Introduction: Population Aging, Healthcare Systems and Surgery

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For want of a nail the shoe was lost.
For want of a shoe the horse was lost.
For want of a horse the knight was lost.
For want of a knight the battle was lost.
For want of a battle the kingdom was lost.
And all for the want of a nail.
John Gower, 1390, Confessio Amantis v. 4785–4787

As in many developed and developing countries, the population in Europe is rapidly aging. According to data from the European Union (Publications Office of the European Union, European Commission: Demography Report. Short Analytical Web Note, 2015), by January 2014, 18.5% of the European population were 65 years and older and 5.1% were 80 years and older. The proportion of European citizens over 65 years old has increased by 4% since 1994. The proportion of Europeans aged 80 years or more is expected to increase to 7.1% in 2030, 9.0% in 2040 and 10.9% by the middle of the century.

A great amount of ink was spent in celebrating the Baby Boomer generation, the people born in the decades after the conclusion of World War II. The enthusiasm induced by the end of the hardest war the human race has ever experienced created the conditions for advancements in many fields and made possible for a great part of that generation to become wealthier, more physically fit and more active than ever before. Claiming the right to wellbeing also allowed hope for a better world to consolidate. All of this laid the foundations for generally better life conditions, at least in Western countries, and made it possible for many of the "baby" boomers to become today's "older" boomers.

Even though the elderly are an inhomogeneous population and a great disparity in health status, resource availability and education exists among individuals, any rough comparison between today's "young old" persons and their parents highlights the enormous advantages impressed on aging processes by better environmental conditions and advances in healthcare. Nevertheless, in all the advanced countries, the aging population represents an enormous challenge for healthcare systems.

With aging, many different risk factors for adverse surgical outcomes accumulate, from comorbidity to poly-pharmacy, reduced functional status, cognitive and sensorial impairment, and frailty. All this requires careful management from geriatrics-experienced doctors and nurses, which is not what the current educational courses are designed for. Consequently, dedicated educational tools, such as this book, are needed and should be more widely implemented at both university and non-university level, with the aim of filling the gap. Together with the need for surgery and anesthesia to open their doors to geriatric medicine, a deeper understanding about the complex needs of geriatric patients is required; humanity, understanding, innovation and expertise should be the basic attitudes of doctors dealing with older persons.

In addition, value redefinition and uncertainty about common reference values make decision-making and patient–doctor communication demanding issues. Involving patients in the decision-making process should be regarded by both doctors and healthcare providers as a fundamental measure to implement in the care process.

A string of caveats has accompanied the debate about the costs and benefits of surgery in the oldest old, also considering awareness about escalating treatment costs and hospital stays, and global care of the patient in the perioperative period. The contemporary debate on the economics of care found some positive solutions in the practice guidelines and in evidence-based medicine, nursing and surgery. However, overcoming the challenge of increasing costs will be impossible without close cooperation among doctors of different specialties, healthcare providers and governmental institutions.

In such a landscape and despite the residual amount of ageism in some sectors of medicine, geriatric surgery has become more and more frequently performed, even in the oldest old, and it is surprising that the fastest-growing segment of the surgical population is currently represented by patients over 85. Many factors have contributed to the expansion of this area; together with increased life expectancy and consequently a higher proportion of older people, an increased need for surgery has been reported among the elderly, mostly due to degenerative and traumatic causes.

Oncologic surgery in older people is continuously growing. With aging, in fact, the ability of cells to respond to proliferative and stress-causing agents decreases, aberrant molecular responses to stressing stimuli can occur and an increased risk of oncogenesis can appear. Cancer development and progression in the elderly is also influenced by decreased immune function. Colon, lung, breast, pancreas and prostate are the most frequent cancers that develop in the elderly.

Degenerative processes affecting joints and bones are another cause of increased need for surgery among the elderly. As increasing age leads to increasing vulnerability in the musculo-skeletal system, the need for joint replacement increases too. This kind of surgery can significantly improve patients' health and well-being. Traumatic events, such as spontaneous falls or accidents, dramatically contribute to the increase in the rate of older patients undergoing orthopedic surgery, hip fracture repair being in pole position. The hip, knee and shoulder are the joints most frequently treated by a surgical approach in the elderly.

