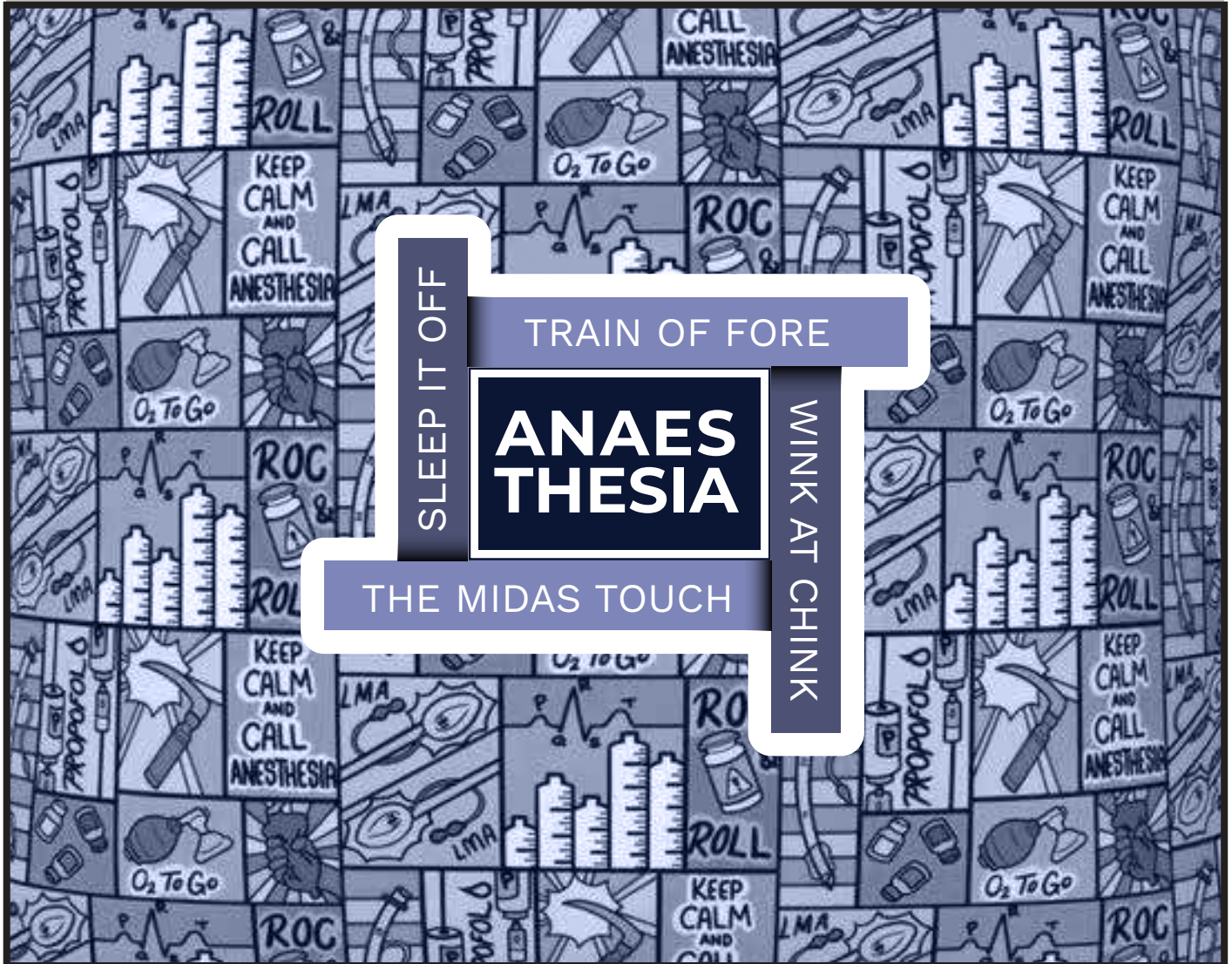




**ISA**  
Indian Society of  
Anaesthesiologists  
Delhi Branch

Eternal Vigilance



# ISA DELHI

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Monthly Bulletin of Indian Society of Anaesthesiologists  
(Delhi Branch)

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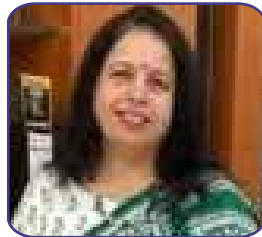
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## President (ISA Delhi Branch message)

Dear Friends

Greetings and wish you a very Happy New Year 2024!

As I reflect on the past year it amazes me how quickly time has flown since taking over the Executive branch of ISA Delhi last October.

Now, as we gear up for 2024, Monthly Meetings, Yuvacon and ISACON Delhi 2024 Annual Conference, true success lies in the active participation of each individual. I urge everyone to consider all the events as their own, contributing to its success and making them memorable. I request participation from various institutions as your involvement will add to the success of these events. Your support and commitment are key to turning this dream into a reality.

I extend my heartfelt wishes to all on this Republic Day. May this day be a celebration of unity, diversity, and spirit of our nation.

Thank you for your dedication and contribution.

**Dr. Lokesh Kashyap**

Professor and Head

Department of Anesthesiology, Pain Medicine and Critical Care  
AIIMS, New Delhi



## Vice President (ISA Delhi Branch message)

Respected Delhi ISAains,  
Warm Greetings.  
Happy New Year 2024.

The year 2023 has been an incredible year for Delhi ISA. There were yearlong activities under the aegis of Delhi ISA, and many thanks to all ISA Delhi office bearers and the Department of Anesthesiology, ABVIMS and Dr RML Hospital. With the start of New Year 2024, ISA Delhi has become ready and vibrant for all academic, awareness, social and sports activities.

With new team at ISA Delhi and participation of New GC members from each zones, various activities has been planned under guidance of ISA National. I invite all to next ISA monthly clinical meet to be held on 16 Jan. 2024 at Rajeev Gandhi Super specialty Hospital, Dilshad Garden, East Delhi.

Best Wishes

Long live ISA.

**Dr. Arvind Arya**  
Vice President Delhi ISA



## Honorary Secretary (ISA Delhi Branch message)

Dear Delhi ISAians,

Greetings from ISA Delhi Headquarters!

The year 2023 is soon coming to an end. We all must have made amazing memories. Our team had taken over ISA Delhi secretariat on 16th October 2023. As we are all set to welcome year 2024, other than our professional and personal commitments we must have some responsibilities as ISAians.

I feel proud to inform all that ISA Delhi has bagged many awards at 70th ISACON National, Gurugram. Teacher of teachers, our own Dr Jayashree Sood madam had been honored with lifetime achievement award. Dr Ridhima Sharma had won ISA young talent award. Dr Abhijit Kumar and Dr Ranju Singh had been awarded with ISA national public awareness award.

My vision as Honorary Secretary of ISA Delhi is very clear. My team took charge with concepts of “Unified ISA Delhi”, where there should be equal opportunities for ISAians from medical colleges, private practitioners, free lancers and Yuva anesthesiologists.

I humbly request all senior anesthesiologists, teachers and colleagues to guide us with their valuable inputs so as to take ISA Delhi to new heights.

Long live ISA.

**Dr. Amit Kohli,**  
Honorary Secretary, ISA Delhi.





## Honorary Treasurer (ISA Delhi Branch message)

Dear members of ISA Delhi,

Warm greetings from the treasurer's desk.

As the dawn of a new year approaches, I extend my heartfelt wishes for joy, prosperity, and fulfilment. Along with new beginnings, it is crucial to reflect on the triumphs and challenges that have shaped the glorious expedition of ISA Delhi this far.

In the spirit of growth, ISA Delhi branch is embracing innovative initiatives which shall be unveiled in days to come. The feedback, ideas, and contributions of our fellow ISAians regarding those activities shall fuel our progress as a society. With the vision of an abounding voyage ahead, I humbly request all our esteemed members to participate in the forthcoming ISA Delhi activities with full enthusiasm.

Amongst many of our agendas, one of the foremost is to promote the "Yuva ISAian rising stars" under the able guidance of their seniors and office-bearers. As we embark on this transformative journey, we encourage open dialogue and collaboration between all of us. Together, we will not just adapt to change but will actively shape it.

Before concluding, I would like to request all my senior colleagues to encourage younger friends to join ISA and boost the ISA membership drive across Delhi.

Thank you for being an invaluable part of ISA Delhi.

Long live ISA.

Jai Hind.

With regards,

A handwritten signature in blue ink that reads "Abhijit Kumar". The signature is written in a cursive style and is positioned above the printed name and title.

**Dr. Abhijit Kumar**

Honorary treasurer, ISA Delhi.



## Editor (ISA Delhi Branch message)

Dear ISA Delhi Members,  
Greetings!  
Happy New Year

It is with immense pleasure that we present to you the 1st issue of our monthly newsletter. Crafted to provide a warm escape from the chilly winters, this edition is crafted with the spirit of the season.

The newsletter contains recent advances, current opinions, relevant but less practiced guidelines, historical aspects with current relevance, sections of long case questions, quiz and crosswords.

We extend an invitation to all hospitals to submit case reports, review articles and studies for potential inclusion in the newsletter.

We encourage all members to keep the articles coming, contributing to the richness of our community. Active participation from all members is encouraged to enrich the diversity and depth of our community's content.

In our pursuit for academic excellence, we welcome constructive criticism for improvement.

Long Live ISA! Long Live ISA Delhi!

**Dr. Puneet Khanna**

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# Inaugural Monthly Clinical Meet

22<sup>nd</sup> December 2023

Delhi State chapter of Indian Society of Anesthesiology  
at Aakash Healthcare, New Delhi.



On 22<sup>nd</sup> December 2023 the inaugural monthly clinical meet of the Delhi State chapter of Indian Society of Anesthesiology was held at Aakash Healthcare, New Delhi.

