



NEWS LETTER

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EDITORIAL FUTURE OF ANAESTHESIA 2050

"We always overestimate the change that will occur in next 2 years and underestimate the changes that will occur in next 10"

Bill Gates

Anaesthesiology has evolved over time, propelled by evolving clinical needs and technological advances. Despite the uniqueness of each patient, an aging patient population, and worsening co-morbidity profile, a one-size-fits-all approach and individual provider experience are the basis of healthcare today. By 2050, 'precision medicine' is expected to enable safer and more efficient patient care, early and more accurate diagnoses, and personalised treatment plans standing on shoulders of 'artificial intelligence' (AI), the Internet of Medical Things (IoMT) and Omics (proteomics, transcriptomics, genomics, metabolomics, lipidomics and epigenomics). Accessibility, equitability, optimisation, and sustainability are additional features of the ideal future anaesthetics. All volatile anaesthetics (potent greenhouse gases) and N₂O will be banned/restricted to low-flow, closed loop systems with integrated recycling to prevent atmospheric contamination. Nano technology for targeted drug delivery of general anaesthetics will consist entirely of intravenous drugs tailored to the patient's Omics.

Wearable devices, medical implants, and personal health apps will provide baseline physiological variables even before the patient enters the PAC clinic. The current fragmented medical record system will be replaced by a universal and comprehensive Electronic Health Record (augmenting HDT) accessible to health care providers anywhere in the world, through patient's biometrics. Telemedicine platforms and remote monitoring technologies may enable preoperative assessments, anaesthesia consultations, and postoperative follow-up care remotely.

Surgeons shall perform more complex procedures using smaller incisions and natural body orifices, guided by AI enabled surgical robots, using patient specific implants and 3D- printed prosthesis. A floating hologram with vital signs on a large background-screen would be a norm in each OT. Future patient monitoring may shift from systemic variables (pulse oximetry for global oxygen saturation) to regional variables (urine oxygen monitoring for detecting acute kidney injury risk). Recently, an advanced haemodynamic monitor incorporated 'Hypotension Prediction Index' predicting hypotension 3-5 min in advance, allowing pre-emptive treatment. Similar monitors and algorithms that can predict future clinical

scenarios will provide inputs to highly automated physiological closed loop systems e.g. fluid volume status and blood pressure. Currently we have monitors (heart rate variability, skin conductance, plethysmography, high frequency pupillometry) to assess intraoperative nociception under GA. The futuristic monitor will not be 'blind' like current ones, will recognise which anaesthetic agent is being used, (from patient's age; DSA signature extraction from the EEG), and will automatically select the algorithm associated with this anaesthetic to display a personalised index value. Virtual reality is currently an established distraction technique to reduce pain due to IV access, tooth extraction, burn dressings. In future, we could transiently bring the patient's consciousness into alternate realities while operating the physical body. Besides measuring pain, pain-monitors would be used to avoid extracting patients from alternate reality by excessive stimuli from the real world where 'surgery' is going on.

The large language model with a chat-based interface, 'Chat-GPT-4,' has cleared the United States medical licensing exam. Medical chatbots shall become available 24/7 and accurately answer most of patient's questions, directing the inquiry to the doctor whenever in doubt. In future, AI algorithms previously exposed to connectomes of millions of patients across the globe will be able to monitor and cross control the reactivity of the brain to medication. A 'human digital twin' would be created to test virtual events before their occurrence. An HDT is a virtual model of a single, specific patient, which incorporates digital, biochemical, and exposomic data about the patient and evolves with the patient as fresh data is inputted.

Disposable video-LMAs with multiple cameras akin to AI-enabled cars for 360° vision will materialise. Point of care ultrasound, the modern physician's stethoscope, is used for loco-regional blocks, gastric volume assessment, arterio-venous cannulation, diagnosis of vocal cord and pulmonary pathology. Future applications comprise improved visualisation and decision-making using AI-enhanced augmented/virtual reality, AI driven simulators and training modules, miniaturisation of diagnostic and interventional tools for real-time support in OT and finally, USG enabled gloves for enhanced diagnosis, treatment and care. Instead of expensive, claustrophobic, large MRI/CT scanners, USG could provide a hologram of anatomical structures for a fraction of the cost. AI predictive modelling could create real time, text-book like colour-coded images, autonomously recognising, highlighting and labelling targeted anatomy during nerve blocks.

(Continue on 2nd Page)

Lower inflation-adjusted income (governmental payment cuts; bundled insurance payments to hospitals requiring anaesthetists to negotiate for their due) and cheap labour with more 'Certified Nurse Anaesthetists' on board, will transform anaesthesiology to a shift-work job. However, an increased volume of surgery in an aging population would raise demand for anaesthesia personnel.

