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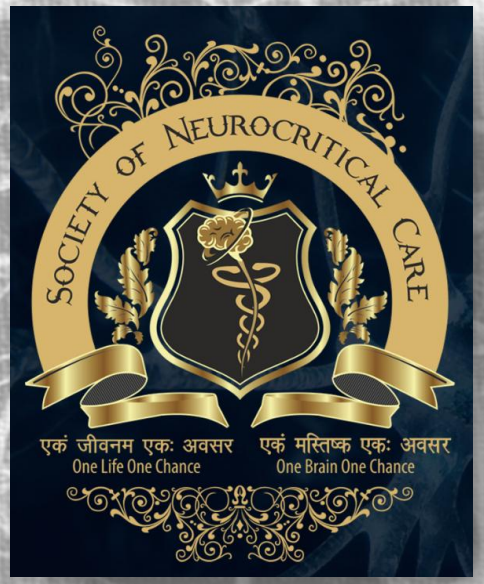

The official publication of Society for Neurocritical Care [SNCC]

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President's message

Dr Harsh Sapra
Director & Head
Department of Neuroanesthesiology & Critical Care
Medanta-The Medicity, Gurgaon (India)

It gives me immense pleasure to lead this endeavour – the Society of Neurocritical Care (SNCC) - India!

As India is not a very resource rich country, the idea of this society is to percolate the best practices in neuro-critical care to the last intensive care unit in the remotest of locations in the country. As important it is to train doctors towards basics, it is equally important to impart training and guidance to specialist centres through exchange of ideas and multicentric research through a common platform. The Society of Neuro Critical Care aims to provide training and guidance towards the basics of neurocritical care through evidence and consensus between various cross specialities.

As was long felt, there was a lacuna in the field of neurocritical care, where a pan inclusive body was needed to look after patients with neurological diseases, neurosurgical ailments, head- and poly-trauma. Experience from various specialities was needed to provide the best for our patients and doctors. The SNCC aims to provide that educational platform where various specialities like critical care, neuroanesthesia, neuro-critical care, neurology, neurosurgery, nursing, neuro-rehabilitation and many more could interact and formulate working guidelines for the best care of our patients. The society aims to start fellowships in neurocritical care and impart quality training to the doctors. Our endeavour is also to collaborate with various international bodies to bring in the best of clinical practice and education in the field. Our special thanks to the Neurocritical Care Society (NCS), USA to extend their collaboration towards the SNCC to advance the mission of promoting neurocritical care in India. As the logo says... One Life, One Chance One Brain One Chance… It becomes our duty to give our best shot for every patient we treat!

The essence of the society is the multidisciplinary and cross speciality approach, where each speciality can complement each other, in reaching the best outcomes.

I would request all doctors from all specialities to join us and provide their expertise to help us reach our goal of *'One Life One Chance, One Brain One Chance'!*

Best

Dr Harsh Sapra

Secretary's message

Dr Hemanshu Prabhakar
Professor
Department of Neuroanaesthesiology and Critical Care
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It is a matter of great honor and proud privilege to lead this new Society of Neurocritical care (SNCC). We respect the responsibility laid on our shoulders by some of the senior members of the fraternity. We sincerely believe that with your support, we will be able to grow fast and make a global presence.

To begin with, we have now given a new *look* to our website [www.sncc.co.in]. It's more informative! With your constructive suggestions and criticism, we hope to improve it further. '*Axone*' is another way of reaching our members and sharing information. This newsletter from the Secretariat will be published every 4 months [April, August and December]. We encourage participation of all the centers practicing neurocritical care by sharing their activities with us. We would be happy to make announcements on your behalf and help you reach to larger audience.

It was felt that formation of subcommittees comprising of various allied specialties such as neurosurgery, neurology, neuroradiology, neuropsychology, cardiac specialties, renal, pulmonology, trauma, emergency, infectious diseases, rehabilitation, clinical pharmacology, physiotherapy and nursing, would be essential for a comprehensive functioning of the Society. Matters relating to the constitution, education, finance, overseas affairs, members benevolent funds and also legal issues would be dealt in a systematic and refined manner through the various committees of this Society. Should you be finding yourself suitable in any of these arenas, do not hesitate to contact us and give us your inputs and suggestions.

We are pleased to inform you that our Society is affiliated to the Neurocritical Care Society (NCS) and we are now global partners with them. With continuing support and guidance from all of you, we hope to make a mark in the International arena and expand ourselves beyond the natural boundaries.

The mission of our Society is to promote best practices in the management of neurocritical care through teaching, training, collaborative research and setting standards of clinical care instituted via international guidelines of best practice. We must all pledge to make SNCC a centre for excellence in research and high standard care of neurologically impaired patients.

I now give you this opportunity to explore our website and frequent this column for updates. Visit www.sncc.co.in for details.

Well begun is half done and well done is better than well said. Here at SNCC we truly believe in actions speaking louder than words!

Sincerely!

Message from Past President - NCS

Dr Gretchen Brophy

Professor of Pharmacotherapy & Outcomes Science and Neurosurgery

Virginia Commonwealth University, Medical College of Virginia

It was an honor to attend the 4th Medanta Neurocritical Care Update (MNCC – 2018) on 31st August – 2nd September 2018, at Gurugram. I would like to thank my most gracious hosts, Dr Harsh Sapra and Dr Gaurav Kakkar, for organizing an outstanding conference and for their wonderful hospitality. The conference brought colleagues from all across India and abroad (US and UK) to participate in educational panel discussions and networking events, making the conference a great success. The delegates witnessed the launch of a new Society of Neurocritical Care [SNCC - India] during this conference. As the President of the Neurocritical Care Society (NCS), I was delighted to participate in the conference, and join the discussions with the SNCC-India founding members to develop the Society's by-laws, establish officer roles and responsibilities, and coordinate and affirm the SNCC-India as a NCS Global Partner. I would like to commend Dr Yatin Mehta, Dr V P Singh, Dr Harsh Sapra, Dr Gaurav Kakkar, Dr Hemanshu Prabhakar, etc who took the initiative to develop SNCC-India as well as join the NCS as a Global Partner to promote neurocritical care practice, education and research throughout India.

Have you heard about the Neurocritical Care Society? NCS is a multidisciplinary, international organization whose mission is to improve outcomes for patients with life-threatening neurological illnesses. NCS aims to recognize, support, and partner with developing neurocritical care sections, chapters, or interest groups within existing national societies, or as newly founded societies in order to advance the mission of improving care for critically-ill patients with neurological diseases.

The NCS currently has 3 established Regional Chapters in the following regions: Asia, Mid-East/Africa, and South America; with the goal of increasing to 5 chapter (with the future additions of North/Central America and Europe Chapters). Each Regional Chapter will be comprised of representatives from partnering organizations.

As a NCS Global Partner, SNCC-India will collaborate with other members of the Asian Regional Chapter to advance neurocritical care worldwide. Examples of Global Partnership opportunities include NCS Asian Regional Chapter meeting development, participation and promotion; Emergency Neurological Life Support (ENLS) course delivery, and research collaboration. SNCC-India members will also receive discounted membership in NCS, allowing for decrease meeting registration, online access to Neurocritical Care, discounted NCS On-Demand products and opportunities for networking with neurocritical care colleagues worldwide.

I am very excited about the SNCC-India partnership with NCS, as this will allow for limitless opportunities and collaborations between our organizations and other NCS global partners. Again, I would like to thank the founders of SNCC-India for all their hard work and establishing this partnership. It was a pleasure to be part of the launch of the SNCC-India!

Gretchen Brophy

Globally yours!

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Importance and role of neurointensive care in the developing SAARC countries

In the past decades, neurocritical care has rapidly grown as a distinct multidisciplinary sub-specialty.[1] The concept of neurocritical care originally emerged from the management of acutely ill postoperative neurosurgical units. In the past, most patients with neurocritical illness were managed together with the patients with medical and surgical critical illness. However, past decade could see the growing evidence supporting the role of organized neurocritical care team to improve outcome in patients with intracerebral hemorrhage, trauma, acute ischemic stroke and sub-arachnoid hemorrhage.[2] The team consisted of trained neurointensivists, Neurocritical care nurses, pharmacists and other health care professionals. However, such dedicated teams have been scarce even in developed world.

When compared to the developed countries, the burden of neurocritical illness is higher in the developing countries. In the developing SAARC countries, central nervous system infections, stroke, traumatic brain injury and traumatic spinal cord injury contributes significantly to the neurocritical burden. The higher burden of illness clearly depicts the potential benefit of delivering dedicated neurocritical care in our part of the world. However, due to multiple barriers in effective delivery of neurocritical care and due to significant evidence-practice gaps, outcome of these patients remain dismal in this part of the world. Some important barriers being lack of public awareness about neurological emergencies, poorly developed pre-hospital transport systems, limited number of trained health care professionals, poor infrastructure and financial constraints.

In parallel to the barriers, multiple opportunities exist to improve neurocritical care, ranging from raising public awareness, enhancing effective prehospital transport, training medical professionals about neurological emergencies and management, developing capacities and making the best out of the available resources.[3] The national policy makers, national critical care societies and international bodies like Neurocritical Care Society can potentially collaborate to address the opportunities to improve neurocritical care services.

International bodies like Neurocritical Care Society has come up with various evidence based guidelines and more recently, the recommendations about standards for Neurocritical Care Units.[4] Neurocritical Care Society has also partnered with the critical care societies of multiple countries with the aim to improve neurocritical care services across the globe. The dedicated national bodies/societies like the Society of Neurocritical Care, India can adapt the international recommendations tailored to the national needs, resources and disease epidemiology. In additional to conducting the brief courses like Emergency Neurological Life Support (ENLS),[5] the national societies can strive to initiate, standardize and maintain the need based training programs to generate trained manpower locally. The training programs should aim to educate and to collaborate with the multidisciplinary healthcare workers involved in management of patients with neurocritical illness.