The Pre Christmas event began with a warm welcome of all the delegates followed by ISA flag raising ceremony. The office bearers of ISA Delhi- Dr. Lokesh, President, Dr. Amit Kohli, Honorary Secretary, Dr. Abhijit, Honorary treasurer and Dr. Anshu Gupta, GC West zone were invited to grace the dias along with Dr. Namita Sharma, head of Department of Anesthesiology & Pain Management of Aakash Healthcare and Dr. Aashish Chaudhry, the Managing Director of Aakash Healthcare Private Limited. Dr. Lokesh welcomed him with flowers. A Beautiful prayer dance followed it.

The event began with a lamp lighting ceremony by all the dignitaries. Dr. Amit Kohli gave the inaugural address followed by President, Dr. Lokesh Kashyap.

All the current office bearers and Dr. Rajiv Gupta ex GC national ISA were felicitated by Dr. Chaudhry with a token of appreciation.



The event had a full house audience and a very participative one as well. Each attendee was gifted a token of appreciation from the host institution



The scientific session started with a talk on motor sparing upper limb blocks by Dr. Ishan Bhatia, Senior consultant, Aakash Healthcare.

Following it a brain storming session on awake Craniotomy was given by Dr. Pallav Kumar, Senior Consultant, Aakash Healthcare

Enhanced Recovery After knee arthroplasty- the SPEED KNEE Program was brought to the house by Dr. Namita Sharma, Senior consultant & HOD Anesthesiology, Aakash Healthcare

## Inaugural Monthly Clinical Meet



A valuable discussion and exchange of ideas followed by felicitation of the speakers were done by ISA office bearers. A quiz was conducted towards the end of the session and prizes given to the winners.

Dr. Aashish Chaudhry gave his final remarks on his perspective on Anesthesia and its impact. At the end Dr. Amit Kohli gave minutes of last meeting and announced the upcoming events under ISA Delhi flagship. The event was followed by high tea.

### **Enhanced recovery after total knee replacement- The Speed Knee Program**

Total knee Replacement (TKR) is the most common surgery performed for End Stage Osteoarthritis. Post surgical pain is a major contributing factor of delayed Rehabilitation after TKR surgery. We at Aakash healthcare, New Delhi follow a Specialized formulated Enhanced recovery after Anaesthesia (ERAS) program to Enhance early Rehabilitation and Recovery after surgery i.e, " THE SPEED KNEE PROGRAM ", which encompasses Pre, Intra and Postoperative factors to facilitate preoperative physiological state as soon as possible.

### **Motor Sparing Hand Blocks**

Motor sparing nerve blocks are medical procedures that involve injecting local anesthetics to block specific nerves, providing pain relief while preserving motor function. In the context of the hand, these blocks can target nerves responsible for sensation without affecting motor nerves, allowing patients to maintain movement while alleviating pain.



### **Anaesthesia for awake craniotomy**

Awake Craniotomy has enabled surgeons to maximise brain tumor resection while preserving neurological function. It requires skill, experience and the commitment of the entire OR team. Anaesthesiologists play an important role in selection and motivation of the patient. Scalp block is an indispensable technique for this procedure. With the advent of newer sedative drugs like Dexmedetomidine & Remifentanyl, the incidence of airway manipulation has drastically reduced. Non- pharmacological management like empathy, hand-holding, reassurance and therapeutic communication play an important role.

Abstracts of monthly meet

# Exploring The Role of Nicotine Replacement Therapy In Alleviating Acute Pain

## Introduction

Nicotine replacement therapy (NRT) has long been associated primarily with smoking cessation.<sup>1</sup> However, recent studies have focussed on exploring its potential role in management of acute pain.<sup>2</sup> Acute pain, often intense and short-lived, poses a great challenge in healthcare warranting effective interventions beyond conventional analgesics. This article aims to explore the emerging prospects of NRT in addressing acute pain, shedding light on its mechanisms, efficacy and implications for clinical practice.

## Mechanisms of nicotine in pain management

Nicotine exerts its effects through nicotinic acetylcholine receptors (nAChRs) present in the nervous system. These receptors modulate neurotransmitter release and play a crucial role in pain modulation pathways.<sup>3</sup> Studies suggest that nicotine enhances the release of endogenous opioids such as endorphins, providing analgesic akin to opioids. Furthermore, nicotine's influence on the dopaminergic system may contribute to pain perception modulation. Nicotine stimulates the nicotinic receptors in the ventral tegmental area of the brain and the consequent release of dopamine in the nucleus accumbens.<sup>4</sup> These mechanisms form the basis for considering nicotine as an adjunct in acute pain management.

## Clinical efficacy of NRT in acute pain

Research exploring the efficacy of NRT in acute pain management has shown promising results. Studies involving animal models and human subjects have demonstrated that nicotine administered via various formulations such as patches, gum or lozenges can alleviate acute pain symptoms.

### a. Reduced opioid consumption

Evidence suggests that incorporating NRT into postoperative care can lead to decreased opioid requirements.<sup>6</sup> This reduction in opioid usage is significant in light of the epidemic, highlighting the potential role of NRT in mitigating opioid-related risks and dependence.

### b. Migraine and neuropathic pain

Studies have indicated a potential benefit of NRT in managing headaches and certain types of neuropathic pain.

### c. Dose-dependent effects

Studies suggest that the efficacy of NRT in pain relief may be dose-dependent.<sup>4</sup> Optimal dosing regimens need further exploration to establish the most effective and safe levels of nicotine administration for pain without exacerbating adverse effects.

### d. Role in ICU patients



# Exploring The Role of Nicotine Replacement Therapy In Alleviating Acute Pain

It has been found to reduce number of ICU days with delirium in critically ill patients

## **Challenges and considerations 1-7**

Despite its potential, incorporating NRT into acute pain management presents challenges and considerations:

### **1. Mechanism of action:**

Understanding the mechanisms through which nicotine interacts with the nervous system to modulate pain perception is vital. The influence on nAChRs and the subsequent impact on neurotransmitter release, particularly in pain modulation pathways, necessitates comprehensive exploration.

### **2. Efficacy and clinical studies**

Scrutinizing the existing body of evidence from preclinical and clinical trials is crucial. Analysing the efficacy of different NRT formulations in diverse acute pain conditions (e.g. postoperative pain, neuropathic pain) and their comparative effectiveness against traditional analgesics is essential for informed decision making.

### **3. Individual variability**

Recognising individual variations in response to nicotine is pivotal. Factors such as genetics, smoking history, and sensitivity to nicotine might influence the effectiveness of NRT in alleviating acute pain. Tailoring treatment plans based on these individual differences could optimize outcomes.

### **4. Safety and adverse effects**

Assessing the safety profile and potential adverse effects associated with NRT in acute pain management is imperative. Addressing concerns related to nicotine addiction, dependency, and other adverse effects, especially in vulnerable populations is critical for mitigating risks.

### **5. Dependency and addiction risks**

Considering the addictive nature of nicotine, there is a need for caution in using NRT for pain relief. Monitoring and minimising the risk of developing dependency or addiction, especially in patients predisposed to addictive behaviours, is a significant ethical and clinical consideration.

### **6. Integration with multimodal pain management**

Exploring how NRT fits into multimodal pain management approaches is crucial. Understanding its role as an adjunct therapy alongside conventional analgesics, physical therapy and psychological relief while reducing reliance on opioids.

### **7. Patient education and informed consent**

## Exploring The Role of Nicotine Replacement Therapy In Alleviating Acute Pain

Emphasizing patient education about the use of NRT for acute pain management is essential. Providing comprehensive information about the benefits, risks, and alternatives enable informed decision making and promotes patient autonomy.

### 8. Regulatory and ethical considerations

Recognising the ethical implications of using a substance with addictive potential in pain management is pivotal. Ensuring compliance with regulatory standards, ethical guidelines, and patient safety protocols while integrating NRT into clinical practice is crucial.

### 9. Long-term effects and follow-up

Considering the long-term implications of using NRT for acute pain management is vital. Longitudinal studies assessing the sustained effectiveness, potential development of tolerance, and any chronic effects of NRT are necessary for comprehensive understanding and safety evaluation.

### Implications for clinical practice and future directions

The exploration of nicotine's role in acute pain management signifies a paradigm shift in pain therapeutics. Integrating NRT into multimodal pain management strategies could potentially reduce reliance on opioids, mitigating their associated risks, including addiction and overdose.

Future research should focus on elucidating optimal dosing regimens, identifying patient subgroups most likely to benefit from NRT, and assessing long term safety and efficacy. Collaborative efforts between researchers, healthcare providers and policy makers are essential to establish guidelines and protocols for the responsible integration on NRT in acute pain management.

### Conclusion

The evolving landscape of acute pain management demands innovative approaches beyond conventional analgesics. NRT with its modulatory effects on pain pathways, holds promise as an adjunctive treatment in alleviating acute pain. However, further extensive research is warranted to delineate its optimal use, safety profiles and integration into clinical practice. Embracing this emerging perspective on NRT underscored the potential for a more comprehensive and tailored approach to acute pain management.

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# Neuromodulation

Chronic pain can be debilitating, affecting every aspect of one's life. Traditional pain management methods may not always provide adequate relief, leaving individuals searching for alternative solutions. In recent years, neuromodulation therapies have emerged promising to manage chronic pain effectively. Neuromodulation employs advanced medical device technologies to enhance or suppress activity of the nervous system for the treatment of disease. These technologies include implantable as well as non-implantable devices that deliver electrical, chemical or other agents to reversibly modify brain and nerve cell activity.

