Original Article

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Perioperative Factors Influencing Outcome in Palliative Cancer Surgery at a Tertiary Cancer Care Institute in Northeast India- A Retrospective Study

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ABSTRACT

Introduction: Surgical palliation of malignancy is defined best as a procedure used with the primary intention of improving Quality of Life (QoL) or relieving symptoms caused by an advanced malignancy. Surgical procedures for palliation include resections, reconstruction, functional repairs, drainage, and biopsy. Primary benefits include QoL improvement through symptom prevention or control, with survival advantage as a secondary benefit.

Aim: To evaluate mortality (30 days and six months), length of hospital stay and Intensive Care Unit (ICU) stay and QoL among patients undergoing palliative surgery for advanced cancer.

Materials and Methods: A retrospective study was conducted at Dr. B. Borooah Cancer Institute, India, from September 2020 to March 2021. The clinicodemographic profile, tumour type and staging, treatment, investigations, surgery, anaesthesia and complications were studied. The outcome was defined by mortality, length of hospital stay and quality of life. Descriptive statistics was used for analysis. A p-value of less than 0.05 was considered significant at 5% level of significance.

Results: A total of 86 patients underwent palliative surgeries, out of which 52 (60.5%) were females and 34 (39.5%) were males with the mean age of 49.6±15.9 years. Among them, 8 (9.3%) died within 30 days of surgery and 11 (12.8%) at six months after surgery. There was a significant association of mortality with pallor, deranged Thyroid Stimulating Hormone (TSH), co-morbidities, chemotherapy, type of surgery and anaesthesia but not with age, sex, type and stage of cancer, American Society of Anaesthesiology (ASA) status and General Condition (GC) of the patient. The mean duration of postoperative hospital stay was 15.8 days and mean ICU stay was 0.8 day for all patients. Patients with pallor had longer duration of hospital and ICU stay. Type of surgery was significantly associated with hospital stay but not with ICU stay. On evaluating the quality of life using Eastern Cooperative Oncology Group (ECOG) score, it was seen that the number of patients with poor ECOG scores (3 to 5) increased significantly from 10 (11.63%) to 13 (15.12%) in the immediate postoperative period.

Conclusion: Patient factors affected the outcome after palliative surgery more than surgical and anaesthetic factors. The high mortality rate of 12.8% warrants detailed prospective studies in the future.

Keywords: Abdominal neoplasms, Death, Operative, Quality of life, Surgical procedures

INTRODUCTION

Cancer treatment is multimodal involving medical, surgical and palliative care. The World Health Organisation (WHO) defines Palliative Care as an approach that improves the QoL of patients and their families facing the problems associated with life-threatening illness, through the prevention and relief of suffering by means of early identification and impeccable assessment and treatment of pain and other problems, physical, psychosocial and spiritual [1]. According to the WHO, around 40 million people need palliative care each year [2].

In an oncology setup, up to 10-15% of patients may present for palliative surgery [3]. Surgical palliation of malignancy is defined best as a procedure used with the primary intention of improving quality of life or relieving symptoms caused by an advanced malignancy. It helps in the evaluation of extent of disease, control of local disease, control of discharge or haemorrhage, control of pain, reconstruction and rehabilitation, and treatment of procedure-related complications [4,5].

Surgical procedures for palliation include resections, reconstruction, functional repairs, drainage, and biopsy. Primary benefits include QoL improvement through symptom prevention or control, with survival advantage as a secondary benefit. The risks of morbidity and treatment-related mortality are usually high owing to the nature of the advanced disease, co-morbid conditions, and poor performance status. Current literature shows morbidity after palliative surgery of 29% and mortality of 11% [6].

Several perioperative factors have an impact on the postoperative outcome after cancer surgery such as age, co-morbidities, stage and types of cancer, treatment received, investigations, perioperative complications and anaesthesia given. But very little is published in the literature about outcome in palliative surgeries. For example- age, co-morbidities, lung metastasis and arterial hypertension predicted morbidity of early outcome after palliative surgery for colorectal carcinoma [7]. A study from a low middle income country found that gastrointestinal cancer patients followed by colorectal cancer underwent major proportion of palliative surgery. Morbidity was high after these surgeries [8].

