

Onco-Anaesthesiology and palliative medicine: Opportunities and challenges

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ABSTRACT

Global cancer burden is on the rise and many more patients present for surgery or other oncological diagnostic or therapeutic interventions requiring anaesthesia. Oncology therapy is unique as it requires a multidisciplinary team of surgical, medical and radiation oncologists apart from palliative medicine (PM) specialists, and anaesthesiologists. Anaesthetic management can affect the outcome of oncology treatment both by ensuring early return to oncology treatment and some anaesthetic techniques being innately associated with recurrence. Hence, the time has come for a separate super-speciality of onco-anaesthesiology to cater to the complex unmet needs of cancer patients. PM is the fourth dimension of oncology care and so mandatory education and training should be included in the undergraduate curriculum.

Key words: Anaesthesiology, curriculum, oncology, palliative medicine, specialisation

INTRODUCTION

As per "Globocan 2018" estimates, there will be 18.1 million new cases and 9.6 million deaths due to cancer in 2018.^[1] Cancer is the second most common cause of death in the world and 1 in 6 deaths occur due to cancer.^[2] In India, there were 1157294 cases and 784821 cancer-related deaths as per recent Globocan 2018 report.^[1] The lifetime risk of developing or dying from cancer is increasing and it is estimated the one in two people born after 1960 have or are at risk of developing some kind of cancer over their lifetime.^[3] This is primarily due to increased lifespan, obesity, environmental pollution and increased screening facilities. Moreover, due to improved overall management of cancer more and more patients are surviving cancer and coming for management of secondary malignancy and incidental surgeries.^[2]

The oncology treatment is a multidisciplinary and patients often require combination of surgery, chemotherapy and radiation therapy. The complications and disability following oncological

surgery may prevent completion of oncology therapy and may reverse the benefits of surgery. Metastasis of tumour is another major problem that affects the overall survival of patients. The battle between the patient's immunity to fight against malignancy and risk of cancer growth at distant site determines the overall outcome. In this article, we discuss the prospects of an upcoming speciality of onco-anaesthesiology and palliative medicine (PM).

WHY ONCO-ANAESTHESIOLOGY?

Oncological management is multidisciplinary, and patients receive a combination of surgery,

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chemotherapeutic agents, radiation therapy and palliative care depending on the disease and stage.^[4,5]

Majority of patients (up to two thirds) may need anaesthesia for diagnostic or therapeutic management of the cancer. The onco-anaesthesiologists must be well versed in the various cancer treatment (chemotherapies, radiotherapy or newer immunotherapy) modalities that the patient has received and be aware of complications, sequelae and adverse effects of each of these modalities so that they can manage the perioperative phase of the patient efficiently [Table 1]. Many surgeries like hyperthermic intraperitoneal heated chemotherapy (HIPEC) and ischemic limb perfusion (ILP) with chemotherapeutic agents are unique to oncology setups. In HIPEC surgery, the heated chemotherapy drugs are delivered directly into the abdomen after cytoreductive surgery. The anaesthesiologists must manage fluids optimally, maintain haemodynamics, manage fluctuations in temperature, coagulation derangement and electrolyte balance.^[6]

There is clear evidence to vouch for the improved outcome of patients treated in a specialised oncological centre by an efficient team comprising

the surgeon and anaesthesiologist as a perioperative physician.^[7] As cancer is becoming a public health problem, anaesthesia for oncology has become a specialised field with the introduction of onco-anaesthesiology as a super-speciality.^[4,7]

Onco-anaesthesiologists function as perioperative physicians, resuscitation specialists and are adept at dealing with difficult airway. They are playing a leadership role in critical care (surgical, oncology and now coronavirus disease (COVID) intensive care units) and managing acute and chronic cancer pain.

Onco-anaesthesiologists have a well-coordinated perioperative care plan with optimisation of co-existing diseases, prehabilitation with cardiopulmonary exercise testing, using haematinics for nutritional optimisation, employing evidence-based and outcome-driven perioperative care pathways [Figure 1]. They know the potential impact of the anaesthetic technique on cancer biology and can deal with postoperative complications with early rescue.^[8,9] Surgical handling of tissues leads to tumour microemboli released into circulation and there is evidence that some

