

# Chapter 14

## Circumcision and Vasectomy: Do They Affect Sexual Function?

E. Charles Osterberg, Richard K. Lee, and Philip S. Li

### Abbreviations

AIDS	Acquired immunodeficiency syndrome
HIV	Human immunodeficiency virus
ED	Erectile dysfunction
HPV	Human papilloma virus
IIEF	International Index of Erectile Function
MC	Male circumcision

### Circumcision

#### *Introduction*

Male circumcision (MC) has been described since antiquity. Many anthropologists do not agree on the origins of circumcision, but some suggest the practice began over 15,000 years ago [1]. The earliest reports of the practice come from Egyptian mummies. Hieroglyphics can be found in many historic relics from multiple cultures [1]. While the religious or cultural forces that drove this practice in the past remain unknown, it remains the most commonly performed surgical procedure worldwide [2]. Currently, over 70 % of the male population born in the USA has been circumcised, mostly during the neonatal period [3]. No other surgical

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P.S. Li (✉)

Department of Urology, Center for Male Reproductive Medicine and Microsurgery, Weill Cornell Medical College of Cornell University, 525 E. 68th Street, Box 269, New York, NY 10065, USA  
e-mail: [psli@med.cornell.edu](mailto:psli@med.cornell.edu)

procedure however has generated as much controversy in the era of modern medicine. One of the controversies surrounding male circumcision lies with its impact on sexuality. In this chapter, we describe this relationship, highlighting the past and present literature examining how circumcision may impact physical and psychological factors in men and their sexual partners.

## ***Circumcision and Sexually Transmitted Infections***

From a global health perspective, there are currently three prospective, randomized clinical trials that have reported epidemiological data supporting the notion that adult male circumcisions significantly reduces the risk of HIV acquisition in African men by 51–76 % [4–6]. The possible mechanisms behind this include penile cornification, lower rates of penile injury during intercourse, fewer HIV receptors, and lower rates of inflammation/sexually transmitted infections. These trials documented acceptable surgical risks/adverse events. Furthermore, MC has been shown to significantly reduce the incidence of HSV-2 infection by 28–34 % and its prevalence by 32–35 % [7, 8]. Among female partners of neonatally circumcised men, there has been over a 40 % reduction in bacterial vaginosis and 48 % *Trichomonas vaginalis* [9]. A recent study from Uganda by Wawer et al. indicated that wives and girlfriends of circumcised men had a 28 % lower rate of infection with HPV (human papilloma virus) in 24 months [10]. While the impact of circumcision on disease prevention is beyond the scope of this chapter, the data is positive. Male circumcision reduces the risk of several sexually transmitted infections in both men and women.

## ***Circumcision and Its Effect on Sexual Domains***

### **Circumcision and Ejaculatory Latency, Sexual Sensitivity, and Sexual Satisfaction**

It has long been postulated that the foreskin has an important role in sexual performance or satisfaction due to the thousands of erogenous nerve endings that lie within the inner mucosa layer of the foreskin [11]. Several studies have in fact reported an increased ejaculatory latency time following circumcision. Senkul and colleagues found that the mean ejaculatory latency time increased from  $2.9 \pm 0.4$  min to  $4.6 \pm 0.7$  min ( $p = 0.02$ ) [12]. This phenomenon may be related to the keratinization or cornification process that occurs on the surface of the glans and shaft skin near to coronal sulcus after circumcision which may lower the sensitivity or alter the sexual excitability of the circumcised male. Taylor et al. provided anatomical and histological support of this theory by suggesting an irreplaceable loss of erogenous mucosa after circumcision [13]. Furthermore, some authors have

suggested that neural reorganization and atrophy of the brain circuitry of sensory nerves supplying the distal glans occurs following circumcision [14]. While increased ejaculatory latency time after circumcision has been reported throughout the literature, some suggest that this is a potential benefit for sexual performance or satisfaction. In men with premature ejaculation, circumcision may improve sexual performance by affecting ejaculatory latency times; however, Gallo found that the majority of men do not go through with the procedure for refractory premature ejaculation [15].