With better training and focusing on the simple strategies to prevent secondary brain injuries, even with limited resources, timely and simple interventions can potentially improve outcome of patients with neurocritical illness.

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Speciality wall!

Dr Chandril Chugh
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Ischemic Stroke

Stroke is defined by the World Health Organization as a clinical syndrome consisting of rapidly developing clinical signs of focal (or global in case of coma) disturbance of cerebral function lasting more than 24 hours or leading to death with no apparent cause other than a vascular origin (1). Stroke is classified broadly into three categories; ischemic stroke, haemorrhagic stroke and subarachnoid haemorrhage. Ischemic stroke occurs due to blockage of blood vessel which limits the blood supply to the brain whereas hemorrhagic stroke occurs due to rupture of blood vessel leading spillage of blood in the intracranial cavity (2). Depending on the site of blood spillage the haemorrhagic stroke could be classified as intracerebral haemorrhage or subarachnoid haemorrhage. Approximately 60-80 % of all strokes are ischemic. The available data (extrapolated from cardiac registries) says there are about 1.4 to 2.0 million (1400,000-2,000,000) ischemic strokes every year in India, which is amongst the highest in the world. Brain attack or Stroke is the second most common cause of death and the third most common cause of disability in the world.

Clinical Presentation and Assessment:

Clinical presentation of stroke depends on the area of the brain affected by occlusion of the arteries. American heart association/American Stroke association (AHA /ASA) have popularised the FAST algorithm to diagnose stroke. FAST acronym stands for Facial droop, Arm weakness, Slurred speech and Time of onset, however this is limited to the diagnosis of ischemic stroke and often ignores symptoms of posterior circulation stroke. Another easy and comprehensive way to remember to signs of stroke is the 7S method

STROKE: *REMEMBER THE 7 S METHOD TO DIAGNOSE STROKE*

- **S**UDDEN (symptoms start suddenly)
- **S**LURRED SPEECH (speech is not clear, as if drunk)
- **S**IDE WEAK (face, arm or leg or all three can get weak)
- **S**PINNING (vertigo)
- **S**EVERE HEADACHE
- **S**IGHT (loss of vision in either eye)
- **S**ECONDS (note the time when the symptoms start and rush to the hospital)

All the symptoms need not be present to diagnose stroke. Any of the above mentioned symptoms can be present and is helpful is diagnosing ischemic as well as haemorrhagic stroke in anterior as well as posterior circulation.

The National Institutes of Health Stroke Scale (NIHSS)

The most commonly used tool to do a fast neurological assessment is the NIHSS. However, it should not be used to replace a comprehensive neurological exam. The 11-item scale measures consciousness, orientation, visual fields, gaze, language fluency and comprehension, speech, sensory loss and neglect, motor strength, and limb ataxia. Validated for use by neurologists and non-neurologist providers and nurses, the scale can easily be completed in less than 10 minutes and serves as an initial measure of stroke severity ranging from 0 (no deficits) to 42 (maximum score) (3). The NIHSS has no minimum score that would exclude eligibility to receive IV alteplase and patients with mild but nonetheless disabling symptoms should be offered therapy. Additionally, eligibility for endovascular therapy has recently been established for appropriate patients with an NIHSS score of 6 or higher and the presence of a large vessel occlusion (4, 5).

Of additional note, one should be aware of biases within the NIHSS. For instance, dominant (left) hemispheric strokes score approximately 4 points higher than nondominant (right) hemispheric strokes, reflecting the impact of aphasia on the neurologic assessment (6). Similarly, for a given NIHSS score, the volume of infarction is greater for nondominant, right hemisphere than dominant left hemisphere strokes (7). Additionally, the NIHSS may underestimate posterior circulation stroke deficits compared to anterior circulation stroke deficits. Patients presenting with small brainstem or cerebellar strokes may have a low or even 0 NIHSS score, and careful vigilance should be employed to determine eligibility for acute treatment in this population (8, 9).

BRAIN IMAGING: While a brain magnetic resonance imaging (MRI) is good ……a plain computerized tomography scan (CT) is enough.

The principal goal of initial brain imaging in the patient with acute stroke is to differentiate hemorrhagic versus ischemic stroke. Of the available modalities, noncontrast head CT is established as a rapidly obtained, highly sensitive, and widely available tool to rule out hemorrhage and inform treatment for acute stroke. Rapid brain MRI offers the additional advantage of being both highly sensitive and specific for ischemic stroke, particularly in cases of suspected stroke mimics, and can adequately rule out hemorrhage on gradient recalled echo (GRE) or susceptibility-weighted imaging (SWI). While either imaging modality is supported in acute stroke guidelines, the generalizability of rapid brain MRI, particularly for smaller and low-access hospitals, remains limited.

The Alberta Stroke Program Early CT Score (ASPECTS) system is a simple and reliable 10-point scale for evaluating early ischemic changes in acute stroke and is clinically relevant in the evaluation of eligibility for endovascular therapy as supported by recent clinical trial data and updated guidelines (10).

ACUTE REPERFUSION TREATMENTS

There is incontrovertible evidence that IV thrombolysis with rtPA and endovascular thrombectomy with a retrievable stent improve neurologic outcomes in patients with acute ischemic stroke. Both treatments should be administered as quickly as possible after stroke onset, can be combined, and are safe in appropriately selected candidates.

IV thrombolysis and mechanical thrombectomy can produce reperfusion injury after recanalization. Reperfusion injury can manifest with hemorrhage and edema. It is more severe when the area of established infarction is larger. Good patient selection (ie, absence of a large ischemic core) and prompt treatment are crucial to avoid this complication.

Intravenous Thrombolysis

IV thrombolysis with rtPA is proven to be effective in improving functional outcomes after an ischemic stroke up to 4.5 hours after symptom onset. Randomized controlled trials followed by large observational studies confirming the rates of recovery noted in these trials and meta-analyses support this therapeutic indication(11-13). The US Food and Drug Administration (FDA) has only approved rtPA for use within 3 hours of stroke onset, but regulatory agencies in most other countries (including those in the European Union) have approved its administration within 4.5 hours of stroke onset (14).

As per 2018 stroke guidelines the following recommendations support the use of intravenous alteplase (15).

Grade 1 A: IV alteplase (0.9 mg/kg, maximum dose 90 mg over 60 minutes with initial 10% of dose given as bolus over 1 minute) is recommended for selected patients who may be treated within 3 hours of ischemic stroke symptom onset or patient last known well or at baseline state.

Grade 1 B: IV alteplase (0.9 mg/kg, maximum dose 90 mg over 60 minutes with initial 10% of dose given as bolus over 1 minute) is also recommended for selected patients who can be treated within 3 and 4.5 hours of ischemic stroke symptom onset or patient last known well.

Grade 2 B: For otherwise eligible patients with mild stroke presenting in the 3- to 4.5-hour window, treatment with IV alteplase may be reasonable. Treatment risks should be weighed against possible benefits.

Grade 2 A: In otherwise eligible patients who have had a previously demonstrated small number (1–10) of cerebral microbleeds CMBs on MRI, administration of IV alteplase is reasonable. *(New recommendation)*

Grade 2 B: In otherwise eligible patients who have had a previously demonstrated high burden of CMBs (>10) on MRI, treatment with IV alteplase may be associated with an increased risk of sICH, and the benefits of treatment are uncertain. Treatment may be reasonable if there is the potential for substantial benefit. *(New recommendation)*

Grade 2 A: Tenecteplase administered as a 0.4-mg/kg single IV bolus has not been proven to be superior or noninferior to alteplase but might be considered as an alternative to alteplase in patients with minor neurological impairment and no major intracranial occlusion. *(New recommendation)*

Hemorrhage is the most dangerous complication after thrombolysis. The reported rates of symptomatic intracerebral hemorrhage (sICH) have varied (between 1.9% and 6.4%), depending on its definition and the design of the study (16). However, most cases of sICH are caused by reperfusion injury and worsen strokes that were already severe and destined to be disabling. Hemorrhagic transformation of a large infarction can increase the risk of death, but sICH rarely negates what would have otherwise been a good recovery (17). In fact, the number needed to harm for IV rtPA has been estimated to be 126 for the combined end point of disability or death. The risk of sICH is increased with old age, diabetes mellitus, severe hyperglycemia, uncontrolled hypertension, and larger hypodensity on baseline CT scan (18). The risk of sICH might also be higher in patients with cerebral microbleeds, although this association is not entirely certain (19).

Mechanical Thrombectomy

Intravenous tPA has been the backbone of stroke treatment for almost twenty years. Intravenous therapy although effective has specific inclusion and exclusion criteria which limits its use in a large number of patients. Moreover the intravenous tPA cannot be used after the 4.5 hour window and has limited efficacy in patients with large vessel occlusion. Riedel et al showed that it is almost impossible to dissolve large clots with intravenous therapy (20). In another study by Alexandrov and Grotta up to one third of patients had re-occlusion of blood vessels after initial recanalization (21).

Over the last two decades the field of endovascular stroke intervention has grown exponentially. From initial trials of intra-arterial tPA infusion to initial clot retrieval devices and now to stent retriever technology the field has come a long way indeed. Initial trials, PROACT I and II showed promise with intra-arterial pro-urokinase infusion with improved outcomes and recanalization rates, however pro-urokinase was never approved by the FDA citing need for further confirmatory trials (22, 23). Intra-arterial alteplase therapy theoretically sounds promising but has never been shown to improve outcomes or decrease mortality in randomised trials, thus is not the preferred approach today.

First generation device, the MERCI device, was approved for mechanical thrombectomy by the FDA and marked the beginning of era of endovascular stroke intervention. The MERCI device was tested in the MERCI and MULTI-MERCI trials both which had significantly high mortality (44 and 34% respectively), despite that the patients who had successful recanalization had a better chance at achieving good functional outcome (24, 25). These trials laid the foundation for further research in the field of acute stroke intervention (26).