Hence, this study aimed to find out the outcome after palliative surgery. The primary objectives were to find the mortality within 30 days of surgery and at six months after surgery, length of hospital stay and ICU stay and secondary objective was to assess whether quality of life of the patients improved or not after surgery.

MATERIALS AND METHODS

A retrospective study was conducted at Dr. B. Borooah Cancer Institute, Guwahati, Assam, India between September 2020 and March 2021, after due clearance from Institute Ethical Committee

(ECR/1040/Inst/AS/2018/RR-22). The sample population was cancer patients who underwent palliative surgery. Data were collected from the Electronic Medical Record system and patients' log records from March 2022 and analysis started soon after the data collection.

For the purpose of the study, palliative surgery has been defined as 'surgery performed for relief of cancer-related symptoms in patients with advanced and incurable cancers'. Advanced malignancy was defined as the presence of locally advanced incurable disease or distant metastasis at the time of operation [5].

Inclusion criteria: Patients undergoing surgery for advanced carcinoma of the stomach, pancreas, oesophagus, colorectal and head and neck for treating complications or provide symptomatic relief were included.

Exclusion criteria: The indications for surgery included fungation, intractable pain, obstruction, bleeding or perforation due to tumours and cases with surgical exploration for curative intention, biopsies, those with incomplete data set and re-exploration surgeries were excluded.

Study Procedure

The studied variables include details-

- Clinicodemographic profile of the patients, the primary diagnosis along with staging, co-morbidities, adjuvant treatment received (chemotherapy and/or radiotherapy);
- Preanaesthetic check-up with ASA (American Society of Anaesthesiology) grade, blood parameters, imaging;
- Intraoperative parameters including type and duration of surgery, anaesthesia given; Intravenous Fluid (IVF) and blood transfusion;
- Postoperative factors including extubation status, ICU and duration of hospital stay;
- Perioperative complications such as ICU readmission, inadequate reversal, Intraoperative hypertension and re-exploration;
- Quality of life was assessed by Eastern Cooperative Oncology Group (ECOG) score in the baseline period and in immediate postoperative period (within 30 days of surgery).

Complications were defined as all events that had a decisive influence on the patient's recovery and led to an extended stay in hospital and/or death. Each death of a patient during the inpatient stay was assigned to the mortality rate, regardless of the period passed after palliative surgery. Death was analysed at immediate postoperative period (within 30 days of surgery) and at six months after surgery.

STATISTICAL ANALYSIS

The descriptive data sets are represented using tables and the results are presented with the use of simple statistical tools including mean and range. Descriptive statistics was also used to present frequencies and charts. Chi-square test was used to evaluate association between categorical variables. Independent T-Test was done for continuous variables. Univariate and multivariate analyses of clinical, laboratory and therapeutic variables associated with outcomes were calculated using logistic regression models. For multivariate analysis, only variables with parameter estimates showing a p-value ≤0.10 in the univariate analysis were finally included. Two-sided exact p-value were reported and p-value ≤0.05 was considered statistically significant. Kaplan Meir method was used to evaluate survival. Hazard ratio was estimated using Cox regression. All data was analysed using Statistical Package for the Social Sciences (SPSS) version 21.0.

RESULTS

A total of 86 patients underwent palliative surgeries at the Institute during the study period out of which 52 (60.5%) were females and 34 (39.5%) were males [Table/Fig-1]. The age ranged from 18 to 80 years with a mean age of 49.6±15.9 years. Most of the patients belonged to ASA class I (77.9%) and II (18.6%) with normal investigations and clinical examination. Pallor was observed in seven patients, icterus in two and oedema in one patient. Out of total, 80 (93%) patients did not receive preoperative chemotherapy and radiation, 15 (17.44%) patients had various co-morbidities such as hypertension, diabetes mellitus, asthma, hypothyroidism, atrial fibrillation etc [Table/Fig-1]. Liver function test was deranged in 10 (11.6%) and renal function test in 8 (9.3%) patients. The most common Electrocardiogram (ECG) changes observed were left axis deviation (10.8%) and sinus bradycardia (8.4%) [Table/Fig-2]. Two patients had pleural effusion and one patient had lung field opacity in preoperative Chest X ray (CXR) and the rest of the patients had no abnormalities.

