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Sexual Health in the Elderly Population

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Abstract

Purpose of Review Among the growing elderly population, sexual health remains an important concern for individuals and couples. An understanding of the expected changes with aging and taking care of aging men and women is important for treating sexual dysfunction. Sexual health issues related to aging can be both linked between men and women and independent. The aim of this study is to determine the most important considerations that contribute to sexual satisfaction in men and women in this population.

Recent Findings Many factors contribute to the overall sexual health of men and women. Hypogonadism and erectile dysfunction both warrant thorough evaluation and consideration of treatment to improve sexual satisfaction. Underlying cardiovascular issues may be present in men presenting with these concerns. In addition to hormone replacement and traditional therapy for erectile dysfunction, therapeutic stem cell injection has shown some promise. Menopause, vaginal dryness, and dyspareunia play important roles in sexual satisfaction in women. Vaginal moisturizers, topical estrogen, and MonaLisa Touch laser therapy all may aid in improving these symptoms and ultimately sex lives. Studies have also demonstrated some benefit in populations with arousal disorders, which can be present in the elderly.

Summary Male patients often describe issues related to erectile dysfunction and hypogonadism, and issues with sexual drive. The pathophysiology is linked between these conditions and treatment of one component can provide symptom relief on a larger scale. A combination of testosterone therapy, lifestyle modifications, and therapy for erectile dysfunction relates to sexual satisfaction in men. In women, an understanding of the physiological process of menopause and offering therapy when indicated can improve the quality of sexual health and provide satisfaction to both patient and partner. While aging can diminish drive and desire, proper counseling and treatment may significantly benefit some patients. A multimodal approach involving the physician, patient, and partner will optimize care and may improve the quality of life in the elderly. This review outlines some normal changes due to aging and identifies some current treatment options for a population in which sexual health can be often ignored or dismissed. By understanding the available tools, a more comprehensive approach can be taken to achieve satisfaction in couples and individuals alike.

Keywords Hypogonadism · Erectile dysfunction · Vulvovaginal atrophy · Sexual health

Introduction

Increased life expectancy in a growing elderly population makes sexual health an important part of patient care. Men and women experience many physiological changes that impact their sexual health as they age. In a survey of 355 individuals, ages 50–90 years, 81.5% were currently involved in one or more sexual relationships [1••]. Despite 90.9% of patients reporting they wanted their physicians to ask them questions regarding sexual history, only 40.5% report ever having a discussion regarding their sexual life with their doctor [2]. By understanding the mechanisms of aging, men and women can be optimized for sexual performance with the assistance of lifestyle changes, medications, and even in some cases surgical intervention. Modifiable components of aging include improvement in cardiovascular health, treatment of hormonal deficiency, psychosocial counseling, therapy for erectile dysfunction, and reversal of vulvovaginal atrophy. We

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will review the pathophysiology of conditions affecting sexual health in the elderly population and outline the treatments available for each condition as it applies to the aging population. It is important for healthcare professionals to address this often-overlooked topic due to the stigmatization that comes with sex in the aging population.

Sexual Health and Aging in Men

Erectile Dysfunction

Introduction

ED is defined as the inability to achieve or maintain an erection rigid enough for penetration. ED increases in prevalence as men age. Seventy percent of men over the age of 70 struggle with some degree of ED, compared to 45% in their 60s and 15% in their 40s [3]. The Massachusetts Male Aging Study reported a 52% prevalence in men ages 40–70 years old [4]. While age alone is a risk factor for ED, additional risk factors among the elderly include hypertension, diabetes, hypogonadism, medication side effects, metabolic syndrome, increased body mass index (BMI), cholesterol, and decreased high-density lipoprotein (HDL) [5]. Medications known to cause ED include beta-blockers, thiazide diuretics, and antidepressant medications [6].