The International Neuromodulation Society defines neuromodulation as “the alteration of nerve activity through targeted delivery of a stimulus, such as electrical stimulation or chemical agents, to specific neurological sites in the body.”

The advent of electrical stimulation for modern pain management began in 1967 based on Melzack and Wall's gate control theory. The gate theory suggests that applying non-painful stimuli to the low-threshold, non-nociceptive, large-diameter A beta fibers causes activation of the inhibitory interneurons and inhibition of the nociceptive A delta and C fiber conduction and discharge in the dorsal horn and subsequent transmission to the central cortex . Other mechanisms of by which these devices act include increase levels of inhibitory and decrease levels of excitatory spinal cord neurotransmitters, promote inhibitory interneuron activation, has complex effects on glial and immune cells, and also acts via supraspinal mechanisms While Gate theory does explain the foundation of neuromodulation, there remain ample questions about the mechanism of action and the explanation of its analgesic effect .

Neuromodulatory techniques include spinal cord stimulation, peripheral nerve stimulation, brain stimulation, non invasive stimulation(repetitive transcranial magnetic stimulation, transcranial direct current stimulation, deep brain stimulation, and motor cortex stimulation)

Neuromodulation forms an important part in comprehensive algorithm for management of neuropathic pain once the conventional treatment options have exhausted.

## **Non invasive techniques**

Noninvasive brain stimulation techniques provide electrical stimulation of the brain via direct current or pulses of magnetic fields. The two techniques that have been studied the most with respect to pain management are repetitive transcranial magnetic stimulation (rTMS) and transcranial direct current stimulation (tDCS). rTMS stimulates cortical tissue via a magnetic coil that is placed near the scalp above the targeted area. When a current is passed through the coil, a magnetic field is produced that penetrates the skull. The current can be provided in pulses of different frequencies. High-frequency stimulation lowers neuronal firing thresholds so that they can fire with less stimulation from other neurons, thereby increasing brain excitability, whereas low-frequency stimulation

# Neuromodulation

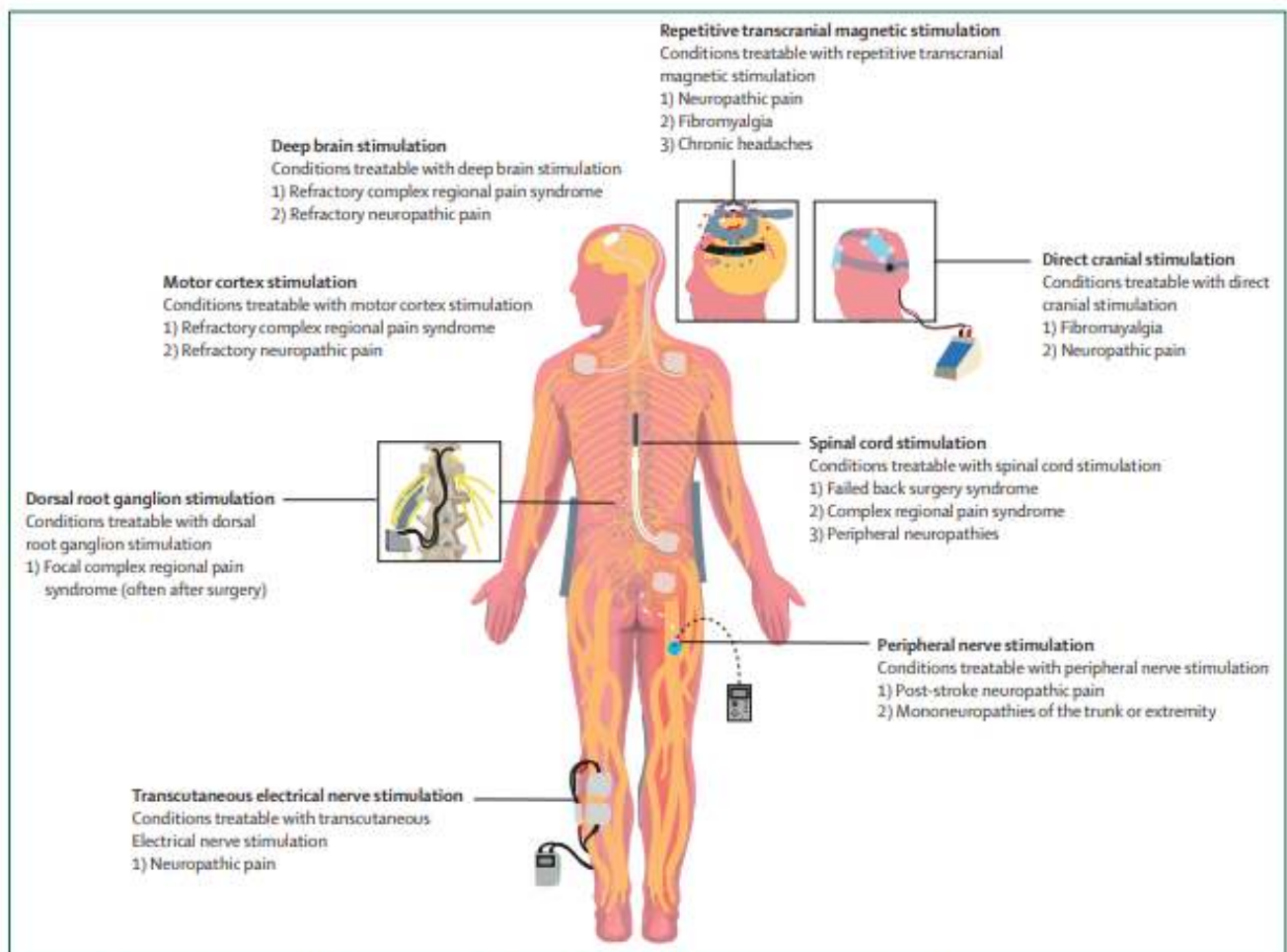


Figure 1: Schematic drawing showing the different forms of neuromodulation and the conditions most amenable to treatment

Peripheral nerve stimulator pulse generators might be implanted or external. Adapted with permission of artist Tricia Park (Cornell University, Ithaca, NY, USA)

increases firing thresholds, thereby inhibiting excitability. Stimulation is provided in 'trains' of pulses of varying lengths, and can also vary in intensity as well as overall duration. A common target for chronic pain treatment with both rTMS and tDCS is to stimulate the motor cortex contralateral to the painful area. Motor cortex activity is thought to limit the processing of nociceptive signals by sending inhibitory signals directly to the thalamus, thereby reducing the perceived intensity of the pain. Currently, the only FDA approved use of non-invasive neuromodulation is for medication-resistant depression. Its utility in other psychiatric disorders is currently under study. Non-invasive neurostimulation also appears to be promising for post-stroke treatment of hemiparesis, aphasia, visuospatial neglect, pain, attention disorders, and movement disorders, as well as migraine and neuropathic pain.

## Spinal Cord Stimulation

SCS is the electrical stimulation, either bipolar or monopolar, over the dorsal aspect of the spinal cord for the relief of pain. Prior use was called dorsal column stimulation, because the stimulation array was placed intradural but

# Neuromodulation

extramedullary over the dorsum of the spinal cord. Main indications include FBSS, CRPS, peripheral ischemia, angina pectoris

## **Peripheral Nerve Stimulation**

The electrical stimulation of a peripheral nerve to either induce activation or modulation of the activity of the nerve. Stimulation can be induced by either monopolar or bipolar stimulation. Clinically, PNS is used for neuropathic pain that follows a single nerve distribution as in traumatic median nerve neuropathy, ilio-inguinal neuralgia, trigeminal neuralgia, CRPS 2

## **Deep Brain Stimulation (DBS)**

DBS delivers a constant low electrical monopolar or bipolar stimulation to a small region of the brain through implanted electrodes connected to an implanted pulse generator. DBS, today, is used for the relief of pain, to partially restore normal movements in Parkinson's disease, essential tremor, and dystonia, and is used to treat epilepsy and certain psychiatric disorders including depression, obsessive compulsive disorder and Tourettes Syndrome.

## **Motor Cortex Stimulation**

Electrical stimulation of the motor cortex has been used to treat central neurogenic pain following trigeminal deafferentation and central post stroke pain. Both monopolar and bipolar motor cortical stimulation enhances motor recovery in combination with rehabilitation for recovery from stroke.

## **Cerebral Cortex Stimulation**

Low current stimulation of the gray matter of the cerebral cortex. The uses for electrical stimulation are experimental and are being studied for the induction of memory, the positive induction of plasticity and the learning process, and to decrease spastic cough reflexes.

## **Sacral Nerve Stimulation**

There are five paired sacral nerve roots, S1-S5. These nerve roots innervate pelvic structures including genitourinary tract and sexual organs and non-pelvic structures such as the skin of the perineum and perianal region. Sacral nerves S1-S3 participate in the formation of the sciatic nerve, made up of the tibial and common peroneal nerves. Electrical stimulation of the sacral nerves are used for the relief of pain from the pelvic and urogenital viscera such as pudendal neuralgia and interstitial cystitis. It is used for urinary and bowel voiding difficulties and incontinence.

## **Occipital Nerve Stimulation**

The electrical stimulation of either the greater or lesser occipital nerves, derived from nerve roots C2-3. Stimulation induces modulation (relief) of painful occipital neuralgia or may relieve the pain of migrainous headaches.

## **Vagus/Vagal Nerve Stimulation (VNS)**

# Neuromodulation

VNS is a form of cranial nerve stimulation, a form of peripheral nerve stimulation. Its present use is for the control of epilepsy and depression and is being studied for the control of obesity.

## **Trigeminal Nerve Stimulation**

The use of electrical stimulation for the treatment of trigeminal neuralgia.

