Review Article

A call for neurologists to take up stroke intervention

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Abstract

Recent data have provided overwhelming evidence in favor of benefits of emergent endovascular intervention in large vessel acute ischemic stroke (AIS). India with its large population has a huge burden of AIS. Hence, neurologists need to gear up to the new challenge of providing interventional care to huge populations of AIS in the country. The best way to cover this unprecedented unmet need is to encourage neurologists to take up interventional subspecialty interests through new but sound training pathways.

Key Words

Acute ischemic stroke, endovascular treatment, interventionalist

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Introduction

The stroke burden in India is enormous. Stroke is the second most common cause of death in India.[1,2] Countrywide, an estimated 165,000 stroke incidents occur every year, implying thereby that one new individual suffers from stroke every 40 s and dies every 4 min.[1-4] Those who survive are very often afflicted by serious, long-term disability (amounting to 102 million disability-adjusted-life-years). The 2010 Global Burden of Diseases (GBDs) project estimates of stroke incidence, prevalence, and mortality in India represent an increase of 68% in stroke incidence and 26% in stroke mortality. Significantly, the 2010 GBD data revealed that nearly a third of all new-onset stroke cases were in people <65 years, of which an overwhelming majority (89%) were from low and middle-income countries such as India. In the United States, the annual economic costs of stroke are estimated at US$ 57.9 billion. Nearly, two-thirds of this expense is constituted by direct health-care costs; the remaining US $21 billion represents indirect costs, including loss of productivity. Sadly, economic costs owing to stroke have not been estimated from India but are likely to be sizeable, if not more.[1-11]

Unmet Needs in Stroke Care in India

Although the data evince the requirement for a copious organizational, infrastructural, and workforce capacity to deal with the burgeoning stroke epidemic, the majority of hospitals in the country are under-resourced to triage and treat patients with stroke quickly and effectively.[10,11] Clinical stroke services are limited, often nonexistent in many parts of the country, distinctly so in the public sector health-care segment.

Existing Treatment Gaps

Contemporary stroke care services are restricted to the high-end corporate health-care sector based largely in metropolitan

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locations. For either economic or geographic reasons, often both, the vast majority of Indian population are unable to access these services. In any case, the available resources are exiguous relative to need. The gap between the need and availability is constituted a number of elements [Box 1]. It is imperative to address these treatment gaps emergently.

Current Evidence for Endovascular Therapy in Acute Ischemic Stroke

Whereas earlier a futuristic dream, endovascular treatment is now visibly effective in acute ischemic stroke (AIS).[12-18] Till some time ago, thrombolysis within 4.5 h was the only proven treatment. However, recanalization rates with intravenous (IV) thrombolysis are suboptimal in patients with large vessel AIS. Endovascular treatment is now the standard of care in this subgroup.[16] A number of interventional trials, including MR CLEAN, EXTEND-1A, SWIFT-PRIME, REVASCAT, ESCAPE, THRACE, and THERAPY, have together provided a solid body of evidence in favor of endovascular intervention over best medical treatment in large vessel AIS.[12-15] In fact, endovascular intervention has been incorporated in a number of guidelines and position statements for the management of large vessel AIS. We are thus entering a new era of stroke therapy, particularly for large vessel AIS. Quite appropriately, health-care providers have to gear up to this added requirement of stroke care provision, which apropos the Indian population is incredibly enormous. Besides the huge numbers requiring intervention in the country, another worrisome issue is the extremely limited time period after stroke onset in which endovascular intervention can be useful. Since onset to reperfusion time is the new bottom line process metric, the single unifying theme underlying effective and safe treatment is the speed of intervention. This means that facilities for endovascular treatment of AIS should be rapidly accessible and hence, abundantly distributed across the vast expanse of the country.

