

## The Sexual Impact of Circumcision

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*[B]y taking off the most sensitive part of the penis, we are really interfering with the way nature designed sex to be.*

– Morris Sorrells, M.D.

### Anatomical considerations

The **prepuce** is an integral part of the penile skin system and has been characterized by anatomical researchers as “primary erogenous tissue necessary for normal sexual function.”[1] Amputation of the prepuce (foreskin) by circumcision alters the anatomy of the penis from its natural design in a number of fundamental ways. Form and function go hand in hand in anatomy. Thus the alterations that circumcision causes in the natural mechanical and sensory capacities of the penis inevitably affect the sexual experience of both the man and his partners.

**Loss of penile surface area** – The foreskin is not just a “flap” of skin, but a double-layered fold of densely innervated skin and mucosa, of considerable area. Circumcision ablates what will become, in the adult, up to 90cm<sup>2</sup> (~14in<sup>2</sup>) of tissue,[2] approximately half of the skin of the penis.[3]

In the flaccid penis, this tissue folds over on itself, covering the glans to varying degrees in each individual. As the penile shaft elongates with erection, the foreskin fold everts and is taken up along the shaft, while still retaining enough slack to maintain mobility of the penile skin sheath. With circumcision, however, the extensive loss of penile skin leaves insufficient tissue for comfortable expansion of the penis with erection. This can result in tight, painful, or bowed erections; tearing or bleeding at the scar site or on the shaft skin; or pulling of hairy skin from the scrotum and pubic area onto the shaft of the erect penis.[4-8] Australian researchers found that circumcised men had shorter erect penises by a mean length of 8mm than intact men (p<0.05),[9] which may be due to tethering of the penis by excess skin tension.

In the case of heterosexual intercourse, once the intact penis is inserted, the vaginal walls hold the skin of the penis relatively stable, allowing the shaft of the penis to glide in and out of its own skin sheath. In contrast, the taut, immobile skin of the erect circumcised penis lacks this natural gliding action with the motions of intercourse, creating an excess of friction directly on the vaginal walls, and potentially causing increased discomfort for both partners.[10] These dynamics also apply to anal intercourse.

The mobility of the intact penile skin also plays a facilitative role in foreplay, masturbation, and intromission (insertion of the penis), all of which are adversely impacted by circumcision.(8,11) One physician described the latter function in this way: “Penetration in the circumcised man has been compared to thrusting the foot into a sock held open at the top, while, on the other hand, in the intact counterpart it has been likened to slipping the foot into a sock that has been previously rolled up.”[12] Several researchers have noted that circumcision causes compensatory changes in masturbatory technique.[13,14] Whereas the intact male can slide the touch-sensitive foreskin back and forth over the glans to self-stimulate, the circumcised male must apply friction directly to the less sensitive glans and shaft of the penis. When masturbating, circumcised men have been found to significantly more often require the use of artificial lubrication, and stimulation to the point of pain to achieve ejaculation.[14]

**Loss of nerve endings** – In the 1950s, Winkelman noted the dense innervation of the prepuce, and classified the prepuce as a “specific erogenous zone,” along with other mucocutaneous regions (such as the lips, nipples, and vulva), areas in which the anatomy is specifically organized to “favor acute sensation.”[15,16] In the 1980s, Moldwin and Valderrama documented “an extensive neuronal network within prepuce tissue.”[17] Taylor et al. (1996) documented dense concentrations of fine-touch-sensing Meissner’s corpuscles in a band of ridged mucosa encircling the preputial outlet, and identified the prepuce as a “a large and important platform” for input into the nervous system.[3] Sorrells et al. (2007), using micro-filament touch-testing on 19 points on the penises of intact versus circumcised men, found that the most fine-touch-sensitive regions of the penis are those removed by circumcision.[18]

The several sensory testing studies that claim to have found no difference between the sensitivity of the intact and the circumcised penis have significant methodological limitations. Some only tested the glans, but failed to test sensation in the prepuce itself.[19,20] Anatomically, the glans has been shown to have primarily protopathic sensitivity (able to feel only crude, poorly localized sensations),[21,22] and is the least light-touch-sensitive part of the penis in both circumcised and intact men.[18] While sensory differences are already less likely to be detectable in such a low sensitivity area, ignoring any comparison with the sensitivity of the foreskin itself is a crucial oversight.

Two studies that reported no difference in sensitivity did test, in addition to the glans, a single point on the dorsal midline of the outer foreskin.[23,24] This point is an area that Sorrells et al. found to be the least sensitive to fine touch compared to other parts of the foreskin (such as the preputial outlet, the frenulum, and the inner foreskin).[18] Testing only the least sensitive part of the foreskin inaccurately weights the results against finding any difference between the sensitivity of the foreskin and parts of the penis that remain after circumcision.