Cardiovascular surgery, ranging from aortic procedures to minimally invasive cardiac valve repair, has in recent years seen an enormous increase among the elderly. Currently, almost 70% of procedures are performed on patients of 65 years or older. The development of minimally invasive techniques such as trans-aortic valve implantation (TAVI) has also allowed compromised patients to undergo surgical treatment and has robustly contributed to the expansion in the number of older cardiac surgical patients. As with all the other surgical procedures in the elderly, comorbidity and functional age rather than chronological age influence surgical outcome.

Among minor surgical procedures, geriatric ophthalmic surgery and endoscopic procedures have expanded enormously in recent years. Following the last "Eurostat Report on surgical operations and procedures statistics" (October 2015: http://ec.europa.eu/eurostat/statistics-explained/index.php/Surgical_operations_and_procedures_statistics), cataract surgery and colonoscopy represent the most common procedures performed in European countries. In analogy with what has been observed in the US, it can be assumed that older patients represent more than 80% of the global ophthalmic surgical volume of activity.

Advancements in both surgical and anesthesia techniques are among the main factors that have allowed this successful expansion to occur; however, it is mostly in the field of perioperative medicine that the key to successful geriatric surgery can be found. The pillars are comprehensive preoperative assessment, preoperative optimization, medication reconciliation, proactive intra- and postoperative management, carefully planned hospital discharge and care continuity. Methodological keys coincide with a team-based and patient-centered approach, adoption of dedicated clinical pathways and effective, supportive and understanding communication strategies. Both the conceptual paradigm of the bio-psycho-social model of medicine and patient participation in care processes and decision-making (patient empowerment) represent the main referral principles for this text. All the topics, from demographic data to guidelines, were approached with the purpose of drawing a portrait of geriatric surgery as it is performed in Europe; probably due to the still limited interest the topic has received so far at the European level, this has not always been possible.

This book was conceived on the basis of these principles; for all who contributed to it, the idea of caring for not the medical condition but the "person" affected by that condition was the driving force. The spirit of this book is that of inspiring colleagues involved in geriatric surgery as well as healthcare managers who are in charge of planning or implementing dedicated clinical pathways.

We hope to have been able to offer our readers, together with a scientific text, a useful tool to improve quality of care, clinical results and patient satisfaction.

Section 1 Preoperative Evaluation

Chapter 1

Aging and Age-related Functional Changes

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The perfect racing car is the one which breaks down a moment after the finish line.

Enzo Ferrari

Introduction

While aging starts with being born and is part of life, the duration of life has progressively expanded over time from prehistory to present times. In the last century, lifespan has taken a huge jump and today humans are living longer than ever. Now the post-World War II generation is entering its senior years, and the geriatric population will increase tremendously in the next few decades.

Surgery dates from the Neolithic period, but major advancements have occurred in recent decades that have allowed for previously unimaginable procedures. Aging is associated with both a reduced capability to cope with external stressors – such as surgery – and an increased need for surgical care to treat different conditions. So, aging and the need for surgery have been proceeding in parallel and this has allowed octogenarians and over to become the fastest growing segment of the surgical population in most advanced countries.

This chapter will examine the definition of aging and aging processes and will provide some keys to understanding how age-related functional changes may interfere with perioperative phenomenological events.

Definition of Aging

An age of 65 years is widely accepted as the threshold for being considered "older," but – as this definition is not universally applicable – there is no standard numerical criterion presently in use. Persons aged 65–74 years are generally designated as "young old", those aged 75–84 years "middle old" and older than 85 years "oldest old."

Individuals age at different rates, and defining aging could be difficult, mostly because it is not the sum of all the diseases that marks the limit, but principally diminished physiological reserves. Most evolutionary biologists define aging as "an age-dependent or age-progressive decline in intrinsic physiological functions, leading to an increase in age-specific mortality rate and a decrease in age-specific reproductive rate." Another definition considers aging "a decline or loss of adaptation occurring with increasing age, caused by a time-progressive decline in forces that regulate natural selection."

While aging appears to be an almost universal feature of life, aging rates and lifespan show great diversity, even within humans. At the same time, people are often interested in learning what they can do to live longer and to remain healthier during their later years, and views about aging are changing rapidly.