Variables		Total, n (%)	Death, n (%)	p-value
Gender	Male	34 (39.5)	6 (17.6)	0.667
	Female	52 (60.5)	5 (9.6)	
ASA† status	I	67 (77.9)	6 (9)	0.125
	II	16 (18.6)	4 (25)	
	III	3 (3.5)	1 (33.3)	
General condition‡	Fair	39 (45.3)	5 (12.8)	0.693
	Good	15 (17.4)	1 (6.7)	
	Poor	32 (37.2)	5 (15.6)	
General examination	Pallor	7 (8.1)	2 (28.6)	0.192
	Icterus	2 (2.3)	0	0.584
	Oedema	1 (1.2)	0	0.7
Chemotherapy/ Radiotherapy	Chemotherapy	6 (7)	3 (50)	0.005
	Radiation	6 (7)	1 (16.6)	0.768
Co-morbidities	Hypertension	3 (3.4)	0	0.009
	Diabetes	4 (4.6)	1 (25)	
	Asthma	1 (1.2)	0	
	Hypothyroidism	2 (2.3)	1 (50)	
	RHD§	1 (1.2)	0	
	AF‖	1 (1.2)	1 (100)	
	CVA**	2 (2.3)	0	
	Blindness	1 (1.2)	0	

[Table/Fig-1]: Patient demographic and clinical factors and their relation to mortality six months (N=86).
†ASA: American society of anaesthesiologists
‡General condition-state of the patient at the time of examination in pre anaesthetic checkup. Classified as Good-Vital signs are stable and within normal limits. The patient is conscious and comfortable (indicators are excellent). Fair-Vital signs are stable and within normal limits. The patient is conscious but may be uncomfortable (indicators are favorable). Poor-Vital signs are unstable and not within normal limits. Patient is acutely ill. (Indicators are questionable.)
§RHD: Rheumatic heart disease; ‖AF: Atrial fibrillation; **CVA: Cerebrovascular accident

ECG findings	n (%)
Normal ECG	54 (62.8)
Atrial fibrillation	1 (1.2)
Right bundle branch block	5 (6)
Left anterior hemiblock	2 (2.4)
Left axis deviation	8 (9.3)
ST changes	2 (2.4)
Sinus tachycardia	4 (4.8)
Sinus bradycardia	7 (8.4)
Non specific	3 (3.5)

[Table/Fig-2]: ECG findings in preanaesthetic checkup (N=86).
ECG: Electrocardiogram

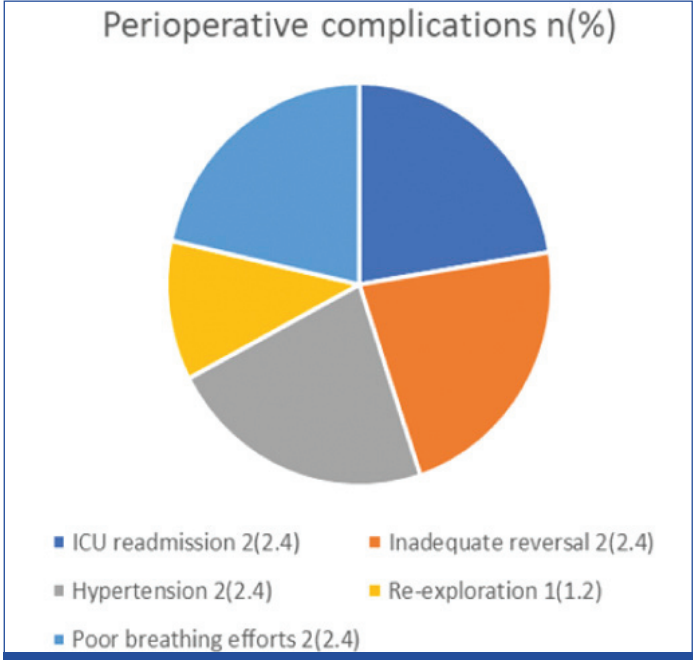
The most common malignancies seen were carcinoma of rectum (29.1%), oesophagus (27.9%) and stomach (25.6%), out of which 52 (60.4%) were in metastatic stage and 34 (39.5%) had locally advanced cancer [Table/Fig-3].