Perhaps surprisingly then, the authors of one of these studies, Bossio et al., still found that the foreskin of intact men was more sensitive to tactile stimulation than any other part of the penis (circumcised or not), and also that it was more sensitive to warmth than the glans (both results statistically significant).[24] However, ignoring their own findings, these authors reported the contradictory conclusion that neonatal circumcision has “minimal long-term implications for penile sensitivity.”[24] This pronouncement further ignores the fact that static, single-point testing in a laboratory may be very different from real-life sexual stimulation, in which all parts

of the foreskin are likely to be stimulated via moving, rather than static, gestures. Bossio et al.'s study has been critiqued in detail elsewhere.[25,26]

Anatomically, excision of the foreskin by circumcision removes the majority of the fine-touch range of the penis's sensory spectrum, an important component of sexual experience. In an online survey, intact males predominantly identified the foreskin, not the glans, as the main site of sexual pleasure.[27] Cold and Taylor state that "the complex interaction between the protopathic sensitivity of the corpuscular-receptor-deficient glans penis and the corpuscular-receptor-rich ridged band of the male prepuce is required for normal copulatory behavior." [1]

**Nerve damage** – Beyond the simple loss of nerve endings, several other forms of neuronal damage can occur with circumcision, due to the severing of nerves. Circumcision scars have been shown to contain amputation neuromas (tangles of nerve tissue resulting from abnormal regrowth) which do not transmit normal sensations, but typically produce pain.[1] In animal studies, extirpation of the external genitalia has been found to result in acute retrograde degeneration of the sexual nerve axons back to the spinal cord.[1]

Podnar found a significantly reduced ability to elicit the penilo-cavernosus reflex (muscle contractions associated with the ejaculation reflex [28]) in circumcised men compared to intact men.[29] Measurement of this reflex is widely used to diagnose underlying neurogenic disorders in erectile dysfunction.[28] Podnar was able to elicit the reflex in 92% of intact men, but only in 27% of circumcised men ( $p < 0.001$ ). A survey by Meislahn and Taylor similarly found that stretching of the penile skin in intact men (which includes the foreskin) more often produced erection and contractions of the bulbo-cavernosal muscle, as compared with stretching the remnant skin in circumcised men.[27]

**Keratinization** - Circumcision permanently exposes the normally covered, mucosal surface of the glans to air and friction, causing the glans to become abnormally dried out and thickened.[1] Sorrells et al. found the already light-touch-insensitive glans to be significantly less sensitive ( $p = 0.040$ ) in the circumcised male, an adverse effect that was found to increase over time.[18]

**Summary** – The anatomical effects of circumcision alter the mechanical dynamics of erection and intercourse, and produce an abnormal and deficient sensory input into the nervous system. Given this, it is hard to imagine that one would not find changes in sexual function and experience. A number of studies have found this to be the case, showing statistically significant evidence of degradation of male sexual performance and satisfaction, as discussed in the next section.

### **Impact on sexual performance and satisfaction**

Besides anatomical studies and those testing penile sensory capacities such as those discussed above, further evidence on the sexual functionality of the foreskin comes from other types of investigations. Among others, these include surveys of adult men before and after circumcision; [8,30-39] surveys comparing circumcised and intact populations; [40,41] surveys of circumcision harm reported by circumcised men; [6,7] surveys on the sexual experiences of

women with circumcised versus intact partners;[10,14,42,43] studies of effects on lubrication and intromission;[10,11,14] and collections of personal reports from men who have non-surgically restored their foreskins, thereby regaining coverage of the glans and mobility of the penile skin.[4,44]

**Before and after studies of adult circumcision** – Studies of sexual outcomes before and after adult circumcision are subject to several methodological limitations that may bias the results toward an underestimation of harm.

First, men who choose to be circumcised as adults are already predisposed to view the outcome as positive, either because they have a physical problem that circumcision resolves, or because they are seeking circumcision out of a pre-existing preference. The limited length of follow-up of before and after studies is another potential source of underestimation of harm. If circumcision has a desensitizing effect on the glans (whether due to keratinization or some other process [41]), and the desensitizing effect is progressive with age,[18] the 24 months or less of typical follow-up time might not be sufficient to detect a difference.[45] For this latter reason, studies finding no difference in penile sensitivity after adult circumcision cannot appropriately be extrapolated to individuals circumcised as infants, in which there is a much longer period before sexual debut than is ever studied in adults.[46]

Despite these built-in biases, a Korean survey found that a man was twice as likely to report diminished rather than improved sexuality after adult circumcision.[47] Overall, a worsening in sex life has been found in about one third of reported adult circumcision cases.[48]

Studies of men's sexual performance and satisfaction before and after adult circumcision reveal an array of possible negative effects. Statistically significant increases have been found after adult circumcision in problems with erection,[30,32,33,49] prolonged time to ejaculation,[33,34,36,39,49-51] penile sensation,[32] difficult intromission,[33] and masturbatory ease and pleasure.[8]