Chronological and Biological Age

Older people are as heterogeneous and varied a group as the rest of the population; this is essentially due to differences between chronological and biological age. Whereas chronological age coincides with the amount of time a person has lived, biological age results from the sum of aging processes, associated conditions, lifestyle and genetics.

Various descriptors of biological age, including "successful aging," "frailty" or "telomere measurement," have been proposed (Kim and Jazwinsky 2015). However, no quantitative evidence-based measure exists for clinical or research purposes. Comprehensive Geriatric Assessment (see Chapter 2) is a set of measures that explores health and functional status and offers a reliable appreciation of biological age.

From a physiological standpoint, aging is characterized by progressive, interindividual variation and not standardized constriction of each organ system's capacity to maintain homeostasis in the face of challenge. Individuals become more dissimilar as they age, belying any stereotype of age. Thus, whereas biological age outlines a personalized, multifaceted profile that may help in predicting outcome after a stressful event, chronological age should be essentially regarded simply as a demographic variable.

Theories on Aging

Aging is a large and complex topic, and presently there are more questions than answers. Historically, from a biological point of view, evolution was not on our side regarding longevity, because it took place in an era of scarcity, whereas today many of us live in an era of abundance. However, our DNA really hasn't changed very much in the past 100,000 years.

More than 300 theories have been postulated to explain aging (Figure 1.1). Most refer to the "programmed aging" and "wear and tear" paradigms. The first group includes the neuroendocrine theory of aging (biological clocks to regulate the aging process), the immune theory (the immune system as a pacemaker of the aging process) and the finite cell division theory (human fibroblasts in culture can only divide a limited number of times). In the second group, free radicals, metabolic rate, error catastrophe, DNA damage, glycosylation and decreased protein function are postulated to play a role in the aging process itself. Cellular waste accumulation-based theories have also been postulated.

However, the biological process differs from diseases of aging, and most of the theories suffer from the fact that they take one well-documented aspect of aging and try to explain from it the whole phenomenology of aging (Armbrecht and Coe 2000).

The term "senemorphism" has been recently proposed (Siqueira Trinidada *et al.* 2012) in regard to a plastic aging phenotype that can be generated through genetic pathways in response to environmental conditions. The authors stressed the importance of caste, reproduction and diet, taking into account effects of caloric restriction on oxidative damage, expression of several genes, stem cell loss, hormone homeostasis, fitness and cause of death. The conclusion was that aging cannot be regarded as a single process, rather the aging phenotype depends on how environmental conditions influence the expression of genes.

A new view on some old evolutionary theories is currently under discussion (Globerson and Reznick 2011). The theory of mutation accumulation proposes that genes beneficial in early life are favored by natural selection over genes beneficial late in life and young organisms are favored over old by their contribution to creating a new generation. This means that the power of natural selection fades with age, making it possible for hazardous late-acting genes to accumulate with old age. Another theory (antagonistic pleiotrophy) claims that the same genes that are beneficial at younger ages become harmful at older ages, and can have an effect on several traits of the organism.

But, in spite of many theories explaining negative effects of aging processes, having a biological age that is younger than the chronological one today seems a feasible perspective, with the maintenance of physical and cognitive independence until old age. Contrary to the stereotype of later life as a time of loneliness,

