

Abstract

Objectives: Palliative surgery aims to relieve patients' symptoms and improve quality of life with surgical interventions. While multidisciplinary approach has been found beneficial for critically ill patients, limited evidence supports this approach in palliative surgery. Here we sought to study whether palliative care consultations can improve outcomes among patients undergoing palliative surgery.

Methods: Consecutive patients undergoing palliative care at gastro-surgical wards in a tertiary Finnish university hospital during a two-year study period were included. Outcomes of those undergoing surgery with or without palliative care consultation were compared. The main outcome measures were patients' functional status, postoperative morbidity, and mortality.

Results: A total of 312 patients were included, of whom 173 underwent surgery, 77 endoscopic care and 62 were treated conservatively. Of the operated patients, 24 underwent multidisciplinary assessment while among the rest the treatment decision was based on the surgeons' assessment. Multidisciplinary assessment was associated with a clinically significantly reduced morbidity (8.3% vs. 23%, $p=0.111$), in-hospital mortality (8.3% vs. 17%, $p=0.051$) and rate of hospital readmissions (8.3% vs. 21%, $p=0.052$). There was no difference in median survival 49 (2–440) vs. 45 (1–971) days ($p=0.949$). Of those undergoing conservative care, 44% could have undergone surgery.

Conclusions: The aim of the palliative surgery is to relieve symptoms among patients with no hope of being cured. While the involvement of the palliative care consultation into the surgical decision-making is likely to reduce unnecessary operations, it is likely to be even more important in improving quality of end-of-life care.

Key messages:

1. What is already known: Palliative surgery has been associated with high mortality and morbidity. Multidisciplinary approach helps with treatment of terminally ill patients.
2. What this study adds: Impact of the palliative care consultation in the preoperative assessment of the palliative gastrosurgical patient.
3. How this study might affect research, practice or policy: Strengthens the cooperation of surgeons and palliative physicians in the treatment of this gastrosurgical palliative patients.

Introduction

Palliative surgery aims to relieve patients' symptoms and improve quality of life with surgical interventions. Earlier studies have reported high mortality and morbidity associated with palliative surgery [1-4]. While Palliative surgery has been shown associated with high mortality and morbidity. Multidisciplinary approach has benefits with treatment of terminally ill patients. palliative surgery is aiming to improve quality of end-of-life with surgical interventions, palliative care as a whole is an approach that improves the quality of life of patients and their families, through the prevention and relief of suffering, both physical and psychosocial and communication about the goals of care, which reflects also to the bereavement of the closest ones [5-7].

The benefits of multidisciplinary approach for terminally ill patients have been reported earlier [8]. If integrated timely, multidisciplinary palliative care approach may guide clinical decision-making in alignment with patients' preferences [6]. However, evidence supporting this approach in palliative surgery remains limited.

Consequently, the purpose of this study was to clarify the effect of a palliative care consultation on the outcomes of palliative surgery in gastro-surgical wards. The hypothesis is that under the influence of the palliative care consultation the best possible treatment approach is selected for these patients more appropriately, which may in turn decrease short-term mortality and the rate of postoperative complications.

Materials and methods

In this retrospective study, each consecutive patient undergoing palliative care in gastro-surgical wards in Tampere University Hospital, Finland between 1 January 2015 and 31 December 2016 and between 1 January 2018 and 31 December 2019 were included. We sought to investigate whether multidisciplinary approach improved quality of palliative care among patients undergoing palliative surgery. Palliative care consultations were implemented into the standard practice in our gastro-surgical wards at the beginning of 2017. The palliative care consultation team consisted of consultants of palliative medicine and palliative care nurses. Teams were available only during office hours. Patients with no palliative indication were excluded. Patients

were also excluded if the treatment aimed to be curative and the palliative treatment decision was made later.