Neuromodulation has been successfully used globally to address severe refractory chronic pain for over five decades. Ongoing research and trials are positive not only to treat pain but in variety of non pain related conditions. The global neuromodulation market has been growing in recent years due to the increasing prevalence of neurological disorders, the development of new and innovative neuromodulation technologies, and the growing acceptance of neuromodulation therapies as an alternative to traditional treatments. The market is expected to grow in the coming years, driven by technological advances, an aging population, and the rising demand for minimally invasive procedures. Compared to the wide acceptance that it enjoys in United States and Europe, it is fairly underutilized in Asia, including India.

In India, approximately 450 DBS surgeries are performed every year, compared to only 30 ITDD systems and 20 SCS devices implanted per year. This translates into SCS being less than 5% of all neuromodulation therapies used. This is in stark contrast to the United States, where SCS accounts for 87% of the total neuromodulation implants, and in Europe, where approximately 80% of the total neuromodulation implants are SCS and 20% are DBS. This discrepancy is not only unique to India, but for most Asian countries as well. There could be several reasons for this. In India, there are around 1300 active pain physicians and around 30 neurosurgeons practicing interventional pain medicine (as per the membership of the ISSP and ISSFN). This translates to around one physician per 1 million of the population, compared to one physician per 61,000 people in the United States. In India, there are three major avenues of pain practice: government hospitals, which are also academic institutions, private multispecialty teaching hospitals, and standalone small private clinics. With the exception of a few large government institutions, neuromodulation therapies for pain cannot be offered due to cost and resource constraints in most centers in this category. The same is true for standalone private clinics. Therefore, most of the neuromodulation therapies for pain are practiced in the tertiary care private hospitals.

The younger generation of pain practitioners in India is becoming more aware and convinced about the role of neuromodulation to alleviate severe pain and suffering. An all-round approach combining improved training, awareness at various levels, more flexible options of newer technology and reimbursement approval can positively influence its use. This can be achieved with the collective efforts of physicians, insurers, industry, and focused academic activities of clinical societies.

# Neuromodulation

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# Let The Record Show

## The History And Evolution Of Anaesthesia Record

***“The least credible source of fact is a specific memory at the time of deposition. Specific memory is no substitute for what is clearly documented in the medical record. In law, the perception of truth is truth. If it is written, it was done”***

From the time of demonstration of use of diethyl ether by Dr William T.G. Morton in 1842, the safety of anaesthesia administration has steadily increased. The development of an anaesthetic record has a significant contribution towards enhancement of patient safety during anaesthesia.<sup>1</sup>

The mortality of anaesthesia during the initial period was significantly high and there were no scientific studies available about the effects of various anaesthetics on human physiology. Two pupils of Massachusetts General Hospital, Dr Harvey Williams Cushing and Dr Ernest Amory Codman attempted documentation of process of anaesthesia to get valuable insights into how a patient would respond to a given anaesthetic. This led to development of first anaesthetic record found in the archives of the Massachusetts General Hospital, dated November 30, 1894. This record documented heart rate, temperature, and respiration throughout the course of the anaesthetic.<sup>1,2</sup>

An elaborate Ether Record was made after 1903 which included systolic blood pressure readings based on Riva Rocci 's method of measuring systolic blood pressure.<sup>2</sup>

Over the years the practice of anaesthesia record keeping has evolved and anaesthesia record these days documents multiple physiological parameters during the process of anaesthesia along with pre-anaesthetic status of the patient, intraoperative events and postoperative management plan. However, manual recording of the data carries its own limitations.

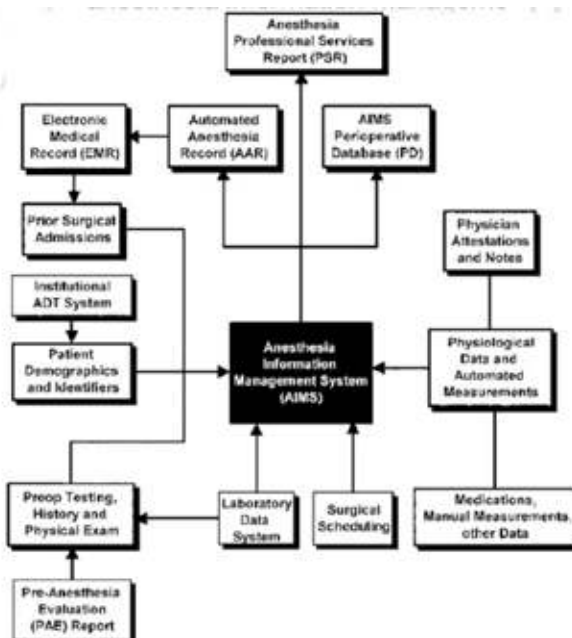
The first automated anaesthesia record was introduced by Dr Elmer Isaac McKesson, who was inventor of anaesthesia machine that could create a graphic representation of physiological variables. The Recording Nargraf was introduced in 1930 and it recorded blood pressure, tidal volume, oxygen concentration and inspiratory gas pressure. Heart rate and respiratory rate of the patient was

# Let The Record Show

## The History And Evolution Of Anaesthesia Record

marked by hand.<sup>3</sup>

Despite the developments, anaesthesia continued to be high risk in mid 80's so much so that anaesthesia speciality had become the main cause of insurance claims of million dollars. The American Broadcasting Company's 20/20 program, titled "The Deep Sleep: 6000 Will Die or Suffer Brain Damage," reported that the administration of anaesthesia was 1000 times more dangerous than being in an airplane 30,000 feet in the air. This indicated the seriousness of anaesthetic errors as they could cause permanent disability or death.<sup>4</sup>



Anaesthesia chiefs at Harvard Affiliated Medical Schools, Boston realised that most of these accidents were due to human error and a few due to equipment failure. This led clinicians to form a committee and first monitoring standards during anaesthesia to enhance patient safety were developed.<sup>5</sup>

ASA monitoring standards were published in 1986 that mandated continuous evaluation of oxygenation, ventilation, and circulation. The

Anaesthesia Patient Safety Foundation (APSF) played a key role in publicizing the importance of the newly developed formal standards for monitoring. A 1989 amendment to ASA monitoring standards required pulse oximetry to assess blood oxygenation. The standards were modified in 1991 to include verification of the correct placement of the tracheal tube by detecting carbon dioxide in the expired gas. All these parameters to be recorded diligently in anaesthesia records.

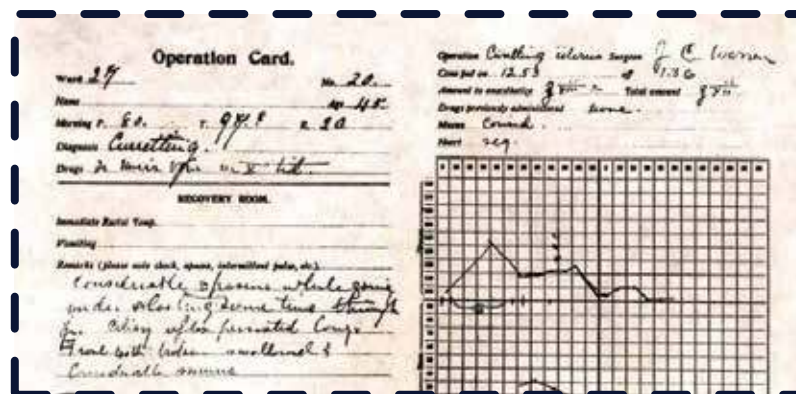
Rosen and Rosenzweig with their publication in Anesthesiology (1985), suggested computerized recordkeeping of anaesthesia practice. The

# Let The Record Show

## The History And Evolution Of Anaesthesia Record

computerized recordkeeping was marketed as a better defence in malpractice suits as it was more legible and correct.<sup>6</sup>

In 1985, Block et al published an account of their efforts to design and implement an automated anaesthesia recordkeeping device at Duke University, in Durham, North Carolina. This system, the "Duke Automatic Monitoring Equipment" or DAME, was designed to capture electrocardiograph (ECG), electroencephalogram (EEG), finger pulsimeter, temperature, and invasive blood pressure inputs. A graphic display of ECG, EEG, and pulsometry was provided by a cathode-ray tube (CRT) in real time, with an alarm panel with auditory and lighted alarms keyed to each monitoring variable. Data was collected by each DAME device, and then transferred to a larger computer system housed in a separate building for electronic storage. DAME device had limitations such as



size and weight of equipment. A new device overcoming these limitations microDAME was introduced but did not gain much popularity.<sup>7</sup>

Further developments in technology led to present

Anaesthesia Information Management systems (AIMS). The first hospital in the United States to adopt an AIMS for full use occurred at Burbank Hospital in Fitchburg, Massachusetts in 1988. AIMS is useful not only in operating room but also in intensive care unit, ward, labour and delivery room, and acute pain services.

AIMS collects data from multipara patient monitor, anaesthesia workstation, and drug delivery system by use of a software. Other events such as anaesthesia induction, patient positioning, insertion of invasive lines such as central venous catheterization and arterial line insertion, the start of surgery, end of the surgery, administration of medications, fluids, and blood products can also be

# Let The Record Show

## The History And Evolution Of Anaesthesia Record

documented manually. AIMS hardware is a computer with keyboards and is transportable.<sup>8</sup>

AIMS has become important component of electronic health record (EHR) of a patient. Benefits of AIMS include enhanced quality of care and patient safety, as well as improvements in operations management, reimbursement, and translational research. Implementation of AIMS though costly can improve the quality of anaesthetic care.<sup>9,10</sup>

The anaesthesia record keeping has come a long way in the history of anaesthesia and is integral part of anaesthesia practice. It's contribution towards patient safety and development of speciality of anaesthesia is both fascinating and intriguing.