Variables		N=86 n (%)	Mortality, n (%)	p-value
Diagnosis	Ca anal canal	2 (2.3)	0	0.574
	Ca colon	5 (5.8)	0	
	Ca duodenum	1 (1.2)	0	
	Ca oesophagus	24 (27.9)	4 (16.7)	
	Ca pancreas	3 (3.5)	1 (33.3)	
	Ca rectum	25 (29.1)	1 (4)	
	Ca stomach	22 (25.6)	4 (18.2)	
	Ca supraglottis	4 (4.8)	1 (25)	
Stage of cancer	Locally advanced	34 (39.5)	5 (14.7)	0.7061
	Metastatic	52 (60.4)	6 (11.5)	
Type of surgery	Feeding jejunostomy	33 (38.4)	6 (18.2)	0.0617
	Gastrojejunostomy	20 (23.3)	3 (15)	
	Palliative gastrectomy	1 (1.2)	1 (100)	
	Diversion colostomy	27 (31.4)	1 (3.7)	
	Diversion ileostomy	5 (5.9)	0	
Postoperative factor	Extubation at the end of surgery	84 (97.7)	11 (13.1)	0.584
Anaesthesia	GA†	77 (89.5)	6 (7.8%)	0.0512
	Epidural anaesthesia	2 (2.4)	0	
	GA+epidural	1 (1.2)	0	
	GA+rectus sheath block	2 (2.4)	0	
	Subarachnoid block	3 (3.6)	1 (33.3)	
	Sedation	1 (1.2)	1 (100)	

[Table/Fig-3]: Surgical and anaesthetic factors and their relation to mortality at 6 months.
Ca: Carcinoma; †GA: General anaesthesia

The most common palliative surgeries performed were feeding jejunostomy (38.4%), diversion colostomy (29.1%) and gastrojejunostomy (20.9%). Intraoperatively, GA was most frequently administered [Table/Fig-3]. Five patients received neuraxial anaesthesia and sedation was used only in one patient with poor General Condition (GC). Eight patients (9.3%) received blood transfusion intraoperatively.

Complications were noted in seven patients. Intraoperative hypertension was observed in two patients which was managed by intravenous antihypertensive agents like nitroglycerine and labetalol. Immediate postoperative complications included re-exploration due to bleeding from anastomotic site in one patient and breathing difficulties in another two, both of whom were admitted in the ICU [Table/Fig-4].



[Table/Fig-4]: Perioperative complications.

The immediate mortality (within 30 days of surgery) noted was 9.3% (8 deaths) and the six month mortality was 12.8% (11 deaths) [Table/Fig-5].

Period	Patients alive, n (%)	Patients dead, n (%)
Immediate (within 30 days of surgery)	78 (90.7)	8 (9.3)
Six months after surgery	75 (87.2)	11 (12.8)

[Table/Fig-5]: Mortality table.

Patients with different co-morbidities had higher mortality than those without which was statistically significant (p-value=0.009) [Table/Fig-1]. There was a significant association between those who did not receive chemotherapy and mortality (p-value=0.005) [Table/Fig-1]. A similar association with radiation was not seen. Patients with pallor had higher risk of death than those without (p-value=0.192) [Table/Fig-1]. Mean TSH value (p-value=0.021) and the volume of intravenous fluid (in mL) administered (p-value=0.045) was statistically significant [Table/Fig-6]. There was no significant association between age (p-value=0.574), sex (p-value=0.667), type of cancer (p-value=0.574) and stage of cancer (p-value=0.308) with the mortality [Table/Fig-1,3,6].