The outcomes of those undergoing surgery with or without palliative care consultation were compared. To reduce patient-selection bias, the control group consisted of consecutive patients undergoing palliative surgery without multidisciplinary assessment 1) after initiation of multidisciplinary teams (for example, if treatment decision was made by the surgeon outside office hours) and 2) those undergoing surgery before implementation of palliative care consultations. The outcomes of these two control populations were reported separately. Additionally, the outcomes of those undergoing endoscopic and conservative palliative care were reported as well.

Patient data was collected from the hospital electronic medical records and hospital surgical database. Patient characteristics were recorded, and they included for example age, sex, comorbidities, type of malignancy, preoperative functional ability, and indication for the surgery. The main outcomes were postoperative morbidity and in-hospital mortality. Postoperative complications were defined and classified according to Clavien-Dindo classification of surgical complications [9]. The secondary outcome measures were the rate of reoperations, the length of hospital stay, postoperative functional ability and long-term mortality.

Statistical analyses were performed using SPSS Statistics version 22 for Windows (IBM Corp, Armonk, NY, USA). The summary measurements were expressed as means with standard deviations or as medians with minimum and maximum values unless stated otherwise. Continuous variables were analysed using Student's t-test or Mann-Whitney U-test, the latter for non-normally distributed data. Chi-square or Fisher's exact test was used for categorical variables. Two-tailed p-values were reported and a p-value < 0.05 was deemed statistically significant.

The study was conducted according to the requirements of the Helsinki Declaration. In compliance with the principles of the local ethics committee, exemption from consent was obtained as the data had already been collected for clinical purposes.

Results

The patient flowchart is shown in Figure 1. A total of 312 palliative patients were included, of which 173 (55%) underwent surgery, 77 (25%) endoscopy and 62 (20%) conservative care. Of the operated patients, 24 (14%) received palliative care consultation. The control group consisted of 149 patients (48%), of which 62% were operated before and 38% after implementation of palliative care consultations practice into gastro-surgical wards. The patient demographics are presented in Table 1. Patients undergoing conservative or endoscopic care had more often significant comorbidities than those undergoing surgery (86%, 78% and 63%, $p < 0.001$, respectively).

The operation-related characteristics are shown in Table 2. The most common indication of surgery was bowel obstruction and the most common indication for endoscopic or conservative care was biliary obstruction. Ninety-three percent of operations were urgent/emergency operations and the seven percent elective. When comparing the two time periods included in the study, the number of exploratory surgeries decreased from 36% to 18%.

The postoperative outcomes of the patients are shown in Table 3. There was a trend towards lower operation-related morbidity (8.3% vs. 23%, $p = 0.111$), in-hospital mortality (8.3% vs. 25%, $p = 0.051$) and rate of hospital readmissions (8.3% vs. 13%, $p = 0.052$) among those receiving palliative care consultation. However, there was no significant difference in median survival 49 (2–440) vs. 45 (1–971) days ($p = 0.949$), as shown in Figure 2. Compared to surgery, the 90-day and 1-year mortality rates were 54% and 91% among patients undergoing endoscopic care and 83% and 98% among patients undergoing conservative care. None of the operated patients assessed by palliative care consultation team were totally dependent of help in daily activities before surgery, compared to three (2.0%) of the control patients. The respective share was 24% and 36% after surgery ($p = 0.264$).

Of those undergoing conservative palliative care, 44% (21/48) could have been treated with surgery based on patient records. The palliative care consultation team was involved in the decision-making to abstain from

surgery in eight cases (17%), while the surgeon made the decision in the remaining 13 cases (27%). Almost every time the decision to abstain from surgery was based on the poor general condition of the patient.

Discussion

The core principle of palliative surgery is to reduce suffering through surgery. While evidence supports palliative care in terminally ill patients [8, 10, 11], there is limited evidence supporting a multidisciplinary approach in palliative surgery. In this study, we compared the outcomes of patients undergoing palliative surgery with or without palliative care consultation. While we report a lower risk of adverse events during hospital stay among those receiving multidisciplinary assessment, the long-term outcomes were similar in both groups.

