Case Report

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A New Score to Assess the Perioperative Period: A Retrospective Evaluation of a Case Report by PERIDIA Score

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Abstract

The complexity of cancer patients and the use of advanced and demolitive surgical techniques frequently need post operatory intensive care hospitalization. In order to increase safety and to select the best medical strategies for each single patient, a multidisciplinary team consisting of anesthesiologists, cancer surgeons, pharmacists, psychologists, statisticians and nurses has performed a new peri operatory assessment, arising from evidence-based literature data. The team focused the attention on supramesocolic peridiaphragmatic cancer surgery, such as esophagectomy, lobectomy and pneumonectomy, hepatic metastasectomy, pancreatectomy, gastrectomy and splenectomy. The clinical data concerning patients hospitalized in 2018 in postoperative ICU of the Cancer Institute Giovanni Paolo II of Bari were retrospectively analyzed. The following case report aim sat demonstrating how a perioperative evaluation is necessary to predict complications related to surgical treatment versus non-multidisciplinary and unstructured assessments. Our first results will be confirmed by an ongoing retrospective study on a large number of patients and by future prospective studies.

Keywords: Perioperative period; Patient assessment; Cancer surgery

Introduction

Nowadays the standardization of peri operatory assessments in cancer patients undergoing per diaphragmaticthoraco-abdominal surgery is a very complex challenge, particularly in the case of multi-organ localization. This aim is worldwide pursued for each patient through the application of international evaluation scores in the pre operatory step (fragility, nutritional structure, comorbidities, previous thoraco-abdominal problems) and/or the prediction of the post operatory onset of complications.

To our knowledge, only a few experiences are reported in literature in terms of peri operatory evaluation, in particular the intra operatory phase lacks shared and validated references as regards clinical scores in critical patients, passing through the three steps, pre, intra and post-surgery.

The following case report is a substantial example of the PERIDIA Score retrospectively applied in our post-operative cancer ICU in 2018 [1-5].

Materials and Methods

A multidisciplinary group, consisting in anesthesiologists, abdominal cancer surgeons and thoracic cancersurgeons, pharmacists, psychologists, statisticians, nurses, hasel borated the PERIDIA Score (**Figures 1-4**), starting from the analysis of the literature reference scores.

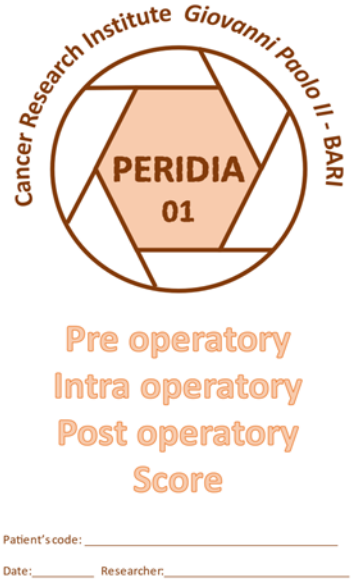

Figure 1: Pre operatory intra operatory-post operatory score.