In 2013, three landmark trials SYNTHESIS, MR RESCUE, and IMS III were published and disappointingly all three trials ruled against endovascular stroke intervention. The SYNTHESIS trial compared treatment with intravenous tPA alone to intra-arterial thrombolysis with rtPA, mechanical clot disruption or retrieval or a combination of these approaches. There was no difference in good clinical outcome (42%) in the endovascular arm versus (46%) in the intravenous tPA arm. Mechanical device was used in only 56/181 patients and stent retrievers were only used in 23 patients (27). MR RESCUE trial compared patients receiving standard care versus endovascular therapy using the MERCI device and the PENUMBRA system. Patients with intracranial ICA or M1 occlusion, NIHSS greater or equal to 6 and within 8 hours of symptoms onset were enrolled. This trial showed no difference in outcomes of patients in the two groups. Reperfusion, defined as modified thrombolysis in cerebral infarction score (mTICI) 2a/3 was 67% and defined as mTICI 2b/3 was only 27%. Good clinical outcome (mRS 0–2) was only demonstrated in 14% (28). IMSIII trial showed a similar outcome with 41% good clinical outcome (mRS 0–2) in the combined Intravenous therapy (IVT)/Endovascular therapy arm versus 39% in the IVT only arm (29). IMS III did not require demonstration of vascular occlusion until the trial was midway when CT angiogram was included in the study protocol. IMS III also did not standardize the endovascular therapy as a result; the methods were a mix of pharmacological thrombolysis, manipulation of clot with use of a guidewire or microcatheter, mechanical and aspiration thrombectomy, and stent-retriever technology (29). These trials failed to show any benefit of endovascular intervention over the intravenous therapy for a variety of reasons. These trials did not standardise the non-invasive vascular imaging thus in IMS III more than 50 % patients did not undergo vascular imaging. The endovascular therapy was performed using older devices and thus the results were often not promising. There were long delays from stroke onset to revascularization, in part due to lack of rapid workflow (26).

Learning from the shortcomings of the trials done in 2013, multiple trials were started using standardized endovascular and imaging approaches. Six trials published from 2014 to 2016 showed statistically significant benefit of patients with anterior circulation strokes who presented within 6 hours of onset of symptoms (30-35). These trials have established the efficacy of mechanical thrombectomy over intravenous therapy with patients doing considerably well in the endovascular arm. When taken in combination, these trials demonstrated that between three and seven patients must be treated to help one additional patient regain functional independence, which is particularly remarkable considering the severity of the symptoms upon presentation. Furthermore, since the benefit conferred by mechanical thrombectomy spanned through the entire range of functional outcome, the number necessary to treat to reduce disability by one level on the modified Rankin Scale was only 2.6(36). This benefit was confirmed across multiple subgroups (including patients older than 80 years and those with very severe strokes as indicated by a baseline NIHSS score higher than 20).Mechanical thrombectomy was also proven to be quite safe, with a pooled rate of sICH of 4.4% across all patients treated in the intervention arms of the five trials. Few emergency treatments in medicine have shown this degree of success.

The dramatic benefit observed in these trials relied on very high reperfusion rates using retrievable stents. These devices are deployed at the level of the occlusive clot, capture the clot in their mesh, and are then retrieved along with the clot. Interventions in these trials were prompt and typically performed by experienced specialists. Delays to treatment were minimized, and consequently the times to reperfusion were relatively short. In fact, those trials with shorter average time to reperfusion showed the greatest clinical benefit.

Wake UP strokes and stroke onset between 6 to 24 hours.

Patients whose neurologic deficits are first noticed upon their awakening or who present beyond the proven 6 hour window represent a particular challenge to the clinician. The same applies to those with unclear time of onset (such as when the patient is aphasic and the onset of symptoms was not witnessed). These situations constitute formal contraindications for IV rtPA, but it is widely agreed that some of these patients may benefit from mechanical thrombectomy. When the baseline CT scan shows no evidence of a large established infarction, it is likely that advanced imaging with CT perfusion or MR diffusion/perfusion may identify those patients who can be safely treated and can improve after successful recanalization. Two recently published trials have helped to make clinical decisions in such patients. The results of the DAWN trial showed the benefit of endovascular treatment in patients carefully selected with imaging up to 24 hours after last being seen well. The DEFUSE 3 trial, assessing endovascular therapy between 6 and 16 hours of last seen well, was terminated and also showed the benefit of endovascular treatment within this time window (37, 38).

Eligibility criteria based upon the Thrombectomy 6 to 24 Hours after Stroke with a Mismatch between Deficit and Infarct

DAWN trial for patients who can start treatment (femoral puncture) **within 6 to 24 hours** of time last known to be at neurologic baseline are as follows:

- Failed or contraindicated for intravenous alteplase
- A deficit on the NIHSS of ≥10 points
- No significant prestroke disability: baseline modified Rankin scale (mRS) score ≤1
- Baseline infarct involving less than one third of the territory of the MCA on CT or MRI
- Intracranial arterial occlusion of the ICA or the M1 segment of the MCA
- A clinical-core mismatch according to age:

•Age ≥80 years: NIHSS ≥10 and an infarct volume <21 mL

•Age <80 years: NIHSS 10 to 19 and an infarct volume <31 mL

•Age <80 years: NIHSS ≥20 and an infarct volume <51 mL

Eligibility criteria based upon the DEFUSE 3 trial for patients who can start treatment (femoral puncture) **within 6 to 16 hours** of time last known to be at neurologic baseline are as follows:

- A deficit on the NIHSS of ≥6 points
- Only slight or no prestroke disability: baseline mRS score ≤2
- Arterial occlusion of the cervical or intracranial ICA (with or without tandem MCA lesions) or the M1 segment of the MCA demonstrated on MR angiography or CT angiography
- A target mismatch profile on CT perfusion or MRI defined as an ischemic core volume <70 ml, a mismatch ratio (the volume of the perfusion lesion divided by the volume of the ischemic core) >1.8, and a mismatch volume (volume of perfusion lesion minus the volume of the ischemic core) >15 mL
- Age 18 to 90 years

As per 2018 stroke guidelines the following recommendations support the use of mechanical thrombectomy (15)

Grade 1 A: Patients eligible for IV alteplase should receive IV alteplase even if endovascular therapies are being considered.

Grade 3 (HARM). In patients under consideration for mechanical thrombectomy, observation after IV alteplase to assess for clinical response should not be performed.

Grade 1 A: Patients should receive mechanical thrombectomy with a stent retriever if they meet all the following criteria: (1) prestroke mRS score of 0 to 1; (2) causative occlusion of the internal carotid artery or MCA segment 1 (M1); (3) age ≥18 years; (4) NIHSS score of ≥6; (5) ASPECTS of ≥6; and (6) treatment can be initiated (groin puncture) within 6 hours of symptom onset.

Grade 1 A: In selected patients with AIS within 6 to 16 hours of last known normal who have large vessel occlusion (LVO) in the anterior circulation and meet other DAWN or DEFUSE 3 eligibility criteria, mechanical thrombectomy is recommended.

Grade 2 A : In selected patients with AIS within 16 to 24 hours of last known normal who have LVO in the anterior circulation and meet other DAWN eligibility criteria, mechanical thrombectomy is reasonable.

Conclusion:

The world of stroke is changing, from a 3 hour treatment window in 1990s we are now able to treat strokes up to 24 hours, practically abolishing "in the window" stroke treatment strategy. The techniques and devices have evolved and have given a new lease of life to stroke patients. Despite all the advancements in stroke therapy, it is unfortunate that less than 10 % patients who present to the hospital are able to receive stroke revascularization therapy in our country. The solution to this problem is spreading awareness among patients and peers. It took almost twenty years for the cardiologists to popularize the percutaneous coronary interventions, considering the significantly smaller number of well-trained interventional neurologists we have an uphill task at hand.

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Physiotherapy corner

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Importance of physiotherapy in patients requiring neurocritical care

Critically ill patients are most vulnerable and challenging cases. Their management cost is enormous. Early discharge from critical care set up is the primary goal for health care professionals. Neuro-critical care units, the super-specialized intensive care units (ICU) for management of neurological patients entail meticulous observations, prompt intervention and compassionate care. Patients requiring neuro-critical care are commonly mechanically ventilated, tracheostomised, sedated, paralyzed and require prolonged ICU stay. Historically critically ill neurological patients are treated in recumbent position. Mobilization is usually delayed in the fear of disturbance of monitoring, unstable hemodynamics, unstable spine or head injury, associated fractures or soft tissue injury and continuation of essential medicines. There is an innate risk of unseen adverse events or complication with physical activities. Impairments due to primary illness along with side effects of interventions leading to bed rest resulting in plethora of secondary complications. ICU acquired weakness, ICU psychosis, respiratory complications such as atelectasis, retention of tracheobronchial secretions, pneumonia and respiratory muscles deconditioning; cardio-vascular complications such as decreased stroke volume and blood volume, increased heart rate, orthostatic hypotension and deep vein thrombosis; musculoskeletal complications such as disuse atrophy of muscles, osteoporosis, tightness, contracture and deformities; decubitus ulcers, constipation are commonly seen problems in neuro-critical care units.

Physiotherapists are movement scientists who have expertise in optimizing physical activity, therapeutic exercises and electrotherapeutic treatment. Experienced neuro-critical care physiotherapists may serve as game changer in various clinical scenarios. The importance of gravity in sustenance of our physiological functions cannot be undermined as two third of our body weight is composed of water that is subject to gravitational force. Prudent use of gravitational stress can prevent large number of secondary complications. Therapeutic body positioning based on West's lung zone to improve ventilation perfusion matching can prevent or delay many other medical interventions like tracheal intubation, oxygen supplementation, bronchoscopy and mechanical ventilation. Likewise postural drainage positions can exploit gravitational force to mobilize tracheo-bronchial secretions in neuro-muscular impaired patients who cannot expectorate effectively. Upright body positions (sitting and standing) are physiologically superior to recumbent positions. Manual techniques like percussion and vibration, breathing exercises, mechanical devices like positive expiratory pressure device, and manual hyper-inflation may combat many pulmonary complications in these patients.