Table 1: Unique Challenges for perioperative management of Oncology patients

Challenges	Reason	Solution
Difficult Airway	Secondary to submucous fibrosis-related trismus. Redo head-neck surgery after flap reconstruction	Difficult airway armamentarium to include fiberoptic bronchoscope and C Mac D blade videolaryngoscope Cricothyrotomy/Tracheostomy skills
Difficult intravenous access	Secondary to irritant IV chemotherapeutic agents and multiple surgeries	Peripherally inserted central catheter (PICC) line/Chemo port insertion prior to commencement of chemotherapy. Usual port precautions mandatory while handling
Increased requirement of analgesia	Many patients are receiving opioids like morphine to manage their pain leading to opioid receptor conformational changes.	Be aware of the potential problem and manage the analgesia accordingly
Nutritional deficiencies and anaemia	Cancer cachexia, dysphagia or poor absorption, chemotherapy drugs	Nutritional counselling, high protein nutrition in preoperative care
Immunosuppression and cancer progression	Anaesthetic technique Anaesthetic drug	Regional anaesthesia is considered protective Volatile anaesthetics and Morphine associated with cancer recurrence. Total intravenous anaesthesia and regional anaesthesia considered protective.
	Surgery, blood transfusion	Blood transfusion based on transfusion trigger. Evidence of decreasing immunity
Interaction with chemotherapy drugs	Hypothermia	Active peri-operative warming
	Bleomycin	Low inspired oxygen concentration and Goal directed fluid therapy to prevent pulmonary complications
	Adriamycin	Echocardiography (Left Ventricular Ejection Fraction); Cardiac output monitoring
	Transtuzumab	Thyroid function tests to exclude hypothyroidism. LV failure can be precipitated.
Radiotherapy	Difficult airway	Videolaryngoscope (Limited neck extension)
Depression	Cancer is like a death-knell to most patients	Reassurance that cancer is now curable Psychotherapy and counselling

anaesthetic drugs too impair the immune-mediated inflammatory response.^[5] A number of publications point towards effect of the anaesthetic technique in the perioperative period on modulation of malignant cell behaviour and cancer recurrence [Table 1].^[4,5,7]

Rehabilitation after cancer surgery or therapy is an important aspect that should be discussed with

the patient early. There is evidence to support early multidisciplinary rehabilitation of cancer patients improves functional outcomes.^[10] So, there is a need to develop the speciality of onco-anaesthesiology for improved care of cancer patients.^[11] Training prospects for onco-anaesthesiology are available across cancer centres around the world for many years and such centres are now also available in India [Table 2].

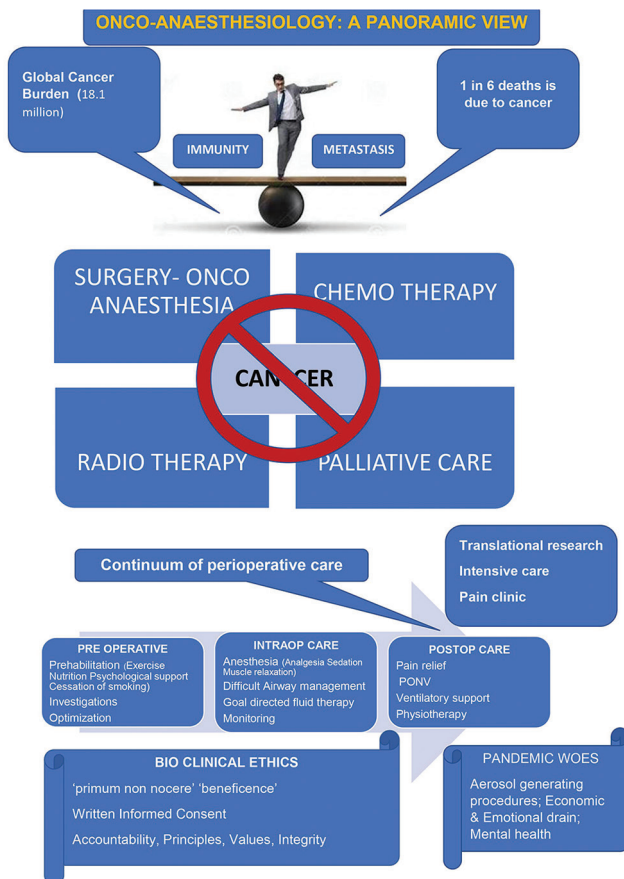


Figure 1: A panoramic view of Onco-Anaesthesiology

Ethical issues

For any major interventions on the patient, the rules of non-maleficence or abiding by the doctrine of primum non-nocere (first do no harm), patient’s autonomy, and beneficence (always doing good) are important concepts. In patients undergoing oncological treatment, ethical issues may arise when patients are withdrawn from ongoing treatment due to personal reasons or non-responsive therapy. Also, many patients with advanced malignancy have a ‘do not attempt resuscitation’ order. This may pose an ethical challenge when they come for a palliative procedure.

ECONOMIC IMPLICATIONS

Cancer therapy entails tremendous physical, economical and emotional drain. Anaesthesiologist’s duty is to wisely rationalise scarce and expensive medical resources, and at the same time have a moral obligation to proffer drugs/procedures beneficial to patients, disregarding the cost-factor.^[12] Should each patient routinely receive the most expensive analgesic/block for postoperative pain relief? Choice of medications and interventions should not be dependent on the insurance policy, personal contacts within the hospital, economic issues or a desire to experiment with new regional blocks.