Given the prevalence of cardiovascular disease among the elderly, it is important to understand how cardiovascular disease impacts sexual performance. In fact, it is thought that ED may serve as a harbinger of concomitant cardiovascular disease and even mortality in some cases. Min et al. studied men undergoing cardiac stress testing and found severe coronary artery disease in 43% of men with ED compared to 17% in those without [7••]. The pathogenesis of ED in the elderly is believed to be via systemic atherosclerosis with symptoms manifesting in smaller vessels including the arterial supply to the penis. Hypertension and other peripheral artery diseases damage these small vessels over time, allowing fewer nutrients and less oxygen to reach the sex organs. In a study by Rogers et al., stenosis of the internal pudendal artery was similar in comparison to stenosis of coronary arteries (52% vs. 65%) with comparable vessel diameter [8]. Endothelial dysfunction secondary to conditions of metabolic syndrome also contributes to the pathophysiology by damaging the source of nitric oxide production in penile tissue [9].

Management

Lifestyle modifications including smoking cessation, exercise, and improved diet are mainstays of treatment with noticeable results. In one randomized trial, 110 obese Italian men with an average BMI of 36.9 who were experiencing ED were randomly assigned to a treatment group with an intensive weight loss program with monthly follow-up in the first year and bi-monthly follow-up in the second year. Control participants received general oral and written guidance. Men in the treatment group averaged a loss of 15 kg while the control group lost an average of 2 kg. The study noted that 31% of men in the experimental group had ED resolve compared to 5% of men in the control group [10••]. These findings suggest that there is an association between weight loss and resolution of ED.

Hypogonadism and erectile function have a known association, and therefore, normalization of testosterone can improve the quality of erections. According to the most recent American Urological Association (AUA) guidelines, all men with ED should have morning serum testosterone levels measured and, in those with hypogonadism, a combined phosphodiesterase type 5 inhibitors (PDE5i) and testosterone replacement therapy (TRT) may be a more effective treatment modality. Sexual satisfaction scores, rigidity of erections, and frequency of morning erections increased with primary testosterone supplementation.

Testosterone supplementation is available in several forms, including intramuscular injections, topical agents, subcutaneous implantation, and an intranasal spray. In addition to these exogenous options, endogenous agents such as selective estrogen receptor modulators (i.e., clomiphene citrate) or aromatase inhibitors (i.e., anastrozole) may increase the body's production of testosterone. Other treatments include administration of GnRH in a pulsatile fashion delivered subcutaneously by a pump. In this population, the role may be limited, as the primary benefit of this approach is in men seeking fertility preservation. A dedicated history of symptoms to differentiate the need for TRT or PDE5i plays a vital role in understanding which treatment would better improve complaints of ED [10••]. The role of addressing concurrent issues in an aging population makes the management of testosterone a critical component of treatment of ED in the elderly.

In addition to lifestyle changes, consideration of TRT in symptomatic males with hypogonadism should be considered along with PDE5i use in those not currently using nitrates for chest pain. The consideration of nitrates in patients with high cardiovascular risk may prompt counseling regarding sexual activity before any pharmacotherapy for ED. According to the AUA guidelines, men can be offered intracavernosal injections, vacuum erection devices, or penile prosthesis surgery as options with appropriate counseling.

Future directions in ED treatment include stem cell therapy as a potentially restorative treatment for ED. The goal of stem cell therapy is to replace non-functional sinusoidal endothelial cells, cavernous smooth muscle cells, and cavernous nerves, allowing for initiation and maintenance of an erection [11]. A small Korean study injected seven men with ED ages 57–87 with umbilical cord-derived stem cells. Six of the seven men

were able to regain morning erections after 6 months, though only one could maintain an erection suitable for intercourse [12]. Bahk et al. performed a clinical trial looking at seven type 2 diabetic men between the ages of 57–87 years. The trial demonstrated that injected with umbilical mesenchymal stem cells into the corpora of these 7 men coupled with PDE5i showed significant improvement with 3 reporting morning erections in 1 month, 2 with an erection suitable for intercourse for 6 months, and 6 reporting increased sexual desire [13••]. The potential benefits of stem cell therapy are reflected in human and animal studies for the treatment of ED. Extracorporeal shockwave is also under investigation as a primary treatment for ED in men but warrants further consideration pending the results of ongoing investigations.