Skeletal muscles lose strength very quickly with absolute bed rest losing as much as 40% of its strength within one week of bed rest. Type I muscle fibers are more prone for atrophy. Strength training of skeletal muscles is associated with improved functional outcome in critically ill patients. Optimal utilization of diaphragmatic muscles from very early stage is very important in prevention of its disuse and dependence on mechanical ventilation. Dependence on mechanical ventilator is one of the major concerns that are associated with increased morbidity and mortality.

Respiratory physiotherapists driven weaning from mechanical ventilation is superior and faster to standard weaning protocols. Recently there is growing interest in ventilatory muscle training for these patients and early researches have shown promising results. Enhancement of physical activities and early mobilization in neurological patients has been documented to reduce number of days on mechanical ventilator, length of ICU stay, as also hospital stay and overall cost of treatment.

The sequel of bed rest were well recognized since fifth decade of twentieth century. Long back in 1970s, early mobilization was documented and used for mechanically ventilated patients but for next three decades there was scant interest in this field. In last one decade there was a paradigm shift and deluge of researches were published on positive effects of early mobility in ICU. Early mobility (ranging from upright positioning, mobility in bed, transfers out of bed to ambulation) was found feasible, safe and effective for reducing ill effects of bed rest. Early mobility is crucial for prophylaxis and early recognition of deep vein thrombosis, decubitus ulcers and musculoskeletal impairments. For comatose patients who cannot participate in active exercises, coma arousal techniques like multimodality sensory stimulation and median nerve stimulation have anecdotal evidence with few well conducted researches to improve sensorium.

Worldwide the number of beds for neuro critical care is increasing at exponential rate. However, there is acute shortage of ICU trained physiotherapists. Entry level physiotherapists lack requisite skills for ICU practice and there is an urgent need to develop specialist certifications, advanced training program like residency and fellowship in ICUs to fill the gap of need and supply. Clinical experience and research based evidence warrant inclusion of dedicated specialist physiotherapist in all critical care units round the clock. In India, so far there are no guidelines for inclusion of physiotherapists in critical care units, patient to therapist ratio and essential qualification and experience for physiotherapists to work in critical care units. The callous attitude of health administrators towards physiotherapy in critical care unit has deprived many sick patients from early mobility, an opportunity for early discharge from critical care units and improved functional outcome.

To conclude, specialist physiotherapist in neuro critical care units are essential for prevention of deleterious effects of bed rest and a vast array of other respiratory, cardio-vascular and musculo-skeletal complications. Therapeutic body positioning, early mobility, chest physiotherapy, strengthening of ventilatory and peripheral muscles and functional retraining are main stay of physiotherapeutic intervention in patients requiring neuro critical care. Physiotherapist must be an essential member of multi-disciplinary neuro critical care team.

Neuronursing corner

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Neurocritical care nursing

Neurocritical care (NCC) has emerged as a distinct medical specialty that links neurology, neurosurgery, and critical care medicine in the comprehensive management of complex and life-threatening neurological problems. As the field has evolved from a primary focus on the postoperative **care** of elective neurosurgical patients, nowadays its primary focus has moved to the resuscitation of neurological emergency cases like traumatic brain injury (TBI) or subarachnoid hemorrhage (SAH) that are still remain a clinical challenge.

In order to deal with the needs of the high acuity population in contemporary NCC setting, a multidisciplinary team management is considered of paramount importance; as members of this team **nurses** hold a key-role for patient care optimization. All members of the neuro-oriented team (anesthesiologists, neurologists, and nurses) assess patients' clinical status throughout the day, nurses as the bedside caregivers are best suited to more frequent intracranial checks of patient's clinical status.

Ideally, a neuroscience ICU nurse should be qualified with an increased knowledge base and possess both technical and interpersonal skills to ensure safe care. Nursing care priorities should focus on initial and on-going assessment, monitoring, hemodynamic management and stabilization of the Spatient admitted in the NCC. Provision of regular neurological exams, vigilance and diagnosis of postoperative delirium, interpretation of vital signs and multimodal brain monitoring indications, correct placement of height of drain, lowering abrupt **intracranial** pressure (ICP) increases, checking the ventilation trend, and safely transporting the patient to either CT / MRI / angiography suite or operating theatre are many of the multilevel practices NCC nurses are challenged with on a daily basis. Perhaps the most important aspect of nursing care is to recognize the subtle changes that could potentially either induce or be indicative of derangement of cerebral hemodynamic, so appropriate interventions can be applied accordingly. This implies that NCC nurses should be aware of the importance of specific physiological parameters alterations in neuroscience critical care management. For instance, even mild systemic hypotension in specific neuro-populations such as SAH and TBI might be more relevant than in other intensive care unit (ICU) patients, while changes of arterial carbon dioxide promote alterations of cerebral blood flow. Moreover, glucose levels should be aggressively treated, as there is evidence that both hypoglycemia and hyperglycemia have an adverse impact on neurologic outcome.

The likelihood for alterations of patient's vital signs during daily nursing care is extremely high. Nursing tasks such as oral care, endotracheal suctioning, repositioning and chest physiotherapy are routinely performed on critically ill patients. All of these tasks are common and left to the discretion of the nurse as to when to perform, how, and for what duration. Though studies are limited, nurses might deliberately limit such tasks in patients with a concern for deleterious ICP increase. However, knowledge of practices for safe suctioning (such as endotracheal lidocaine instillation, one or two quick passes of the catheter, etc.) application of adequate sedation and pain relief before providing patient care and chest physiotherapy, careful repositioning, controlling fever, seizures and hyperglycemia, prophylaxis of deep vein thrombosis and are of paramount importance to anticipate and prevent common ICU complications and avoid potential ICP elevation.

Beyond the care that aims to minimize neurologic status deterioration, nurses are delegated to check repeatedly throughout the day vital signs, intake and output (increased diuresis in case of central diabetes insipidus due to severe brain damage), all continuous infusions, patency of intravenous lines, depth of endotracheal tube and type of waveforms for all invasive monitors, to assess lab work (with special attention to electrolytes and glucose levels) and to take care of toileting and early mobilization. Furthermore, nurses should play a pivotal role in supporting family members and alleviate much of their anxiety.

In everyday practice, much decision making about the timing and the type of intervention needed to accomplish the predetermined goals is based on the judgment and experience of the bedside nurse with limited oversight from the attending physician. In case of a medical crisis, the bedside nurse is assigned with the duty to alert the responsible physician, for applying the indicated treatment modalities. Protocols implementation is particularly helpful in guiding less experienced ICU nurses and standardizing nursing practice, towards optimization of the quality of care.

In conclusion, it becomes evident that a nurse staff dedicated and specifically trained in the treatment of NCC patients, along with a subspecialty physician staff, can significantly improve the quality of clinical care in neuroscience critical care population, thus the need for such an expertise personnel is an absolute priority.

From the Pharmacopoeia

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Vaptans Group of drugs

Various drugs: Conivaptan [V_{1A}/V_2 selective], Relcovaptan [V_{1A} selective], Nelivaptan [V_{1B} selective], Lixivaptan, Mozavaptan, Satavaptan, Tolvaptan [V_2 selective]

Mechanism of action: Vasopressin receptor antagonists

Dosages:

Conivaptan (intravenous) [5mg/mL (20mg/100mL D5W]: 20 mg IV infusion over 30 minutes followed by 20 mg IV as continuous infusion over 24-hour period for 2-4 days. May increase up to 40 mg/day after initial day of treatment.

Conivaptan (oral): 40mg or 80 mg per day

Tolvaptan (oral): 15 mg orally once a day, may increase to 30 mg per day, maximum up to 60 mg per day after initial day of treatment. Can be given maximum up to 30 days

Relcovaptan (oral): Not yet approved for clinical use

Nelivaptan (oral): Not approved for clinical use

Lixivaptan (oral): As of May 2010, in Phase III clinical trials involving patients with hyponatremia, including those with concomitant heart failure.

Mozavaptan: It was approved in Japan October 2006 for hyponatremia (low blood sodium levels) caused by syndrome of inappropriate antidiuretic hormone (SIADH) due to ADH producing tumors.

Satavaptan: Not approved for clinical use

Pharmacokinetics:

Conivaptan: Conivaptan hydrochloride functions by antagonizing V2 receptors in the renal collecting ducts and thus causing aquaresis or water secretion. It increases the urine output, and decreases the osmolality of urine. Conivaptan metabolized cytochrome P450 isoenzyme. CYP3A4, but inhibits its own metabolism. About 99% of conivaptan found is bound to human plasma proteins over the range of 10 ng/mL to 1000 ng/mL. The mean half-life of the drug is 5 hours and mean clearance is 15.2 L/hr.

Tolvaptan: Tolvaptan is administered via oral route. Its bioavailability is unclear. Around 99% of the drug is bound to protein. It is metabolized in liver and its elimination half life is 12 hours. After oral administration, tolvaptan produced aquaresis characterized by increases in urine volume and free water clearance, and consequent increases in serum osmolality and serum sodium within the 24-h period after dosing. Tolvaptan is eliminated almost exclusively by non-renal routes, with < 1% of the administered dose excreted unchanged in urine. It is excreted through fecal elimination Renal impairment can, however, influence the pharmacokinetics of drugs predominantly eliminated by non-renal mechanisms through effects on drug metabolism enzymes and the activities of drug transporters.

