Aging and Erectile Dysfunction

Laura C. Echeverri Tirado, BSc,[1] Julio E. Ferrer, MD,[2] and Ana M. Herrera, MD, PhD[3]

ABSTRACT

Introduction: Erectile dysfunction (ED) has been identified as the most common sexual problem that affects mainly men older than 40 years. According to this, there is a strong evidence linking ED with a number of medical conditions and related risk factors that had been described in the literature, yet there is limited information about the specific mechanism involved in the establishment of ED among healthy older men.

Aim: The purpose of this study is to review the literature and mainly focus on the basic physiologic and vascular alterations and morphologic changes related to aging and its related risk factors, summarizing the main and the latest findings in basic research of tissue remodeling process involved in ED pathophysiology.

Methods: Data from the pertinent literature were examined to inform our conclusions.

Main Outcome Measure: This article defines the morphologic and physiologic mechanisms involved in the process of aging, which play a key role in the development of sexual dysfunction.

Results: ED has been considered as a nonlife-threatening condition, but the recognition of its multiple comorbid conditions, the importance of aging process over the male sexual performance among them its relation with vascular and nitric oxide content alteration, as well as penile morphologic changes, and the fact that it is a widespread under-reported disease, have established the need of an early diagnosis and treatment of this common sexual problem within the general male population.

Conclusion: In this case, morphologic and physiologic mechanisms that are involved in the aging process play a key role in the development of sexual dysfunction in the absence of any other clinical or medical condition.

Key Words: Aging; Erectile Dysfunction; Tissue Remodeling

INTRODUCTION

Erectile dysfunction (ED) is defined as a consistent or recurrent inability to achieve and/or maintain a penile erection sufficient for sexual activity. This condition has been identified as the most common sexual problem that affects mainly men older than 40 years.[1–3]

According to the World Health Organization (WHO), due to the increase in life expectancy, by 2025 about 15% of worldwide population will be over the age of 65 years. This will also relate with increased prevalence of ED (~322 million of cases), establishing a serious demand of healthcare policies to prevent or diminish sexual dysfunction within the male population.[1,2,4,5]

Despite the fact that this disorder has been present since ancient times,[6] it is in the past few years that sexual medicine has played an important role putting together a wide overview about ED. There is a strong evidence linking ED with a number of medical conditions such as neuropsychiatric disorders, vascular and histologic changes, endocrine abnormalities and iatrogenic causes.[3] Besides these medical conditions, there are related risk factors associated with a higher prevalence of ED, being the most important diabetes, hypertension, dyslipidemia, and coronary heart disease.[7,8]

Even though these medical conditions and risk factors are well known and have been described in the literature, there is limited information about the specific mechanism involved in the establishment of ED among healthy older men.[5,7] To that end, there are morphologic and physiologic mechanisms involved in the process of aging that play a key role in the development of sexual dysfunction in the absence of any clinical or medical condition.[9–12]

Received January 20, 2015. Accepted June 22, 2015.

[1]Basic Sciences, Universidad CES, Medellin, Colombia;

[2]Urology, Universidad CES, Medellin, Colombia;