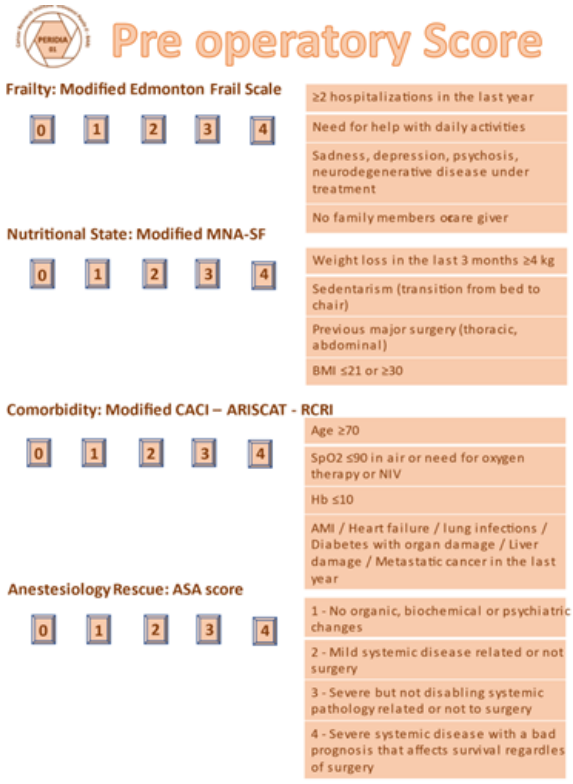

Figure 2: The score allows to assign from 0 to 16 points in each phase. The minimum score is 0; the maximum score is 48.

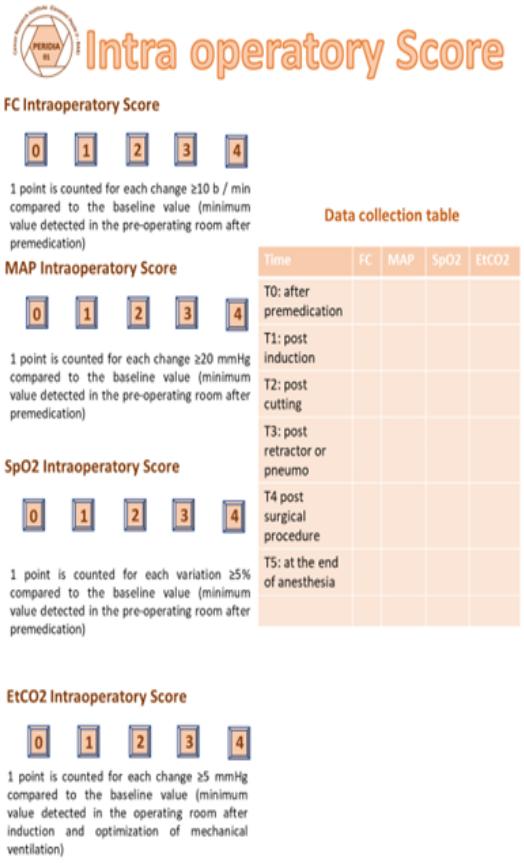

Figure 3: Intra operatory score.

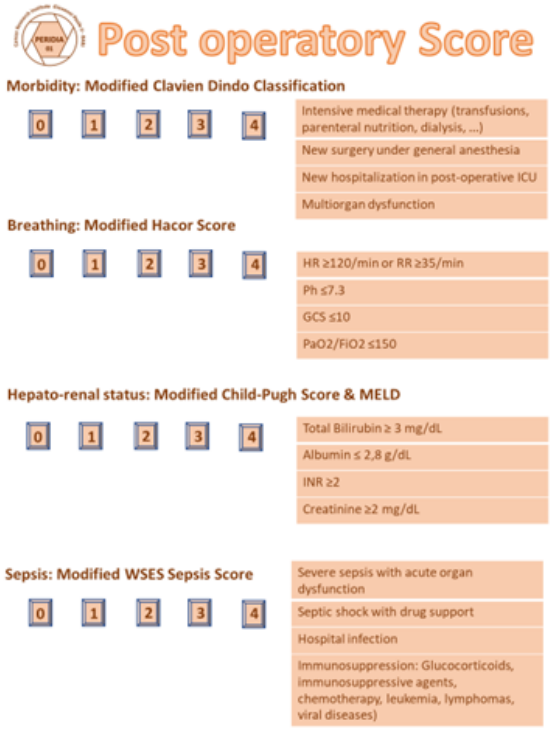

Figure 4: Post operatory score modified Clavein Dindo classification.

In the first step of our study, some scores already in use in clinical practice were selected for the peri operatory evaluation process. Edmonton Frail Scale, Mini Nutritional Assessment Short Form, Charlson Age Morbidity Index, Assess Respiratory Risk in Surgical Patients in Catalogna (ARISCAT Index), Lee's Revised Cardiac Risk Index, Preoperative Esophagectomy Risk, Clavien dindo Classification, Child Pugh Score, Model for End Stage Liver Disease, Simple Risk Score for Pancreatectomy Surgical Outcomes Analysis and Research, Hacor Score and World Society of Emergency Surgery Sepsis Score were deeply analyzed and synthetized by the team to extract the most significant items to build our new score, named PERIDIA score [6-8].