There are limited results on the outcomes of palliative surgery, probably because the outcomes are poor regardless of which approach is chosen. Recently, we reported 37% morbidity and 41% mortality associated with emergency palliative surgery [4]. Furthermore, functional outcomes after surgery were poor as well [4]. In this study, we sought to study whether these traditional surgery-associated outcomes would improve if palliative patients underwent multidisciplinary assessment. Earlier studies have found team-based models beneficial for end-of-life patients, and it has been proposed that multidisciplinary teams should focus on high-risk patients [8]. Surgical mortality reflects both the intrinsic risks of the operation and the underlying morbidity of patient. The main goal for palliative surgery, as already stated, is to improve the quality of end-of-life. We consider that reduction in short-term mortality in our study reflects the patient selection. The surgery itself produces suffering for the patient, and operating a palliative patient always requires very careful consideration. After the implementation of multidisciplinary approach, conservative approach instead of surgery was found to be eligible for a higher number of patients.

As stated in earlier studies, palliative care aims not only to improve these traditional surgical quality outcomes, but it has benefits on symptomatic and psychosocial support, communication about goals and risks of care, and the experiences of the patients and their closest ones at the end of patient's life [5, 6]. The surgeon is the best professional to assess the patient's operability together with the anaesthesiologist, but

the involvement of a palliative care consultation team improves the quality of whole perioperative care and may highlight the patient's preferences about the goals of care. Finally, the authors would like to also emphasize importance of educational factors, as there is significant educational value of multidisciplinary approach for both surgeons and palliative care consultation team members as well.

There are some limitations. This was a retrospective single centre study. There was some certain patient selection bias between groups, which cannot be avoided with this study setup. Although the study was retrospective, the follow up data was comprehensive. Palliative care consultations were available only during office hours. Consequently, palliative care consultation teams assessed some patients prior to the surgery. This might explain the slightly worse outcome among those undergoing surgery without palliative care consultation. It is likely, however, that many of these patients required immediate surgery (e.g., because of bowel perforation) and could not wait for a multidisciplinary assessment until office hours. Patients requiring urgent but not immediate surgery are usually able to wait until being assessed by palliative care consultation team.

Conclusions

According to our study, the involvement of the palliative care consultation team into surgical decision-making improves the short-term outcomes such as in-hospital mortality and morbidity. We also emphasize that the routine use of multidisciplinary approach is likely to improve the quality of end-of-life among this fragile group of patients.

Table 1. Demographic data

Variable	Surgery (n=173) with multidisciplinary assessment			Endoscopy	Conservative
	No Before PTs ¹	No After PTs ²	Yes		
Number of patients, n (%)	93 (30)	56 (18)	24 (7.7)	77 (25)	62 (20)
Age, median (min-max)	69 (28-92)	72 (33-92)	67 (41-98)	71 (38-97)	79 (48-91)
Female, n (%)	47 (51)	20 (36)	11 (46)	34 (44)	35 (57)
BMI, median (min-max) ³	24 (13-41)	24 (14-39)	24 (17-35)	24 (16-42)	27 (17-65)
Smoking, n (%)	16 (17)	9 (16)	3 (13)	12 (16)	9 (15)
Comorbidities, n (%)	70 (75)	38 (68)	12 (50)	60 (78)	53 (86)
Diabetes	24 (26)	11 (20)	4 (17)	21 (27)	22 (36)
Hypertension	49 (53)	22 (39)	6 (25)	38 (49)	29 (47)
Atrial fibrillation	10 (11)	5 (8.9)	2 (8.3)	14 (18)	18 (29)
COPD ⁴	7 (7.5)	2 (3.6)	1 (4.2)	4 (5.2)	4 (6.5)
Alzheimer	4 (4.3)	2 (3.6)	1 (4.2)	6 (7.8)	11 (18)
Coronary artery disease	11 (12)	8 (14)	1 (4.2)	9 (12)	16 (26)
Heart failure	7 (7.5)	2 (3.6)	2 (8.3)	6 (7.8)	10 (16)
Malignancy, n (%)	89 (96)	46 (82)	22 (92)	74 (96)	51 (82)
Colorectal	34 (37)	16 (29)	9 (38)	7 (9.1)	14 (23)
Pancreaticobiliary	13 (14)	6 (11)	3 (13)	33 (43)	20 (32)
Gastric	12 (13)	7 (13)	4 (17)	8 (10)	2 (3.2)
Oesophagus	2 (2.2)	1 (1.8)	1 (4.2)	12 (16)	0 (0.0)
Gynaecological	25 (27)	14 (25)	5 (21)	13 (17)	11 (18)
Other malignancy	3 (3.2)	2 (3.6)	0 (0.0)	1 (1.3)	4 (6.5)
Preoperative findings					
Advanced cancer, n (%)	82 (88)	42 (75)	21 (88)	63 (82)	48 (68)
Peritoneal carcinosis, n (%)	0 (0.0)	22 (39)	10 (42)	4 (5.2)	11 (18)
Ascites, n (%)	40 (43)	13 (23)	6 (25)	3 (3.9)	4 (6.5)
Preoperative functional ability, n (%)					
Independent in daily activities	60 (65)	39 (70)	17 (71)	62 (81)	36 (58)
Partially dependent in daily activities	31 (33)	16 (29)	7 (29)	14 (18)	23 (37)
Totally dependent in daily activities	2 (2.2)	1 (1.8)	0 (0.0)	1 (1.3)	3 (4.8)

