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Conference Report

The aged patient who has undergone an operation in the intensive care unit

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Abstract. The reaching of 13% within the Italian population of those who are older than 70 has caused a significant rise in the number of the elder people who undergo major surgery operations; this is due also to the availability of mini-invasive endo-laparoscopic techniques, to the availability of new very manageable anaesthetics and new anaesthesia plans, suitable for the elder, to a more effective control of post-operative pain, and mostly to a comfortable access to I.C.U. in the post-operative phase.

Key words: Intensive care unit, elder people, surgery operations

"Non sunt in senectute vires
Ne postulantur quidem vires a senectute"
Cicerone "De Senectute"

The reaching of 13% within the Italian population of those who are older than 70 has caused a significant rise in the number of the elder people who undergo major surgery operations; this is due also to the availability of mini-invasive endo-laparoscopic techniques, to the availability of new very manageable anaesthetics and new anaesthesia plans, suitable for the elder (Monitored Anaesthesia Care), to a more effective control of post-operative pain, and mostly to a comfortable access to I.C.U. in the post-operative phase.

The post-operative intensive phase sees the highest quoad vitam risk for the elder person which has to undergo an operation, due to the occurrence of formerly latent disfunctions of vital organs, which are often not identifiable during pre-op controls, despite suitable surveys.

If such disfunctions extend trough over 5 days, and at the same time involve two or more systems, can evolve, in an high percentage of elderly, to the dreadful MOF, that nowadays, despite the high qualitative therapeutics levels achieved, both pharmacological and instrumentals, still preserve a percentage of mortality of 35-55% in the occidental world.

Therefore it is a prior end to identify, in the elder patient, the limits of functional reserve of the vital organs, in the pre-anaesthesia evaluation phase yet, discerning between a successful aging and a biologically significative aging.

Being able to define the biologic age of the elder means to break down the potential complications and improve the prognosis, since the neuro-endocrine-metabolic surgical stress further put down the functional reserves of the vital organs.

A recent metanalysis (1) of wide and accredited international polycentric projects, in order to search pre and intraoperative "risk factors" which most weigh heavily on causing the postoperative complications of the elder, gave different results related to the population partition, separated in morbidity and mortality sections (2):

- 29,2%, healthy;
- 30,3%, disease of 1 organ;
- 20,9%, disease of 2 organs;
- 19,6%, disease of 3 or more organs.

These data upset an enduring acknowledgment for which the complications involving the vital organs would be inevitable events for the elder.

The following parameters showed to have a statistically significative relation to the appearance of severe complications in the postoperative period:

- ASA score ≥3;
- Previous strokes;
- Cardio-respiratory dyspnea;
- Creatininemy >1,5;
- Duration of the surgical operation;
- Intraoperative complications, especially the bleeding;
- Typology of the operation (urgency/emergency).

According to Farrow (2) the greater incidence on the prognosis of the elder patient in the I.C.U., is connected to the presence of cardio-vascular and respiratory diseases:

- Arterial Hypertension with left ventricular hypertrophy;
- Cardiac failure;
- Coronary failure with previous A.M.I.;
- COPD.

We observe a different predictivity of some parameters, closely considering (sec. Bayes) the statistics obtained from the metanalysis: particularly the ASA score >3 represents the only variable with an high susceptibility (75% per morbidity, 95% per mortality), but in the whole variables the value of the negative predictivity is superior than the positive predictivity.

Numerous clinical aspects that can be noticed in the preoperative period, and the way to manage the anaesthesiological plan, can condition the development of postoperative complications: it is estimated that a great majority of the elder patients gets to the preoperative control relatively volume-depleted, both for a reduced thirst stimulus that brings to a dangerous raise of hematocrit, with hemoconcentration, of the plasmatic osmolarity and azotemia, and for a kidney dysfunction unable to adequately hold water and electrolytes, due to a predictable reduced tubular susceptibility to the ADH and aldosterone. This condition inevitably emphasize in the intraoperative phase, when the protract exposure of the intestines to the air causes liquids evaporation and worst for blood losses. For this reason 50% of the elder patients shows an high risk of developing arterial hypotension up to the hypovolemic shock in the postoperative period. The hypotension risk is frequent as well in the hypertension patient due to the a failing baroreceptorial control on the cardio-vascular changes.