The PERIDIA score has been subsequently divided into 3 scores, each of which expressing a score from 0 to 16 for a maximum of 48 points. The first score concerns the pre operatory period and supports the anesthetic and surgical evaluations of pre-hospitalization. It consists in 4 scores, to each of which a score from 0 to 4 points can be assigned. With regard to the Modified Edmonton Frail Scale, a point is assigned to the verification of each of the following conditions: ≥ 2 hospitalizations in the last year; need for help with daily activities; sadness, depression, psychosis or neurodegenerative disease in treatment; absence of family members or caregivers. Regarding the Modified Mini Nutritional, Assessment Short Form, a point is assigned to the verification of each of the following conditions: weight loss in the last 3 months ≥ 4 Kg; sedentarism (transition from bed to chair); previous major surgery (thoracic, abdominal); BMI ≤ 21 or ≥ 30. About the Modified Charlson Age Morbidity Index, ARISCAT Index and Lee's

Revised cardiac Risk Index, one point is assigned for each of the following conditions: age ≥ 70 years; SpO2 ≤ 90 inair environment or need for oxygen therapy or non-invasive ventilation; haemoglobinemia ≤ 10 g/dl; AMI or heart failure or lung infections or diabetes with organ damage or liver injury or metastatic solid tumor in the last year. Finally, the ASA score is taken from the anesthetic assessment pre-hospitalization and in any case is assigned on the basis of the following criteria: 1 points for no organic, biochemical or psychiatric alteration; 2 points for mild systemic disease related or not to the reason for the surgery; 3 points for severe but not disabling systemic pathology related or not to the reason for the surgery; 4 points for severe systemic disease with a severe prognosis that affects survival regardless of surgery [9,10].

For the intra operative period, the multidisciplinary technical team aimed at matching the main phases of the surgery (T0: Pre-treatment after pre-dressing; T1: Post induction; T2: Post cutting; T3: Post retractor or pneumo; T4: Post surgery; T5: Post anesthesia) with the variation of 4 vital parameters commonly used during the monitoring of general anesthesia (heart rate or HR, mean arterial pressure or MAP, saturation or SpO2, capnometry or EtCO2) [11-15].

However, due to the lack of punctual clinical parameters in intra operatory period, in the present case report, we had to adapt these evaluations, regardless of the surgical phase. Therefore, 1 point was assigned in the HR Intra operatory Score for each change ≥ 10 b/min with respect to the baseline value (minimum value detected after premedication); 1 point was assigned in the MAP Intra operatory Score for each change ≥ 20 mmHg with respect to the baseline value (minimum value detected after premedication); 1 point was assigned in the SpO2 Intra operatory Score for each change ≥ 5% from the baseline value (minimum value detected after premedication) and 1 point was assigned in the EtCO2 Intra operatory Score for each variation ≥ 5 mmHg compared to the baseline value (minimum value detected after induction and optimization of mechanical ventilation)[12,13].

The postoperative score is also based on 4 scores, each of which being assigned a score from 0 to 4 points. Regarding the Modified clavien dindo classification, a point was assigned to the occurrence of each of the following conditions: intensive medical therapy (transfusions, parenteral nutrition, and dialysis); new surgical evaluation under general anesthesia; further hospitalization in post operatory ICU; multiorgan dysfunction. About the Modified Hacor Score, a point was assigned to the occurrence of each of the following conditions: HR ≥ 120/min or RR ≥ 35/min; PH ≤ 7.3; GCS ≤ 10; PaO2/FiO2 ≤ 150. Regarding the Modified Child-Pugh Score & MELD, a point was assigned to the occurrence of each of the following conditions: Bilirubin tot ≥ 3 mg/dL; Albumin ≤ 2.8 g/dL; INR ≥ 2; Creatinine ≥ 2 mg/dL. With reference to the Modified WSES Sepsis Score, a point was assigned to the occurrence of each of the following conditions: severe sepsis with acute organ dysfunction, septic shock with vasopressors, nosocomial infection, immune suppression, glucocorticoids, immunosuppressive agents, chemotherapy, leukemia, lymphomas, viral diseases [14-20].