¹ Patients undergoing surgery without palliative care consultation (before implementation of palliative care consultation teams)

² Patients undergoing surgery without palliative care consultation after implementation of palliative care consultation teams (e.g. outside office hours)

³ BMI, Body mass index

⁴ COPD, chronic obstructive pulmonary disease

Table 2. Surgery-related characteristics

Variable	Surgery (n=173) with multidisciplinary assessment		
	No Before PTs ¹	No After PTs ²	Yes
Number of patients	93 (30)	56 (18)	24 (7.7)
Indication, n (%)			
Intestinal occlusion	48 (52)	36 (64)	22 (92)
Intestinal perforation	6 (6.5)	14 (25)	0 (0.0)
Other	39 (42)	6 (11)	2 (9.1)
Operation, n (%)			
Exploratory surgery	33 (36)	11 (20)	3 (13)
Colostomy or ileostomy	21 (23)	21 (38)	7 (30)
Adhesiolysis	1 (1.1)	4 (7.1)	1 (4.3)
Bowel resection	9 (9.7)	13 (23)	7 (30)
Gastrojejunostoma	17 (18)	2 (3.6)	3 (13)
Percutaneous gastrostomy	3 (3.2)	0 (0.0)	0 (0.0)
Other	9 (9.7)	5 (8.9)	2 (8.7)
ASA physiological status, n (%)			
I-II	11 (12)	7 (13)	2 (8.3)
III-V	82 (88)	49 (88)	22 (92)
Planned palliative operation, n (%)	65 (70)	29 (52)	21 (88)
Emergency operation, n (%)	93 (100)	47 (84)	21 (88)

¹ Patients undergoing surgery without palliative care consultation before implementation of palliative care consultation teams

² Patients undergoing surgery without palliative care consultation after implementation of palliative care consultation teams (e.g. outside office hours)

Table 3. Outcome of palliative care among patients treated in gastro-surgical wards (n=312)