Others have reported contrary findings in terms of sensitivity. Bleustein et al. reported a lack of difference in sensation on the glans of circumcised and uncircumcised men [16]. The authors evaluated approximately 60 neonatally circumcised and uncircumcised men with quantitative somatosensory testing on the dorsal midline glans using vibration, pressure, spatial perception, and warm/cold thermal thresholds. When controlling for sexual dysfunction as reported by the International Index of Erectile Function (IIEF) questionnaire, age, hypertension, and diabetes, there was no difference between cohorts of neonatally circumcised men versus uncircumcised men on somatosensory testing. Krieger et al. reported on a study of over 2,500 Kenyan men randomized to either immediate circumcision or delayed circumcision after 2 years. While 64 % of men reported increased penile sensitivity following circumcision, 6 % reported a decrease in sensitivity [17]. Masood, et al. found that 38 % of men reported increased penile sensation after circumcision, although 18 % of men reported decreased sensation ( $p = 0.01$ ) [18]. Although penile sensation may be improved or changed after circumcision, there is a large variation in the use of the terms sexual sensitivity, sexual function, and sexual satisfaction in this literature, and it is often difficult to compare results across studies due to the variations in terminology.

## Circumcision and Sexual Dysfunction

Sexual function has been classically described by Masters and Johnson who pioneered research into the nature of the human sexual response. Their model for sexual function incorporated four stages: excitement, plateau, orgasm, and resolution [19–21]. Any perceived subjective or objective interference with in any of these stages is broadly defined as sexual dysfunction.

The impact of circumcision on global sexual function beyond ejaculation has also been widely debated. Many studies have used validated questionnaires like the International Index of Erectile Function (IIEF) [22] to evaluate sexual dysfunction following circumcision. While such questionnaires have been externally validated [23, 24] it is often difficult to exclude confounding factors like the influence of the male psyche.

Aydur et al. prospectively examined 107 Caucasian men aged 22–44 years who underwent circumcision at varying ages (0–2 years, 3–5 years, and 6–12 years) but subsequently underwent evaluation of sexual function with the Golombok-Rust

Inventory of Sexual Satisfaction scale [25]. The authors found no relationship between childhood circumcision age and overall sexual function.

When comparing adult sexual function before circumcision done after puberty and postoperatively, Senkul et al. reported no difference in sexual function outcomes as assessed by the Brief Male Sexual Function Inventory (BMFSI) [12]. A similar study was performed by Collins et al., showing no differences in BMFSI scores preoperatively or 12 weeks postoperatively [26]. Masood et al. used the IIEF scores of 88 men to show that there was no difference in sexual function between those who were circumcised after puberty and controls [18].

Another unusual indication for circumcision was erectile dysfunction. In fact, in the early nineteenth century, erectile dysfunction or impotence was “treated” with circumcision [1]. Senkul et al. examined this question with a prospective study encompassing 42 men aged 19–28 years referred for circumcision for religious or cosmetic reasons. BMFSI scores preoperatively and postoperatively 12 weeks were equivalent [12].

In Uganda, Kigozi et al. prospectively randomized over 4,000 men to undergo circumcision versus control as part of a HIV prevention trial. In a subgroup analysis, the authors examined sexual satisfaction and sexual dysfunction between cohorts. They found no differences between the study arms in reported sexual desire, erectile function, and/or ejaculation based on IIEF scores [27].

Similarly, Krieger et al. performed a similar analysis in 2,500 Kenyan men undergoing circumcision as part of a prospective, randomized controlled trial (RCT) for HIV risk reduction. As with the Kigozi et al. study, the authors found no significant difference between cohorts with respect to the frequency of erectile dysfunction, inability to ejaculate, pain during intercourse, and/or lack of pleasure with intercourse [17].

In addition, male circumcision does not seem to affect a homosexual man’s sexual function. Mao et al. examined a large cohort of homosexual men. While men who were circumcised later in life tended to engage in receptive anal intercourse, there were no differences in reported sexual dysfunction rates [28].

More broadly, Laumann et al. examined the sexual practices of a cross-section of American men aged 18–59 years using data from the National Health and Social Life Survey (NHSL) [3]. The authors found that after controlling for age, men who were uncircumcised were more likely to complain of sexual dysfunction. In particular, the likelihood of having difficulty achieving or maintaining an erection was lower for circumcised men (OR = 0.66, CI 0.42–1.03) [3]. Furthermore, the authors also found that circumcised men reported 50 % less anxiety about sexual performance. Interestingly, it was noted that circumcised men performed a greater variety of sexual practices, reported more lifetime sexual partners, as well as more frequent masturbation. Taken together, the authors concluded that a clear benefit of circumcision with respect to sexual dysfunction could be seen, especially among those aged 45–59 years.