Pharmacodynamics:

Conivaptan is a nonpeptide, dual antagonist of arginine vasopressin (AVP) V_{1A} and V_2 receptors. The level of AVP in circulating blood is critical for the regulation of water and electrolyte balance and is usually elevated in both euvolemic and hypervolemic hyponatremia. The AVP effect is mediated through V_2 receptors, which are functionally coupled to aquaporin channels in the apical membrane of the collecting ducts of the kidney. These receptors help to maintain plasma osmolality within the normal range by increasing permeability of the renal collecting ducts to water. Vasopressin also causes vasoconstriction through its actions on vascular $_{1A}$ receptors. The predominant pharmacodynamic effect of conivaptan in the treatment of hyponatremia is through its V_2 antagonism of AVP in the renal collecting ducts, an effect that results in aquaresis, or excretion of free water. Conivaptan's antagonist activity on V_{1A} receptors may also cause splanchnic vasodilation, resulting in possible hypotension or variceal bleeding in patients with cirrhosis. The pharmacodynamic effects of conivaptan include increased free water excretion (i.e., effective water clearance [EWC]) generally accompanied by increased net fluid loss, increased urine output, and decreased urine osmolality.

In patients taking tolvaptan the urine volume and fluid intake increase in a dose dependent manner which results in overall negative fluid balance. Increases in serum sodium and osmolality can be observed 4-8 hours post-administration and is maintained for 24 hours. The magnitude of serum sodium and osmolality change increases with escalating doses. The affinity for V2 receptors is 29x greater than that of V1a receptors and does not have any appreciable affinity for V2 receptors.

Indications: Euvolemic and hypervolemic hyponatremia [S sodium <125 meq/lt]

Contraindications: Hypersensitivity, hypovolemic hyponatremia, Anuria, pregnancy and lactation [no available data]

Drug interactions:

Hypertonic saline: Concomitant use not recommended

Diuretics: Increases risk for dehydration

P-gp inhibitors: Tolvaptan dose reduction may be required

P-gp substrates: Tolvaptan may increase AUC and Cmax of P-gp substrates

Coadministration with CYP3A inducers: Tolvapatn dosage increase may be required

Coadministration of digoxin with oral conivaptan resulted in a 1.8- and 1.4-fold increase in digoxin Cmax and AUC, respectively; monitor digoxin levels.

Side effects:

Osmotic demyelination syndrome, hepatic/renal impairment, headache, infusion site phlebitis, atrial fibrillation, hypertension, hypotension, confusion, insomnia, dehydration, dry mouth, hyperglycemia, hypoglycemia, hypokalemia, hypomagnesemia, hyponatremia, pyrexia,

Precaution:

Conivaptan has not been shown to be effective for the treatment of the signs and symptoms of heart failure

Tolivaptan can cause serious and potentially fatal liver injury; acute liver failure requiring liver transplantation reported

Infusion site reactions are common and can include serious reactions, even with proper infusion rates

Administer drug via large veins, and change infusion site after 24 hours.

Discontinue if undesirably rapid rise in serum Na (>12 mEq/L/day)

Neuroimaging

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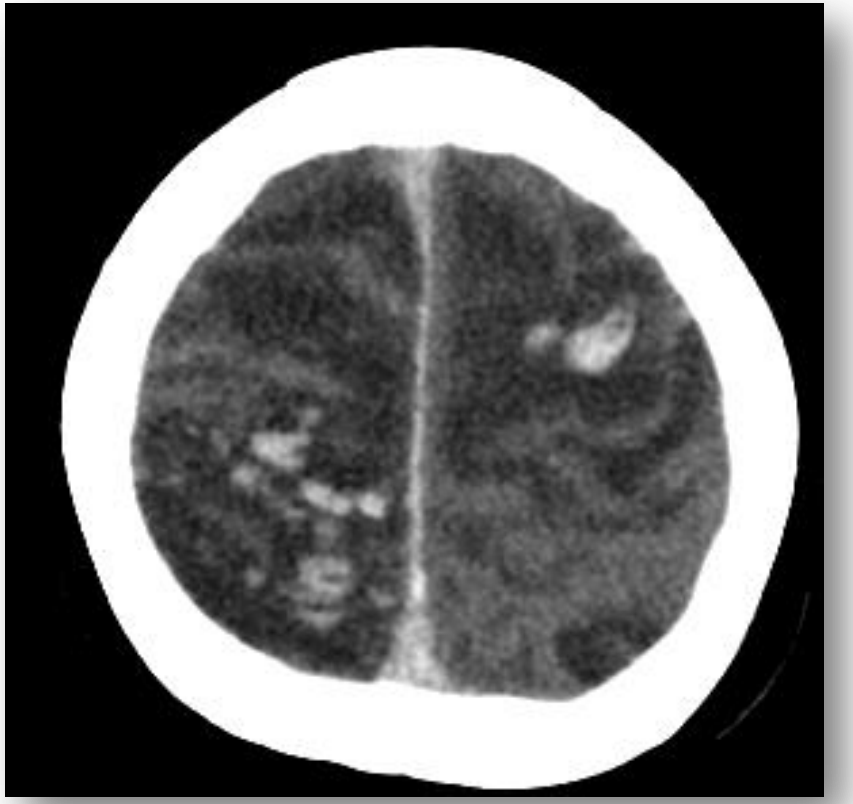
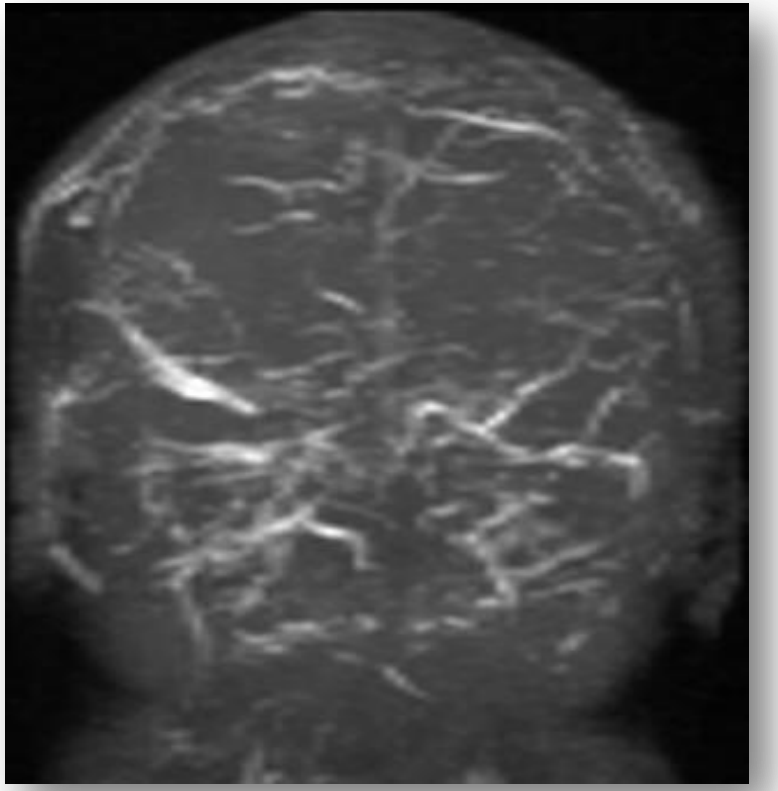
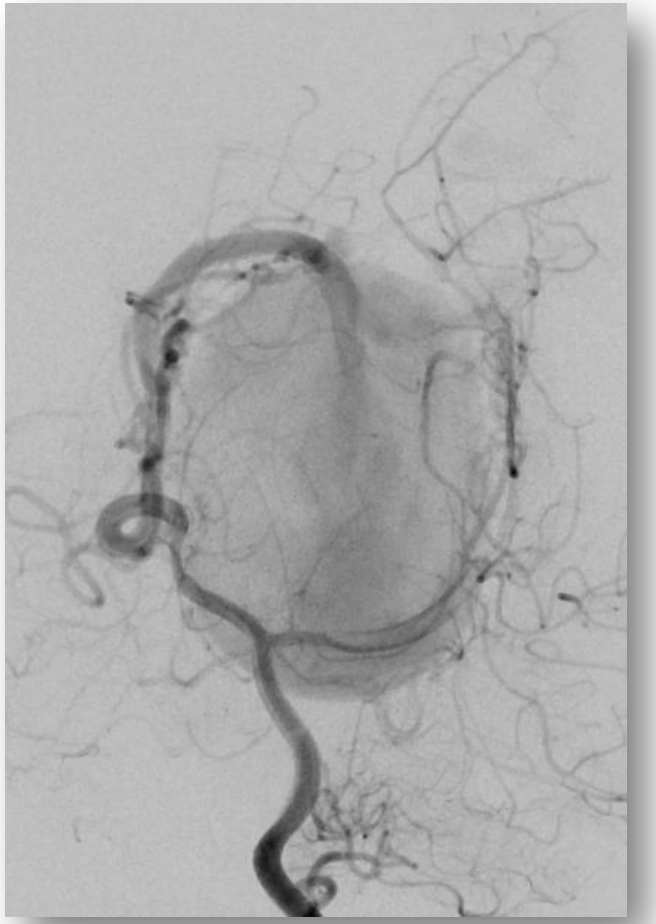
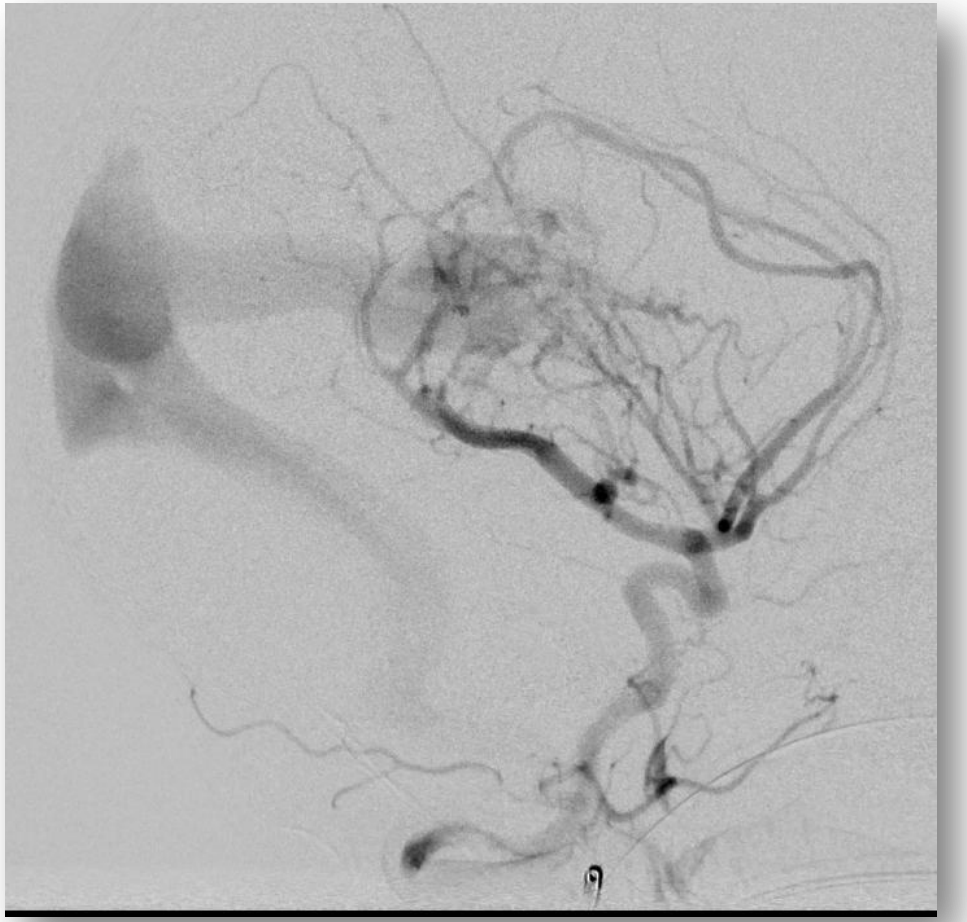
I. Make the diagnosis