Case Presentation

A Caucasian female, 75 years old, was admitted in our hospital and evaluated as eligible for surgery for clinical evidence of obstructive jaundice.

She suffered of severe obesity (BMI 42), Type 2 diabetes mellitus, arterial hypertension, chronic atrial fibrillation, previous breast cancer (successfully treated in 1996) and ampullary pancreatic cancer in 2013, for which she was in follow up. In 2018, a relapse of the pancreatic disease was suspected [20-23].

After a general clinical evaluation, surgeons decided to place a Peripherally Insert Central Catheter (PICC) and optimize ongoing therapy to achieve a better clinical condition before surgery. During check-up, a MRI was performed and highlighted a choledochal tightened stenosis and total dilatation of intrahepatic biliary tract, that confirmed the supposed diagnosis.

Surgical duodenocephalo pancreatectomy with external biliary drainage, sub hepatic drainage, retro duodenal drainage and pelvic drainage was carried out.

Mild hemodynamic instability was observed and effectively treated with infusion of vasopressor drugs.

Therefore, the patient was transferred to our Post-Operative ICU for five days without severe complications

The patient was then transferred to the normal affiliated surgery unit, where she received routine post-operative cares. Twenty-eight days after surgery, the drainages showed leak of haematic material and one event of massive melena, which required multiple transfusions and an urgent CT.

The imaging highlighted bilateral basal pleural effusion with left parenchymal atelectasis and right thickening foci and concomitant multiple intra-abdominal and intra-pelvic blood harvesting [23-27].

Although multiple transfusions and antibiotic therapy were promptly performed, the patient developed anasarcatic state and altered mental status, then followed by hypovolemic shock unresponsive to plasma-expanders and transfusion therapy. After ten days of this clinical status, she finally died.

Results

The PERIDIA score was applied to the patient (**Figures 5-7**). In the preoperatory period, the score assigned 13 points to the patient due to 2 hospitalizations in the last year, sadness and depression, sedentary lifestyle without caregivers, weight loss in the last 3 months of 8 Kg, previous major abdominal surgery, BMI 42 age 75 years, Haemoglobinemia 8.5 g/dl, diabetes mellitus with left lower limb neuropathy and local cancer recurrence, anesthetic evaluation of ASA 4.

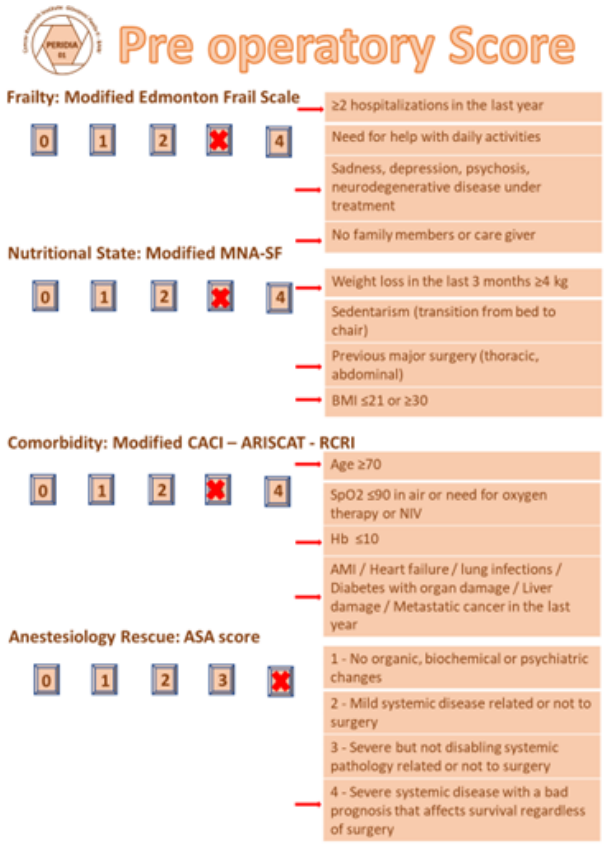

Figure 5: The score assigns 13/16 points in pre operatory phase.