Table 2: Opportunities for training in Onco-Anaesthesiology and Palliative Medicine

Onco-Anaesthesia	
DM course (duration in years)	Fellowship course (duration in years)
Department of Onco-Anaesthesiology and Palliative Medicine, DRBRAIRCH, AIIMS (3 years)	AIIMS Rishikesh
Department of Anaesthesiology, AIIMS Rishikesh (3 years)	Tata Memorial Centre (TMC) Mumbai (Oncoanesthesia & Pain: 2 yrs)
The DM course is expected to be started in other AIIMS as well shortly	Tata Medical Centre (TMC) Kolkata
	Rajiv Gandhi Cancer Institute and Research Centre (RGCI RC) Rohini, Delhi
	Healthcare Global (HCG) Cancer Center Ahmedabad
	Max Hospital Saket New Delhi
	Indo American Cancer Centre Hyderabad
Palliative Medicine	
MD	Fellowship
TMH (Mumbai)	AIIMS (Bhubaneswar)
AIIMS (New Delhi)	National Fellowship in Palliative Medicine at Calicut (one year)
GCRI (Ahmedabad)	Post-doctoral fellowship in Pain and Palliative care (MNJ, Hyderabad)

AIIMS-All India Institute of Medical Sciences, TMH-Tata Memorial Hospital, GCRI-Gujarat Cancer and Research Institute, MNJ-Mehdi Nawaj Jung

PANDEMIC WOES

The COVID-19 pandemic has brought in a change in operating conditions and practice in every speciality across the board be it medical or non-medical. India had an ongoing lockdown for nearly 3 months from end March till 30th of June and guidelines were put in place, wherein elective surgeries were postponed.^[13] Oncologists across the world have come up with guidelines on the management of cancer patients during this pandemic.^[14-16] Oncological surgery are considered time-sensitive in nature and therefore semi-emergent surgeries continued during the pandemic.^[16,17] Anaesthesiologists by the nature of their work have been at the forefront of airway management, oxygen therapy, ventilation support, haemodynamic management, sedation and analgesia during the pandemic. The onco-anaesthesiologist thus had to face the pandemic and various aerosol generating procedures associated with anaesthesia head-on not only in the intensive care but also for elective oncological surgeries too. This has also been made possible by the clear guidelines laid down to manage patients during the pandemic by the onco-anaesthesia society.^[18]

For the first time in history, an anaesthesiologist was featured on the cover of TIME magazine. An achievement indeed, but this only comes with associated hardships. The anaesthesiologist had to delve into physics of air circulation in the operation theatre and try to ensure aerosol clearance between cases during the pandemic.

Cancer patients being more vulnerable to COVID-19, (by virtue of their older age group, immunosuppressed state) cancer hospitals have been converted to virtual fortresses by installing multi-level barriers.^[19] Head and neck procedures were challenging. The standard precautions including the use of videolaryngoscopes, Personal Protective Equipment (PPE) and aerosol boxes for intubation have become standard practise as per guidelines.^[20]

Perception and practice in the medical fraternity

The World Health Organisation (WHO) predicts 22 million new cancer diagnoses per year globally by 2030 and demand for anaesthesia is bound to increase spirally for diagnosis and treatment.^[2] Many new cancer centres are being commissioned in major metros across India to face this requirement. It is increasingly recognised that onco-anaesthesiologists

have the opportunity to positively influence oncological outcomes of patients with potential for disease modification.^[4] Onco-anaesthesiologists can help cancer care by impeccable perioperative care to ensure patients return early to intended oncological treatment (RIOT)^[21] and are at a point where they have the opportunity to minimise the biological perturbation of the surgical stress response and to tailor anaesthetic techniques to minimise activation of cancer progression pathways.^[5]

A career in Palliative Medicine (PM)

PM is considered the fourth dimension of oncology after medical, surgical and radiation. Today, with the integration of PM from the time of diagnosis of cancer, there are many avenues for a PM physician to flourish.^[22] World Health Organisation (WHO) has recognised palliative care as an integral part of the comprehensive services required for the non-communicable disease and approved the framework on integrated people-centred services at the 69th World Health Assembly in 2016.^[23] There is a need for maturity and professionalism before taking up PM as a profession.