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# Let The Record Show

## The History And Evolution Of Anaesthesia Record

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## Overdose Does Not Discriminate - R.I.P

Addiction is like a curse, and until its broken, its victim will perpetually remain in the shackles of bondage. A drug overdose does not discriminate on who or how it acts, and the list of celebrities who have succumbed to an overdose only teaches us one thing – addiction isn't just about using drugs, it is about what the drug does to your life.



It's no secret that celebrities often have it all: money, fame, and power. But what we may not know is that many of them also struggle with addiction. The Life of a celebrity is also a life that is very stressful. In the words of Nathan Hartzenberg, “drugs and alcohol are the cruel engine of many artist’s creativity.” The tragic loss of a renowned celebrity to a drug related death is an event that often leaves many unanswered questions. A life that had the ability to impact so many others, gets nipped in the bud. Famous and much-loved celebrities such as Elvis Presley, Mathew Perry, Michael Jackson, Whitney Houston, Heath Ledger, and many more have been the victims of such unfortunate drug overdose incidents.

While many deaths may be due to misuse of illegal substances, some of these drugs are not always illicit and are in fact prescribed by practitioners and an overdose may not always be intentional.



Elvis Presley, the king of Rock and Roll, began declining in his popularity in last 3 to 4 years of his life. He had difficulty in performing; received unfavourable reviews; and experienced anger and depressive behaviour. He died unexpectedly on August 16, 1977, in the bathroom of his Graceland mansion in Memphis, Tennessee. He was found on the floor by his girlfriend/fiancee, Ginger Alden, around 2:00 pm.

Elvis had visited the dentist the day before for a temporary crown and was given codeine. Later he called his

## Overdose Does Not Discriminate - R.I.P

physician, Dr. George Nichopoulos (“Dr. Nick”), for increased pain and was prescribed six hydromorphone tablets. Also, three packets of prescription drugs for an upcoming music tour arrived at the same time and each packet contained secobarbital, ethchlorvynol, diazepam, secobarbital/amobarbital, meperidine, and antidepressants, typical of what he always took on a tour.

Elvis played racquetball at 3:00 am on the morning of his death and was noted to tire easily. Still, he seemed in a good mood and stayed up the rest of the night as usual, entertaining his friends and playing the piano and singing before he retired at 8:00 am. (He usually went to bed between 6:00 and 7:00 am.)

After being found at 2:00 pm, he was probably already dead. He was taken to the emergency room at Baptist Memorial Hospital and pronounced dead at 3:30 pm. Elvis was only 42 years old. An autopsy failed to show an obvious cause of death, but 2 months later a toxicology report indicated polypharmacy: 14 drugs were found in his system, including codeine (at 10 times the therapeutic level), methaqualone (in a toxic amount), morphine, meperidine, ethchlorvynol, diazepam, and several barbiturates. The combination of central nervous system depressants and codeine was believed to be lethal. However, the medical examiner's office stuck to its original diagnosis of “cardiac arrhythmia.” One can only assume that he had probably taken these medications to overcome the pain of the dental treatment, and continued to pop them one after the other, as the pain did not subside.

Celebrity patients frequently practice polypharmacy using multiple physicians, multiple drug stores, and multiple aliases to obtain medications. Drug interactions therefore play a significant role in drug-related deaths. For example, the consumption of multiple central nervous system depressants, such as opioid pain killers, sedatives, hypnotics, or alcohol may lead to an unintentional overdose due to severe respiratory depression. Denial increases as dependency worsens. Prescription drugs, especially the opioid analgesics, now cause more deaths than heroin and cocaine. They form deadly combinations with barbiturates and other sedatives and with alcohol. Michael Jackson's life ended abruptly due to acute propofol intoxication but midazolam, lidocaine, diazepam was also found in his autopsy report and they were prescribed drugs. Heath Ledger, who was awarded the Oscar posthumously for his role as Joker died due to combined drug toxicity due to oxycodone, hydrocodone, alprazolam, diazepam, temazepam, doxylamine (which was also considered as an accidental overdose).

More recently, Mathew Perry who was loved for his role as Chandler Bing from the famous series “F.R.I.E.N.D.S.” succumbed to an overdose of ketamine. Ketamine (often nicknamed ‘special k’) is a dissociative drug, first synthesised in the 1960s as an anaesthetic. While ketamine can be highly beneficial in hospitals for patients experiencing severe pain, it has also found its way into the black market, and is now used recreationally for its hallucinogenic effects as a common street drug, called Kit Kat, Special K, K, Ket, and even Vitamin K.

## Overdose Does Not Discriminate - R.I.P



Ketamine is a drug that can be utilised for a variety of purposes. By targeting multiple processes in the brain, ketamine manipulates the neurotransmitter glutamate, essential to keeping our brains functioning as they should. In lower doses, however, glutamate production seems to become enhanced, inducing hallucinogenic side effects, such as altered vision and sound, which can leave users

experiencing a variety of emotions – with some individuals even noting that they felt close to death after having taken the substance. At higher doses, ketamine blocks glutamate, slowing down communications in the brain, one of the reasons it works so effectively as a sedative but it can also induce intense hallucinations, which may be either enjoyable or frightening, making its effects unpredictable. Once a high enough dosage of ketamine has been consumed, users fall into a ‘K-hole’, leaving them both disassociated and unable to control their bodily functions.

### LOWER DOSES



FEELINGS OF LIGHTNESS



ENHANCED PERCEPTION OF MUSIC



BETTER MOOD

### HIGHER DOSES



TO TREAT DEPRESSION



OUT-OF-BODY EXPERIENCES



ENHANCED SENSE OF TOUCH



EUPHORIA

Taking ketamine produces feelings of dissociation, and of being outside one’s own body. Ketamine has a highly addictive potential, which can lead individuals to become dependent on the drug for its mood-altering properties. A ketamine user can enter a dreamlike mental state or a trance, and experience a distorted reality, and sometimes feelings of euphoria. I remember while doing my senior residency, I had anaesthetised a middle-aged man for fracture femur surgery with subarachnoid Block. While operating, the orthopaedic residents got stuck while applying the distal screw of the femur nail, and the effects of subarachnoid block started to wear off. The patient started complaining of pain, and so I supplemented with IV ketamine. Within 5 minutes, the patient who had been very anxious with the onset of pain, suddenly started reciting a poem (or a “Sher” as we call it in Urdu) that he had written himself. The tired orthopaedic residents also started smiling and in fact even jokingly asked me, “Ma’am, I will have what he is having”.



## Overdose Does Not Discriminate - R.I.P

In the words of Dr. Dennis Daley, Associate Professor of Psychiatry, Chief of Drug and Alcohol Services, and Director for Centre of Psychiatric and Chemical Dependency Services at University of Pittsburg Medical Centre in Pittsburg, Pennsylvania, "Recovery from addiction requires hard work, a proper attitude and learning skills to stay sober. Successful drug recovery involves changing attitudes, acquiring knowledge, and developing the skills to meet the many challenges of sobriety."

In order to understand addiction, it is therefore important to understand, what relief does an addict hope to find in the drug or the addictive behaviour, and educate them about the problems of overdose. Sadly, the last three words most addicts say to themselves is "Just One More" before they are found by first responders who are usually family or friends ... and who have only three words left to say "Rest in Peace".

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# Robotics in Anesthesiology

Edging Forward With Will Against Will?

***“Robotics is not about making machines to serve us, its about creating machines that can be our partners.”***

-Cynthia Breazeal

The word ROBOT itself derives from the Czech word “robota,” or forced labor, as done by serfs. However, now it has come up to mean

A mechanical device that sometimes resembles a human and is capable of performing a variety of often complex human tasks on command or by being programmed in advance.

## **Contemplating the technological environs**

Human beings have known to be one of the most insecure species.

Technological progress has always upset their societal order. To give an example, Luddite in the 19th century destroyed the first mechanical looms that they thought was threatening their livelihood.

However, the industrial revolution when it happened transformed first England then most of the western world beyond imagination.

Travelling in a pilotless fully autonomous flying car was just a fantasy not very long ago. Nonetheless, recently, in June 20 23 the retro futuristic hybrid which can be driven on the road like a regular car or flown like a VTOL aircraft was awarded a special airworthiness certification from the US Federal Aviation Administration (FAA) that enables it to hit the skies. Anaesthesiologists have historically drawn parallels from the aviation industry due to the complexity of their working environment and a greater propensity of human factors compromising safety.

The anaesthesiologists as “pilots of human biosphere” precisely, of the perioperative timeline have learnt lessons from the aviators (who developed a support system by automation) and are probably eager to embrace the opportunities offered by innovation, technological progression, precision and reliability.

## **The Robotic Dream**

“The dream is an anaesthesia machine that would skilfully perform repetitive tasks and risky procedure, requiring precision, maintain safe anaesthesia without need for constant human intervention, minimise their occupational hazards of exposure to dangerous drugs, radiations, infections and stress of the work environment.”

An overview off the current status of robotic anaesthesia that follows might help us to speculate.

**He who works with his hands and mind is an anaesthesiologist.**

# Robotics in Anesthesiology

## Edging Forward With Will Against Will?

An anaesthesiologist is typically surrounded in the OR by over 100 parameters and the numbers are ever expanding due to technological revolution. This translates into a highly complex working environment sustained by multitasking like simultaneously administering drugs, teaching and training, record keeping, administrative tasks, supervising more than one ORs, troubleshooting machines, monitoring the ever-increasing clinical parameters and screens performing clinical procedures etc.

While most of us are aware of the progress of robotic surgery, robotic anaesthesia has gained rather little exposure until now. Some common terms that we are aware of are- closed loop systems, intubating robots, regional anaesthesia robots.

