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## Theme Symposium

# Anaesthesia considerations and implications during oncologic and non-oncologic surgery in cancer patients



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## ABSTRACT

Cancer has been the leading cause of mortality in both developed and developing countries. With the advancement in chemotherapeutic agents, the quality and lifespan of patients with advanced malignancies has improved. These patients often come to hospitals for various types of elective and emergency surgeries. The attending anaesthesiologist faces a daunting task while managing these patients as there can be gross physiological derangements in most of the organ systems. A careful and thorough preoperative assessment, optimisation of physiological milieu, vigilant intraoperative monitoring, anticipation of potential complications and postoperative pain control is essential for reducing perioperative mortality and morbidity in these patients. The toxicity of chemotherapeutic agents and potential drug interactions with selected anaesthetic drugs are of prime concern while anaesthetizing such patients. The build-up of nutrition in these patients is essential during preoperative period and should be continued during postoperative period also.

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## 1. Introduction

Malignancy has become one of the leading causes of death especially in developed world and even in developing countries; its incidence has increased tremendously over the last few decades. In 2008, it was found that about 12.7 million patients were diagnosed of some form of malignancies worldwide out of which about 7.6 million died of the malignancy itself or its associated complications.<sup>1</sup> Malignancy as a group accounts

for about 13% of all deaths per year with the most common sites being lung/bronchus, colorectal, breast and prostate.<sup>2</sup> The most common types of malignancies found in children are leukaemia (34%), brain tumours (23%) and lymphoma (12%).<sup>3</sup> With the advent of newer and advanced chemotherapeutic agents, survival and lifespan of these patients has witnessed a tremendous increase. As a result, large number of these cancer patients during post cancer treatment presents either for surgical intervention for the primary tumour excision or

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emergency intervention for their various ill effects. Due to multitude of effects of malignancy on various systems in the body and effects of chemotherapeutic agents, these patients pose a great challenge to the attending anaesthesiologist.<sup>4</sup>

## 2. Effects of tumour on the body

### 2.1. Local effects of tumours

Tumours of head, neck and pose significant problems in maintenance of airway especially after induction of anaesthesia due to their extrinsic compressive effects or may be due to presence of intrinsic tumour.<sup>5</sup> Preoperatively, radiographic examination of soft tissues of neck and computed tomography of neck is mandatory in these patients for careful preoperative planning for securing an unobstructed airway. Planned awake fiberoptic guided intubation may be required in tumours with extrinsic compression on airway and a preoperative tracheostomy may be required in patients with an anticipated difficult fiberoptic intubation due to presence of large vascular tumour inside the airways. Postoperatively these patients can be at risk of airway compromise due to oedema of larynx and neck structures which may warrant continuing the mechanical ventilation in these patients till the airway oedema subsides.

Superior vena cava syndrome may develop in primary lung malignancy due to obstruction of venous return from the head and neck by the tumours. It may be an acute or subacute process and results in facial oedema, plethora, dilatation of veins of chest wall and neck, headache, conjunctival oedema, respiratory difficulty, visual disturbances and altered level of consciousness. Diagnosis is usually clinical or by non-invasive venous studies. Therapy includes administration of thrombolytic agents and/or emergent radiotherapy in patients with airway compromise.<sup>6</sup>

Pericardial effusion and cardiac tamponade are rare due to the primary tumours of pericardium but are usually due to metastasis to the pericardium. Acute accumulation of as little as 100 ml of fluid in pericardial cavity can lead to tamponade and cardiovascular collapse while chronic accumulation of large volumes of fluid can be accommodated inside the pericardial cavity due to the stretching of the pericardium. Echocardiography is the investigation of choice and can detect as little as 15 ml of pericardial fluid.<sup>7</sup> Treatment depends on the degree of haemodynamic compromise and can involve pericardiocentesis or pericardiectomy depending on the aetiology of diffusion and its likely recurrence.

### 2.2. Systemic effects of tumour

- Pain is a common symptom in patients with malignant tumours with an incidence of 25% in newly diagnosed malignancies and upto 75% in advanced disease.<sup>8</sup> It may be due to involvement of somatic nerves by tumour itself or by the systemic metastasis. These patients can present for various procedures for relief of chronic pain like nerve blocks, ganglion blocks etc.

- Majority of patients with advanced malignancy present with cachexia which is characterised by significant weight loss, anorexia, weakness, poor performance and impaired immune function.<sup>9</sup> These cachectic patients pose significant challenges to the attending anaesthesiologist due to their disturbed homeostasis
- Renal failure can develop in cancer patients by both pre-renal as well as intrinsic renal mechanisms. However, pre-existing renal and renal endocrine disorders can be more challenging in such patients.<sup>10</sup> Pre-renal causes include dehydration due to cachexia or poor oral intake and intrinsic renal causes includes sepsis syndrome or use of nephrotoxic chemotherapeutic agents. Post-renal failure also is likely in obstruction of renal outflow tract by pelvic tumours, prostate or cervical malignancies.<sup>11</sup>
- Infection is a common and unfavourable effect of malignancy which is mainly contributed by depressed immunologic function due to neutropenia. It may occur due to malignancy interfering with bone marrow functions or may be due to drug induced myelosuppression. These nosocomial infections increase hospital stay and the cost to patient.<sup>12</sup>
- A characteristic constellation of systemic symptoms termed as 'paraneoplastic syndrome' can occur due to secretion of various hormones from the primary tumour into the circulation which causes various metabolic abnormalities like myasthenic syndrome in thymoma, syndrome of inadequate secretion of antidiuretic hormone (SIADH) seen in small cell carcinoma bronchus and so on.<sup>13</sup>
- Electrolyte abnormalities usually develop in malignancy, the commonest being hypercalcaemia which develops in about 10% of all malignancies and is due to bony metastasis causing bone resorption. Other abnormality seen is hyponatremia which may develop due to SIADH or due to impaired ability to produce dilute urine.
- Tumour lysis syndrome is a constellation of symptoms that is associated with cytotoxic therapy of malignancy resulting in various metabolic derangements like hyperuricemia, hypocalcemia, hyperkalemia, hyperphosphatemia and uraemia leading to acute renal failure. It is associated with leukaemia, small cell carcinoma lung, testicular and breast cancer.<sup>14</sup>

### 2.3. Haematological effects

The haematologic effects of malignancy are due to a primary malignancy of bone marrow (leukaemia), metastasis or myelosuppression due to chemotherapeutic agents. The major haematologic effects seen are:

- Anaemia is a common finding and suggests chronicity of the disease with significantly low erythropoietin levels due to direct suppression of erythropoietin secreting cells by the malignancy or due to suppressive effects of radiotherapy and chemotherapy.<sup>15</sup>
- Leukopenia is most often associated with the chemotherapeutic treatment of solid tumours and is directly related to the incidence of systemic infections.<sup>16</sup>

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