Variable	Surgery (n=173) with multidisciplinary assessment			Endoscopy	Conservative
	No Before PTs ¹	No After PTs ²	Yes		
Number of patients	93 (30)	56 (18)	24 (7.7)	77 (25)	62 (20)
Admission to ICU, n (%) ³	3 (3.2)	2 (3.6)	0 (0.0)	0 (0.0)	0 (0.0)
Morbidity CD, n (%) ⁴	21 (23)	13 (23)	2 (8.3)	27 (35)	3 (4.8)
Minor CD I-II	9 (9.7)	0 (0.0)	1 (4.2)	1 (1.3)	0 (0.0)
Major CD III-IV	12 (13)	13 (23)	1 (4.2)	26 (34)	3 (4.8)
Re-operation, n (%)	13 (14)	13 (23)	1 (4.2)	27 (35)	4 (6.5)
In-hospital mortality, n (%)	11 (12)	14 (25)	2 (8.3)	12 (16)	12 (20)
LOS, days, median, (min-max) ⁵	5 (1-22)	7 (2-32)	6 (2-14)	2 (0-34)	3 (0-11)
Readmissions, n (%)	24 (26)	7 (13)	2 (8.3)	19 (25)	4 (6.4)
Postoperative Functional ability, n (%)					
Independent in daily activities	11 (14)	3 (7.1)	2 (9.5)	21 (32)	4 (7.8)
Partially dependent in daily activities	36 (46)	27 (64)	14 (67)	37 (57)	30 (59)
Totally dependent in daily activities	32 (41)	12 (29)	5 (24)	7 (11)	17 (33)
Location for follow up treatment, n (%)					
Home, independently	12 (13)	3 (5.4)	1 (4.2)	19 (25)	3 (4.8)
Home, with home care	6 (6.5)	3 (5.4)	2 (8.3)	3 (3.9)	2 (3.2)
Primary health care ward	30 (32)	21 (38)	9 (38)	28 (36)	25 (40)
Other hospital	30 (32)	6 (11)	5 (21)	11 (14)	9 (15)
Residential care	2 (2.2)	0 (0.0)	0 (0.0)	1 (1.3)	5 (8.1)
Palliative care ward	0 (0.0)	6 (11)	2 (8.3)	2 (2.6)	4 (6.5)
Other department in study hospital	0 (0.0)	2 (3.6)	2(8.3)	2 (2.6)	3 (4.8)
Survival, days, median, (min-max)	46 (1-971)	33 (2-507)	49 (2-440)	76 (2-804)	15 (1-370)
Mortality, n (%)					
14 days	20 (22)	20 (37)	5 (21)	14 (18)	29 (48)
30 days	38 (41)	26 (48)	10 (42)	26 (34)	40 (67)
90 days	59 (63)	41 (76)	17 (71)	41 (54)	50 (83)
1 year	81 (87)	50 (93)	22 (92)	69 (91)	59 (98)

