Association of erectile dysfunction and urolithiasis

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DISCUSSION

Prevalence of urolithiasis varies in different countries. In adults, the prevalence is relatively higher in Western countries than in the Eastern hemisphere. The reported prevalence of urolithiasis increases from 1-5% in Asia, to 5-9% in Europe, 12% in Canada and 13-15% in the USA, although even some Asian countries, such as Saudi Arabia, have a very high reported prevalence of 20.1% (15, 16). To our knowledge, there are no studies examining the association between ED and urolithiasis. We found that patients with urolithiasis had a higher risk of ED than controls. We also found that T levels were significantly lower in patients with urolithiasis when compared with matched controls.

ED is a prevalent and important disease that has been associated with various comorbidities. The evaluation of patients with ED should include a general health assessment followed by a discussion of reversible factors and lifestyle changes that might help to preserve erectile capacity (17).

Studies have demonstrated that ED is up to 3 times more prevalent in individuals with metabolic syndrome (MetS) (18, 19). Direct relationships between ED and various components of MetS including obesity, hypertansion (HTN), type 2 diabetes mellitus (T2DM), and hypertriglyceridemia have also been shown (20, 21).

Several interrelated reasons may explain the observed relationship between MetS and ED. Hypogonadism has been associated with MetS and its association with sexual dysfunction and ED is well known. *Corona et al.* demonstrated that low testosterone levels are associated with severe ED, hypoactive sexual desire, decreased nocturnal erections, and reduced intercourse frequency (22). Low testosterone levels were also significantly associated with decreased penile peak systolic velocity (22). Because testosterone has been demonstrated to increase cavernosal nNOS mRNA levels in rats, hypogonadism may result in diminished NO synthesis and subsequent ED (23).

In addition to its relationship with diabetes and cardiovascular risks, MS has recently been associated with kidney stone diseases (11, 24). *Rendina et al.* recently conducted a cross-sectional study and showed that MetS patients are twice as likely to suffer from renal stones (25). There is evidence that these parallel changes might be linked. Studies have shown that MetS and its components (obesity/increased waist circumference, HTN, etc) are associated with increased rates of nephrolithiasis. Using the NHANES III (*Third National Health and Nutrition Examination Survey*) data, West and associates similarly showed that the odds of self-reported stone disease are approximately twice as likely in individuals with MetS than those without (13). There are a number of possible reasons for the association between MetS and nephrolithiasis. It has been demonstrated that features of MetS are associated with decreased urine pH. One study noted that increasing insulin resistance (IR) (measured by comparing glucose disposal rates via euglycemic clamp with 24-hour urine studies) is associated with more acidic urine (26).

Increasing evidence has shown that ED and nephrolithiasis share several common risk factors. It has been speculated yht the pathomechanisms present in the development of endocrine and vasogenic renal disarrangement may also be involved in the pathology of ED and urolithiasis. Features of MetS such as IR, hyperglycemia and resulting advanced glycation end-products (AGEs), free fatty acids (FFAs), and chronic inflammation may lead to endothelial damage and atherosclerosis (27, 28). With endothelial dysfunction, there is a decrease in vascular nitric oxide (NO) levels (27). NO has crucial functions in maintaining vascular health. It defends against the initiation of atherosclerosis by inhibiting adhesion of platelets and leukocytes to the vascular wall as well as decreasing proliferation of vascular smooth muscle (29).

Elevated FFAs, associated with dyslipidemia in MetS, can cause endothelial dysfunction through increased free radical production and inhibition of NO synthesis via activation of protein kinase C, a pathway that ultimately leads to decreased NO synthase (NOS) activations (29). These aforementioned findings demonstrate the strong

No conflict of interest declared.

relationship between MetS and endothelial dysfunction as well as the importance of NO in this physiology. ED may be linked to the impaired endothelial function. NO is important in producing the arterial and venous dilation necessary to attain and sustain an erection. Endothelial dysfunction is related to the loss of nitric oxide bioactivity in the endothelium. Abnormalities of this vasodilator system are present in atherosclerosis and play an important role in the pathophysiology of ED (30).
In light of this evidence, ED and urolithiasis have similar risk factors such as components of MetS. We also know that testosterone levels is lower in patients with the MetS.

Supplementary references

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