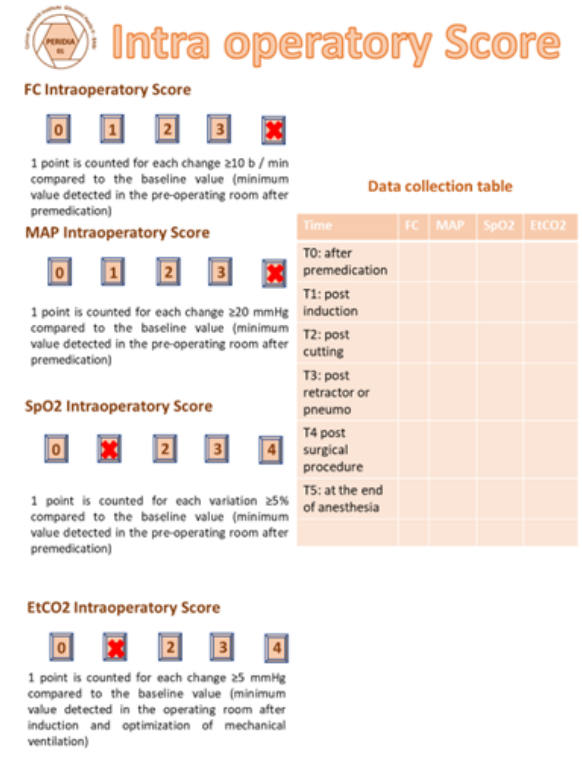

Figure 6: The score assigns 10/16 point in intra operatory. 7/16 point in post operatory ICU phase.

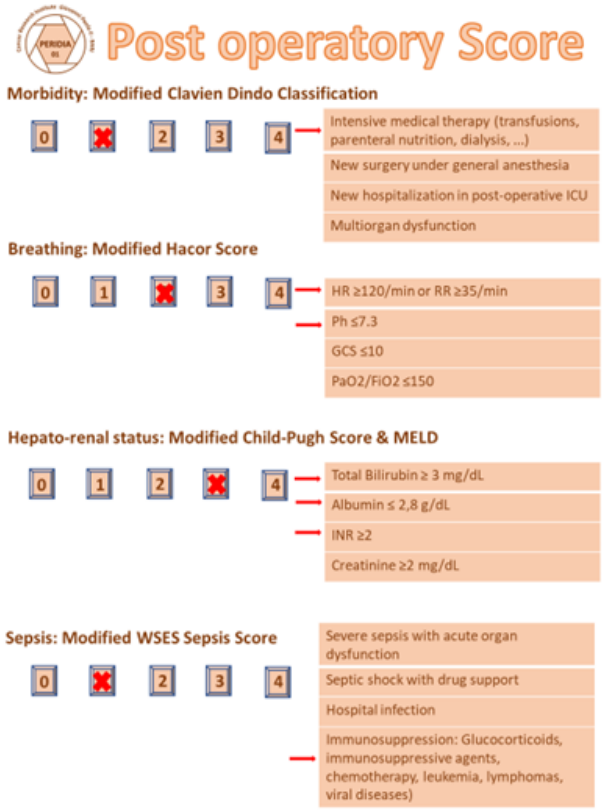

Figure 7: The score assigns 7/16 point in post operatory ICU phase. The total of score is 30/48 point.

In the intra operatory period, the score assigned 10 points to the patient, due to 4 variations of HR ≥10 b/min, 4 variations of MAP ≥ 20 mmHg, and 1 variation of SpO2 ≥ 5%, 1 variation of EtCO2 ≥ 5 mmHg with respect to the baseline value, respectively.