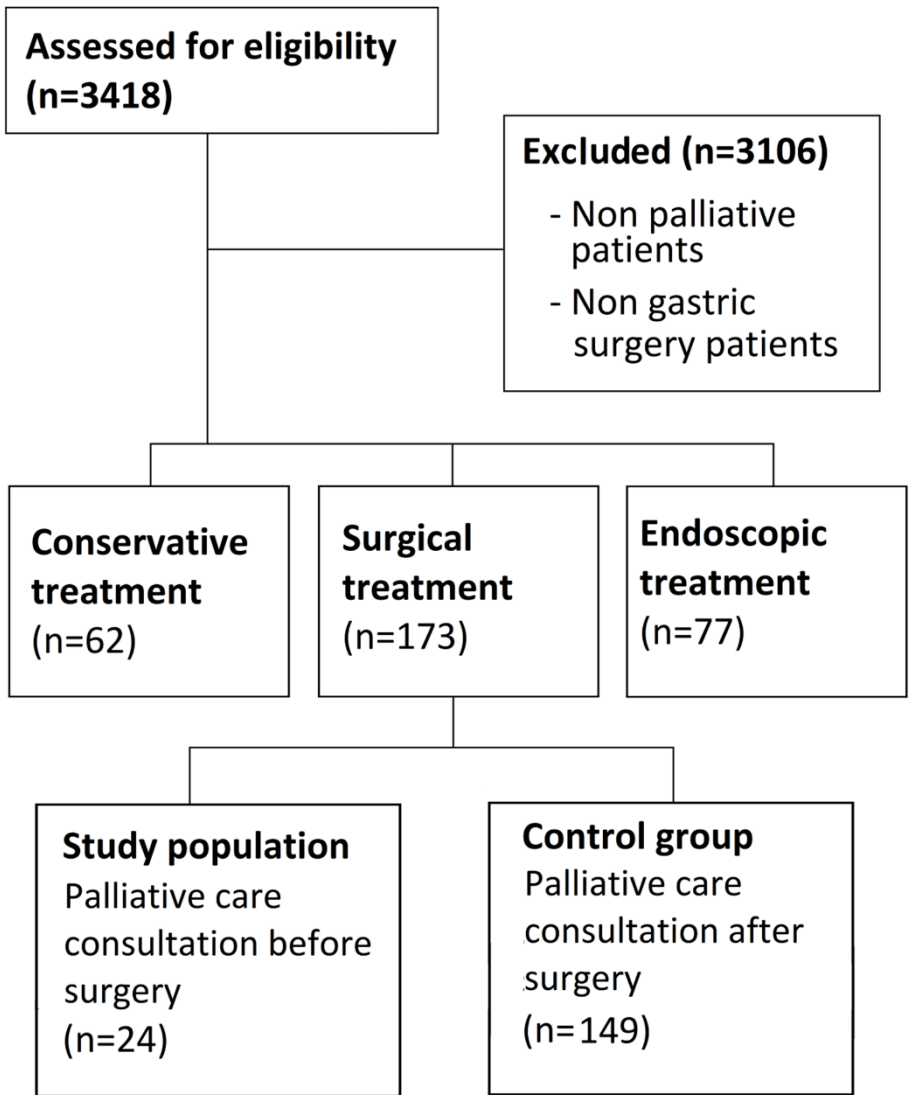
¹ Patients undergoing surgery without palliative care consultation before implementation of palliative care consultation teams

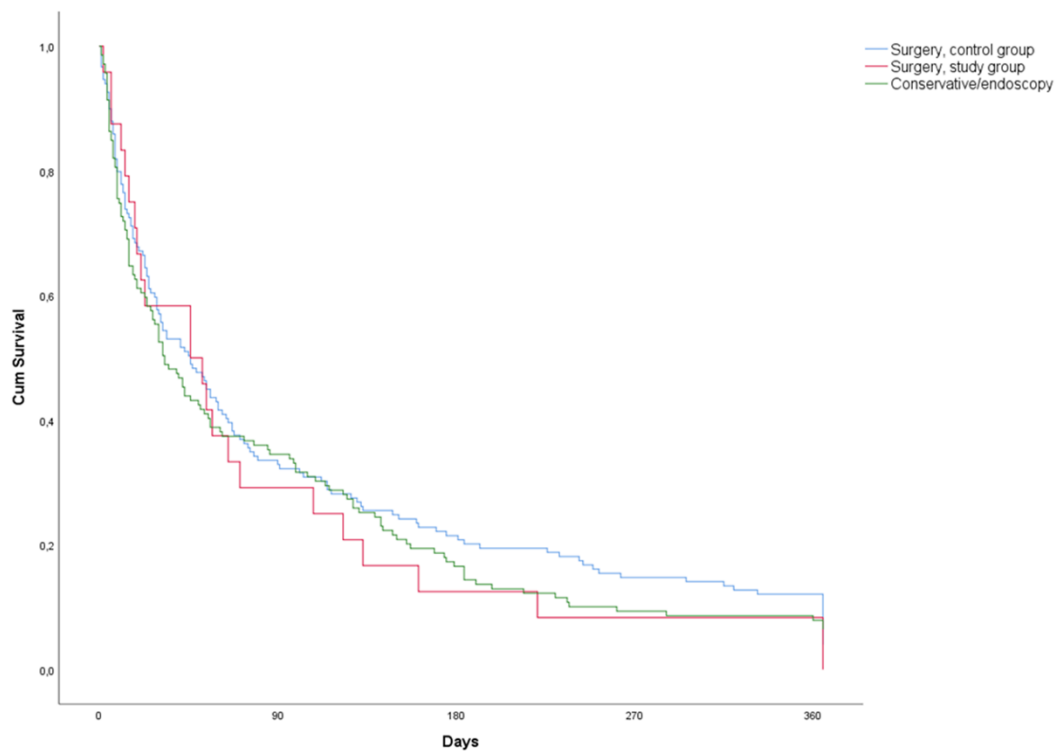
² Patients undergoing surgery without palliative care consultation after implementation of palliative care consultation teams (e.g. outside office hours)