Two before and after studies, carried out in conjunction with the African HIV trials, claim to have found no difference in sexual satisfaction and performance.[37,38] While these studies are initially suspect due to the implausibly low rates of sexual dysfunction found both before and after circumcision (much lower than studies performed outside of Africa [52]),[40] nonetheless they have been accorded particular attention and credibility,[53,54] presumably because of their randomized controlled design. However, RCTs are not immune to various sources of bias, for example:

- A strong study design does not eliminate the need for high-quality questionnaires. In one of these studies, the survey questions were so poorly designed that they could not have detected a difference in sexual outcomes, even if one existed.[55]
- The studies were carried out by the same researchers who ran the HIV trials in which the subjects had already participated, i.e. they were not impartial, independent investigators, nor blinded to the circumcision status of the subjects.

- The subjects themselves may have tended towards socially desirable responding, the tendency to provide answers that make one look good in relation to social norms and expectations, especially with self-reporting of sex data in face-to-face interviews.[56,57]
- Drop-out rates were significant for the HIV trial populations,[58] which could have affected the outcome results if men who experienced sexual problems after circumcision, or were reluctant to report them, were disproportionately present in the drop-out group.[40]

**Large European surveys** – Two large surveys recently compared sexual outcomes for circumcised versus intact men. Frisch et al. found that circumcised men in Denmark were more likely to report frequent orgasm difficulties than intact men.[40] In a survey from Belgium, Bronselaer et al. found that circumcised men reported decreased sexual pleasure and lower orgasm intensity at the glans compared to intact men, more effort required to achieve orgasm, and a higher percentage experienced unusual penile sensations (such as burning, prickling, itching, tingling, numbness, or pain).[41]

**Premature ejaculation (PE)** – A survey of men circumcised as adults in the UK about their sexual function before and after circumcision found no difference in premature ejaculation rates overall, however, the subjects were almost 3 times as likely to report worsening of PE after circumcision than improvement.[35] A study examining the correlates of premature ejaculation found that having been circumcised was significantly associated with PE among Malaysian men (OR=4.881).[59] However, other PE studies have not shown this association, reporting, instead, reduced rates of PE and longer time to ejaculation following adult circumcision.[60-62]

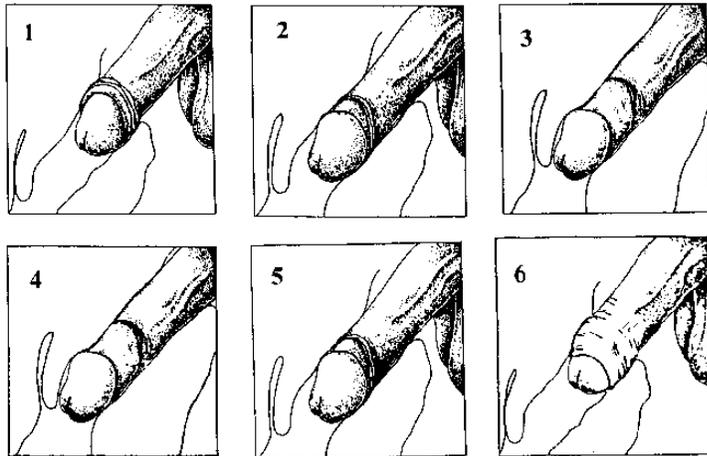
### **Effect on male sexual behavior**

Several large surveys point to behavioral differences between circumcised and intact men. Laumann et al. found among circumcised American males a “more highly elaborated set of sexual practices,” including more frequent masturbation and a greater preference for oral sex.[63] The British National Survey of Sexual Attitudes and Lifestyles reported that circumcised males were more likely to report homosexual partners and partners from abroad.[64] Frisch et al. found that circumcised men were more likely to have had ten or more sexual partners compared to intact men.[40] Several studies have shown significantly lower rates of condom usage in circumcised men.[14,65]

### **Effect on partners of circumcised men**

Circumcision not only impacts the sexual experience of the man himself, but also has appreciable effects on the experience of his sexual partners.