The significant driving force to the success of the interventional trials has been a faster recanalization of the occluded vessel, and this has been achieved by an organized workforce and availability of dedicated stroke centers. Hence, neurologists will need to adapt to the new demand with novel triage rules and process and train new and existing personnel. They will need to reassess medical aspects of care including the thrombolytic agents in combination with endovascular thrombectomy, anesthesia use, adjuvant antithrombotic therapy, and medical management of blood pressure. Finally, they will have to properly identify the best imaging selection techniques because the association with outcome cannot be confounded by the lack of reperfusion.

Box 1: Gaps in provision of stroke care in India

Use of thrombolysis for stroke (a dismal 0.5% of all strokes receive thrombolysis)
24/7 availability of stroke physicians
Neuro-interventionist/s
Availability of stroke practice guidelines and implementation of stroke care pathways suitable to the Indian environment
Availability of stroke units
Availability of stroke teams
Sufficient community awareness programs which are essential key elements to provide optimal stroke care to the community
Efficient public emergency ambulance systems

Stroke infrastructure must now completely adapt to endovascular therapy. As with IV recombinant tissue plasminogen activator, only a small percentage of patients with stroke will require endovascular therapy (estimates are 10%) but this small percentage will drive the reorganization of systems of stroke care.

Endovascular Therapy for Aneurysms and Arteriovenous Malformations

Advances in endovascular techniques have provided safe and effective therapeutic alternative in the setting of acute aneurysmal subarachnoid hemorrhage. These techniques allow parent vessel preservation and may be combined with surgical approaches. Electrolytically detachable platinum coils may be deployed strategically within an aneurysm promoting thrombosis and eventual obliteration.[19] Other materials such as balloons or glue also may be used. A meta-analysis of relevant studies including the International Subarachnoid Aneurysm Trial found that endovascular coiling of cerebral aneurysms yields a better clinical outcome in comparison to clipping does with the greatest benefit in patients with a good preoperative grade.[20] Progressive refinement in endovascular techniques and devices for the cerebral vasculature have expanded therapeutic options available for definitive treatment of cerebral aneurysms. More pliable, low profile stents may be used for stent-assisted coiling for the obliteration of wide-necked aneurysms. Balloon-expandable covered stents may be used for the treatment of selected carotid or vertebral artery pseudoaneurysms.[21]

Need for Capacity Building for Stroke Intervention in India

While facilities for comprehensive stroke care are undeniably limited in the country, stroke intervention centers are woefully in short supply. Besides, stroke intervention is constrained due to lack of personnel, knowledge, availability of infrastructure and overall, a lack of awareness about advances in stroke care. Among these gaps, perhaps most crucial is the enormous gap in the number trained and skilled stroke interventionists, who are indisputably the centerpiece of any intervention program.

Stroke intervention is a highly specialized and demanding field, requiring high levels of skill acquired over a large number of interventional procedures performed over long periods of time. To be accomplished as a stroke interventionist involves a fair amount of dedication, requiring professional practice confined to intervention alone leaving aside the practice of general neurology. The expert group recognizes that impromptu and isolated attempts at intervention by busy practicing general neurologists might not only yield poor outcome but also compromise safety.

There is thus a dire need to develop a highly-trained and competent stroke intervention workforce. The workforce can be generated from pools of neurologists, neurosurgeons, and neuroradiologists.

Why Neurologists are Suited to Evolve to Stroke Interventionists?

Neurologists, in particular, those who have added expertise in emergent work-up and care of stroke are in an advantageous position to take up stroke-related intervention. They are best equipped to make critical clinical decision during and immediately after the intervention. They can thus play the combined role of a clinician and interventionist. There are highly successful parallel models of clinicians successfully developing interventional experience in the form of cardiologists who undertake interventional procedures in addition to their routine clinical duties and neurosurgeons who have evolved from clipping of aneurysms to interventional approaches. Neurologists have to learn from their cardiology colleagues, for whom postgraduate training certification is mandated by several months of posting in the cardiac catch laboratory. Not only this, aggressive approaches have led to primary cardiac intervention (angioplasty by the Cardiologist to become the standard of care in acute myocardial infarction.