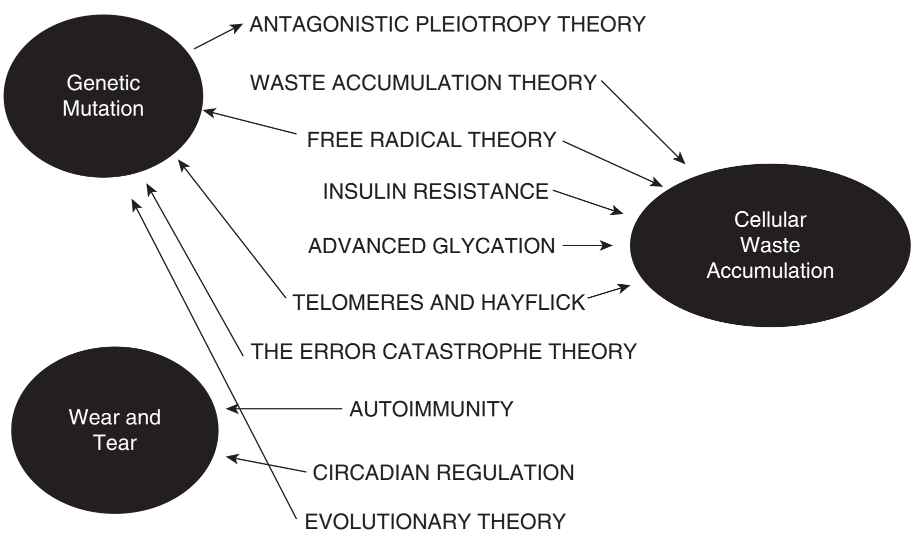

Figure 1.1 Theories on aging (Viña *et al.* 2007), reproduced with the permission of John Wiley.

depression and decline, a growing body of research shows that, in many ways, life gets better as we get older. Evidence indicates that our moods and overall sense of wellbeing improve with age.

Effects of Aging on Organs and Apparatuses

The Concept of Homeostenosis

Homeostasis is the process through which the body maintains internal equilibrium. Age inevitably induces a progressive reduction in the global functional reserve and the physiologic reserves of every organ and system, which become less resilient. So, homeostatic mechanisms deteriorate with aging, although there is wide variability in this dysfunction. In addition, with aging, more physiologic reserves are required to maintain homeostasis when the body is not at rest, and organisms become less resistant.

Homeostenosis is the characteristic, progressive constriction of homeostatic reserve that occurs with aging in every organ and system (Khan 2017). Stenosis refers to the narrowing of a structure. In the aging process, it means an encroachment on function, that in Figure 1.2 corresponds to the progressively smaller area laying under the physiologic limit curve. With aging, homeostenosis increases the vulnerability of organs to disease, although a homeostenotic system is not necessarily diseased. When the body undergoes stress states such as exercise, trauma, infection or surgical aggression, physiologic reserves are used to maintain homeostasis. The greater the stress, the more physiologic reserves are needed.

As a result, a stress easily overcome by the young organ (represented in the left side of the figure) may put the older organ's ability to maintain homeostasis beyond the physiologic limit, leading to an acute injury or disease state (see the right side of the figure, where a sharp decline in physiologic reserve is represented). This trend illustrates the reduction in reserves that occurs at the most advanced ages and explains why the oldest individuals frequently become frail, susceptible to more disease and injury, and less able to recover from stressful situations. Homeostenosis highlights the reduced ability in older subjects to recover after an aggressive or stressful state (Troncale 1966).

Functional Decline

All organs and apparatuses lose their functional reserve with lifespan. The rate of decline varies depending on the organ and system, and on individual characteristics mainly associated with healthy habits, quality of life and probably genetics. It is noteworthy that in the global drop-off of functional reserve, 80 years old marks a sharp limit for all organs and systems. Functional changes occur in all organs and apparatuses; in the following sections, changes in organs that are most relevant to the perioperative course are described.

