Vol 10| Issue 2| 2020 | 113-117.

e-ISSN 2248 – 9142
print-ISSN 2248 – 9134

International Journal of
Current Pharmaceutical & Clinical Research

www.ijcpcr.com

ANAESTHESIA FOR ELDERLY PATIENTS

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ABSTRACT

Development in anesthesia and operative techniques has considerably reduced morbidity and mortality in the elderly patients. Several anesthetic techniques have been used for elderly patients including general anesthesia, regional anesthesia, intravenous sedation and monitored anesthesia care. However, anesthesia related mortality in these patients is still high. Elderly person of 80 years of age and older presents a specific challenge to anesthetists, who needs to acquire and maintain skill and expertise in the management of such patients. Departments should have a lead clinician with an interest in the care of the elderly. Development in anesthesia and operative techniques has considerably reduced morbidity and mortality in the elderly patients. All elderly patients undergoing surgical procedures require a preprocedural evaluation to assess the risks of anesthesia and procedure and to manage problems related to the preexisting medical conditions, monitoring patients during intraprocedural and postprocedural periods as well as postprocedural management. Several anesthetic techniques have been used for elderly patients including general anesthesia, regional anesthesia, intravenous sedation and monitored anesthesia care. However, anesthesiarelated mortality in these patients is still high. All elderly patients undergoing surgical procedures require a preprocedural evaluation to assess the risks of anesthesia and procedure and to manage problems related to the preexisting medical conditions, monitoring patients during intraprocedural and postprocedural periods as well as postprocedural management. This article considers the age-related physiological changes, preprocedure assessment and preparation, anesthetic techniques, intraoperative care and postoperative care. Age does not obtund the perception of pain. Acute and chronic pain management teams should be available to treat the elderly. Prophylaxis for Thrombo embolic disease should initiated to prevent further complications.

Key words: Anesthesia; Analgesia; Elderly, day surgery, Inpatient.

INTRODUCTION

Advances and improvement in medical science have increased life expectancy for most people, and according to the latest World Health Organization (WHO) data, life expectancy in Italy is very high, being 82.7 years (male 80.5, female 84.8 years). Although the mechanisms that control the aging process and life span remain unknown, we can speculate that a very important factor contributing to the Italian longevity is the healthcare system, which is ranked second according to WHO and which has the third best medical performance worldwide [1].In parallel with the increasing longevity of the population, the volume of surgery is growing rapidly, and anesthesia in the elderly patient has become an extremely important issue, mostly because this segment of the population is the most vulnerable and is likely to have the highest number of comorbidities, to suffer from frailty, and to have diminishing physiological reserve.

Functional reserve and organ functions are normally decreased in the elderly patients. Morbidity and mortality rates after surgery in the elderly patients are significantly greater than the younger patients.

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Moreover, inhospital adverse events and prolonged duration of hospital stay are commonly observed in these patients [2]. However,age itself is not a disease process but instead serves as a chance for developing age-related diseases. These adverse events could be minimized by proper preoperative assessment, appropriate anesthetic technique and careful postoperative care.

In order to minimize the perioperative adverse events, anesthesiologists need to focus on the risks related to the operative procedure, the anesthetic and analgesic techniques, and the patient's underlying medical, physical, and functional condition. Aging is a universal physiological phenomenon, associated with a progressive loss of functional reserve in all organs and systems; however, the extent and onset of these changes vary significantly from patient to patient. Understanding of the physiological consequences of aging represents one of the prerequisites to administer good anesthetic care to elderly patients.

Cardiovascular system

Aging leads to decrements in the extent of autonomic control of the cardiovascular system. Consequently, baroreflex responses can not fully maintain hemodynamic stability in stressful situations such as orthostatic hypotension and administration of vasoactive medications [3]. Ischemic heart disease, hypercholesterolemia, hypertension and diabetes mellitus are common in the elderly patients. Consequently, autoregulation of blood flow to kidney and brain is decreased. The physiological stress response might be impaired because of reduced autonomic function. Atrial fibrillation is also common in the elderly patients.

Respiratory system

Pulmonary functions are all reduced in the elderly patients. Additionally, the residual volume is increased. Hypoxemia may develop easily. Furthermore, the prevalence of chronic obstructive pulmonary disease dramatically increases with age [4]. Atelectasis and lung infections are more common in these patients.