### **Robotic Anaesthesia**

Robotic anaesthesia or anaesthesia delivered by an automated control system can be seen as a convergence of artificial intelligence medical informatics and anaesthesiology.

The mainstay of artificial intelligence is developing algorithms from very large databases as well as deep machine learning from repetitive patterns. The richer the database is and the broader the range of observed parameters the more reliable the algorithms will become to govern increasingly autonomous machines. This leads to the 'utopic concept of singularity' whereby AI would surpass the combined intelligence of all human beings, machines would become capable of emulating all human intellectual functions with the additional capability for delivering projects with augmented precision, speed and strength and all this while maintaining error free performance.

Anaesthesiologists have a range of opinions about when this would happen. Some even believe NEVER.

### **Classification**

Robotic anaesthesia has been classified into 3 categories.

- 1) Pharmacological - Calculating and delivering drug doses based on feedback parameters
- 2) Mechanical- Imitating manual gestures
- 3) Cognitive robots- Guiding clinical decision making through pattern recognition in algorithms and clinical scenarios

# Robotics in Anesthesiology

Edging Forward With Will Against Will?

## Pharmacological robots

These are based on closed loop systems while keeping specific parameters of interest in target ranges (example blood pressure bispectral index etc) through microprocessor controlled intricate feedback loop.

One such system SEDASYS (Johnson and Johnson, New Jersey, USA) received regulatory approval from the food and drugs authority (FDA) in the USA but the manufacturer decided to stop selling it in 2016 due to non-profitability.

What doomed the much-ballyhooed computerised sedation system to failure?

*Destiny or poor design?*

*Was it a friend or foe?*

## Cognitive Robots

They are also known as clinical decision support (CDS) systems, and are divided into two categories:

- a. Rules-based expert systems relying on algorithms created by the experts in the specialty.
- b. Machine learning systems train themselves through identifying repetitive patterns in the data collected during the process of patient care.

The first CDS was trialed in 1950s, and the most evolved format presently is the various Anesthesia Information management Systems (AIMS) in clinical use. AIMS provide an affordable and invaluable role in advising the anaesthesiologist for compliance with the given rule. For instance- recent guidelines, alerting against the potential drug interactions or dosing violations, introducing forced functions, not authorising administration of a substance with known allergy in the patient and maintaining record of monitored values and all events of interest during the anaesthesia care episode.

So far no clinical automation in anaesthesiology has been attempted for suggesting or selecting the choice of anaesthesia technique or the clinical endpoints.

## Mechanical Robots

Mechanical robots are designed to simulate manual gestures with varying degrees of automation. Initial efforts were made by various scientists to utilise da Vinci surgical robot system (California, USA) for performing popliteal nerve blocks on manikins for endotracheal intubation with the anaesthesiologist operating remotely.

# Robotics in Anesthesiology

## Edging Forward With Will Against Will?

Further efforts were directed at producing robots that are smaller, reliable, and affordable, for gaining intravenous access (e.g. Haemobot®), performing ultrasound-guided nerve blocks (e.g. Magellan®), and undertaking endotracheal intubation (e.g. Kepler®, and REALTI®).

### Intubating robots

Intubating robots appear promising due to their purported capabilities with precise movement, accurate navigation and ease of access around difficult bends in the air passages, all with the potential advantage of undertaking the procedures remotely.

Various intubating robots were developed, for example -the Kepler Intubating System where operator would introduce video laryngoscope using the robotic arm, controlled by a joystick, personally identify the anatomical features through the camera and manually advanced the endotracheal tube attached to the VL.

Remote robot assisted intubating system was also experimented with promising results on pigs. It had a camera embedded on the tip of ET to provide feedback to the operator who would perform laryngoscopy and ET advancement using the joystick. All these intubating robots had the limitation of prolonged intubating times, use of repeated attempts, mucosal trauma and fogging researchers.

National Aeronautics and Space Agency (NASA), ( Houston, USA) developed Robonaut 2 which is the highly dextrous humanoid robot with cameras and other embedded sensors capable of multiple versatile applications. The design limitations identified included its lack of speed and a large hand size with poor grip for smaller instruments.

### Transition

The question is how robotic anaesthesia can enter the daily practice in away which is useful and structured allowing a smooth transformation from the present state of development towards the future of anaesthesia.

### One could envision a 3-step introduction.

#### i. Development and introduction of decision support system

Let us take an example- how often do we forget to monitor neuromuscular blockade? An honest answer would be quite often. Why is there no smart monitoring system that would ask us at the end of surgery to monitor neuromuscular blockade, suggest the correct site, maybe even show it on the screen, ask us to enter the value and then suggest or recommend a line of action according to the current guidelines? Why are such systems not available when every clinician would agree that they add value to anaesthetic safety in order to

# Robotics in Anesthesiology

Edging Forward With Will Against Will?

avoid post operative residual paralysis?

We need to develop and integrate these systems to make anaesthesia even safer.

ii. Automated assist devices semi-automated anaesthesia

Example- closed loop administration of propofol

iii. Completely automated anaesthesia

## Summary

To date none of these airway robots have reached the routine OR clinical practice. More research and trials are needed to test and improve these machines with regards to their functionality, reliability, safety, and malfunctions. The anticipated and eagerly awaited robotic invasion of the perioperative space is likely to enhance the anesthesiologist's performance, consistency, and efficiency, through improving accuracy, preventing error, and reducing risk. At the least semi-autonomous systems may become incorporated in routine clinical practice in not-too-distant future.

However, we must also recognize that they have led to a loss of clinical skills among younger practitioners, who tend to rely on tests and monitors rather than examining the patient.

Research is also ongoing on the ways to improve robot acceptability and likability.

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# Pigtail Catheter Induced Bronchopleuro Cutaneous Fistula: A Case Report

Bronchopleuro-cutaneous fistula (BCF) is a pathologic communication between the bronchus, pleural space, and subcutaneous tissue. Computer tomography (CT) scan is one of the best modalities for early diagnosis. Recently pigtail catheters are emerging as a useful and less morbid alternative to traditional large bore chest tubes for management of malignant pleural effusion in palliative care settings.

We are reporting a case of iatrogenic BCF following pigtail catheter placement in a 51-year-old male patient, known case of carcinoma right tonsil, presented to the emergency department (ED) with shortness of breath (SOB), associated with right sided pleuritic chest pain since last 2 days. During evaluation, chest X-ray shows right sided hydropneumothorax, and a 12F pigtail catheter was inserted. On accidental dislodgement of the pigtail catheter, the patient develops severe dyspnea and extensive surgical emphysema within next 12-hours, rescued with intercostal drainage (ICD) tube placement. Later on, CECT chest reveals right sided hydropneumothorax with a patent BCF.

Most of the time BCF is benign, but often it can be difficult to diagnose and treat also. The chest x-ray findings are inconclusive, but presence of an air-fluid level in the pleural space (i.e., hydropneumothorax) may be a clue. The unique CT findings are more conclusive.

In conclusion, during evaluation of a dyspneic patient with hydropneumothorax, BCF should be kept as a differential diagnosis and CECT thorax is the modalities of choice for an early detection.

## Keywords

Bronchopleuro-cutaneous fistula, hydropneumothorax, pigtail catheter

## Patient Consent Declaration

The authors certify that they have obtained all appropriate patient consent.

## INTRODUCTION

Bronchopleuro-cutaneous fistula (BCF) is a pathologic communication between the bronchus, pleural space, and subcutaneous tissue. Possible etiologies are positive pressure ventilation (PPV), post pneumonectomy, thoracostomy tubes, perforating chest trauma, neoplasia, chemotherapy and chronic empyema etc. (1–3) Computed tomography (CT) scan is one of the best modalities for early diagnosis. Recently pigtail catheters are emerging as a useful and less morbid alternative to traditional large bore chest tubes for management of malignant pleural effusion in palliative care settings. The smaller size and flexibility of the catheter provides the advantage of minimal invasiveness, that results in reduce pain and decrease the chance of surrounding tissue injury. We are reporting a case

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of iatrogenic BCF following pigtail catheter placement.

## CASE REPORT

A 51-year-old male patient, known case of carcinoma right tonsil, conservatively managed with radical radiotherapy and chemotherapy 9-months back, presented to the emergency department (ED) with shortness of breath (SOB), associated with right sided pleuritic chest pain since last 2 days. He had visited ED multiple times in the recent past with same complains and treated with thoracocentesis most of the times. He was admitted in the palliative care unit (PCU) for further management. During evaluation, chest X-ray shows right sided hydropneumothorax, and decision of inserting a 12F pigtail catheter under ultrasound (US) guidance was taken in the ward. Approximately 650 ml of exudative pleural effusion (milky white) was drained over next 24 hours through the pigtail catheter. After sending the pleural fluid for bacterial culture and sensitivity, empirical antibiotic coverage was started for empyema thoracic. Later on, *Pseudomonas aeruginosa* was isolated from the pleural fluid, sensitive to multiple antibiotics including Piperacillin Tazobactam. Accidentally the pigtail catheter was dislodged on the very next day and the patient develops severe dyspnea and extensive surgical emphysema extending from the mandible to pelvis within next 12-hours. Intercostal drainage (ICD) tube was placed immediately as a rescue measure in the right pleural cavity. To find out the cause of recurrent hydropneumothorax, on the next day, the patient underwent a CECT chest, which reveals right sided hydropneumothorax with the drain tube in-situ, collapse of underlying lung parenchyma, patchy areas of consolidation in medial segment of right middle lobe, and a patent BCF. Following ICD insertion, the patient was monitored closely for further progression of disease. He was discharged on day 3 with ICD in-situ.