Hypogonadism

Introduction

It is well understood through various cross-sectional studies that testosterone levels decrease with age. The European Male Aging Study (EMAS) was one of the main population studies that demonstrated in 3220 men, ages 40–79, that serum total testosterone concentration fell 0.4% per year [14]. The AUA defines hypogonadism as being testosterone deficient combined with symptoms or signs that are associated with low serum total testosterone. These changes can be associated with dysregulation of the hypothalamic-pituitary-gonadal axis at all three levels. At the gonadal level, reduction in Leydig cells diminishes testosterone production. In the hypothalamus, the rhythmic release of gonadotropin-releasing hormone (GnRH) may decrease. Finally, the pituitary produces a lower amplitude release of luteinizing hormone (LH) and follicle-stimulating hormone (FSH) [15]. Given these changes, men maintain their sexual activity and fertility later in life unlike women during menopause. These physiologic changes result in decreased testosterone and symptoms of hypogonadism.

The most prevailing complaint of elderly men regarding their sexual function is decreased libido [16]. A decrease in libido encompasses a variety of sexual elements including sexual drive, sexual thoughts, and enjoyment [17]. Men experience a significant decline in their sex drive as they age. Lindau et al. reported that in a study of 1455 U.S. men, 57–85 years of age, 28% reported a lack of interest in sex [18]. However, the relationship between testosterone and libido is not completely understood. They are strongly related at a population level; however, on an individual case by case basis, decreased libido is not necessarily a direct indicator of decreased testosterone [19]. Morales et al. found that a 2% testosterone solution provided a greater baseline to endpoint improvement in SAID (Sexual Arousal, Interest, and Drive) scores as well as HED (Hypogonadism Energy Diary) score vs. the placebo group [20]. Clinicians must also exercise caution in the evaluation of low libido, as it is often secondary to medications, depression, systemic illness, or psychogenic causes [21••]. In some cases, physicians mistake decreased libido as ED [22]. Decreased libido is often a secondary consequence of ED due to the emotional and psychological effects of ED. This is an important distinction to establish, so that treatment is guided appropriately.

Decreased androgens are associated with constitutional changes as men age. It was demonstrated that the prevalence of symptomatic androgen deficiency in men between the ages of 30–79 years old was 5.6% and increased remarkably with age to 18.4% among 70-year-olds. They noted various symptoms, such as a marked decrease in libido, ED, osteoporosis/osteoporotic fractures, lethargy, sleep disturbance, depressed mood, and low physical performance. Furthermore, they were able to conclude that no differences in symptomatic androgen deficiency existed among African American (Black), Hispanic, and Caucasian (White) group populations [23]. While tolerable in a younger population, the muscle and bone strength changes pose an increased risk to the elderly due to the potential risk of falling. The decreased muscle mass and strength correlates with frailty in elderly men, leading to an increased incidence of imperfect balance and falls, which is a known cause of morbidity in this population [24]. Decreased testosterone also leads to decreased bone mineral density and osteoporosis. Approximately 30% of men suffer from hip fractures and exhibit a higher morbidity and mortality associated with these fractures compared to women [25]. The cause of osteoporosis in elderly women is clearly established to be a direct effect of estrogen deficiency; however, in men, it is hypothesized to be a combined effect. Adequate testosterone aromatization to estradiol helps to prevent decreased bone mineral density and, in turn, age-related bone loss [26].

Management

In an attempt to counter these effects, testosterone supplementation has consistently been the routine treatment for male hypogonadism. It is important that testosterone supplementation is only provided when testosterone deficiency produces symptoms. Testosterone deficiency without symptoms, or symptoms with normal testosterone, is not indications for supplementation [27]. Gruenewald et al. performed a systematic review of the benefits and risks of testosterone supplementation for the effects of hypogonadism in the elderly population. Some of these benefits were preventing bone loss at the femoral neck, increasing bone mineral density, and increased functional status as well as upper and lower body strength, libido, ED, and mood also were improved with testosterone supplementation [28]. Testosterone supplementation is generally a safe therapy, but there are some risks to be considered, such as increased prostate volume, infertility, erythrocytosis, venous thromboembolism, and worsening of sleep apnea. The

decision for hypogonadal men to undergo testosterone supplementation should be evaluated on a case by case basis and should not be implemented in all men experiencing symptoms.