Circumcision has been found to significantly increase vaginal dryness during intercourse (Cortés-González,  $p=0.004$ ).[10,14,42] As described above, in the intact penis, once inserted, the penile skin sheath stays relatively stable as it is held in place by the friction with the vaginal



walls, while the shaft glides in and out of its own skin sheath. On the outstroke, the foreskin bunches up in a cuff around the glans, acting as a dam to retain natural lubrication, followed by redistribution of lubrication with the inward stroke. In the circumcised penis, without the foreskin cuff, the exposed coronal rim acts as a one-way valve to pull lubrication out of the vagina, while the taut shaft skin carries moisture out of the body with each outstroke where it is repeatedly exposed to air drying. One group of

researchers advises “it is imperative that future studies of female arousal disorder report and control [for] the circumcision status of male sexual partners,” and suggests that ‘female arousal disorder’ may be a normal response to sex with a circumcised partner.[66]

The loss of the gliding action of the foreskin can lead to difficulties with intromission,[33] with an increased amount of force required for penetration.[11] The loss of gliding action can also lead to greater discomfort with intercourse due to the application of friction directly to the vaginal walls.[10] Discomfort from friction would be exacerbated by loss of natural lubrication or the presence of scrotal or pubic hair drawn onto the shaft by too tight an erection. These factors may have a particularly significant impact on women’s comfort during menopause,[66] when reduced natural lubrication and tissue atrophy commonly result in dyspareunia (painful intercourse).[67]

O’Hara et al. surveyed women with sexual experience with both circumcised and intact partners.[10] While this survey may have some limitations due to selection bias (since the participants were in part recruited through an anti-circumcision newsletter), participants’ responses did not differ with the source of recruitment. Participants overall reported, with circumcised partners as compared to intact, a decreased ability to experience orgasm with vaginal intercourse, decreased experience of multiple orgasms, decreased enjoyment of prolonged intercourse, and a decreased sense of intimacy with the partner. Even women who expressed a preference for circumcised partners reported more frequent experience of discomfort and progressively decreasing vaginal lubrication with intercourse.

The survey also found a difference in the mechanics of intercourse with circumcised versus intact partners. Participants reported that circumcised men “tend[ed] to thrust harder and deeper, using elongated strokes,” while intact men “tended to thrust more gently, to have shorter strokes, and tended to be in contact with the mons pubis and clitoris more.”[10] This dynamic reflects the self-stimulating action of the light-touch sensitive foreskin, which does not have to move very far back and forth to generate pleasurable sensations. The closer contact with the female pubic area may explain the association of greater ease of orgasm for women during intercourse with intact partners.

O'Hara's qualitative results have been confirmed by subsequent studies. The large survey of the effects of circumcision on sexual function in Denmark, by Frisch et al., found circumcision significantly associated with a range of frequent sexual difficulties in women, notably orgasm difficulties, dyspareunia (OR=8.45), and "incomplete sexual needs fulfilment".[40] A survey of Greek men circumcised as adults found that 46% of participants reported a worsened sex life for their female partner compared to 33% who reported an improvement for their partner.[36] Bossio et al., surveying Canadian and American women, found that women with a current intact partner reported higher levels of sexual satisfaction than women with a current circumcised partner, independent of whether they reported a preference for the circumcised penis for selected sexual acts.[43] On the other hand, a study based on the African HIV RCTs claimed similar or greater levels of sexual satisfaction among female partners after the spouse's circumcision,[68] however, some of the same methodological limitations exist here as in the sexual satisfaction study in the same population of circumcised men, discussed above.

Studies claiming to show a preference of women for one or the other circumcision status have reported differing results, and results appear to be related to pre-existing experience with and beliefs about the circumcised or intact penis.[10,14,43,69]

Few studies have examined the effects of circumcision on the partners of gay men. In an Australian survey, gay men reported a progressive decline in the sensitivity of the glans more often in their circumcised partners, and reported that their circumcised partners were less likely to ask respondents to be gentler on their penis during sex.[14] In a survey of American and Canadian populations, gay men preferred an intact partner for all sexual activities, and held more positive beliefs about the intact penis than did women in this population.[43]

## Summary

It is incontestable that circumcision eliminates from a man's sexual experience any sensation in the foreskin itself, as well as any sexual functions that involve the manipulation of the foreskin, such as during foreplay or masturbation. That such pleasurable activities might have significant subjective value to genitally intact men and their partners is also uncontroversial.[70] Therefore, according to one commentator, to say that circumcision has little or no effect on sexual experience is to adopt "an extremely narrow conception of that term." [45]

The contention that circumcision causes deficits in sexual sensation and function is supported by the fact that several products have been developed specifically for circumcised men to help overcome problems with penile sensation and function (e.g. Manhood®, Sensum+®, Senslip®);[71-73] by the association of circumcision with the need for artificial lubrication and erectile dysfunction drugs;[74] and by the fact that many circumcised men have sought out foreskin restoration techniques.[75,76]

Scientific evidence points to numerous deleterious effects of circumcision on the sensory and mechanical dimensions of sexuality, both for the man and for his sexual partners. For this reason, a number of authors have concluded that fully informed consent for circumcision must include disclosure of its potentially harmful effects on sexual satisfaction and performance.[14,35,41]

The highly personal and subjective nature of sexuality argues all the more against irreversibly altering the genitals of children, before an age at which they are able to judge their own preferences and make their own mature decisions.

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