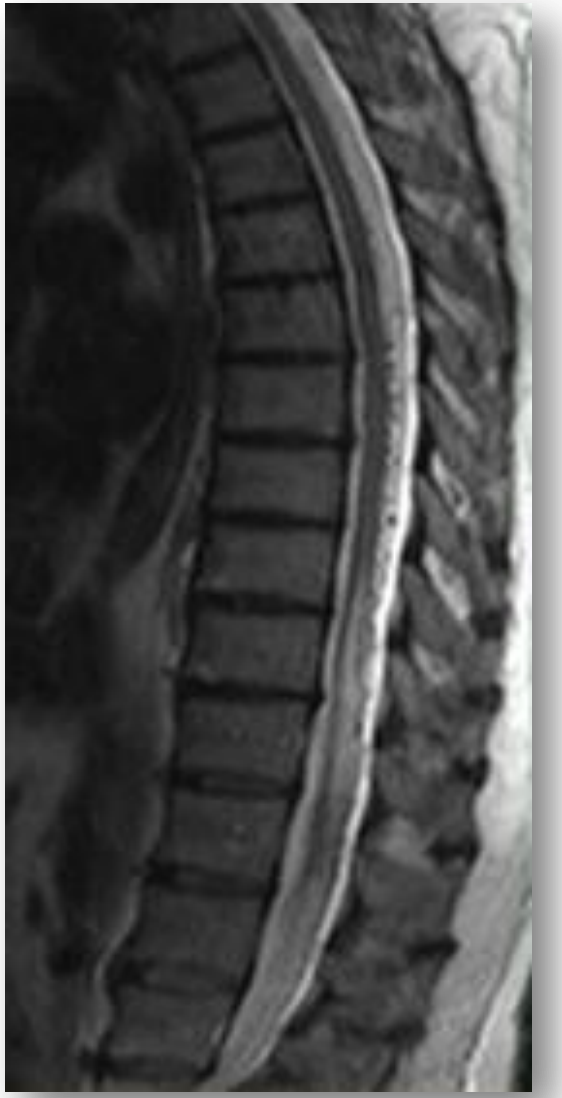


2. Identify the vascular malformation

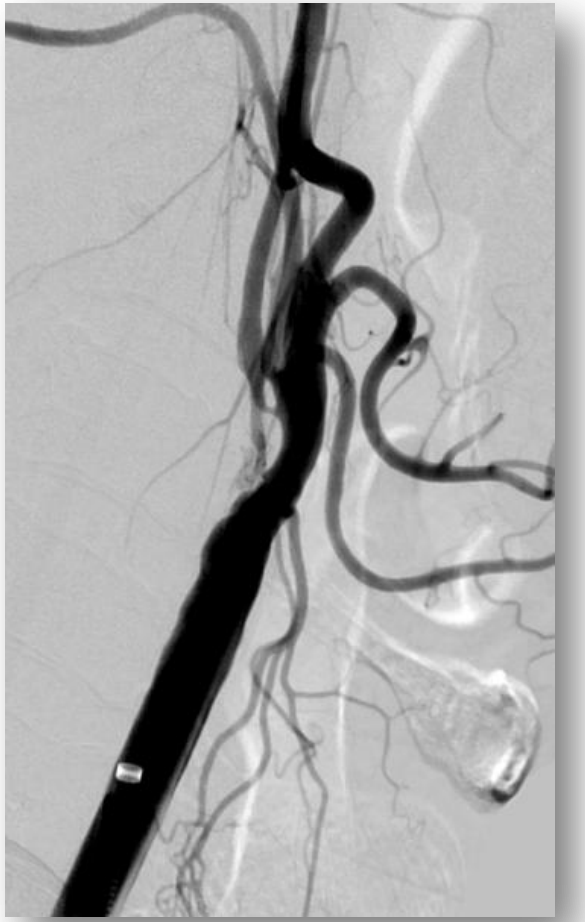


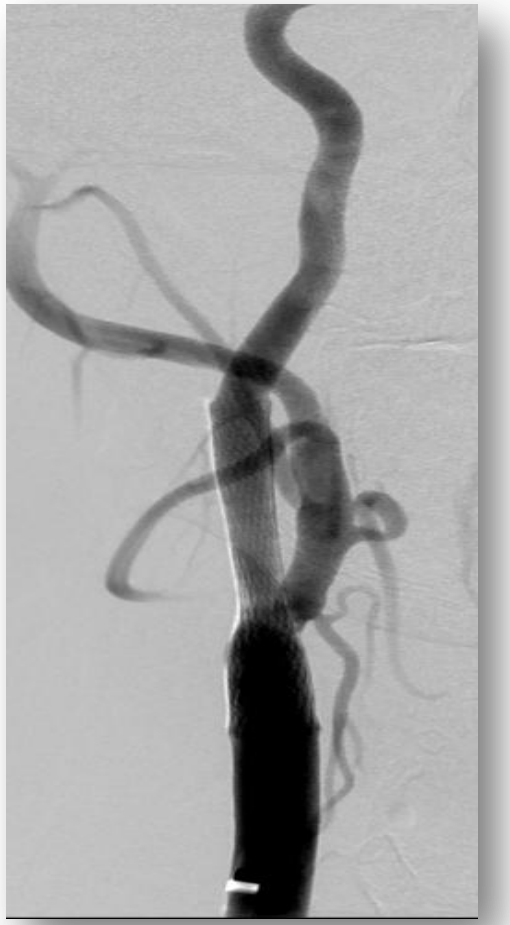


3. Identify

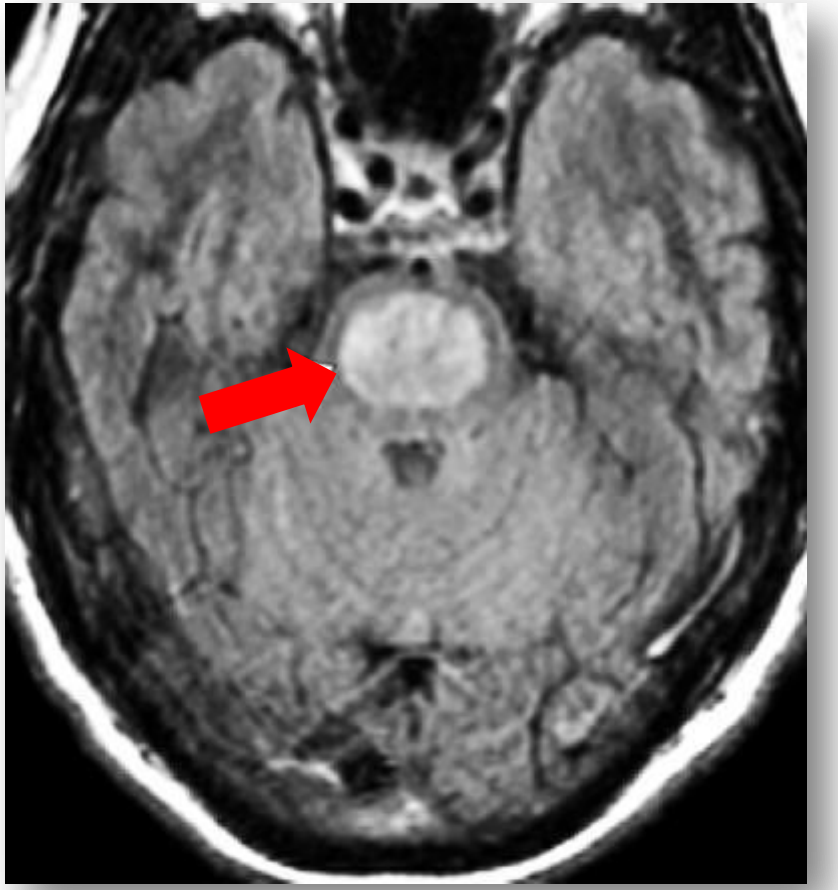


4. What is the cause of stroke in this patient, and what treatment has been given?





5. What is the diagnosis in this patient who developed coma after rapid correction of hyponatremia?



Answers:

1. Cerebral venous thrombosis (CVT)
2. Vein of Galen Malformation (VOGM)
3. Spinal arterio-venous malformation (AVM)
4. Carotid artery stenosis/ carotid stenting
5. Pontine osmotic demyelination

Trial of Trials

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Prominent trials in the recent years that have been critically dissected at MNCC 2018 & 2017 in this unique session called *'Trial of Trials'*.