Acute Stroke Team Composition

Regardless of whether the role of an interventionist is taken up by a neurologist or otherwise, the expert group is of the view that each teaching neurology facility (including institutions offering DM and Diplomate of National Board [DNB]) in the country should mandatorily undertake to form an "acute stroke team (AST)." The stroke team should essentially comprise (i) a clinician - ideally a neurologist, who has expertise in emergent stroke work-up and care, (ii) and an interventionist (who may be a neurologist, neurosurgeon, or neuroradiologist) who is responsible for performing the interventional procedures and also participates in the immediately postprocedure care. Both the clinician and interventionist have different roles; the former takes up the responsibility of long-term care and monitoring, while the role of the interventionist is largely restricted to the period of, and immediately after the intervention.

The expert group recommends two additional resource persons to optimize functioning of the AST: (1) A stroke nurse available 24/7, who will monitor the acute stroke patient and (2) a stroke intervention technician, who is purpose-trained in stroke intervention and hence different from the Cath Laboratory technician, who is oriented to cardiac catheterizations.

Need for Incorporating Vascular Neurology Training in Neurology Training Curricula

Historically, when modern methods of imaging were not available, neurologists often resorted to carotid angiograms. Indeed, digital subtraction angiogram (DSA) was developed by a neurologist. One of the ways to kindle interest in stroke intervention is to introduce hands-on training in performing diagnostic DSAs as a component of the DM neurology curriculum.

Training in diagnostic DSAs during postgraduate training should be an initializing step in undertaking an interventional career. However, the expert group is of the view that merely performing a few diagnostic DSAs do not fulfill requirements for a stroke intervention career pathway. Nevertheless, in the current era of stroke care, a neurology trainee should be appraised of DSAs so as to be able to identify vascular anatomy to holistically part in acute stroke care. There is thus a strong case for including rotation in the DSA laboratory with hands-on participation and maintenance of logs thereof during neurological postgraduate training.

Justification for "Fellowship" Program for Stroke Intervention in India

The history of stroke intervention is indeed a short one. Historically, there have four types of training tracks in stroke intervention in Western countries: (1) Self-styled, (2) grand-fathering track, (3) nonaccredited fellowships, and (4) accredited fellowships.

The way forward to augment the available stroke interventional workforce (currently limited to about fifty in the country) is to encourage neurologists to take up full time interventional careers through stroke intervention fellowships. It is proposed that these fellowships might be accredited by the National Board of Examinations (leading to the award of DNB). An alternative proposition is a joint Indian Academy of Neurology-Indian Stroke Association-Society for Neuromuscular Intervention accredited fellowship program in recognized centers on similar lines to critical care fellowships offered by the Critical Care Society. It is envisaged that the duration of this fellowship should be 2 years. Other essential requirements including the number of procedures, infrastructure, and mentor characteristics should also be specified.

It is heartening to note that a number of neurologists are now pursuing training in the few available specialized centers for stroke intervention [Figure 1]. The time has come to accredit their training experience. This would considerably augment and only add to the paltry cerebrovascular intervention workforce. It is desirable to have training programs that are inclusive of neurologists, neurosurgeons, and neuroradiologists to meet the enormous workforce gap as well as address the manifold domains of intervention including strokes, aneurysms, and nonvascular interventions.

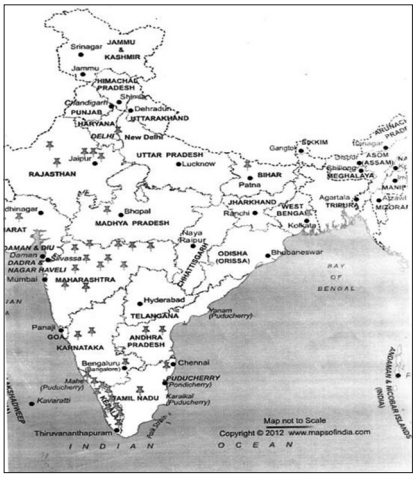

Figure 1: Map of India showing various centres actively involved in neuro-vascular intervention for stroke

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Conflicts of interest
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