

Neurointervention in Nepal: Scope and challenges

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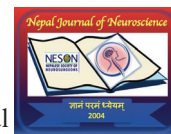
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Neurointerventional surgery, also referred to as endovascular neurosurgery or interventional neuroradiology, is a rapidly evolving subspecialty intersected by neurosurgery, radiology and neurology fields. With the introduction of innovative endovascular devices and techniques, it offers minimally invasive approach to most of the neurovascular disorders.

History of neurointervention

The history of neurointervention can be traced back to 1920s when the first cerebral angiogram was performed by Egas Moniz. Later in 1970s, the use of detachable balloons to treat cerebral aneurysms has been described in the literature.^{1, 2} However, it was in 1991 when the use of detachable platinum coils (Guglielmi Detachable Coils) by Guglielmi et al revolutionized the endovascular treatment of brain aneurysms and initiated the modern era of neurointervention.³

Although the application of neurointervention in acute ischemic stroke (AIS) treatment has been more recent, it has now been the standard therapy globally. Intravenous recombinant tissue plasminogen activator (rt-PA) was the only evidence-based medical treatment option for intracranial vessel occlusion for a long time. However, five RCTs in 2015 (MR CLEAN, EXTEND IA, ESCAPE, SWIFT PRIME, REVASCAT) demonstrated

that endovascular mechanical thrombectomy (MT) performed within 6-8 hours from the symptom onset led to significant clinical benefits in the selected patients with AIS.⁴ More recently, two multicenter RCTs (DAWN and DEFUSE 3) have further widened the therapeutic window up to 16 hours and 24 hours from symptom onset showing that MT is safe and effective in carefully selected patients based on advanced imaging criteria.^{5, 6}

Indications of neurointerventional treatment

The most common and important indications of neurointerventional therapy are:

1. Aneurysm (ruptured/ unruptured) treatment: coiling (simple/balloon- or stent-assisted), flow diversion devices, neck reconstruction devices etc.
2. Mechanical thrombectomy for acute ischemic stroke (large vessel occlusion)
3. Embolization for vascular malformations: arteriovenous malformations (AVMs), dural AV fistulas, and venous anomalies
4. Preoperative tumor embolization
5. Stenting of neck and brain vessels stenosis

Pathways into neurointervention training

There are primarily three pathways to becoming a neurointerventionalist: neurosurgery, radiology and neurology. Basically, fellowship training in neurointervention lasts for 1-2 years following the specialization in neurosurgery, neuroradiology/ interventional radiology or vascular neurology. Each route has its unique strengths and provides unique training opportunities and experiences for professional development.

Scope and challenges in Nepal

Stroke is a major cause of morbidity and mortality in Nepal. So, the use of neurointervention in timely treatment of stroke to prevent stroke related death and disability is of paramount importance. With the initiation of endovascular MT in 2019, it has been a standard treatment for acute ischemic stroke recently in few hospitals mostly centered in the capital city Kathmandu.⁷ However, there

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are many constraints limiting the application of this treatment modality in Nepal. At present, there are only about 10 neurointerventionalists in the country providing the service and very limited hospitals with the suitable angiography suites. The major challenges faced during the delivery of these services include:

- Low understanding of health-related problems, so people do not seek medical help unless complicated.
- Patients unable to afford medical care in the absence of adequate health insurance policies.
- Delay in arriving health facilities due to poor transportation system.
- Inadequate number of neurointerventionalists.
- Insufficient number of nurses and paramedics trained for stroke/neurointerventional procedures.

Awareness of the disease is of utmost importance not only to the public but also to the medical personnel involved in the initial management. It has been well reported that the educational awareness programs to the emergency medical services (EMS) personnel significantly reduced the time of treatment since onset, thereby improving the outcomes of the patients.⁸ Besides acute ischemic stroke, the scope of neurointervention in Nepal has been widened for treatment of aneurysms, vascular malformations, vessel stenosis and so on. Despite various challenges, neurointervention is gradually evolving in Nepal. With increased comprehensive stroke centers, availability of the devices, access to better health insurance, entry of more physicians in this field, coordinated EMS for prompt management as well as awareness campaigns, neurointervention can revolutionize the treatment of acute ischemic stroke in Nepal.

Conflict of Interest: None.

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