Renal system

Aging is associated with a steady decline in renal function. Renal functions are impaired. Monitoring of urine output during and after major surgery would be routinely done. Although, postoperative renal failure is rare [5]. Risk factors for acute postoperative renal failure include advanced age, diabetes mellitus, pre existing renal insufficiency, major vascular surgery and recent exposure to nephrotoxins.

Nervous system

A reduction of central nervous system function in the elderly patients is observed. There is an increase in disorders of cognitive function, memory loss, and degenerative diseases such as Parkinson's disease in these patients. Postoperative cognitive dysfunction increases with aging. In addition, pain thresholds increase, and this may cause to the delay in presentation of painful conditions. Regional anesthesia or combined general and regional anesthesia could be beneficial.

Pharmacology

The reduction of hepatic and renal functions influences pharmacokinetic pharmacodynamic of anesthetic drugs. This might be increased the sensitivity to these drugs. Additionally, minimal alveolar concentration declines with age. Long-term drugs should be maintained through out the hospital stay.

Nutrition

Poor nutrition status is common in the elderly patients [2]. The recent study has demonstrated that preoperative comprehensive elderly assessment increases ability to predict patients at a greater risk for morbidity and mortality among the elderly patients with very advanced age or multiple comorbidities.

Musculoskeletal

All types of degenerative diseases involve the elderly patients. This may limit exercise tolerance and makes it difficult to assess their fitness. Epidural and spinal blocks are technically difficult. In addition,the elderly patients are predisposed to fractures and dislocation. Positioning and pressure points should be well prepared before and during the procedure.

Preoperative Preparation

It has been estimated that elderly people require surgery four times more often than the rest of the population, and that this number will increase by 25% by 2020 [6]. As this will happen in a context of limited resources and growing costs, it is foreseeable that there will be an increasing demand for outpatient treatments and an increasing pressure on surgeons and anaesthetists to operate in ambulatory settings [7]. This review summarizes current selection criteria, anaesthesia techniques and methods for peri and postoperative pain control in geriatric outpatient surgery.

This review of research on anesthesia for elderly patients first summarizes the normal physiologic changes that occur with aging, an overview that is essential to frame the discussion of research in the three sections that follow, on preoperative assessment, intraoperative management, and postoperative management of the older surgical patient. Postoperative respiratory complications and delirium are emphasized, and issues of acute and chronic pain management for elderly surgical patients are also highlighted. The goal throughout is to identify needed research in elderly patients anesthesiology.

Preoperative assessment and evaluation

A full history and thorough clinical assessment is required, especially in older and more compromised patients. Patients over 70 years suffer from at least one associated condition and in 30% of them comorbidities are two or more. Polimedication is common and may increase the risk for drug interaction. Compliance toward medications may be insufficient. Analgesics and drugs acting on central nervous system (CNS) may increase the risk of falls. As the risk of thromboembolic complication is increased, a proper preventive treatment should be prescribed.

As a principle, not compensated, poorly stabilized patients should be treated as inpatient, as they are at high risk of perioperative complications. Many studies indicate that the risk of perioperative complications after day surgery increases in the presence of pre-existing conditions, especially cardiovascular and respiratory, but little evidence supports correlation between outcome and coexisting disease.

Anaesthesia techniques

In general terms, all anaesthesia techniques, from local to general anaesthesia, may be applied.

General anaesthesia

Depletion in neurotransmitters, reduced neuronal density and reduced innervation of skeletal muscles are induced by ageing and may cause reduction in anaesthetic drug consumption. Both reduced cardiac index (which causes increased induction time) and reduced baroreflex response (which causes reduced compensatory tachycardia) increase the risk for intravenous anaesthetics overdosing. Discrepancies between tele-expiratory and plasma concentration, which are due to reduced alveolar exchanges, may allow overdosing of inhaled anaesthetics. Changes in pharmacokinetics (reduced hepatic and renal flow, reduction in total body water) and pharmacodynamics (increased sensitivity to CNS depressant agents,reduction in minimum alveolar concentration with age by 4–5% per decade after 40 years) which can be observed in the elderly are related to ageing processes. Thesechanges interfere substantially with the final action of anaesthetic drugs and increase their side-effects. Combining all these metabolic changes together with fasttrack anaesthesia and day surgery may be challenging. Reducing dosage and carefully titrating drugs is essential.