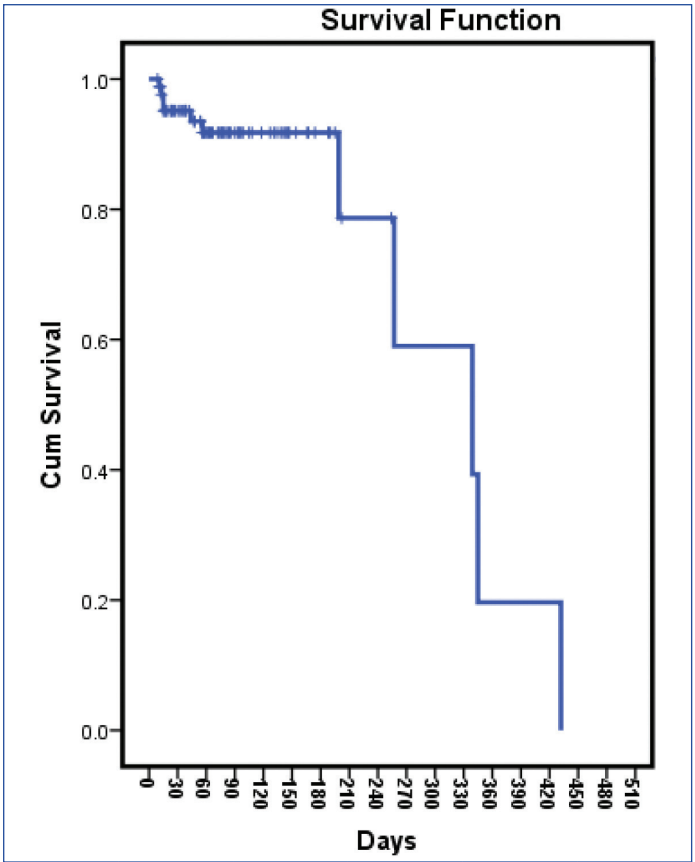
Variables	Alive (n=75) Mean±SD	Dead (n=11) Mean±SD	p-value
Age (years)	49.19±16.16	52.09±14.05	0.574
Duration of surgery (min)	79.47±45.33	72.73±46.12	0.647
Heart rate (/min)	94.55±19.58	98.64±13.37	0.506
Haemoglobin (g/dL)	10.67±2.39	11.54±2.57	0.268
Total counts	8187.85±3447.48	8672.73±4260.22	0.674
Platelets (McL)	260.17±127.15	309.91±159.97	0.245
RBS* (mg/dL)	114.15±32.96	123.18±26.88	0.389
TSH† (mIU/mL)	2.42±3.39	10.56±29.67	0.021
Albumin (g/dL)	3.41±0.64	3.26±0.96	0.480
Sodium (mEq/L)	137.47±5.98	135.82±4.94	0.387
Potassium (mEq/L)	3.90±0.73	3.68±0.50	0.340
INR‡	1.09±0.46	1.24±0.56	0.344
Intravenous fluid (mL)	966.00±387.23	1227.27±464.95	0.045
Blood loss (mL)	132.67±91.72	130.00±151.06	0.935

[Table/Fig-6]: Perioperative factors affecting mortality (30 days).
*RBS: Random blood sugar; †TSH: Thyroid stimulating hormone; ‡INR: International normalised ratio

There was a significant association between the type of palliative surgery performed and the mortality (p-value=0.0617) [Table/Fig-3]. Patients who received GA had a mortality of 7.8% [Table/Fig-3]. Highest mortality was observed in ASA III patients (33%) which was not statistically significant (p-value=0.125). Similarly, highest mortality was observed in patients with poor GC (15.6%) but it was again not statistically significant (p-value=0.693) [Table/Fig-1]. On analysing the overall survival function one month survival was found in 98.8%, six months survival in 95.1% and 12 month survival in 19.7% patients [Table/Fig-7].