To conclude, dramatic changes in both hardware and software are predicted, with improved safety statistics

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(morbidity and mortality), bridging the technological gap between India and the developed world. AI/robots won't replace the anaesthesiologists, but anaesthesiologists who use AI will replace the ones who don't, Healthcare is multifaceted and requires intuitive thinking, and empathy. While AI is high on intelligence quotient (IQ), human doctors are high on emotional quotient (EQ) and both complement each other.

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SAME-DAY YTTRIUM-90 RADIOEMBOLIZATION : FIRST IN THE COUNTRY AT RGC

Primary liver cancer is the seventh most frequently occurring cancer in the world and is responsible for the second-highest number of cancer-related deaths. Globally, hepatocellular carcinoma (HCC) is the dominant type of liver cancer, accounting for approximately 75% of the total. Cirrhosis remains the predominant risk factor for HCC which can result from virus-related liver disease (Hepatitis B & Hepatitis C virus) and non-viral etiologies like alcohol-associated and metabolic dysfunction-associated fatty liver disease.

If detected early, HCC can be easily treated either by liver resection/transplant or percutaneous ablative techniques. Lesions upto 3 cm treated with ablation (Fig 1) show a comparable recurrence rate or overall survival rate as compared to surgical resection. The larger lesions require combination treatment with trans-arterial chemoembolization (TACE) / transarterial radioembolisation (TARE) followed by ablation/surgery, if upfront surgery is not possible (Fig 2).

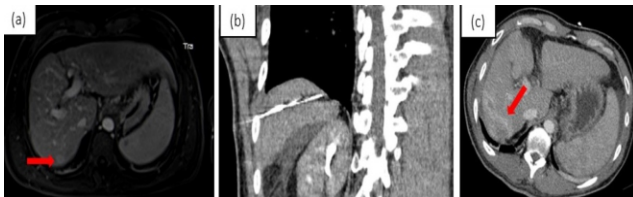


Fig 1 (a) Seg VII HCC (arrow) (b) MWA antenna placed under USG & CT guidance (c) Check contrast CT showing complete ablation of the lesion (arrow)

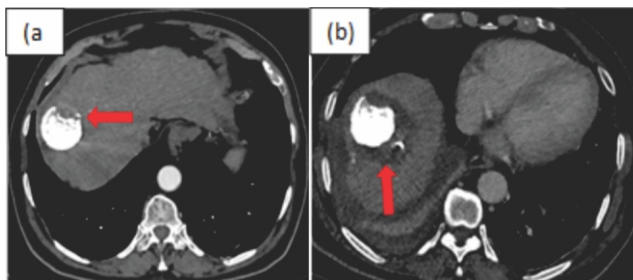


Fig 2 (a) Seg VIII HCC (arrow) showing small residual area post TACE. (b) Complete ablation achieved with MWA.

However, once the tumor is large and/or invades the vascular structures like portal vein and/or hepatic vein, TARE remains

a better option to downstage the disease to try to make the patient reach liver transplant. Larger HCC's which do not show vascular invasion can be treated with TACE but this will need to be done in multiple sessions due to dose limitation in each session. Often a combination of TARE (to treat the large tumor) and SBRT (for additional treatment for portal vein tumor thrombus) is used to adequately downstage the tumor.

TARE, also called as selective internal radiation therapy (SIRT) with Yttrium-90 (⁹⁰Y), has always required a 7-10 day interval between workup and treatment due to non-availability of therapy locally. It is imported from Singapore and can be flown in limited flights only where the pilot is licensed to carry nuclear material, causing the delay in availability of the medicine. There are several indications for TARE including downsizing intrahepatic tumors, increasing future liver remnant (FLR) size prior to surgery, bridging to transplant for HCC, controlling tumor size and inducing hypertrophy of FLR before resection (radiation lobectomy), palliation or delayed progression for advanced HCC, and primary treatment of isolated liver lesions (radiation segmentectomy [RS]). TARE can be used to treat a wide range of liver tumors including HCC, Cholangiocarcinoma, Neuroendocrine tumors and colorectal liver metastasis.

In the workup for TARE, angiography is done to demonstrate the tumor supply and dyna CT's are done from different tumor feeders to calculate the perfused tumor volume from each feeder and thus the therapy to be delivered. Technetium-99 macro-aggregated albumin (99mTc MAA) injection in the workup is used to assess the tumor uptake, tumor:normal liver ratio, extrahepatic uptake and lung shunt as assessed on a single photon emission computed tomography scan (SPECT). **Ideally if the therapy was available, like any other drug, it could be infused once all the results of workup are available.**

Finally, now the option of pre-ordering the therapy so it can be infused on the same day is available in India. The first such case where the TARE workup and therapy were done on the same day has been done at Rajiv Gandhi Cancer Institute, Delhi. This helps in shorter stay for the patient in the hospital, lesser expenditure as the same hardware is used in workup and treatment. This also brings down significant logistic expenses of the patients who come from outstation for treatment. The cost of TARE has been brought down to Rs

Same day TARE is an intricate procedure requiring meticulous patient selection and imaging assessment to define who might be the best candidates anatomically, physiologically, and psychologically for this procedure. The procedure requires excellent co-ordination between the Interventional Radiology department and Nuclear medicine department along with availability of the cath lab for 6 to 7 hour. The procedure is taxing for the interventionist as well as the patient as they both have to endure for almost 5 to 6 hour of procedure time. Patients with large arterio-portal or arterio-venous shunts are best avoided for this technique as they may fail in the workup.