Spinal anaesthesia

Age-related cardiovascular alterations, sympathetic block and consequent decrease in peripheral vascular resistance may produce intense hypotension and bradycardia together with potentially dangerous consequences in the case of reduced cardiovascular reserve. The risk of urinary retention, especially in men and/or diabetic patients, is known in elderly patients. Skeletal degeneration may increase technical difficulty. Specific patterns of spinal anaesthesia in the elderly are:reduced latency time, reduced cerebrospinal fluid (CSF) volume and increased density. These two last factors cause greater diffusion of local anaesthetics. Demielinization of nervous fibres also causes wider block extension.

Consequently, a 40% reduction in local anaesthetic dosage has been suggested [8]. Due to reduced volume and increased density of CSF, baricity of hyperbaric solutions is reduced and they become ‘less hyperbaric’.Increased risk of urinary retention and need for postoperative catheterization (40% of over 60s) after 2%hyperbaric prilocaine in ambulatory setting has been recently reported [9].

Intraoperative Care

Fluid management:

Inadequate hydration may often rapidly deteriorate in organ functions. Perioperative fluid monitoring is necessary. The surgical patients will have been fluid depleted for at least 4-6 h previously. The anesthesiologist must be concerned of the volume status. Fluid balance ought to be maintained during the procedure.

Pain management:

Many elderly patients suffer from acute or chronic pain and increasingly seek treatment for their condition. Depression is common in the elderly patients and is especially likely to be encountered in the elderly patient with chronic pain. Given the increased options and facilities, the overall percentage of chronic pain management appeals increased. The devastating majority of pain litigation in the claims database encompassed invasive procedures such as blocks and injections [10]. The most common complication of invasive pain management procedures was nerve injury. An anesthesiologist should concern any unexpected motor and/or sensory findings, and should carefully monitor the patients for an extended time after the neuraxial blockade.

Postoperative care:

It is recommended that all patients with a predicted peri-operative mortality of more than 10% should be admitted to a level 2 or 3 critical care facility [30]. However, the Working Party recognises that, although access to critical care should not discriminate on the basis of age, there is a chronic mismatch between the number of beds needed to satisfy the 10% recommendation and the actual number of beds available, with no imminent prospect of the number of beds increasing significantly in the UK. Pragmatically, therefore, the Working Party recommends that anaesthetists routinely risk assess older patients towards the end of surgery with regard to the level of postoperative care they require, discharging patients into

critical care facilities if this is likely to reduce morbidity or mortality significantly, or if identifiable organ support is required.

Anaesthetists are instrumental in reducing the need for, or required duration of, postoperative care, through appropriate intra-operative management of anaesthetic drug administration, blood pressure, patient temperature, fluid therapy and analgesia. Despite optimum management, however, patient pathophysiology may demand critical care admission. If this cannot be provided immediately, then postoperative care should be provided in the postoperative care unit (PACU), to a critical care standard and by suitably experienced personnel. The Working Party supports the discontinuation of an operating list (if appropriate) if anaesthetic personnel are required to provide such care in PACU, until such time as the patient can be transferred for definitive critical care.

Assessment of fitness for discharge from PACU is the decision of the responsible anaesthetist, and should take into consideration the patient's vital signs, temperature, urine output, pain and cognitive status. Good documented communication is essential to ensure the continuation of appropriate postoperative care. The elements of good peri-operative care continue into the postoperative period, and are aimed at avoiding complications and re-enabling the patient. These include analgesia, maintenance of core temperature, fluid therapy and pressure care. Basic monitoring should be continued upon return to the ward, with all hospitals ensuring employment of Modified Early Warning Scores and provision of Critical Care Outreach teams [11].

Postoperative pain management:

It has been demonstrated that postoperative pain after day surgery may last more than 3 days and affect quality of life for more than 7 days [11]. Organizative aspects such as clear instructions at discharge, availability of analgesic drugs and follow-up are key factors [11], especially in geriatric day surgery. Pain perception does not decrease with age. Fear of addiction or cognitive impairment may restrain patients in reporting postoperative pain. Dementia or aphasia may make it difficult to assess. Easy and simple pain scales should be preferred [12]. Multimodality combines different drugs with the aim of reducing doses and minimizing side-effects of analgesics.