Mean hospital stay was 15.8±9.4 days with a minimum and maximum stay of 3 days and 60 days respectively [Table/Fig-8]. The longest hospital stay was observed in palliative gastrectomy cases (mean 33 days) followed by gastrojejunostomy (25 days), diversion colostomy (10.48 days), feeding jejunostomy (15.52 days), diversion ileostomy (19.6 days) and diversion colostomy (10.48 days) [Table/Fig-9]. Type of surgery was significantly associated with length of hospital stay (p-value=0.003) [Table/Fig-9].

Mean ICU stay was 0.8±1.8 days with minimum and maximum stay of 0 and 14 days respectively [Table/Fig-8]. Palliative gastrectomy cases stayed for average five days in ICU. A maximum 14 day ICU stay and 60 day hospital stay was observed in one gastrojejunostomy patient who had postoperative bleeding and



	1 month	3 month	6 month	9 month	12 month
OS [n (%)]	85 (98.8)	82 (95.1)	82 (95.1)	51 (59)	17 (19.7)

[Table/Fig-7]: Overall survival (N=86).
OS: Overall survival

Days of stay	Mean±SD	Median (days)	Minimum (days)	Maximum (days)
Postoperative	15.8±9.4	13	3	60
ICU	0.8±1.8	0	0.0	14

[Table/Fig-8]: Duration of postoperative stay and ICU stay.
ICU: Intensive care unit

Variables	Postoperative stay (days)				ICU stay (days)			
Type of surgery	Mean±SD	Min	Max	p-value	Mean±SD	Min	Max	p-value
Feeding jejunostomy	15.52±8.77	3	43	0.003	0.79±1.2	0	6	0.260
Gastro jejunostomy	25±11.3	17	33		1.47±3.5	0	14	
Palliative gastrectomy	33	33	33		5	5	5	
Diversion colostomy	10.48±5.6	4	22		0.44±0.71	0	2	
Diversion ileostomy	19.6±10.2	9	34		0.20±0.45	0	1	
ASA status								
I	15.34±10.016	3	60	0.731	0.61±1.792	0	14	0.022
II	17.44±7.248	5	33		1.19±1.276	0	5	
III	16±6.92	12	24		3.33±2.517	1	6	

[Table/Fig-9]: Duration of hospital and ICU stay with type of surgery and ASA grading.

pulmonary complications needing ventilator support [Table/Fig-9]. However, there was no statistical significance of type of surgery with ICU stay (p-value=0.260).

ASA I patients stayed in hospital for a mean of 15.3 days, ASA II patients for 17.4 days and ASA III patients for 16 days. This was not statistically significant. However, there was a positive correlation between ASA status and duration of ICU stay (p-value=0.022) [Table/Fig-9].

There was no statistical significance between preoperative chemotherapy and radiation and presence of co-morbidities with duration of hospital and ICU stay. However patients with pallor had significantly longer duration of hospital and ICU stay (p-value <0.001) [Table/Fig-10]. Overall, the duration of hospital (p-value=0.742) and ICU (p-value=0.279) stay was not positively associated with the mortality [Table/Fig-11].

Variables	Postop stay (days) Mean±SD	p-value	ICU stay (days) Mean±SD	p-value
Pallor	27.43±19.15	<0.001	3.29±5.02	<0.001
Chemotherapy	17.33±14.09	0.674	0.5±0.55	0.659
Radiation	11.83±7.7	0.294	0.17±0.41	0.362
Co-morbidities	16.38±5.62	0.773	1.38±1.455	0.166

[Table/Fig-10]: Duration of hospital and ICU stay with preoperative variables.

Duration	Alive (n=75), Mean±SD	Dead (n=11), Mean±SD	p-value
Postop stay (days)	15.63±9.13	16.64±11.75	0.742
ICU stay (days)	0.73±1.74	1.36±2.16	0.279

[Table/Fig-11]: Duration of hospital and ICU stay with mortality.

On evaluating QoL preoperative baseline ECOG and immediate postoperative (within 30 days of surgery) ECOG were analysed. Among them, 76 (86.04%) patients had good baseline ECOG scores (0, 1 and 2) and 10 (11.63%) patients had poorer ECOG scores of 3 and 4 [Table/Fig-12]. Whereas in the immediate postoperative period, 73 (84.88%) patients had ECOG scores of 0 to 2 and 13 (15.12%) patients had poorer ECOG scores of 3 to 5. These findings were statistically significant (p-value=0.0449). However, the ECOG was not calculated at six months due to presence of confounding factors after such a long period.