Therefore fluidotherapy represents a basis aspect of the postoperative therapy; it has to be managed carefully since the hemodynamic condition of the elder, as just said, easily causes an impairment of the cardiac pump and annul some compensation mechanism: therefore it is closely necessary, in addition to the customary monitoring of the ECG, NiBP, HF, hemogasanalysis, to follow up central venous pressure (CVP) which allows to modulate the fluids infusion speed, avoiding the risk to develop acute pulmonary edema.

In the management of more complicated clinical conditions could be necessary to perform a transesophageal echocardiography (TEE) or cannulate the pulmonary flow with a Swan-Ganz arterial catheter, in order to have exact data on the pressures and the filling volumes of the heart.

This complex diagnostic-therapeutic approach, that is not free from risks, must be reserved to patients that present worrying limitation of cardiac function such as congestive heart failure, serious coronaropaties, advanced myocarditis. Generally, a good elder management in I.C.U. should be characterized, until possible, by a lowered invasivity. Excessive use of devices (tracheostomic cannula, Magill tube, CVC, arterial and bladder catheter, ICP catheter, ecc.) in immunodepressed patients, increases the risk of infection, first in the site of implant, and then systemic. Bacterial translocation, in this condition, rise the risk of infections with possible development of sepsis or MOF (3). When the physician formulate a therapy has to considerate that the elder often shows a pharmacodynamic and pharmacokinetic changes, for the following reasons:

- Fat body mass (FBM);
- Body mass index (BMI) and total body water ratio are deeply spoiled;
- the elder shows a lower central volume of distribution with an increased volume of distribution at steady state;

- moreover the elder presents a reduced total body clearance and an increased drug fraction not linked with plasmatic proteins (4);
- and more the kidney shows an impairment of his function due to a deficit of renin-angiotensin system, aldosterone, ADH, and to an hypoperfusion arteriosclerosis;
- as well as the liver that presents an oxide-redox reactions, hydrolysis and glycuro-conjugation deficit.

For all these reasons, there is indication for the use of longer half-time b-blocker, and it has to be expected a lower pharmacologic reaction to the use of glycosides.

Decubitus changes in the postoperative control

Elder patients without cardiac infarction and/or vascular anomalies, have no important alterations of end-diastolic volume, thanks to cardiac compensation mechanism such as:

- the increase of atrial contraction that compensates the end-diastolic flow;
- the prolonged isovolumetric relaxation that delays and increases the ventricular filling.

These changes assure an efficient blood flow (5), that can spreads along the stiff arterial system, and preserve a good cardiac output. This positive hemodynamic condition is possible if the patient, during the stage in I.C.U., lies on his back, without sudden decubitus changes. Therefore rapid decubitus changes eliminates these benefits and determinate a rapid worsening of cardiac output. This is probably due to a lowered autonomous nervous system function and a reduced adrenergic receptor sensitivity rather than to a reduced cardiac function (6). The problem of decubitus changes is directly related to the necessity to execute a precocious mobilization and deambulation, trying to avoid rapid decubitus changes; this approach is necessary to avoid the decubitus wounds, pulmonary infections dependent from mucus stasis and most to prevent lower limbs venous stasis (7). Moreover the elder presents haemocoagulative changes (8) towards trombophilia which is proportionately related to the complexity of the surgical operation he has undergone. Therefore in I.C.U., the physician has to monitorize haemocoagulative values such as the inhibiting complex (ATIII, PC, PS), fibrinogens and its degradation products (D-dimer, FDP), PTT, PTL count, and provide for physical therapies such as intermittent pneumatic compression (I.P.C.) in order to put down the risk of pulmonary embolism, which can impair heavily the elder outcome, most when numerous pulmonary segments are involved.

Pulmonary embolism is postoperative more frequent complication and recent studies say that the use of anticoagulant agents (sodic heparin i.v., low molecular weight heparin, calcic heparin) can't always prevent this complications.

Postoperative pain control

It's common opinion that this medical treatment is not a deluxe therapy, but, particularly in the elder, represents an effective prevention against haemocoagulative disease, but most against refractory infections resulting from an hypoventilation caused by pain. Pain control drugs (opioids, opioids-benzodiazepines association, bupivacaine-lidocaine) can be administered either i.v., trough patient controlled drug infusion speed (P.C.A.), or epidural, thanks to a peridural catheter positioning in the preoperative phase, that remains in situ for all the stage in I.C.U.

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