Ain Shams University
Faculty of medicine
Department of anaesthesia &ICU

Perioperative Management of Geriatric Patients Undergoing Major Orthopedic Operations

AN ESSAY

SUBMITTED FOR PARTIAL FULFILLMENT OF MASTER DEGREE IN ANAESTHESIOLOGY

Presented by: Mohamed Sayed Abbas El-Sayed
M.B.B.CH. Ain Shams University

Supervisors

DR/ Omar Mohamed Taha EL-Safty, MD
Professor of Anesthesiology
Faculty of Midicine
Ain Shams University

DR/ Mohab Fathy Gorgy
Lecturer of Anesthesiology
Faculty of Midicine
Ain Shams University

Faculty of Midicine
Ain Shams University

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List of Abbreviations

AD	Alzheimer's Disease
ANH	Acute Normovolemic Hemodilution
ANS	Autonomic Nervous System
APACHE	Acute Physiological And Chronic Health Evaluation
ASA	American Society of Anesthesiology
CBF	Cerebral Blood Flow
CGA	Comprehensive Geriatric Assessment
CPAP	Continuous Positive Airway Pressure
CO	Cardiac Output
DO2	Delivary of Oxygen
ECW	Extra Cellular Water
FRC	Functional Residual Capacity
GABA	Gamma Amino Butyric Acid

GFR	Glomerular Filtration Rate
ICP	IntraCranial Pressure
MAC	Minimum Alveolar anesthetic Concentration
MI	Myocardial Infarction
OSA	Obstructive Sleep Apnea
PACE	Preoperative Assessment of Cancer in Elderly
PCA	Patient Controlled Analgesia
PNS	Parasympathatic Nervous System
POSSUM	Physiological and Operative Severity for enUmeration of Mortality & Morbidity
RV	Residual Volume
SNS	Sympathatic Nervous System
TEE	Trans Esophageal Echocardiography
THA	Total Hip Arthroplasty
TKA	Total Knee Arthroplasty

V/Q	Ventilation Perfusion Ratio
VC	Vital Capacity

Introduction

INTRODUCTION

Geriatrics is the branch of medicine that focuses on health promotion, the prevention, treatment of disease and disability in later life. The term itself can be distinguished from gerontology, which is the study of the aging process itself. The term comes from the Greek "geron" meaning "old man" and "iatros" meaning "healer"

Older persons often have multiple comorbid conditions that limit their functional capacity and recovery and increase the risk of death. An initial complication is much more likely to lead to other complications; failure of one organ to function adequately is more likely to lead to failure of other organs.

A preoperative assessment is useful to identify factors associated with increased risks of specific complications and to recommend a management plan that minimizes the risks. Each person should be assessed individually, and judgments should be based on an individual's problem and physiologic status, not on age alone.

Advanced age, poor functional status at baseline, impaired cognition, and limited support at home are risk factors for adverse outcomes. However, when age and

severity of illness are directly compared, severity of illness is a much better predictor of outcome compared to age. Emergency operations carry a greater risk compared to elective operations in all age groups, particularly elderly persons.

The aggressive attack on the orthopaedic ailments of the elderly is well rewarded by the results. Many old people prefer to take a reasonable chance to achieve a happy and satisfactory quality of life by having a major operation than to linger on in pain, unhappiness, and without independence.

Total hip arthroplasty (THA) has proven to be one of the most successful procedures performed in orthopedic surgery. This has been verified in numerous long-term studies that have reported clinical success rates in excess of 90% after a minimum of 10 years' follow-up.

Total hip arthroplasty is also one of the most common elective surgeries performed in older adults. It is estimated that approximately 1-3% of the older adult population (those 65 years and older) will undergo THA at some point, with the average age being 66.

With the increasing life expectancy, a greater number of elderly patients are being referred to an orthopaedic department to have elective total knee arthroplasty (TKA). Total knee arthroplasty should be considered in the very elderly only after carefully balancing the benefits of surgery against the risks of surgery.

CHAPTER 1

PATHOPHYSIOLOGICAL CHANGES IN GERIATRICS

THE PATHOPHYSIOLOGICAL CHANGES IN GERIATRICS

The most important generalization from physiologic studies of aging is that the basal function of the various organ systems is relatively uncompromised by the aging process.

However, functional reserve and the ability to compensate for physiologic stress are reduced (Fig. 1).