Same-day 'map and treat' has proven to be technically feasible, offering a number of distinct advantages to clinicians, hospitals, and patients. The patient in whom this was done at RGCI had come from Bangladesh and was seen in the Interventional Radiology OPD mid-week for treatment of large liver tumor (Intrahepatic Cholangiocarcinoma). The CT evaluation looked promising and as the patient wanted to reduce stay away from home, same day therapy was offered. We pre ordered the therapy and carried out the entire procedure in the same week with infusion of 3.43 GBq through three tumor feeders. Post procedure SPECT showed good distribution and the very happy patient was discharged

the next day.

The patient has been kept on follow up protocol now.

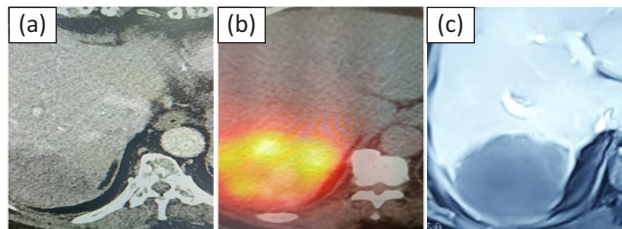


Fig 3 (a) Washout seen in the tumor in the venous phase of CT Scan (b) PET CT post Y-90 therapy showing adequate dose delivery to the tumor (c) Check MRI done at 3 months showing complete tumor necrosis.

Conclusion

A same-day ⁹⁰Y radioembolization protocol is feasible in select patients and this can expedite cancer therapy and bring down the treatment cost.

Dr. Abhay Kumar Kapoor
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22ND ANNUAL INTERNATIONAL CONFERENCE: RGCON 2024

Rajiv Gandhi Cancer Institute and Research Centre organized its yearly global academic conference with the aim of promoting ongoing medical education and sharing knowledge and expertise from distinguished faculties, both domestic and international, to benefit the delegates, students, and professionals alike. RGCON 2024, took place at Hotel Crowne Plaza, Rohini, New Delhi, India from 15th to 17th March 2024. The conference theme for this year was "**Head and Neck Cancer: Bridging the Gap; From Cure to Survivorship.**"

RGCON 2024, as promised, delivered an enriching experience, with a compelling program featuring the latest ground-breaking advancements and research presented in scientific and educational sessions, complemented by vibrant networking events.

With a comprehensive program that encompassed the latest developments in diagnosis, treatment modalities, and survivorship care, along with an impressive line-up of esteemed speakers, both nationally and internationally renowned, this event delivered a dynamic and enriching experience for all attendees.

Key highlights of the conference include:

Cutting-Edge Research: Novel therapies, precision medicine approaches, and emerging technologies that are transforming cancer care were discussed & explained.

Multidisciplinary Approach: Engaging sessions were delivered that promote collaboration among various disciplines, including surgery, radiation oncology, medical oncology, pathology, and supportive care with emphasis on the power of teamwork to improve patient outcomes.

Patient-Centered Care: Importance of patient centered care by hearing the inspiring patient stories was discussed.

Interactive Workshops: Attendees participated in hands-on workshops and case discussions to enhance the practical skills and problem-solving abilities.

The conference was attended by 11 International faculty and 200 national faculty and 1300 delegates.



CME WITH DOCTORS OF DWARKA, DELHI

CME Programme organized by RGCIRC in association with Doctors of Dwarka, Delhi on Sunday, 18th February 2024 at Radisson Blu Hotel, Dwarka, New Delhi. Dr. (Prof.) Ishwar Chandra Premsagar, Chief of Neuro & Spine Oncology Services, RGCIRC delivered a lecture on **Management of Headache & Backache** and Dr. Vipul Sheth, Sr. Consultant & Unit Head - Hemato Oncology & BMTU, RGCIRC spoke on **Car T Cell in Hematology Malignancies**.



CME – IMA PANIPAT



RGCIRC organized a CME in association with IMA Panipat on Saturday, 09th March 2024 at Days Hotel, Panipat, Haryana. Dr. Vineet Talwar, Director – Medical Oncology, RGCIRC delivered a lecture on **Epidemiology, Diagnosis and Newer Treatments in the Management of Biliary Tract Cancers** and Dr. Shivendra Singh, Sr. Consultant & Chief of GI Oncosurgery & Liver Transplant Services and Director - Academics spoke on **Robotic Surgery in GI Cancers**.

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