## DISCUSSION

Most of the time BCF is benign, but often it can be difficult to diagnose and treat also. Above all, it may lead to significant lung infection by providing a direct access of microorganism to the lung parenchyma, bypassing the physiological protective mechanisms. Regarding the pathophysiology of BCF development in this case, the pigtail catheter induced accidental lung perforation creates a fistulous tract from the skin to the lung parenchyma, thus creating a BCF, is the most likely explanation in this case. Krumpel et al, described a unique physical diagnostic sign observed in patients with BCF: a high-pitched squeak over the affected chest area during a sustained Valsalva maneuver. (4) They postulated that turbulence across the bronchial fistula because of the high transbronchial pressure gradient during the Valsalva maneuver produces the squeaking sound. The pitch of the leak squeak sign is higher in smaller fistulas than in larger fistulas. (4) The chest x-ray findings are inconclusive, but presence of an air-fluid level in the pleural space



## Pigtail Catheter Induced Bronchopleuro Cutaneous Fistula: A Case Report

(i.e. hydropneumothorax) may be a clue.(5) The unique CT findings confirm the diagnosis and delineate its course. In this case, we overlooked the initial presence of hydropneumothorax, and treated the patient in the line of empyema thoracic. It's only the accidental removal of the pigtail catheter and subsequent surgical emphysema, which reminds us regarding the possibility of simultaneous BCF as the etiology of hydropneumothorax. The complications of tube thoracostomy with pigtail catheter are minimal, but include hemothorax, infection, dislodgement, kinking, disconnection or blockage of the tube. Kinking and blockage happen more frequently with pigtail catheters owing to their smaller diameter.(6) Among rare complications reported in the literature, Kim et al. reported a case of a 67-year-old man who developed impaired vision immediately after pigtail catheter insertion due to multiple cerebral air emboli proven by CT scan head.(7)

Alkhankan et al, described a case of a 50-year-old man who became suddenly unresponsive and apneic followed by development of left-sided weakness during insertion of a pigtail catheter, where CT angiogram demonstrates air emboli in the right main cerebral artery. (8) Danekas et al. reported a potentially lethal complication of inadvertent placement of the pigtail catheter in the left ventricle in a 3-year-old patient resulting in pulsatile blood flow following advancement of the introducer needle.(9) Most BCFs due to trauma can often be managed by tube thoracostomy and usually resolve spontaneously.(3) Treatment options include but not limited to endoscopic repair, parietal pleurectomy, and chemical pleurodesis. Chemical pleurodesis is an effective way to treat air-leak and it is carried out by using autologous blood or chemical agents like talc powder, tetracycline, doxycycline, bleomycin etc. Irrespective of the method, the goal of pleurodesis is to form adhesions between the both layers of pleura and thus minimizing the space. Autologous blood initiates a local inflammation on the pleural surfaces and a continuous patch of clotted blood (fibrin) is formed, which can potentially adhere to the lung parenchyma that produces the leak. (10) Other newer sophisticated and minimally invasive options are fibrin-glue placement. The new modalities of treatment are less invasive and easy to perform, they have their own limitations as well.

### CONCLUSION

If any dyspneic patient presents with hydropneumothorax, he/she should be evaluated properly with a high suspicion regarding the presence of BCF always. CECT thorax is the modalities of choice for an early detection of BCF.

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# Research Articles Worth A Read

2022-2023

As we close out the year, we thought it would be a worthwhile exercise to go over a few articles related to anaesthesiology, pain medicine and critical care which made us think about our practices and our specialty. These are in no particular order and are the reflection of our own interests and biases.

1. Intravenous iron administration before cardiac surgery reduces red blood cell transfusion in patients without anaemia.

British J Anaesth Volume 131, ISSUE 6, P981-988, December 2023

**TL;DR** In patients without anaemia undergoing on pump cardiac surgery who received 1 gm of intravenous ferric carboxymaltose pre-operatively, there was reduction in need for RBC transfusion and increased Hb levels.

2. Opioid-free versus opioid-sparing anaesthesia in ambulatory total hip arthroplasty: a randomised controlled trial. Published: December 02, 2023 DOI: <https://doi.org/10.1016/j.bja.2023.10.031>

**TL;DR** In patients undergoing day care total hip arthroplasty, opioid free anaesthesia (OFA) and opioid sparing anaesthesia (OSA) provide comparable recovery and postoperative pain relief. OFA did not result in reduced 24 hour opioid consumption. The recent enthusiasm for Opioid free anaesthesia must be tempered by findings such as these. In our opinion, perioperative opioids when used judiciously are great pharmaceuticals which have been needlessly maligned.

3. Quantifying hospital environmental ventilation using carbon dioxide monitoring – a multicentre study.

First published: 07 December 2023. <https://doi.org/10.1111/anae.16124>

**TL;DR** Fascinating study! To our knowledge, this is the first study which demonstrates what we intuitively know...many areas in our hospitals (offices, rest areas for residents and staff, etc.) are poorly ventilated and can have a higher risk of airborne infections. I remember during covid times, we used to have our daily meetings outside in the open where there was plenty of sun and air!

4. Cadd, Matthew MRCP; Jackson, Paul MBBS; Ewnetu, Baby MRCP. Ondansetron for the Prevention of Pruritus in Women Undergoing Cesarean Delivery With Intrathecal Opioid: A Systematic Review and Meta-Analysis. *Anesthesia & Analgesia* 138(1):p 70-84, January 2024. | DOI: 10.1213/ANE.0000000000006526

**TL;DR** Ondansetron significantly reduces the incidence of pruritus ascribed to intrathecal opioids in women undergoing C-sections with the usual caveats of a meta-analysis.

5. Karam, Cynthia MD\*; Zeeni, Carine MD\*; Yazbeck-Karam, Vanda MD†; Shebbo, Fadia M. MSc\*; Khalili, Amro MD\*; Abi Raad, Sarah G. MD\*; Beresian, Jean MD\*; Aouad, Marie T. MD\*; Kaddoum, Roland MD\*. Respiratory Adverse Events After LMA® Mask Removal in Children: A Randomized Trial Comparing Propofol to Sevoflurane. *Anesthesia & Analgesia* 136(1):p 25-33, January 2023. |

# Research Articles Worth A Read

2022-2023

DOI: 10.1213/ANE.0000000000005945

**TL;DR** In this prospective, randomized, double blind clinical trial, children aged 6 months to 7 years old were enrolled in to 1 of two groups, TIVA or Sevoflurane group. Children receiving TIVA with propofol had a significantly lower incidence and lower severity of respiratory adverse outcomes compared to the patients receiving inhalational anaesthesia with sevoflurane.

6. Coppens, S., Somville, A., Hoogma, D.F., Dewinter, G., Neyrinck, A., Desmet, M., Vandebroek, A., D'Hoore, A., Wolthuis, A., Bislenghi, G., Fieuws, S. and Rex, S. (2024), The effect of anterior quadratus lumborum block on morphine consumption in minimally invasive colorectal surgery: a multicentre, double-blind, prospective randomised placebo-controlled trial. *Anaesthesia*, 79: 54-62. <https://doi.org/10.1111/anae.16177>

**TL;DR** In laparoscopic colorectal surgery, adding a bilateral anterior quadratus lumborum block to a standard multimodal analgesia regimen DID NOT reduce opioid consumption or pain scores

7. Platelet Transfusion before CVC Placement in Patients with Thrombocytopenia. van Baarle. *NEJM* 2023. doi: 10.1056/NEJMoa2214322

**TL;DR** The withholding of prophylactic platelet transfusion before CVC placement in patients with a platelet count of 10,000 to 50,000 per mm<sup>3</sup> resulted in more CVC-related bleeding events than prophylactic platelet transfusion.

8. Roh, David J. et al. Hemoglobin Concentration Impacts Viscoelastic Hemostatic Assays in ICU Admitted Patients\*. *Critical Care Medicine* 51(2):p 267-278, February 2023. | DOI: 10.1097/CCM.0000000000005700

**TL;DR** Lower hemoglobin concentrations have a consistent, measurable impact on ROTEM/TEG testing in ICU admitted patients. It is possible that patients with low hemoglobin may appear to have normal viscoelastic parameters when, in fact, they have a mild hypocoagulable state.

9. Shanmugam N, Verma R, Sarkar S, et al. Functional near-infrared spectroscopy guided mapping of frontal cortex, a novel modality for assessing emergence delirium in children: A prospective observational study. *Pediatr Anaesth*. 2023; 33: 844-854. [doi:10.1111/pan.14708](https://doi.org/10.1111/pan.14708)

**TL;DR** There is significant difference in the change in oxyhemoglobin concentration during induction, maintenance, and emergence in specific frontal brain regions between children with and without emergence delirium. This is exciting! fNIRS and similar modalities could be used as neurological monitoring for depth of anaesthesia in the future.

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# Uncertainty

The “Certain” Beauty Of Perioperative Medicine!



*“Medicine is a science of uncertainty and an art of probability”, as famously articulated by Sir William Osler.*

Uncertainty is a peculiar feature of health care, as for any other elaborate domain for which the outcomes involved are non-linear. Clinical practice being inherently complex, multifaceted, and deeply situational, certainty here is no less than a delusion and only uncertainty is definite. Meanwhile the tolerance to uncertainty has long been discussed as a necessary skill for the physicians; it should be rather embraced given the newer avenues it extends for reflecting upon the alternative possibilities, materializing as an even more profound engagement in decision-making.

Talking of perioperative medicine in particular, the heterogeneity of the inter-individual response to pharmacological agents and the concomitant genetic polymorphisms, greatly influence the safe conduct of anaesthesia-analgesia. Amidst an acknowledgment of the perioperative ‘omics’ (proteomics, metabolomics, transcriptomics, pharmacogenomics), modern day approach endorses a heightened tendency to practice perioperative care along the lines of a personalised management in contrast to the traditional one-size-fits-all approach.