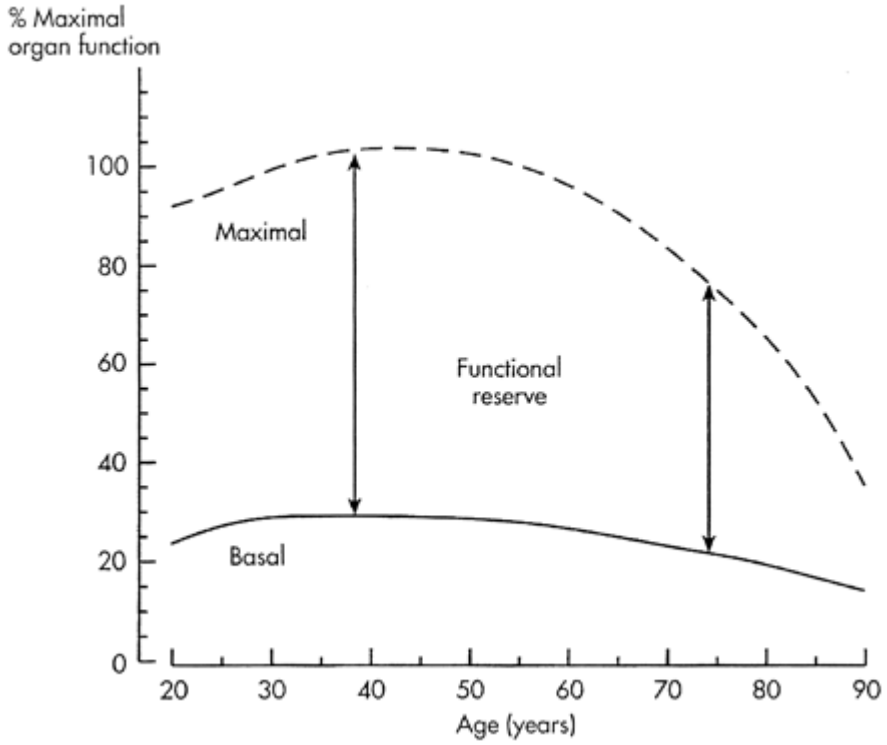

Figure 1.The Relationship between maximal (broken line) and basal (solid line) physiologic function. (Muravchick .1996)

Functional reserve is the difference between maximal and basal function. Aging inevitably reduces functional reserve even in individuals who are physiologically "young." The configuration of the curve for basal function is adapted from longitudinal measurements of total (not weight-specific) basal metabolic rate. **(Falk. 1998)**

Cardiovascular and Autonomic Nervous System Aging

With advancing age, the autonomic nervous system (ANS), heart and blood vessels become less capable of maintaining hemodynamic stability. a diminution in the tonic influence of the parasympathetic nervous system (PNS), a decline in the responsiveness of beta receptors and a progressive replacement of supple, functional cardiac and vascular tissue by stiff, fibrotic material. **(Lakatta , et al.1994)**

With advancing age, increasing arterial rigidity tends to elevate the systemic vascular resistance (SVR). Increased sympathetic nervous system (SNS) activity may also contribute to the increase in SVR, although this age-related change is controversial in its magnitude and importance. Hypertension in the elderly is characterized by a disproportionate increase in systolic pressure. In consequence, the left ventricle (LV) must work harder to

eject blood into a more rigid aorta. This chronic strain eventually causes the LV to become hypertrophied. **(Tresch, MCGough .1995)**

Veins are also subject to progressive stiffening with age. The decreased compliance of the capacitance system reduces its ability to "buffer" changes in intravascular volume. Thus, aging can exaggerate the hypotension that results from blood loss, as well as from the peripheral pooling of blood with general or conduction anesthesia. Increased stiffness of the (hypertrophied) elderly cardiac ventricle impairs diastolic filling, and could cause a reduction in end-diastolic volume. **(Falk. 1998)**

As aging impairs both the diastolic filling and the chronotropic and inotropic responsiveness of the heart, the ability of the older patient to cope with perioperative stress is predictably impaired. Increased metabolic demands, such as those imposed by sepsis or postoperative shivering, may not be met when the maximal CO and DO2 are limited by aging. In addition, atherosclerosis may convert a moderate degree of hypotension into an intolerable reduction in cardiac, cerebral or renal blood flow. **(Rooke , Robinson . 1997)**