Sexual Health and Aging in Women

Menopause

Introduction

Menopause is defined as the cessation of hormone production by women's ovaries with a lack of menstrual periods for 12 months [29]. There is a transition from cyclical high levels of estrogen to varying levels of estrogen during menopause to a consistent low level of estrogen production observed in post-menopausal women [30]. The resulting changes in estrogen levels drive many of the potential pathologies of aging such as osteoporosis, dyspareunia, and decreased libido. The loss of estrogen results in unhindered osteoclast activity and bone reabsorption, leading to structurally weaker bones. Estrogen levels also mediate some of the dissatisfying qualities of sexual health noted by elderly women. Decreased estrogen sensitivity in vaginal epithelial cells results in vaginal dryness and decreased lubrication with sexual activity. Pain with intercourse, or dyspareunia, is another often-reported finding associated with physiological aging in sexually active women [31]. Despite these drawbacks, older women remain sexually active and consider this to be an important part of their life.

Decreased estrogen in women due to menopause leads to neurologic and psychosexual changes including mood, irritability, anorgasmia, impaired sexual performance, and decreased libido [32••]. The decreased libido in women is likely a consequence of the multitude of sexual problems experienced such as vaginal dryness, dyspareunia, decreased clitoral sensitivity, and decreased orgasmic intensity [32••]. The physiological changes of aging in men and women are outlined in Table 1 below.

Management

It is hypothesized that a decrease in the amount of circulating androgens may be a contributing factor to decreased libido in a menopausal female [33]. In a study of 326 women, those with fluctuating testosterone levels (3.8 to 21.5 mg/dl) reported a decline in sexual libido four times more than women who did not have fluctuating testosterone levels [34]. This may explain the relationship observed in women who received both estrogen and TRT and demonstrated a consequent recovery of sexual libido, indicating an important role in using TRT in conjunction with estrogen replacement [35]. Two large phase III studies known as Investigation of Natural Testosterone in Menopausal women Also Taking Estrogen in Surgically Menopausal women (INTIMATE 1 and 2) observed that total sexual satisfaction increased by 74% in INTIMATE 1 and 51% in INTIMATE 2, with significant improvement in all domains of sexual function in testosterone-treated women vs. placebo [36]. Results of the Women's Health Initiative in 1998 revealed concerns regarding breast cancer, endometrial cancer, increased fractures, and cardiovascular disease, which led to a decrease in hormone replacement therapy (HRT) use in women. Since that time, a number of studies show that these risk factors may be more independent of HRT than previously understood, with rates in women remaining roughly the same despite reduced HRT use [37]. While HRT may play a role, a multifactorial approach should also include physical therapy, psychological counseling, hormonal supplements, medication changes, and sexual devices (Table 2).

Vulvovaginal Atrophy/Orgasmic Changes

Introduction

Vulvovaginal atrophy (VVA) is a common cause of significant physical and emotional distress among aging women. The manifestations of VVA are primarily seen in perimenopausal women with a 4% incidence in women experiencing early menopause and 47% in women experiencing late menopause [38]. The pathophysiology of VVA is well established and believed to occur as a direct effect of decreased estrogen

Table 1 Physiologic changes of aging in men and women

Erectile dysfunction	Vulvovaginal atrophy
Decreased libido	Decreased libido
Decreased energy level	Decreased energy level
Decreased penile sensitivity	Decreased clitoral sensitivity
Osteoporosis	Osteoporosis
Decreased muscle mass/strength	Dyspareunia
Increased adiposity	Decreased orgasmic intensity/anorgasmia