One study does report a negative association between circumcision and sexual function Frisch, et al. reported a negative association between circumcision and orgasm (OR = 3.25, CI 1.42–7.47) after adjusting for confounders (i.e., age,

cultural background, religion, marital status, and frequency of sexual activity) in a large Danish cohort of men [29]. The authors hypothesized that this was secondary to decreased sensitivity of the penis after circumcision.

### **Circumcision and Its Effect on Female Partners**

The impact of male circumcision on female sexual dysfunction has been reported, but confounders, questionable methodology, or biased data collection often limits these data. For example, in one US survey, 139 women who reported having sexual intercourse with both circumcised and uncircumcised men claimed to achieve orgasm more often with uncircumcised men (OR = 4.62 CI 3.7–5.8) [30]. Furthermore, the spouses of circumcised partners complained of increased vaginal discomfort, decreased vaginal secretions, and more negative postcoital feelings. Similarly, in a large Danish national health survey, the spouses of circumcised men report more incomplete sexual fulfillment (OR = 2.09, CI 1.05–4.16), orgasmic difficulties (OR 2.66, CI 1.07–6.66), and dyspareunia (OR = 8.45, CI 3.01–23.75) [29]. In contrast to these studies, Kigozi recently reported that Ugandan female partners reported superior sexual satisfaction after their spouses underwent circumcision [27]. Taken together, the current data are conflicting in terms of how male circumcision impacts female sexual function.

### ***Conclusions on Male Circumcision***

The impact of circumcision on sexual function is unclear given the heterogeneity in the studies that have been reported. The majority of studies report an equivocal effect on sexual function, with only one study demonstrating an improvement in sexual outcomes [3]. Although many have speculated about the effect of circumcision on sexual function, no prospective, randomized trials exist to confirm or refute this association.

The American Academy of Pediatrics with endorsement of the American College of Obstetricians and Gynecologists believe that current evidence indicates the health benefits of newborn male circumcision outweigh the risks and that the procedure's benefits justify access to this procedure for families who choose it [31]. The American Urologic Association believes that neonatal circumcision also has potential medical benefits and advantages but associated risks with the decision to perform the procedure resting with the parent or legal guardian [32].

## Vasectomy

### *Introduction*

Today, it is estimated that 6 % of couples worldwide rely solely on vasectomy for their contraception [33]. In the USA, this number increases to 7–10 % of American couples with a prevalence of 18 % of men by age 45 [34]. With more than 500,000 vasectomies performed every year, it is only second to circumcision as one of the most common surgical procedures performed [35]. As such, patients are electing for vasectomy most commonly between the ages of 30–50 years, with decades of life expectancy after their vasectomy [35]. With a prolonged life expectancy after vasectomy, its impact and consequences on a man's health has become a concern. Initially fueled by the fact that a large proportion of men develop anti-sperm antibodies after vasectomy, some authors postulate that vasectomy may have a negative effect on sexual health and long-term disease development [36, 37].

### *Vasectomy and Its Affect on Sexuality and Sexual Function*

The incidence of psychological or sexual problems following vasectomy has been reported between 1 and 3 % [38]. An early study by Finkbeiner et al. reported that 0.3 % of men demonstrated new-onset erectile dysfunction following vasectomy with 2.5 % of men reporting worsening sexual desire [39].

Arratia-Maqueo et al. examined the effect of a vasectomy on one's perception of sexual satisfaction using IIEF scores. The authors examined 29 males who completed the questionnaires preoperatively and 12 weeks postoperatively. The authors found that vasectomy had no significant global influence on a man's sexual satisfaction [40]. Moreover, Bertero et al. found that vasectomy actually increased the mean total IIEF scores of 64 men from a total of 64–66 ( $p < 0.001$ ) [41]. Overall, 67 % of their cohort experienced some improvement in IIEF scores postoperatively, with only 17 % reporting a worse score. Specifically, the sexual domains of desire and sexual satisfaction were most improved.

In one of the largest studies, Dias examined the long-term effects of 200 army soldiers following vasectomy [42]. The author found that 92 % of men reported sexual satisfaction following vasectomy with minimal effect on libido. This study however did not use validated questionnaires for sexual function.