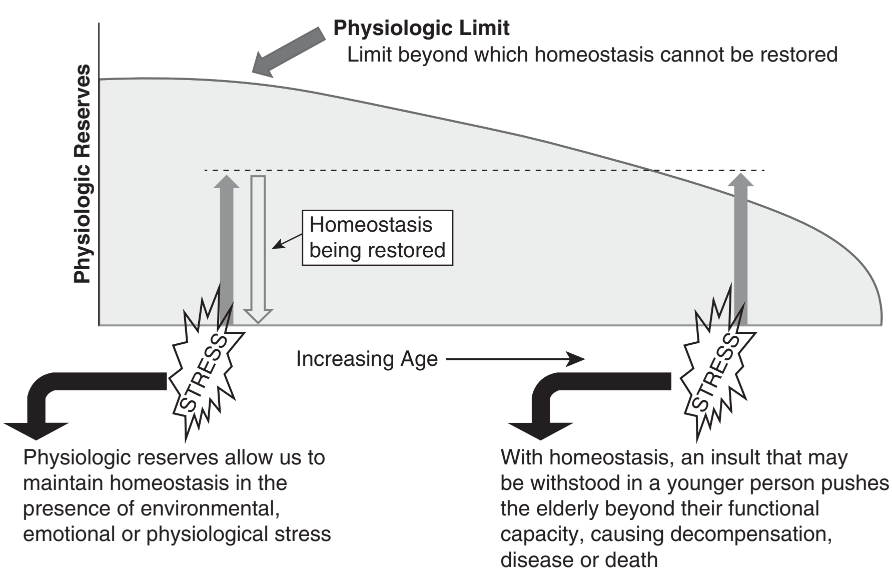

Figure 1.2 The graph shows the process of homeostenosis as a function of aging. At young ages functional reserves overcome needs when facing a stress situation (left side). With increased age, this reserve can be lower than needed, entering homeostenosis (right side). (A black and white version of this figure will appear in some formats. For the color version, please refer to the plate section.)

Respiratory System

Aging is marked by significant changes in the respiratory system. Lung function and capacity reaches its maximum around the age of 20 years and is maintained for about 10–20 more years (Smith 1986). Deterioration then sets in, as some 1% of capacity is lost with each year of life (Wahba 1983).

The most important changes consist of reduced elastic recoil of lungs, decreased compliance of the chest wall and diminished respiratory muscle force. Elastic recoil begins to decrease at the rate of 0.2 cmH_2O each year after the age of 20, leading to a loss of 50% at around the age of 50 years (Janssens *et al.* 1999). Senile emphysema, increased residual volume and functional residual capacity are the main consequences. Changes in chest structure (kyphosis, vertebral collapse, calcification) reduce rib mobility and chest compliance, leading to increased breathing work and reduced functional reserve in acute conditions. Decreased respiratory muscle strength can decrease maximal inspiratory and expiratory force by as much as 50%.

All these changes lead to a 20% reduction in the surface area available for gas exchange and modify the ventilation–perfusion ratio. Gas exchange surface reduces from approximately 75 m^2 at 30 years to 60 m^2 at 75 years, and – by the age of 90 years – 30% of the surface available at 30 years may have been lost.

Declines in reflexes governing coughing and swallowing, and diminished sensitivity to hypoxia and – to a lesser degree – to hypercapnia, also occur.

The changes described above are important causal and concausal factors for postoperative atelectasis, respiratory failure, aspiration and infection.

Cardiovascular System

The main cardiovascular changes induced by aging are related to replacement of flexible, functional cardiac and vascular tissue by stiff material. As a result, compliance of cardiovascular structures progressively reduces. The large arteries of the body lose their elasticity, with a stiffer aorta resulting in increased peripheral resistances, that are further increased by the increased sympathetic tone that establishes with aging.

The aortic valve is the cardiac valve most frequently affected by age-related pathological changes. Blood pressure normally increases and may remain slightly high, even if treated. A variable degree of left ventricular hypertrophy develops as an adaptive mechanism to the increased peripheral resistance. Hypertrophy is accompanied by inadequate tissue perfusion, leading to myocardium–coronary-artery disproportion and risk of ischemic disorders.

Clinically important diastolic dysfunction likely involves poor ventricular relaxation in early diastole, as well as the natural ventricular tissue stiffening from aging and hypertrophy. This predisposes to heart failure, pulmonary congestion and cardiac decompensation.

Stiffening in veins reduces the ability to buffer changes in volemia and the capability to compensate vasodilation. At the autonomic nervous system level, both reduced β-adrenergic and baroreflex responsiveness further reduce the compensatory tachycardia in response to hypovolemia.

To eject blood into a more rigid aorta, the left ventricle has to put in an increased amount of work. In the older heart, the reduction in functional reserves limits the extent to which cardiac output and peripheral oxygen delivery can be augmented to compensate increased metabolic demands induced by exertion, sepsis or shivering. In the presence of atherosclerotic lesions, this reduced capability to defend general and regional flow against the usual perioperative challenges can cause even moderate hypotension to turn in intolerable reduction in cerebral, cardiac or renal flow, with consequent increased risk of ischemic complications (see chapter 36).

