513 interventional radiologists in UK working across 151 trusts

• Unclear how many with endovascular expertise but increasing number of centres (75%) now providing 24 hour service
Delivering and sustaining 24 hour interventional radiology services - percentage units providing 24 hour service cover for key procedures.
Interventional Cardiology

- 659 Interventional cardiologists
- 119 centres (100 NHS), >96,000 procedures (average of 145/cardiologist)
- 20 NHS centres <400 procedures/yr; none <200
- But different technical challenges requiring lots of additional training
- Are there cardiologists who are not already fully occupied
- Different equipment
- But very good at rapid arterial catheterisation and thrombectomy/stenting
PCI Centres UK 2014: 119 UK Centres
Stroke Physicians

• Stroke Medicine 179 England, 3 Wales, 12 Scotland 3 Northern Ireland
• Recruitment problems for existing posts
• Would need to learn advanced catheter skills from scratch – maybe 2-3 years additional training
• Train to read CT angiograms, ASPECTS scores etc.
• Important to match specialty to personality. Would you find someone who was good at coping with a complex catheterisation going wrong also good at coordinating a multidisciplinary stroke meeting discussing rehabilitation and discharge?
Non Medical Interventionists

• What is it that is required that could not be learnt by someone without a medical degree who is good at computer games?

• Part of a team with experienced stroke physician skills, 2 dimensional neuroradiology expertise, anaesthetist
Can we afford to run a service exclusively with neuro-radiologists?

- 200 additional consultants @£100,000 each per annum basic salary exclusively for thrombectomy service = £20m/annum.

- 4000 cases a year = £5000/patient just on interventionist salary costs

- Assuming NNT of 4 for transformed outcome = £20,000 per successfully treated patient
Are there parallels with development of IV thrombolysis?

• NINDS trial published in 1995
• It took 20 years to develop a service that provided 24 hour cover across the country
• The trial (and all subsequent ones) used neurologists/stroke physicians in specialist centres to deliver treatment
• If we waited for enough stroke physicians to be employed to deliver it, it still would not be in place (197 consultants would provide enough for 32 centres)
Conclusions

• The choices are:
  • Run services only where and when there are INR available
  • Be prepared to wait for a generation or more to get sufficient staff
  • Find alternative staff to deliver the procedure
  • The most logical solution is to train vascular interventional radiologists to perform intracerebral work. Include the training as part of core curriculum
  • Recruit the right people with the skills and the enthusiasm and don’t be limited by titles
  • Service led by specialist neuroradiologist but cover to include vascular IR
  • Maybe some cardiologists able and willing but not going to be come a routine part of their work