In the post operatory period, the score assigned 7 points to the patient due to the several transfusions and the necessity of parenteral nutrition, HR 128 min, PH 7.25, total Bilirubin 14 mg/dL, Albumin 2.1 g/dL, INR 2.5, previous chemotherapy.

The total PERIDIA score was 30 points. Due to the numerous adhesions related to the previous surgical procedure, the last surgery lasted 8 hrs; in postoperative ICU the patient stayed 5 days, while the whole hospitalization was 61 days.

Discussion

After a previous cancer, the patient was affected by a second primitive tumor, with a poor prognosis, with local recurrence in a context of comorbidities (arrhythmia, jaundice, metabolic syndrome) that was presumably not adequately assessed for the possibility/need for surgery.

In these clinical cases, a perioperative evaluation score able to trace the right route of treatment could provide alerts both in the preoperative period (for example the possibility to start a tailored rehabilitation path or a surgical procedure rather than a path of palliative care) and in the intra operative (need to use invasive monitoring of cardiac output by catecholamine's in continuous infusion) and in the postoperative, for instance for a

prolonged hospitalization, the destination of a semi-intensive postoperative room, where the patient can receive a continuous monitoring of vital functions.

The multidisciplinary team assigned a 30/48 score to the patient. This value is far beyond the upper threshold we are defining as a minimum score to identify possible predictable risks, according to our first results in the ongoing retrospective PERIDIA01 study. This study is demonstrating an increase of clinical complications in patients who were assigned a one third score with respect to the maximum (16/48). Moreover, patients with a 10/16 score within each phase of the evaluation (pre, peri and post), more frequently develop clinical complications.

In the light of these evidence, the 30 point-score assigned to our patient can be considered as predictive for the subsequent critical and fatal complications the woman faced up.

The use of a perioperative score elaborated by a multidisciplinary team even if in retrospective evaluation also allows to formulate other considerations on the clinical course of the patient, in particular from a pharmacological point of view. The patient administered before and during hospitalization Diltiazem Hydrochloride 60 mg (1/2 tablet twice a day), Digoxin 0.125 mg (1 tablet a day), Warfarin (1 tablet a day), Ibersartan +Hydroclorotiazide 150 mg+12.5 mg (1 tablet a day). At the hospitalization, she showed significant extension of the INR and electrolyte alteration.

This clinical condition could derive also from pharmacological interactions. In fact, hydroclorotiazide can produce hypokalaemia and hypomagnesaemia, that increase the inhibition of Na/K ATPase mediated by Digoxin. Furthermore, Diltiazem may cause increases in digoxin plasma levels, probably by decreasing digoxin clearance. Hypokalaemia and Hypomagnesaemia induced by diuretics may predispose patients on digitalis treatment to arrhythmias.

During the two months of hospitalization, the patient received Furosemide 20 mg (twice a day). The combination with a thiazide loop diuretic drug (Hydroclorotiazide) may produce additive or synergistic effects on diuresis and excretion of electrolytes including sodium, potassium, magnesium and chloride. This condition could explain the electrolytic alteration. Furthermore, the patient was treated with proton pump inhibitor Pantoprazol 40 mg per day, that is reported to induce hypomagnesaemia in chronic use and the risk may be further increased when combined with other medications such as furosemide. Although diuretics and digitalis glycosides are frequently and appropriately used together, diuretic-induced hypokalaemia and hypomagnesaemia may predispose these patients on digitalis treatment to arrhythmias. In fact, during hospitalization, cardiologists reported arrhythmic tones.

Conclusion

In the light of the results obtained from the application of the PERIDIA score in some patients, our multidisciplinary team intend to continue the application of this new evaluation system retrospectively to a larger cohort of patients to provide a further scaling up in the assessment process of the perioperative score in oncologic patients, with a particular reference also to the pharmacologic treatment to choose in each step of the care pathway.

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