Cognitive function

With aging, important structural and functional alterations occur within the central nervous system, consisting of diffused atrophy, reduced number of neurons and diminished density and activity in both neurotransmitters and neurotransmitter receptors; with the global population aging, cognitive impairment has become a major challenge worldwide.

Over decades, brain volume decreases by approximately 20% compared to a person in their twenties. The more affected areas are the frontal cortex, putamen, thalamus and nucleus accumbens. Significant structural and functional age-related changes also affect cerebral circulation, consisting of a certain degree of engorgement of the ventricular system and reduction in cerebral blood flow. Whereas in the course of healthy aging the auto-regulation of cerebral blood flow is maintained, pathologic vascular alterations significantly reduce the effectiveness of this compensative mechanism (Whalley *et al.* 2004).

A certain degree of decline in speed of thinking and working memory is usually observed across a population as a consequence of physiologic brain ageing, whereas other cognitive functions, such as verbal ability, are maintained. Fluid intelligence decreases with aging, however a relevant role in preserving the daily problem-solving ability observable in cognitively non-impaired older subjects is exerted by knowledge and experience (Chen *et al.* 2017).

Cognitive decline is not only attributable to cell death, but also to alterations in synaptic plasticity and interneuronal connectivity. These phenomena are more relevant in regions of the brain (e.g. the limbic system or the association cortex) in which function most frequently declines in the course of aging. At the same time, changes in brain enzyme production, receptors and neurotransmitters can be observed; consequences of reduced levels of acetylcholine and AChC-receptors and reduced levels of dopamine and dopamine receptors are motor dysfunction, memory impairment and depression.

Together with these alterations, possible reduction in peripheral blood flow whose effects might contribute in the cognitive decline can be observed.

Cognitive impairment is an important predisposing factor for postoperative cognitive (see Chapter 38) and non-cognitive complications.

Renal system

Aging significantly affects kidney structure, renal blood flow and renal function. Between the ages of 40 and 80, approximately 20% of the renal mass is lost, mostly from the cortex. Microscopically, a reduction in the number of functional glomeruli can be seen, but both the size and the capacity of the remaining nephrons increase for a long time, partially compensating for this loss (Abdelhafiz *et al.* 2010).

Beginning around the age of 40, glomerular filtration rate (GFR) decreases by approximately 1 ml/min/year. This decline is accompanied by a gradual loss of muscle mass and is rarely associated with an increase in serum creatinine, making this parameter a poor indicator of GFR in these patients.

Age has no effect on electrolyte concentrations or the maintenance of normal extracellular fluid volume. However, overall, the adaptive mechanisms responsible for regulating fluid balance are impaired in the elderly, and the capacity of the kidney to dilute and concentrate urine progressively reduces. Moreover, older individuals have decreased thirst perception and often fail to increase water intake when dehydrated. In older patients a sodium load requires more time to be excreted and it is harder to retain sodium when dietary sodium intake is reduced, making these patients highly vulnerable to sodium metabolism alterations and, as a result, more predisposed to hemodynamic instability (Zhou *et al.* 2008).

Postoperative renal complications are often related to the pathophysiologic changes reported above (see Chapter 40).

Temperature regulation

Temperature control is impaired in the elderly. Elderly patients neither shiver nor vasoconstrict in response to cold until their temperature has fallen to a level significantly below that required for activating these mechanisms in the younger adult population. Therefore, they are more prone to hypothermia, especially over the age of 80. Perioperative hypothermia persists for longer in geriatric patients, predisposing them to a wide spectrum of postoperative complications.

The Older Surgical Patient: A “High-consumption/Low-yield” Engine Enrolled in a Promising Race

Older surgical patients have high energy consumption for basal functioning and reduced energy reserves for extra tasks. This discrepancy is often further increased by associated illnesses, the medication required to treat them and a number of non-clinical factors, ranging from social to psychological. For a long time, this has caused their exclusion on principle from surgical care, often on the basis of chronological age only.

In recent years, the pressure exerted by the expansion of the aged surgical population – together with significant advancements in surgery and anesthesia and a better knowledge of risk factors for adverse outcomes – has modified this attitude, allowing geriatric surgical care to become a common daily practice, routinely followed by favorable outcome, increased lifespan and improved quality of life. Nevertheless, this field continues to represent a challenge, due to the high complication rate and loss of functional capacity after hospital discharge.