ATACH-2

Published in NEJM , ATACH-2, following up from ATCH-1, had the aim to see if rapid lowering of systolic blood pressure leads to better outcomes in patients with Intra-cerebral bleeds who were hypertensive. It was a Randomised Multicentre, Open Labelled trial with Intention to treat analysis with a Power of 90% and an alpha error of 0.05. Conducted between May'11 – Sep'15 across

110 centres in 6 countries US, Germany, Japan, China, Korea, Taiwan, patients were randomised to either groups within 3 hrs (extended to 4.5 hrs). The treatment group had a blood pressure target of 110-139mmHg while the control

group had the target of 140-179mmHg. Primary outcome was proportion of patients with mRS 4 - 6 at 3 months. A total of 8532 patients were screened of which 1000 were randomised as 500 in each group. The mean age was 61 years,

38% were women and 56.2% were Asian. There was no difference to be observed in either the primary or secondary outcomes and the results did not support reduction of systolic BP to 110-139 in intra-cerebral haemorrhage.

- ***Strengths***: Multicentre, Randomised
- ***Weaknesses***: - Recruitment criteria changed, Under powered, More than 50% population was Asian

GOLIATH

Published in JAMA Neurology, the GOLIATH trial studied the 'Effect of General Anaesthesia (GA) vs Conscious Sedation (CS) in Endovascular therapy on Infarct growth and clinical outcomes in patients with Acute Ischaemic Stroke". It was a randomised, prospective, single centre, open labelled trial with Blinded end-point evaluation. They screened 1501 patients at a single Danish Centre with Large vessel strokes of Anterior circulation of less than 6 hrs duration. A total of 128 patients were randomised to either groups between Mar'15 – Feb'17. The primary outcome of infarct growth was less in the GA than the CS group but the difference was not significant. At 90 days, functional outcome with mRS showed improving trends towards the GA group. There were no significant differences in the safety end points between the two groups.

- ***Strengths*** : Randomised, Prospective, Open labelled
- ***Weaknesses:*** -Single centre with easy access to rapid anaesthesia, Small Sample size, Under powered

DAWN (Practice Changing)

Published in 2018 in the NEJM, the DAWN trial explored the results of 'Thrombectomy 06 to 24 hours after Stroke with a mismatch between deficit and infarct.' It was an International, Multicentre, Web based , Randomised, Unblinded, Open trial across 26 centres in USA, Canada , Europe & Australia . The primary aim was to see the improvement in functional recovery in patients who were 06-24 hrs post acute stroke with either 'Thrombectomy + Standard care ' or 'Standard care alone'. The treatment group received 107 patients while the control group had 99 patients. The primary outcome significantly improved in the thrombectomy group with a UWmRS at 90days of 5.5 vs 3.4 in the treatment vs the control group and a Functional Independence mRS at 90 days of 49% vs 13% in the same. Amongst the secondary outcomes, Early therapeutic response (Decrease in NIHSS score by 10 on day5) was 48% vs 19% - $p<0.01$ while the Vessel Recanalisation at 24hrs was 77% vs 39% in the treatment vs the control groups respectively. The authors concluded that 'In patients with intracranial and proximal ICA strokes with mismatch between symptoms vs infarct volumes and who were last seen normal 06-24 hours prior, Mechanical Thrombectomy is better in regards to functional independence & disability at 90 days

- ***Strengths***: Effective Randomisation, -Dichotomous mRS & UW-mRs, Multicentre.
- ***Weaknesses:*** -Industry sponsored - Funded by Stryker, Lesser severe strokes not included (NIHSS>10), Trial closed early – Underpowered, Advance imaging & devices not available to all

EPO-TBI : Role of Erythropoietin (Epo) in Traumatic Brain Injury

Multicentre, Multinational trial held between May'10 – May'15 across 29 centres in 7 countries. It treated patients in the age of 15-65 years with Moderate-Severe Head Injury with EPO vs Saline within 24 hrs of admission. The patients were given EPO 40,000 units or Placebo within 24 hours and then weekly for 03 weeks. There was screening USG within 48 hrs and then twice weekly. The primary outcome was reduction in the no of patients at 6 months with a GOS (E) of 4 or lower and Secondary Outcome was measured with: Mortality at 6 months, Proximal DVT, Quality of Life assessment and Cost Effectiveness. There were 302 patients analyzed in the treatment group vs 294 in the control group. The authors concluded that EPO did not reduce the no of patients with severe dysfunction or disability and that the Effect on mortality is uncertain.

Strengths: - Multicentre: Multinational, Randomised, Prospective. Mortality Reduction in subgroup …..but rather more disability.

Weaknesses: **-** Vast majority did not receive their full dose, Only 26% in the EPO and 25% in the placebo group got 3 doses, Longer time delay to administer doses which was upto 24hrs .

RESCUE-icp

Published in 2016 in NEJM, this was the 'Trial of Decompressive Craniectomy in Traumatic Intracranial Hypertension'. It was a an International, Multicentre, Concealed Randomised trial with Parallel Groups across 52 centres in 20 countries. The Primary Outcome was GOS (E) at 6 months whilst the Secondary Outcome measures included GOS (E) at 12 & 24 months, Mortality at 6,12,24 months and Quality of Life at 6,12,24 months. It assessed over 2000 patients and randomised 408 with results available for 398. There were 202 patients in the Surgical group and 196 in the Medical group. Time for randomisation was 1.5 hours. 92.6% in the surgical group underwent decompressive craniectomy while 87.2% in the medical group underwent Barbiturate infusion. Rescue surgery was performed in 37.2% of the patients in the medical group. The results showed that the 6 month GOS(E) was 42.8% in the surgical vs 34.6% in the medical group. In other words for every 100 patients that were treated with surgery, there were 22 more survivors:

Strengths: Multicentre, Prospective, Randomised.

Weaknesses: ICP target was inappropriate, GOS(E) was dichotomous, Increased disability at the cost of producing more survivors.

Report on the 4th Annual Medanta Neuro Critical Care Conference, 2018

The 4th annual Medanta Neurocritical Care Conference (MNCC) was held at The Leela Ambience, Gurugram, Indiafrom 31st August – 2nd September. The conference was organized by the Department of Neuroanaesthesia and Neurocritical Care, Medanta – The Medicity, Gurugram. Dr Harsh Sapra was the Organising Chairperson and Dr Gaurav Kakkar was the Organising Secretary. The meeting was held in collaboration with the Indian Society of Critical Care Medicine (ISCCM). The main theme of the conference was "Consensus in Controversies: Improving Patient Safety". Over 200 delegates participated in the conference with several national and international faculty members. The participants included neuroanaesthesiologists, neurointensivists, neurosurgeons, neurologists, fellows and residents.

The meeting commenced with the preconference full day ENLS workshop on 31st August, 2018. The workshop was conducted and certified by the NCS, USA and attracted a huge number of participants. The workshop discussed the basics of management of neurological emergencies and was highly liked by the participants.

The conference commenced on 1st September. The events on the first day of conference included 3 workshops andpanel discussions followed by dinner. The workshops were on Airway, EEG for Neuro ICU and PICC line and intraosseous access insertion.

The conference was formally inaugurated by traditional lamp lighting and a welcome inaugural address by Dr. Naresh Trehan, Dr. V P Singh and Dr. Yatin Mehta on 1st September. The opening session among panel discussions was on "Vasospasm in SAH" with Dr. Gaurav Goel as moderator. The invited panel discussed intraarterial vasodilatation and milrinone, and the current status of triple H therapy in management of SAH. This was followed by a discussion on "Role of ICP monitoring in TBI" that was moderated by Dr. Hemanshu Prabhakar. The discussion focused on the status of ICP monitoring in India. The subsequent discussion was on "Spinal Injury" and revolved around role of steroids in spine injury and airway control in cervical spine injury. It was moderated by Dr. M Radhakrishnan. The next session focused on "Benchmarking of Neuro Critical Care in India" that was moderated by Dr. Sandeep Lakhani. Setting standards for training and monitoring data for outcomes were the main points of discussion. After tea break, "Anti-epileptics" were discussed, and moderated by Dr. Prasanna Bidkar. The duration of treatment and prophylaxis in TBI or tumour resection and the relative merits and demerits of phenytoin and levipil were discussed.The next session saw an interesting discussion on "Hyperacute Stroke Service". It was moderated by Dr. Ashutosh Jadhav and some of the recent trials in this context were discussed apart from the age old controversy regarding GA vs LA for stroke. The next discussion was on "Immunoglobulins and Albumin" and was moderated by Dr. Chandranil Chugh. Dr. Nitin Sood moderated the next session on "Bleeding and Clotting". This session saw a discussion on the role of TEG and newer oral anticoagulants. "Nutrition" was the topic of next panel discussion. Dr. Joseph N Monteiro moderated the session. Various aspects of nutrition including early feeding and TPN vs enteral nutrition were discussed.

The main highlight of this years' meeting was the launch of the "Society for Neuro Critical Care" that has been conceptualized by some of the stalwarts in the field of neurocritical care in India. The SNCC is affiliated to the Neuro Critical Society and is headed by Dr Harsh Sapra (President), Dr Hemanshu Prabhakar (Secretary) and Dr Gaurav Kakkar (Treasurer). The Executive Members include Dr S Manikandan, Dr Swagata Tripathy, Dr Vasudha Singhal, Dr Sridhar Nagaiyan, Dr Nidhi Gupta, Dr Yash Javeri, and Dr Chandril Chugh. The SNCC aims to further neurocritical care services in India, and standardise practices and form guidelines in India.