³ ICU, Intensive care unit

⁴ CD, Clavien-Dindo classification of surgical complications

⁵ LOS, length of hospital stay





Contributorship statement

Matti Laitamäki: planning the research, data collection, data analysis, drafting and writing the article and approval of the final version of article.

Reetta Piili: planning the research, critical revision, and final approval of the article.

Johanna Laukkarinen: planning the research, critical revision, and final approval of the article.

Mika Ukkonen: planning the research, data analysis, drafting the article, and final approval of the article.

All authors of the article take full responsibility for the completed article and the publication decision.

References

1. Smith BR, Stabile BE. Gastric adenocarcinoma: reduction of perioperative mortality by avoidance of nontherapeutic laparotomy. *J. Gastrointest. Surg.* 2007;11:127-132
2. Gonzalez R, Smith CD, Ritter EM, Mason E, Duncan T, Ramshaw BJ. Laparoscopic palliative surgery for complicated colorectal cancer. *Surg. Endosc.* 2005;19:43-46
3. Miner TJ, Cohen J, Charpentier K, McPhillips J, Marvell L, Cioffi WG. The palliative triangle: improved patient selection and outcomes associated with palliative operations. *Arch. Surg.* 2011;146:517-522
4. Laitamaki M, Alamyllari I, Kalliomaki M, Laukkarinen J, Ukkonen M, Junttila E. Scoring Systems May be Effective in Predicting Mortality Associated with Palliative Emergency Gastrointestinal Surgery: A Retrospective Observational Study. *World J. Surg.* 2021;45:2694-2702
5. Kelley AS, Morrison RS. Palliative care for the seriously ill. *N Engl J Med.* 2015;373(8):747-755. doi:10.1056/NEJMra1404684
6. Bakitas MA, Tosteson TD, Li Z, et al. Early versus delayed initiation of concurrent palliative oncology care: patient outcomes in the ENABLE III randomized controlled trial. *J Clin Oncol.* 2015;33(13):1438-1445. doi:10.1200/JCO.2014.58.6362
7. World Health organization. WHO definition of palliative care, Geneva. 2002.. Updated 2002. Accessed 11.6., 2022.
8. Yefimova M, Aslakson RA, Yang L, Garcia A, Boothroyd D, Gale RC, Giannitrapani K, Morris AM, Johanning JM, Shreve S, Wachterman MW, Lorenz KA. Palliative Care and End-of-Life Outcomes Following High-risk Surgery *JAMA Surg* 2020 Feb 1;155(2):138-146. doi: 10.1001/jamasurg.2019.5083.
9. Clavien PA, Barkun J, de Oliveira ML, et al. The Clavien-Dindo classification of surgical complications: five-year experience. *Ann. Surg.* 2009;250:187-196

10. Verwijmeren L, Peelen LM, van Klei WA, Daeter EJ, van Dongen EPA, Noordzij PG. Anaesthesia geriatric evaluation to guide patient selection for preoperative multidisciplinary team care in cardiac surgery. *Br J Anaesth*. 2020 Feb 14;S0007-0912(20)30014-3. doi: 10.1016/j.bja.2019.12.042. Online ahead of print.

11. Kasivisvanathan R, Jhanji S, McLeod A, Baikady R, Wigmore T, Gruber P. High risk multi-disciplinary process for major cancer surgery. *Br J Anaesth*. 2015.