In times of modeling, cybernetics and system sciences, what can we learn from the structural dynamics of the aging process itself?

Interindividual variability in preoperative functional capacity is probably – at least in early old age – the main critical element affecting the final result. This implies that generalization is a deleterious methodological key when approaching senior surgical patients. Also, it implies that we need to collect adequate information before deciding whether to submit a patient to surgery or not. As reported in Chapter 2, the way surgeons and anesthetists traditionally evaluate adult patients before surgery doesn't capture this interindividual variability presented by senior patients. In practice, redesigning the traditional preoperative pathway in accordance with principles of multidisciplinarity and a team approach is an unavoidable part of the process (see Chapter 9).

Resistance, the ability to be unaffected by something adverse, is reduced in the elderly. In the case of surgery, reduced resistance to stress means that a ceiling effect exists for the amount of pathophysiological stimuli elderly patients can face without any damage; in practical terms, this implies that every effort to limit the invasiveness of the procedure, sudden hemodynamic troubles and increased metabolic demand should be made when planning a surgical approach or selecting an anesthesia technique (see Chapters 31 and 20).

Resilience, the ability to return to the original shape/state, is also reduced in the elderly. Despite their functional interindividual variability, the oldest patients (roughly beyond 80–85 years) share a pattern of being on a "functional cliff." This implies that in the oldest old, even minor adverse events can start a series of subsequent cycles progressively moving away from the prior condition and evolving toward catastrophe. This also occurs with the evolution of frailty: preventing further impairments is the sole mechanism capable of arresting the drop. Avoiding invariable approaches, tailoring compensative solutions on the basis of individual needs and carefully anticipating recovery trajectories are essential to the care of older surgical patients (see Chapters 33–42). Under a practical profile, close continuous observation, careful management of every step and cautious evaluation of the cost/benefit ratio before any decision are indispensable measures.

Comprehensiveness is probably the best conceptual hint coming from geriatric medicine, which shifts the focus from a monodimensional approach centered on the cause of the illness to a multidimensional one, extended to the "ensemble" represented by the patient and the condition affecting him; it is through this methodological key that surgery and anesthesia in the elderly can find, beyond their technical excellence, their higher expression.

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Chapter 2

Preoperative Evaluation from Traditional Consultation to Comprehensive Geriatric Assessment: A 360° Perspective

Gabriella Bettelli

The beginning is the most important part of the work.
Plato, The Republic

Preoperative Evaluation

Screening patients before operations is a basic step in the surgical pathway; the way it is performed deeply influences surgical outcome in terms of both complication rate and mortality. Fundamentally, surgical evaluation establishes whether the patient's status is compatible with surgery and likely to benefit from it, and selects the most suitable procedure. Preoperative anesthesia consultation pinpoints patients at risk of increased perioperative morbidity and mortality, and designs strategies to reduce risk. Over the years, inputs from different professional areas together with changes in demographics and epidemiology have contributed to converting preoperative evaluation into a more complex process, resulting from multiple actions and often requiring the contribution of different competences.

Clinical practice of preoperative evaluation of the elderly widely varies in Europe, according to the institution where it takes place, its organizational structure, the presence of dedicated units (see Chapter 45), resource availability and nation-based law provisions.

Consistent evidence indicates that traditional preoperative evaluation of the elderly does not capture all those elements that are needed to both measure the risk of complications and plan targeted perioperative strategies, whereas interdisciplinary, comprehensive and team-based preoperative evaluation can significantly improve the surgical outcome. This represents the paradigm on which to build an effective, dedicated and evidence-based evaluation process; to succeed in coping with the increasing number of older patients undergoing surgery (now accounting for 50% of the surgical population), its adoption should be applied on a massive scale.

With the aim of offering a unitary vision, this chapter provides a 360° approach to preoperative evaluation; more detailed information on crucial aspects to consider are provided in Chapters 3–11.