The current literature suggests that vasectomy largely does not impact sexual function [43]. In a large review of the peer-reviewed literature, Philliber showed the majority of studies report no change in erectile function, duration of erections, time to orgasm, ability to control climax, volume of the ejaculate, and/or quality of the orgasm [44].

### ***Vasectomy and Its Effect on Male Psyche***

Early documentation of the impact of vasectomy on the male psyche has been reported since the 1970s [45]. Wolfers suggested that the concept of permanent sterilization may result in profound emotional setbacks, especially in a patriarchal society [46]. Rodgers and Sandlow reported a 40 % increase in psychological disturbances following vasectomy [47, 48]. In addition, several case studies have reported that a higher proportion of vasectomized men present in psychiatric clinic, although this did not necessarily imply a causal relationship between vasectomy and psychiatric disease [46]. One study suggests that the risk of hospitalization for mental disorders is lower in vasectomized men [49], yet American history demonstrates the many negative effects of forced sterilization eugenics on the male psyche [50]. In general, it is difficult to prove a direct causal relationship between vasectomy and any impact on the male psyche. Simple questionnaire surveys are an unreliable method to examine such a complex relationship.

### **Vasectomy and Its Effect on Female Sexual Partners**

Couples have many options including both surgical and medical intervention when it comes to permanent sterilization. Some authors report improved marital relations and communication among partners who mutually decide on vasectomy over tubal ligation [51].

Hofmeyr et al. conducted a survey of 33 men and their spouses before and after vasectomy using the Index of Sexual Satisfaction (ISS) questionnaire, which measures behavior, attitudes, occurrences, and affection associated with marriage. The authors found that vasectomy did not impact one's marital satisfaction nor does it impact the communication within the marriage [52]. A similar study by Maschhoff et al. however demonstrated that vasectomy may improve marital stability. The authors found that women reported an improvement in marital communication, while men reported a 20 % decrease in thoughts of separation and divorce; overall, couples reported an improvement in sexual satisfaction [53]. A vasectomy's positive impact on female relations stems mainly from reduced anxiety of fertilization and increased frequency of coital relations leading to a global improvement in communication. This theory has been termed "re-affiliation syndrome." [53]

In summary, fewer than three studies have reported a negative impact on marital relations after vasectomy, while the majority of studies have reported no significant change. It is important to note, however, that most studies have been retrospective in nature, using non-validated questionnaires in different cultures with discordant follow-up intervals [44].

## ***Vasectomy and Its Effect on Hormonal Function***

Early prospective studies have suggested that vasectomy may impact the functioning of the hypothalamic–pituitary axis. Mo et al. found that men who underwent vasectomy 10–19 years previously had higher dihydrotestosterone levels, while men who underwent a vasectomy greater than 20 years ago had higher testosterone levels versus age-matched controls [54]. However in all other longitudinal studies, there has been no significant association of vasectomy with changes in the concentrations testosterone, luteinizing hormone, or follicle-stimulating hormone up to 25 years after the operation [55, 56].

## ***Conclusions on Vasectomy***

Although an abundance of studies exist on the positive or negative effects of vasectomy on sexual function, there remain no level I data to change current practice patterns. Similar to circumcision, the impact of vasectomy on sexual dysfunction is difficult to assess purely based on surveys or questionnaires. The studies presented are predominately descriptive and lack controls so the data presented must be taken cautiously with their inherent limitations. Nonetheless, vasectomy does not appear to negatively impact sexuality.

Beyond the scope of this chapter, an association between vasectomized men and the development of chronic disease states may exist. Initial concerns were raised in the 1970s when vasectomized Rhesus monkeys were found to have an increased risk of atherosclerotic disease [57]. Disease states that may be implicated include cardiovascular disease [58], thrombophlebitis [59], prostate cancer [60], testicular cancer [61], and urolithiasis [62]. However, other literature suggests that vasectomized men have a lower incidence of chronic disease [36]. The result of four large-scale, retrospective cohort studies has shown that vasectomy was not significantly associated with an increased risk of hospitalization and that the procedure does not increase adverse health outcomes in any of the aforementioned disease states [49, 63–65].

Taken together, vasectomy should continue to be offered to patients after informing them of the risks and/or benefits of the procedure. It remains the gold standard surgical alternative for sterilization that is proven to be safe and efficacious.

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