[3]Faculty of Medicine, Universidad Cooperativa de Colombia, Medellin, Colombia

http://dx.doi.org/10.1016/j.sxmr.2015.10.011

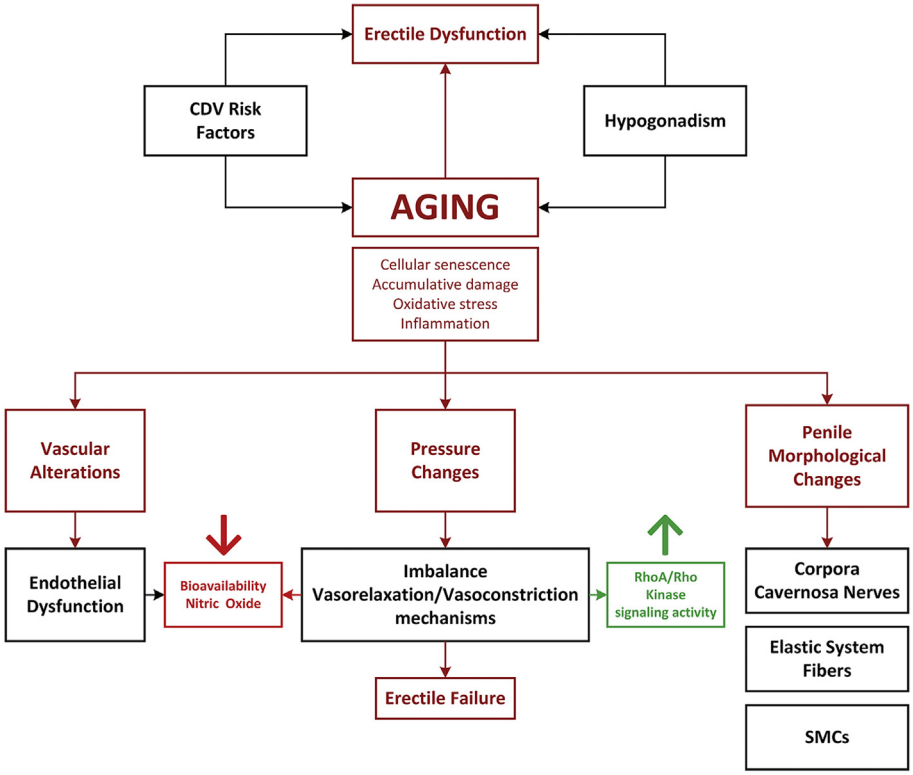

Figure 1. There are morphologic and physiologic mechanisms involved in the process of aging that play a key role in the development of sexual dysfunction. Cardiovascular risk factors and hypogonadism have a critical impact during the establishment of the aging process that could also lead to erectile dysfunction. Cellular senescence could induce oxidative stress and hence inflammation that with time leads to accumulative damage. With this overview, the main mechanisms of the aging process that drive toward erectile dysfunction include vascular and physiologic alterations and penile morphologic changes.

In this review, the authors will mainly focus on the basic physiologic and vascular alterations and morphologic changes related to aging and its related risk factors, summarizing the main and the latest findings in basic research of tissue remodeling process involved in ED pathophysiology (Figure 1).

ERECTILE DYSFUNCTION ETIOLOGIES

The NIH Consensus Statement determines that: "the multifactorial nature of erectile dysfunction, compromising both organic and psychologic aspects, may often require a multidisciplinary approach to its assessment and treatment",[3] which compels medical community to a full knowledge of its causes and age-associated risk factors, and its impact over the male reproductive system.

Regardless of multifactorial etiologies of ED, there are just few diseases that can be considered as the primary cause of ED such as hypertension, cardiovascular disease (CVD), and diabetes. In fact, ED has been considered as a possible marker for comorbid conditions including diabetes and CVD.[13–15] Despite this general clinical knowledge, most of the erectile dysfunction among older men takes place in those who are healthy but with existent numerous vascular risk factors.[5,7] Several epidemiologic studies have shown direct correlation between age and male potency: among men 40 to 70 years old showed decreased potency from 60% to 33%[9,16]; and it has been established that the risk of ED was about 26 cases per 1,000 men annually and increased with age from 1.2% per year for men aged between 40 and 49 years to 4.6% for men aged between 60 and 69 years, results from the Massachusetts male aging study.[17] Results from a population-based cohort study in Brazil showed that this condition also increased with age even with a 2.5-fold higher incidence of ED among Brazilian men compared with the Massachusetts male aging study,[18] among others.[5,7,10,19–24] According to this background, aging is considered as one of the most important risk factors for ED development.[7,12,25]

Historically, ED has been considered as a nonlife-threatening condition[26]; but it is in the past few years that recognition of its multiple comorbid conditions, the importance of aging process over the male sexual performance, and the fact that it is a widespread under-reported disease, have established the need for an early diagnosis and treatment of this common sexual problem within the general male population.[7,12,25,27]

Age Related to Vascular Alterations

Erectile function (EF) is described as a neurovascular phenomenon that demands an intact vascular endothelium;