ECOG scores	Preoperative n (%)	Postoperative n (%)	p-value
0	17 (19.8)	15 (17.4)	0.0449
1	32 (37.2)	38 (44.2)	
2	27 (31.4)	20 (23.3)	
3	8 (9.3)	4 (4.7)	
4	2 (2.3)	1 (1.2)	
5	0 (0)	8 (9.3)	

[Table/Fig-12]: ECOG status (N=86).

DISCUSSION

Cancer surgeries of the palliative kind are performed worldwide very commonly but are often understudied in literature. Cancer by itself lowers the immunity of the individual and the side effects of treatment adds on to the insult on the patient. Palliative surgery offers a feasible option for reducing disease specific symptoms and improving QoL in advanced cancer.

In a recent similar study done in India, about 60% of palliative surgical procedures were performed because of gastrointestinal cancer mostly due to gastroesophageal and colorectal cancer, and the most common indication for palliative surgery was gastrointestinal obstruction (43%) followed by wound infections and local complications (10%) [6].

In this centre, the most common palliative surgeries performed were feeding jejunostomy, diversion colostomy and gastrojejunostomy because of cancer of rectum, esophagus and stomach [Table/Fig-3]. Type of cancer did not have any significant impact on overall survival or death of the patient. However, type of surgery was significantly associated with mortality. The duration of surgery did not affect the outcome of the patients among those who died or survived (p-value=0.647) [Table/Fig-6].

In a study by Konopke R et al., patients having emergent surgery after chemotherapy have more co-morbidities and severe disease,

which are associated with higher complication rates and mortality [7]. In the present study also, there was a significant difference in mortality rate among those who received chemotherapy but not among those who received radiation [Table/Fig-1].

In a study by Krouse RS et al., the immediate 30-day mortality was 12.2% and the overall mortality was as high as 23.3% [3]. Whereas Miner TJ et al., got a 30-day postoperative mortality of 3.9% with the median survival of 212 days [9]. The immediate 30-day mortality was 9.3% in this study. This relatively low mortality rate could be because of lesser number of cases studied compared to others. In a recent study done in 2021 by Wong JSM et al., the 30-day morbidity and mortality was found to be 43% and 21% respectively [10].

In a study by Nakajima H et al., 21.3% of patients died of cancers within 6 months after palliative surgery [11]. Compared to this, 12.8% patients died within 6 months of surgery in this study [Table/Fig-5].

Perioperative factors play an important role in the outcome after surgery. Patients' age, co-morbidity and duration of surgery have been shown to affect the perioperative outcome in patients with advanced carcinoma of ovary undergoing Hyperthermic Intraperitoneal Chemotherapy (HIPEC) [12]. Similarly, preoperative albumin, age, and emergency nature of surgery were significant independent predictors for 30-day morbidity and preoperative ECOG status and albumin were found to be better predictors for 30-day mortality [10]. Patient-related factors (older age, higher ASA score, presence of anaemia, and lower serum albumin) and procedure-related factors (performance of combined surgical procedure) increased postoperative complications and 1 year mortality in elderly patients undergoing surgery for colorectal cancer [13]. Age ≥70 years, lower BMI, and hypoalbuminemia were found to be mortality predictors for distal and total radical gastrectomy [13].

In this study, age (p-value=0.574), gender (p-value=0.667), duration of surgery (p-value=0.647), ASA score (p-value=0.125), preoperative albumin (p-value=0.480), cancer type (p-value=0.574) and stage (p-value=0.308) were not associated with increased mortality. However, type of surgery (p-value=0.0617), presence of co-morbidities (p-value=0.009) and receiving of chemotherapy (p-value=0.005) were statistically significant [Table/Fig-1,3,6].