Table 2 Sexual problems and treatments in aging men and women

Sexual problems	Treatment
Men	
Erectile dysfunction	- Lifestyle modifications similar to those for cardiovascular disease (e.g., exercise, smoking cessation, improved diet)
	- Testosterone replacement therapy (e.g., injections, topical agents, intranasal spray)
	- Phosphodiesterace-5 inhibitors (e.g., sildenafil)
	- Intracavernosal injections
	- Vacuum-assisted erection devices
	- Penile prosthesis
	- Stem cell therapy
Hypogonadism (decreased libido)	-Testosterone supplementation
	• Topical/transdermal, parenteral, intramuscular, oral preparations
Women	
Decreased libido	- Estrogen replacement and testosterone replacement therapy
	- Selective estrogen receptor modulators
	- Phosphodiesterase-5 inhibitors (e.g., sildenafil)
	- Nutritional supplements (e.g., ArginMax)
Vulvovaginal atrophy (e.g., dyspareunia)	- Topical agents, e.g., vaginal lubricants during sexual intercourse
	- Estradiol vaginal creams
	- Sustained-release estradiol vaginal ring
	- Oral estrogen
	- CO_2 laser therapy (e.g., MonaLisa Touch)
	- Selective estrogen receptor modulators

activity on the vaginal epithelium [39]. The vaginal epithelium thins and, as a result, there are fewer cells exfoliated into the vagina, which raises pH and disturbs the natural lactobacillus flora of the vagina [40]. Some of the reported symptoms associated with this condition include vaginal dryness, irritation, postcoital bleeding, and soreness. In addition to these symptoms, women with VVA have an increased incidence of recurrent urinary tract infections as well as urge and stress incontinence [41].

Management

The distress that arises from VVA among women drives many of them to seek treatment, either hormonal or non-hormonal. The choice of treatment depends on a variety of factors including the patient's severity of symptoms, preference, and safety and efficacy based on individual patient reports. Non-hormonal remedies consist of topical agents such vaginal lubricants used during sexual intercourse to prevent dyspareunia. Women are counseled on various lubricants, with water and silicone based being the most commonly used. A prospective double-blind daily diary study of 2453 women observed that water-based lubricants were associated with fewer genital symptoms during vaginal intercourse such as dyspareunia, burning, itching, or bleeding [42••]. Vaginal moisturizers are another form of non-hormonal therapy used on a daily basis to prevent vaginal dryness and provide more long-term relief. They are absorbed by the vaginal epithelium and lower the pH, thus mimicking the natural secretions of the vaginal mucosa [42••].

Clinicians may recommend self-care measures mentioned above for dyspareunia associated with VVA before beginning estrogen therapy; however, estrogen treatment is the standard of care. Hormonal therapy may be administered either systemically or locally. Given the higher incidence of adverse effects of long-term systemic estrogen use, most providers prefer topical estrogen for VVA. Those with a personal or family history of breast and gynecologic malignancy should be counseled on a potential oncologic risk associated with using estrogen agents. Although the optimum treatment modality and dose has not yet been established with these local regimens, the wide variety of regimens give patients options. Among these are estradiol vaginal creams containing estradiol and conjugated estrogens, a sustained-release ring that delivers estradiol, and a micronized estradiol hemihydrate vaginal tablet [43]. A systematic review looked at 19 trials with 4162 women to measure the efficacy and safety of these hormonal therapies. Overall, most of these therapies had similar efficacy in the relief of symptoms. However, there were more adverse effects associated with the tablet related to uterine bleeding, perineal

pain, and breast pain. In addition, the most favored modality was the ring due to ease of use, comfort, and overall satisfaction [44].

New treatments for vulvovaginal atrophy increase satisfaction in women later in life. One such treatment using CO_2 laser therapy, also known as MonaLisa Touch, has shown some promising results. Fifty menopausal women were given three laser treatments over the course of 12 weeks and evaluated on physical metrics, as well as personal satisfaction. Forty-two women reported no discomfort with the treatment and there was a statistically significant improvement in physical and personal metrics [45]. CO_2 laser therapy has also shown to have beneficial effects in post-menopausal women for VVA. In Eder et al., 28 healthy post-menopausal women (mean age 60.1) demonstrated a significant improvement after one laser treatment in both vaginal health index score as well as female sexual function index score. This is an encouraging and potentially life-altering sign for women unable to find symptom resolution through mainstay treatments.