When PM started, anaesthesiologists were involved because many common aspects like coordination with several different medical specialities, pain, sedation, critical care, physical and social therapy, are in the domain of anaesthesiology.^[24] The major limitation of anaesthesiology has been the absence of recognition among the patients and specialists.^[25] The additional role of onco-anaesthesiologists as a palliative care physician helps them interact with the patient at various time points during oncology treatment and provides gratification as well.^[25] It is obligatory for the physician to not only respect the medical, and legal but also the professional responsibilities. The service rather than profit orientation, collegial discipline and clemency for relieving the suffering is the priority.^[26] This bolsters credence of PM amongst other professionals and laymen. The physicians here display this virtue more readily than their brethren because of the daily encounter with continued upheaval of suffering and mortality.^[27]

National Medical Commission, the new 'Avatar' (form) of erstwhile Medical Council of India (MCI), emphasises on undergraduate (UG) and postgraduate (PG) curriculum in PM in India. Courses in PM are already available [Table 2] and are in pipeline in many other centres to meet the growing demand.

Our government is keen to include palliative care in the Ayushman Bharat Program in the form of ‘Total Pain Relief’. World Health Assembly resolution in 2014 called upon WHO and the Member States to improve access to palliative care as a core component of health systems, with an emphasis on primary health care and community/home-based care.^[28] Keeping this in mind the National health mission is training and starting PC units in rural areas across India, making training or a post-graduation in PM a sought-after career.^[29]

Research opportunity

Many retrospective studies and *in vitro* studies published in recent years have hypothesised the association between anaesthetic agents like propofol and sevoflurane on immunomodulation. Tumour necrosis factor-alpha is associated with the lidocaine-induced protection of cancer recurrence.^[30] Propofol has an inhibitory effect on cancer progression through its association with matrix metalloproteases.^[31]

However, most of the evidence on the effect of anaesthesia on cancer recurrence is limited to animal studies. Multiple RCTs (NCT00418457, NCT03034096, NCT02786329, NCT03109990, NCT03172988, NCT02840227) are in progress, being done on lung cancer, breast cancer and colorectal cancer surgeries comparing varying techniques of anaesthesia and disease-free survival and their results are expected in near future. Overall survival as well as recurrence free survival as reported by a retrospective study in hepatocellular cancer patients receiving inhalational anaesthesia versus TIVA is higher for the TIVA group (17.7% vs 12.6%; 15.4% vs 11.7%).^[32] Improved recurrence-free survival has also been reported in the TIVA group vs inhalational anaesthesia group in another retrospective Korean study (Hazard Ratio 0.48).^[33]

A retrospective Danish study on 8694 colorectal cancer patients published in 2020 reported a weak association between cancer recurrence and inhalation anaesthetic exposure (Hazard Ratio = 1.12).^[34] Propofol/remifentanyl based TIVA has been shown to inhibit vascular endothelial growth factor (VEGF-C) release after breast cancer surgery when compared with sevoflurane based inhalational anaesthesia in a recent prospective randomised trial. VEGF-C is known to promote tumour growth and metastasis. The 2-year recurrence free survival rates for breast cancer were 78% and 95% in the sevoflurane and TIVA groups, respectively.^[35] Another multicentric prospective RCT published in Lancet in 2019 found no difference in mortality between

propofol-paravertebral block and morphine sevoflurane groups in 2118 breast cancer patients.^[36]

Prospective studies to find the association of anaesthesia with cancer recurrence is the need of the hour and would be an exciting area of study for budding researchers. Some other topics of research in the field of onco-anaesthesiology include the feasibility of opioid-free anaesthesia, techniques to modulate perioperative inflammatory markers, strategies to reduce the time to RIOT, optimum prehabilitation techniques, and integration of palliative care with oncology treatment. Chronic pain is a common problem in patients with malignancy and opioids are the mainstay of management. Opioids have their side-effects and development of targeted opioid drugs for Mu receptor heterodimers is an opportunity for research in times to come.^[37]

Indian Council of Medical Research and Indian Cancer Research Consortium are providing increased funding opportunities in onco-anaesthesiology and PM. This would be an additional incentive for those with a keen research interest.

FUTURE PERSPECTIVE

As the incidence of cancer is rising so is the number of exclusive cancer hospitals and demand for trained onco-anaesthesiologists. National cancer institute has been developed at Jhajjar (Haryana) as a nodal institution to provide comprehensive cancer care and opportunities for translational research. Several corporate hospitals have dedicated oncology blocks with very lucrative remuneration packages. Seven comprehensive cancer centers are likely to be commissioned by August 2021 in Assam (4), Chandrapur(1), Tirupati(1) and Ranchi(1) by Tata Trust. (communications Professor KS Sharma, Tata Trust Cancer Care). PM too has made inroads in many corporate hospitals and with the increasing incidence of non-communicable diseases in our country, PM maybe the next sought-after speciality.

CONCLUSION

The perioperative care of oncology patients is complex. Tailoring the anaesthesia technique to individual patient is the need of the hour to reduce inflammatory-immune response, facilitate return to intended oncology therapy, enhance perioperative care and improve long-term outcomes in oncology. Hence, the time has come for a separate super-speciality of onco-anaesthesiology.

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Conflicts of interest

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