In this study, there was a wide variation in the age group. In elderly patients, a high incidence of peri and postoperative complications is generally expected due to a limitation of the physiological reserve, and added co-morbidities. Three patients above 70 years did not survive in our study within 6 months of surgery. But this was not statistically significant (p-value=0.574).

Although there was a high mortality in ASA III patients with poor GC and locally advanced disease, overall these factors were not significantly associated with mortality outcome. Among the preoperative investigations, the value of TSH (p-value=0.021), Hb (p-value=0.268) and platelet count (p-value=0.245) had a significant impact on perioperative outcome. The mean TSH and IVF administered among the alive and dead were found to be statistically significant (p-value=0.021 and 0.045) [Table/Fig-6].

Interestingly, in a retrospective chart review, independent risk factors for morbidity and in-hospital mortality were found to be similar in cancer patients and in curative care [7]. So, the final selection of patients before palliative surgery could predict outcome better.

Patients undergo palliative surgery under general, regional or local anaesthesia with sedation. In this study, general anaesthesia was most frequently administered. Recently, there is a growing concern of the potential for anaesthetic technique to influence long-term outcome in cancer patients by modulating the neuroendocrine stress response and *via* interactions with the immune system. In addition, the potential for anaesthetics to directly interfere with cancer cell biology is also increasingly recognised. Anaesthesia may also interact with chemotherapeutic agents like adriamycin, bleomycin, transtuzumab [14]. TNM stage, lymphovascular invasion, isoflurane, and KM grade, and use of isoflurane were independent risk factors affecting colorectal cancer prognosis in one retrospective study conducted on colorectal cancer patients undergoing elective laparoscopic resection. Sevoflurane and high-grade inflammation were associated with improved survival [15]. In this study, 7.8% of patients who received GA died. There was a significant association between type of anaesthesia and immediate mortality [Table/Fig-3].

In this study, patients stayed in hospital for average 15.8 days and in ICU for 0.8 day. Type of surgery was significantly associated with length of hospital stay. However, there was no statistical significance of type of surgery with ICU stay. The longest ICU (14 days) and hospital (60 days) stay was observed in one gastrojejunostomy patient with postoperative bleeding and lung complications. ASA status was significantly associated with ICU stay. There was no statistical significance between preoperative chemotherapy and radiation and presence of co-morbidities with duration of hospital and ICU stay. However, patients with pallor had significantly longer duration of hospital and ICU stay.

The intent of palliative care is to select the best treatment that maximises quality of life while minimising risks and harm. The goal of palliative surgery must be maintenance of function as long as possible or the relief of distressing symptoms. Positive outcomes include relief of symptoms, improved QOL, possible increase in survival, and the ultimate goal of a peaceful death [3].

In this study, the quality of life was assessed by ECOG score before and after surgery and found that the number of patients with poorer ECOG scores increased significantly in the post operative period [Table/Fig-13]. In another study, ECOG performance status and post-drainage treatment were independent predictors of overall survival in multivariate analysis after biliary drainage by endoscopic retrograde cholangiopancreatography for analysis of metastatic cancer [16].

Limitation(s)

Firstly, this study was limited to those factors which were found to have a positive influence on the final patient outcome in similar other studies. Secondly, QoL could not be assessed properly as ECOG was chosen for the measurement which is based on patients' ability to do particular tasks. This could in turn be measured only at baseline and at immediate postoperative period. After six months the quality of life would be dependent on several other factors and deterioration or improvement may not be due to the surgery per se. A better approach would have been to add some questionnaire to the study for proper follow-up of QoL. Lastly, a broader approach to the study could have been taken by involving researchers from different specialities related to the overall care of the cancer patient. Limiting the study to those factors associated with anaesthesia may have led to an investigator bias.

CONCLUSION(S)

This study shows that patient factors and perioperative factors can influence the outcome after palliative surgery. With a significant mortality rate of 12.8% and a lengthy hospital stay of 15.8 days there is a growing need for routine multidisciplinary meeting to discuss the role of palliation preoperatively and a ERAS (Enhanced Recovery After Surgery) protocol for proper perioperative optimisation of the palliative cancer patient.

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