Successful achievement of orgasm involves phase I of the sexual response cycle—desire, followed by arousal, orgasm, and resolution. Desire consists of sexual drive (biological), sexual motivation (psychological), and sexual wish (social) [46]. The Diagnostic and Statistical Manual of Mental Disorders (DSM) 5 has grouped two diagnoses, hypoactive sexual desire disorder (HSDD) and female sexual arousal disorder (FSAD), into one category known as female sexual interest/arousal disorder (FSIAD). HSDD is defined as "persistent or recurrently deficient sexual fantasies and desire for sexual activity" [47]. FSAD is defined as the recurrent inability to attain or maintain sufficient general arousal despite adequate stimulation. HSDD is most prevalent in middle-aged women 45–64 (12.3%), compared to women ages 18–44 (8.9%) and women over 65 (7.4%) [48]. The etiology of these disorders is multifactorial encompassing elements such as age, medications, biology, and psychology.

However, despite the undistinguished etiology, there are hormonal and non-hormonal treatment options for women experiencing sexual dysfunction. Among the hormonal treatments are hormone replacement with systemic or vaginal estrogen, androgen supplementations, and selective estrogen receptor modulators (SERMs). In post-menopausal women, treatment with estrogen combined with progesterone demonstrated improvement in sexual function, most likely as a result of the improvement of vaginal atrophy [49••]. Although off-label, topical testosterone combined with estrogen demonstrated an increase in sexual desire in post-menopausal women [50]. Ospemifene, a SERM, has been shown to significantly help with dyspareunia and is safe in post-menopausal women at appropriate doses [51]. Among the non-hormonal treatments for post-menopausal women, the ones that have demonstrated the most efficacy are sildenafil and the nutritional supplement, ArginMax. Sildenafil, a PDE5i, demonstrated effectiveness in treating the symptoms of FSAD in post-menopausal women [52••]. ArginMax showed a significant improvement in post-menopausal women, with 51% endorsing improvement vs only 8% of the placebo group endorsing improvement [53]. Flibanserin, is a 5-hydroxytryptamine 1A (5-HT_{1A}) agonist/5-HT_{2A} antagonist that acts on serotonin receptors in the central nervous system and is used specifically for FSIAD. The SNOWDROP trial specifically looked at this drug and its efficacy in post-menopausal women. The study demonstrated that compared to patients who received placebo, the flibanserin group showed significantly greater number of satisfying sexual encounters as well as a higher female sexual function index score [54].

In addition to sexual factors involved individually in male and females, it is also important to consider the couple. An interesting dynamic that was observed in one study that looked at couples and noted that both sexes reported concerns regarding the level of sexual desire (11% in women, 15% in men), however, men tended to report more dissatisfaction with their overall sexual life then women in all age groups. The greatest concerns leading to the dissatisfaction were issues with sexual function as well as disagreements with a partner about the initiation of and obligations to have sex [55]. Other literature demonstrates an increase in subjective well-being in elderly couples who reported high sexual desire, frequent partnered sexual activities, and few sexual problems versus those on the other spectrum of those qualities [56]. Interestingly, many of these issues are actually more psychological than biochemical. A common issue among these elderly couples is desynchrony in personal development and sexual scripts as well as a fixed interactional pattern with rigid "sexual roles" which is commonly developed in couples who have been together for long periods [57].

Conclusions

Healthcare providers carry an important responsibility in the general care of patients' overall health, and sexual health comprises only a small part of this goal. Dedicated men's and women's clinics may thus offer an opportunity to address multiple issues as they affect the general well-being of patients. Understanding the physical and social changes that occur with aging has proven critical to addressing issues related to sexual health in these patients. Advances in medicine have increased longevity, and sexual health remains an important part of life for both elderly men and women. As we gain more insight, our ability to counsel our patients may be able to better address their issues related to sexual health and improve overall patient quality of life.

Data Availability N/A

Compliance with Ethical Standards

Conflict of Interest RR: Acerus Pharmaceuticals-Consultant, Aytu Biosciences-Consultant, Boston Scientific-Consultant, Coloplast-Consultant, Direx-Investigator, Endo Pharmaceuticals-Consultant, Nestle Health-Consultant.

Code Availability N/A

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