Preoperative Evaluation of the Elderly: State of the Art

Points of Consensus among International Guidelines

A number of guidelines (GLs) issued between 2009 and 2016 screened the appropriate evidence on perioperative care of the elderly; even though conceived at international level and probably not entirely applicable in Europe, they represent robust elements to refer to when designing the process of care, from preoperative evaluation to the postdischarge phase (Box 2.1).

With reference to preoperative evaluation, a minimum acceptable standard should include, together with traditional praxis, the following areas:

- cognitive function and mental capacity in decision-making
- depression
- risk of postoperative delirium (POD)
- alcohol or other substance abuse
- cardiac evaluation in accordance with ACC/AHA and ESA/ESC GLs on non-cardiac surgery
- risk of postoperative respiratory complications and adoption of preventive strategies
- functional status (FS) and risk of fall
- frailty
- nutritional status and adoption of adequate preoperative interventions
- chronic medication, identification of potentially inappropriate drugs and perioperative medication management

BOX 2.1 GLs on Perioperative Care of the Elderly

- ESA – European Society of Anaesthesiology:
  - Evidence-based and consensus-based guideline on postoperative delirium (ESA 2017)
- ACS NSQIP/AGS – American College of Surgeons National Surgical Quality Improvement Programs/American Geriatric Society:
  - Optimal Perioperative Management of Geriatric Patients: A Best Practice Guideline (2016)
- AGS – American Geriatric Society
  - Guidelines on Postoperative Delirium (AGS 2015)
- AAGBI – Association of Anaesthetists of Great Britain and Ireland:
  - Perioperative care of the elderly 2014 (AAGBI 2014)
- SIOG – International Society of Geriatric Oncology:
  - Perioperative care of older patients with cancer (SIOG 2012)
- SIGN – Scottish Intercollegiate Guidelines Network:
  - Management of Hip Fracture in Older People: A National Clinical Guideline (SIGN 2009)

- surgical treatment goals and accordance with patient's expectations
- family and social support.

These points reflect the wide spectrum of variables to consider before deciding about surgery in the elderly. Comprehensive Geriatric Assessment (CGA; Inouye *et al.* 1998) – a set of information conceived to comprehensively assess FS and health needs in elderly patients – is the most used tool to assess the majority of the aspects mentioned above.

Preoperative evaluation of the Elderly: A Context-sensitive Issue?

Who Should Evaluate Elderly Patients?

Apart from country-to-country differences induced by nation-based factors influencing clinical practice, the way preoperative evaluation is organized mostly depends on the local organizational context. Evidence from GLs does not specify who should be in charge of preoperative evaluation, and the sole applicable guideline-based principles are:

- regardless of who takes part in it (doctors or nurses), the evaluation process should be concluded by an anesthesiologist (ESA 2011)
- multidisciplinary care and an expanded role for senior geriatricians and senior anesthetists in coordinating perioperative care should be encouraged (AAGBI 2014).

Implementing comprehensive preoperative assessment strategies and interfacing all professionals involved in the process requires careful planning; building such a mechanism outside of dedicated care pathways and/or without indicating who is in charge of the process governance, may be challenging anywhere. What is clear is that neither can the usual 10-15 minutes per consultation model be satisfactorily applied to the elderly, nor is that standard compatible with the communication needs of the elderly. Furthermore, evidence indicates that CGA is fully effective when extended to the whole care process, not when just performed preoperatively.

The first organizational implication is that, as geriatric competences are needed to accomplish these goals, geriatric nurses or doctors should be involved in the process. Alternatively, supplemental education in geriatric assessment should be provided to surgeons and anesthetists. In the personal experience of the author, instructing anesthetists in CGA and frailty assessment offers a feasible, successful, cost-effective and easily manageable solution.

The main surgical field where geriatricians are involved is orthopedic surgery (ortho-geriatric units, see Chapter 24). Less frequently, essentially due to their low numbers, they are involved in other surgical specialties.

In institutions where geriatric doctors/nurses are not operating or there are no dedicated units, providing supplemental education to surgeons and anesthetists offers a cost-effective alternative and represents a reasonable solution. Anesthetists, who are by definition perioperative doctors, are fully eligible to cover such responsibility.

Who Should be Considered Elderly?

A universally accepted definition of elderly does not exist; a diffused criterion considers persons aged