Local anaesthetics play a pivotal role both alone (field block) and/or as a part of the anaesthesia plan. In both cases, it should be remembered that they have limited duration and that only continuous catheter administration can protect against the reappearance of pain. Given the risk of catheter misplacement, misunderstanding about instructions and loss of sensitivity, patient compliance and level of comprehension (of the patient himself and of caregivers) should be carefully evaluated before deciding to use such techniques. NSAIDs are effective as single drugs only in the case of light-to-moderate pain. In the elderly, an increased risk of severe gastric complications in comparison to younger patients has been reported [13]. Hypovolaemia and dehydration, which are common in the elderly, may aggravate the risk of acute renal insufficiency following their use, especially in association with angiotensin-converting enzyme (ACE) inhibitors [14] and in a dose-dependent way [15].

Acetaminophen has few peripheral effects and no anti-inflammatory action, and is widely used due to its high safety profile. At the recommended doses of 4 g a day is usually excellently tolerated. Associations of acetaminophen and minor opioids have shown to be well tolerated in postoperative pain in the elderly. Opioids are often indispensable in case of major day surgery. Tramadol is well tolerated and effective and is indicated in the case of moderate-to-severe pain. Slowly titrating the dose is effective in reducing emesis. Confusion after its use has been reported in the elderly. Oxycodone, alone or in association with acetaminophen, is widely used in the adult population. A recent review has confirmed that oxycodone pharmacokinetics are age dependent and that careful and individual titration of the doses is necessary in the elderly [16]. Oxymorphone is a minor metabolite of oxycodone and has been recently introduced in the marketplace as oral opioid. Its use in the elderly has been recently reviewed, but it does not seem to have any particular advantages and should be used with the same level of attention of similar drugs [17-18]. Context-sensitive analgesia is a synergic approach to postoperative pain which considers the patient, the surgical procedure and the postoperative scenario. Ageing processes, comorbidity, intercurrent medication, expected pain, together with factors specifically related to 'that' patient (such as the presence of preoperative pain, education and compliance to instructions, troubles in swallowing tablets, etc.) are to be considered as a part of context analysis.

Aging is a universal and progressive physiological phenomenon clinically characterized by degenerative change in both the structure and the functional capacity of organs and tissues. In general, geriatric patients are more sensitive to anesthetic agents. Less medication is usually required to achieve a desired clinical effect, and drug effect is often prolonged. The most important outcome and overall objective of peri operative care of geriatric population, is to speed recovery and avoid functional decline.

Conclusion:

The knowledge of the physiological changes associated with aging and a careful preoperative evaluation of the patient are essential to plan and optimize the anesthetic care of older adults. The comprehensive care of elderly patients, however, needs to rely on a multidisciplinary dedicated team, including at the very least the physician, the surgeon, and the anesthesiologist, and this approach may significantly improve

periprocedural results and both short- and long-term outcomes in senior patients requiring surgical procedures. Elderly patients are exclusively vulnerable and particularly sensitive to the stresses of hospitalization, anesthesia and surgical procedure. No anesthetic agent or technique is unequivocally superior for all conditions or circumstances. Appropriate preoperative, intraoperative and postoperative management is needed of elderly patients. In addition, anesthesiologists must have knowledge of the physiological, pharmocokinetic and pharmacodynamic differences before they utilize their anesthetic techniques.

The number of elderly patients undergoing day surgery will increase in the near future, due to clinical, epidemiological, social and economic reasons. This will bring new challenges for anaesthetists, surgeons and nurses operating in day surgery centres. Healthcare systems and social services will also be involved in the challenge. In the field of anaesthesia, the demand for advanced skills on perioperative management of elderly patients will make specific educational programmes mandatory. Future research should focus on development of specific selection criteria, minimally invasive surgical techniques and effective and well tolerated postoperative pain treatment. The quality improvement in assistance levels and the development of telematic communication systems [44,45,46] will lead to an extension of day surgery indications to the elderly.

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