With precision medicine being defined as the one aiming to tailor the therapy to the individual characteristics, the tools required for tailoring the perioperative care will in turn only require an enhanced open-mindedness and an augmented facility for computing-interpreting the probabilities that we, as physicians have ever been used to. In reference to the probabilistic perspective presented by ‘evidence-based medicine’ (EBM) also, the conventional estimates of probability like the ‘holy grail’ p-value thresholds have recently been interrogated with eventually revealing highly ‘fragile’ randomized literature in our research ecosystem. Having said that, alongside the probabilistic perspective portrayed by EBM, there ought to be a human perspective to the matter. The crux lies in the comprehension that nobody can know for sure, however as one would again say that the probability is... that is, only being human, at the same time demonstrating a certain degree of expertise-experience backed confidence, with the noble objective of providing the most appropriate care possible. EBM on the other hand as well, despite of having much to offer as a scientific modus operandi, at best would provide some answers but certainly not all. Intriguingly so, seeking lucid solutions often become the hardest when required the most, particularly when we

# Uncertainty

The “Certain” Beauty Of Perioperative Medicine!

are increasingly becoming aware of the impediments in translation of the results of the systematic literature (considered to be the highest level of evidence) into recommendations and guidelines for shaping our day-to-day clinical practice, wherein the role of a critical appraisal can certainly not be overemphasized. As for all the other prevailing sources of clinical uncertainty, the research minds fortunately welcome them as potential knowledge-gaps, relentlessly exploring further relevant answers to aid an improved holistic understanding.

A realistic assessment of the scope of precision medicine is indeed the need of the hour. If we remember that in uncertainty perpetuates a ‘certain’ beauty of medicine, we can develop novel opportunities to learn, relearn and ultimately refine our perioperative care. This uncertainty can become an integral part of patient care goals to improve overall perioperative outcome.

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## PG Section: Long Case Series

### Mitral Stenosis in Pregnancy

1. What are the physiological changes in pregnancy that impact cardiovascular function?
2. What changes occur in the cardiac examination of pregnant patients?
3. Describe the cardiac risk prediction models used in the pregnant population.
4. What are the hemodynamic changes during labor and the puerperium?
5. Define Mitral Stenosis and outline its etiology.
6. Describe the clinical manifestations of Mitral Stenosis.
7. What are the stages of Mitral Stenosis?
8. Differentiate Mitral Stenosis from other valvular heart diseases concerning pregnancy outcomes.
9. In the context of a pregnant patient with Mitral Stenosis, elaborate on the role of echocardiography in the pre-anesthetic assessment. How does it influence your anesthetic plan?
10. Explain the role of preoperative optimization strategies, such as beta-blockers or diuretics, in the anesthetic management of a pregnant patient with severe Mitral Stenosis.
11. What are the potential risks and benefits of using a labor epidural in a patient with Mitral Stenosis? How might it influence maternal and fetal outcomes?
12. Compare and contrast the advantages and disadvantages of general anesthesia versus neuraxial blockade for a pregnant patient with Mitral Stenosis. What factors would guide your choice?
13. Describe your approach to airway management in a pregnant patient with Mitral Stenosis undergoing general anesthesia for a non-obstetric surgical procedure.
14. Explain the potential risks of hypotension associated with neuraxial blockade in a pregnant patient with Mitral Stenosis and the strategies to prevent and manage it.
15. Explain the rationale and considerations for using vasopressors or inotropes in a pregnant patient with Mitral Stenosis during anesthesia. What are the goals of their use?
16. Explain the potential effects of positive pressure ventilation on hemodynamics in a pregnant patient with Mitral Stenosis. How would you optimize ventilation in such cases?
17. Discuss the considerations for fluid management during anesthesia in a pregnant patient with Mitral Stenosis. How does this differ from non-pregnant patients?
18. Elaborate on the considerations for post-anesthesia recovery and monitoring for a pregnant patient with Mitral Stenosis. What signs would indicate a need for further intervention?
19. Discuss the role of invasive monitoring, such as arterial line placement, in a pregnant patient with Mitral Stenosis undergoing anesthesia. When is it indicated?
20. Discuss the role of oxytocin in the management of postpartum hemorrhage in a pregnant patient with Mitral Stenosis. How do you balance the need for uterine contraction with the potential cardiovascular effects?

## PG Section: Long Case Series

### Mitral Stenosis in Pregnancy

21. Describe your approach to postoperative pain management for a pregnant patient with Mitral Stenosis who underwent a cesarean section under general anesthesia.

#### **Suggested Readings**

1. Chestnut's Obstetric Anesthesia: Principles and Practice
2. Luthra A, Bajaj R, Jafra A, Jangra K, Arya VK. Anesthesia in pregnancy with heart disease. Saudi J Anaesth 2017;11:454-71.
3. Anesthetic Care of the Pregnant Patient with Cardiovascular Disease: A Scientific Statement From the American Heart Association. Link to the article Circulation. 2023;147:e657–e673.

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## Photo Quiz

### **PART 1:** **Airway equipment** **identification**

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**Q1. Identify the Airway Equipment**



**Q2. Identify the Airway Equipment**



**Q3. Identify the Airway Equipment**

Entries to be sent at [isadelhiexecutive@gmail.com](mailto:isadelhiexecutive@gmail.com) and [dramitkohli@yahoo.com](mailto:dramitkohli@yahoo.com) by 20 January 2024, first three correct entries will be given a token of appreciation in the next clinical meeting

## Photo Quiz

### PART 2: Past, present and Future of Anaesthesia

Past Identify the person

Clue 1: Described safe Lumbar Puncture Technique at 3rd of 4th lumbar Intervertebral space.

Or

Clue 2: His technique was used by August Bier for deliberate cocaineization of Spinal cord (Spinal Anaesthesia)



Present

Q.2 Identify all the Techniques in this image

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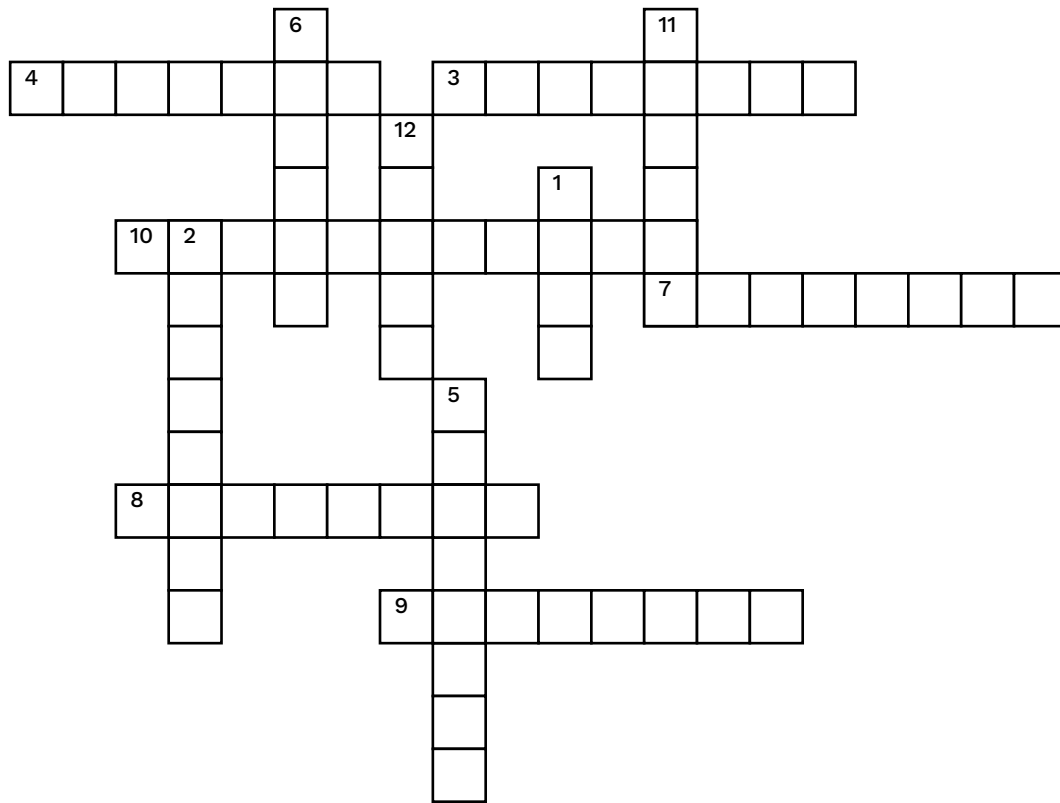


Future:

Q.3 What is the underlying principle of SCANNAV ULTRASOUND TECHNOLOGY?

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# Crossword



## Across

3. A synthetic opioid, often used in anaesthesia.
4. Dr. Morton called ether this to keep its nature a secret.
7. A drug used to reverse the effects of opioids
8. First synthetic local anaesthetic
9. A common intravenous anaesthetic agent
10. A non-flammable, inhaled anaesthetic agent

## Down

1. He discovered the anaesthetic properties of nitrous oxide
2. A pain relief method often used in childbirth
5. Common term for Atropa Mandragora
6. Founder of modern anaesthesiology
11. Surgeon who operated the cases publicly demonstrating the effects of ether with Dr. Morton
12. Dr. Morton was one of his pupil

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**ISA**  
Indian Society of  
Anaesthesiologists  
Delhi Branch

# ISA DELHI

Monthly Bulletin of Indian Society of Anaesthesiologists (Delhi Branch)

**ISSUE 01,  
DECEMBER 2023**

SLEEP IT OFF

TRAIN OF FORE

**ANAES  
THESIA**

WINK AT CHINK

THE MIDAS TOUCH

## 2024

### JANUARY

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