Post-lunch panel discussions on Day 1 started with a discussion on "CSF infections" moderated by Dr. Navin Kumar. Following this session was a discussion on "TB meningitis in the Indian Scenario" moderated by Dr. Swagata Tripathy and talked about forming Indian guidelines. "Antifungals" were discussed in the next session, moderated by Dr. Vivek Nangia and talked about stewardship. The next session discussed "Renal Replacement Therapy in Neuro-ICU" and was moderated by Dr. Deepak Govil. The last two sessions of Day 1 were on "End of Life Care and Organ Donation" moderated by Dr. Sridhar Nagaiyan, and "Ideal Volatile for Neuro Anaesthesia" moderated by Dr. Kavita Sandhu. Day 1 concluded with dinner at The Leela and provided an opportunity for the delegates to interact with each other.

Day 2 of the conference started with a discussion on "Home Care" moderated by Dr. Sandeep Diwan and talked about setting standards for home critical care. This was followed by case based discussions on phrenic nerve stimulator and awareness and neuromusculsr monitoring, moderated by Dr. Anirban Banerjee and Dr. Navratan Hans. A discussion on "Lung Ventilation in the Injured Brain" followed next, moderated by Lt. Col. Vikas Marwah. "Liquid Biopsy for Brain Tumours" were discussed next, moderated by Dr. Vineet Dutta.

Key note lectures were delivered by Dr. Gretchen M Brophy on "past, present and future of Neurocritical Care" and "Patient Safety", and by Dr Gagan Adlakha on mindfulness (non-technical talk). Dr Gaurav Kakkar then delivered an interesting talk on "Trial of Trials" that was followed by the last session on neuroradiology by Dr. Gaurav Goel.

Poster sessions were conducted on both the days and attracted 12 presentations on a wide range of interesting topics. Dr. Gaurav Singh Tomar won the first prize for poster sessions and Dr. Rajeeb Kumar Mishra won the second prize.

This years' meeting was well attended and appreciated by delegates and faculty alike for the wide range of discussion. It is sure to attract participants over the coming years as well and generate further interest in neurosciences.

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Report on the 2nd Neurocritical Care, Emergency Neurological Life Support and Neurosimulation Refresher & Certificate Course, held at Indraprastha Apollo Hospitals, New Delhi

After the successful conduct of the first course in 2017, the 2"nd Neurocritical Care, Emergency Neurological Life Support and Neurosimulation Refresher & Certificate Course" was held at Indraprastha Apollo Hospitals, New Delhi, on 16th& 17th November 2018, followed by the Neurosimulation session at Medanta –The Medicity, Gurugram on 18th November 2018 .The course was organised by the Department of Neuroanaesthesia and Neurocritical Care at the Indraprastha Apollo Hospitals, in collaboration with Medanta –The Medicity, Gurugram, with Dr .K.J .Choudhury as the Organising Chairpersonand Dr.Nidhi Gupta as the Organizing Secretary .The course was endorsed by the "Society of Neurocritical Care" and the "Indian Society of Neuroanaesthesiology and Critical Care".

As we all are aware; complex, life-threatening neurological diseases are best cared for by trained intensivists with special expertise in neurocritical care. Understanding the basic fundamentals of neurocritical care isthe first stepping stone towards achieving the onerous task of ensuring maximum patient safety and optimizing outcomes of neurocritically patients. Since, "Time is Brain", it is only the right steps taken at the right time by the attending doctorsthat can make a meaningful difference while salvaging these patients witheither 'injured' or 'at risk brain'. Hence, the main motto of this course was to empower the young trainees in Neurocritical Care with the basic tenets involved in the critical care of this unique subset of patients.

The course was conducted by the eminent faculty drawn from renowned academic institutions across the country. Itofferedan amalgamation of varied teaching modalities to cover all the possible topics in a detailed and interesting way, including didactic lectures pertaining to topics on the basics of neurocritical care, problem based learning discussions (PBLDs) on acute neurological injuries and their emergency management, audio-visual presentations of various neuromonitoring modalities followed by skill stations for hand-on practice and in the end, getting an opportunity to apply all this knowledge for actual clinical "decision-making" during the simulated neurological emergencies in the "Neurosimulation Sessions" (organized by Medanta – The Medicity, Gurugram).

It was attended by 25 delegates from varied institutions, pursuing their courses ranging from D.N.B Anaesthesia and M.D Anaesthesia to D.N.B Neuroanaesthesia and D.M Critical Care .The first day of the course commenced with a welcome and introductory note byDr .K.J.Choudhury and Dr .Harsh Sapra .This was followed by the lectures on Basics of Neurological Examination, Neuropharmacology, Neuromonitoring, Neurocritical care, and Mechanical Ventilation by experts including Dr. Hemanshu Prabhakar, Dr . Indu Kapoor, Dr .Ankur Luthra, Dr .Vasudha Singhal, and Dr .Chirag Madan .The post-lunch session included the interactive discussionson clinical case-scenarios created by our experts; Dr. Ankur Luthra, Dr. Hemanshu Prabhakar, Dr. Charu Mahajan and Dr. Kiran Jangra, on the topics pertaining to Traumatic brain injury, Spinal cord injury, Subarachnoid hemorrhage and Acute non-traumatic weakness .The PBLD's were very much appreciated by all the students, who actively participated and made it an interesting session to continue.

After the tea break, the day concluded with the hands-on training on multimodal neuromonitoring techniques)including intracranial pressure monitoring, cerebral oximetry and cerebral microdialysis (and the much-applauded workstation on "Transcranial Doppler"by Prof .Hemanshu Prabhakar .Another highlight of the day was the release of a book by Dr K J Choudhury and Dr Harsh Sapra, 'Coexisting Diseases and Neuroanesthesia' edited by Hemanshu Prabhakar, Vasudha Singhal and Nidhi Gupta, publihsed by Springer .

Next day of the course started with lectures on Basics of Neuroradiology, Metabolic and Endocrine care, Renal and Gastrointestinal care and Psychological care in neuro-critically ill patients by Dr. Zulfiqar Ali, Dr .Nidhi Gupta, Dr. Kiran Jangra and Dr .Jaya Wanchoo, respectively .Post lunch sessions included the PBLD's on topics including Acute Stroke, Meningitis and Encephalitis, Status epilepticus and Resuscitation following cardiac arrest by Drs Vasudha Singhal, Jaya Wanchoo, Nidhi Gupta and Zulfiqar Ali, respectively .The day ended on a high note,with all the delegates getting an opportunity to brush up their sonography skills on two different work-stations. Uses of Ultrasound in neurocritical carewere demonstrated on a male volunteer by Dr.Vasudha Singhal and Dr. Chirag Madan while the use of ocular sonography to measure optic nerve sheath diameter, as a non-invasive correlate of Intracranial pressure was conducted by Dr .Jaya Wanchoo and Dr. Arpan Gupta. Simultaneously, the Neuroimaging workstation was conducted by Dr. Zulfiqar Ali with the detailed explanation of his collection of neuroimaging scans. The Apollo session of the course concluded with the ending remarks and the distribution of certificates and the CME course books, especially prepared by the Oxford University Press - India for this course.

The last day of the event included the unique "Neurosimulation Sessions "on neuro-critical care emergencies conducted at the Neurosimualtion lab, Medanta –The Medicity, Gurugram, by a team of neuroanaesthesiologists, neurosurgeons, neuro-technicians and nurses, led by Dr .Harsh Sapra and Dr .Gaurav Kakkar ,which was an icing on the cake . The sessions targeted not only the clinical performance of the students but also their "soft-skills "as clinicians, in terms of teamwork and leadership in critical situations . Following high-tea, the course concluded with ending remarks and certificate distribution by Dr .Harsh Sapra.

Dr. Nidhi Gupta

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Department of Neuroanaesthesia

Indraprastha Apollo Hospital

Sarita Vihar,

New Delhi

Highlights

2nd National Conference of Society of Neurocritical Care (SNCC), Pune, 05th to 07th April 2019

2 Pre-conference Hands on Workshops were held on 5th April 2019

Emergency Neurological Life Support (ENLS)Workshop
Dates: 5th April 2019

Venue:5th Floor, R S Wadia, Auditorium Ruby Hall Clinic
Total No of Delegates Attended: 56

Course Instructors: Dr Gaurav Kakkar, Dr Gentle Shreshtha, Dr Pramod Sood, Dr Prasad Suryawanshi & Dr Sushma Gurav

- Workshop on Organ Donation
  Dates: 5th April 2019
- Venue:Tehmi Grant Nursing School, Auditorium, Near Ruby Hall Clinic
  Total No of Delegates Attended: 74
- Course Instructors: Dr Abhay G Huprikar, Dr Kapil Zirpe, Dr Abhijeet Deshmukh, Mrs Arati Gokhale, Mrs Surekha Joshi

2nd National Conference of Society of Neurocritical Care (SNCC) India – 2019
Organized By: Society of Neurocritical Care.
In Association with: ISCCM Pune Branch & Ruby Hall Clinic, Pune.
Dates: 06th & 07th April 2019
Venue: Hyatt Regency Hotel, Pune INDIA
Total No of Delegates Attended: 133

ISCCM, Pune Branch & Society of Neurocritical Care (SNCC) Team has successfully conducted the**2nd National Conference of Society of Neurocritical Care** in PUNE, India on 6th & 7th April 2019 at the Hyatt Regency, Pune.

Day 1 - The Full Hall

Dr Kapil Zirpe giving the welcome address

9.15 am ON TIME …Everytime

SNCC Oration Conferred on Dr Mathew Cherian

Chairpersons: Dr Kapil Zirpe, Dr Yatin Mehta & Dr Harsh Sapra

Announcements

1. 3rd Neurocritical Care (NCS) Asia and Oceanic Chapter Annual Meeting. 30th October – 1st November 2020. Delhi-NCR (India). [A joint venture of ISCCM and SNCC]

2. Neurocritical Care workshop, ENLS (Emergency Neurological Life Support) course – 26-27th February 2020, at the ISCCM's 26th Criticare 2020, Hyderabad

3. NCS 18th annual meeting – September 22-25, 2020 at the Phoenix Convention Centre, Phoenix, Arizona

Share with us your experiences, achievements, or any other story of success!
Suggestions are most welcome!

Send us your entries at:

indiasncc@gmail.com