THE NEUROBIOLOGIC AND PHYSIOLOGIC OUTCOMES OF WOMEN AFFECTED BY FEMALE GENITAL CUTTING

By

AGNES NTUBE EWONGWO

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Abstract

The discussion of the practice of Female Genital Cutting (FGC) is becoming more prevalent due to higher influx of migrant populations to western societies. Administering care to migrant women living with FGC requires an in-depth understanding of the pathophysiology of FGC. This literary review comprehensively evaluates the literature, examining the complex practice of FGC, and investigates the physiology and function of female genital organs to better understand alterations, if any, of cut women. PubMed, Medline (OVID), Cochrane, and Science Direct database searches were performed for studies that examined both the neurobiology and biologic function of female genitalia in cut vs. uncut women. This thesis illustrates the ability of cut women to experience orgasm, sexual arousal, desire and pleasure. The mechanism of neural rewiring and synaptic plasticity associated with FGC may create a shift in sensitivity to other erogenous sites, preserving clitoral integrity, and maintaining sexual function in women who have undergone this procedure. FGC does not necessarily attenuate sexual feelings, hence arguments that solely portray this practice as detrimental to women's sexual quality of life do not convey the full scope of the array of sexual sensations and expression women with FGC may experience.

Introduction/Historical context

The cultural practice of Female Genital Mutilation/Cutting (FGM/C) has become an important topic of discussion in many western nations and healthcare settings. The terminology for this practice has evolved over the years with increased societal knowledge on its practice. Female Circumcision (FC) is a more traditional term that resulted in the misconception that the procedure was similar to male circumcision [8]. FGC represents a more neutral term commonly used to depict a non-judgmental stance [1]. Female Genital mutilation (FGM) is a more commonly used terminology by the World Health Organization (WHO) and in the Western world but it portrays the practice as harmful and is considered jarring terminology by some communities [8]. The negative connotation behind FGM makes it offensive to cultures that perform FGC out of love, to ensure their daughters' future, or as a form of ethnic identity creating barriers to open dialogue with affected communities. In this thesis, the terms FGM, FGC, and FC are used interchangeably to portray my commitment to non-partisanship.

The increase in legislation against this practice has opened more discussions about the morality and acceptability of this practice. The SB 1342 bill that is working its way through the Arizona state legislature includes Arizona among the growing list of states where discussion of FGM is becoming more prevalent [5]. This thesis focuses on the impact of FGM on sexual function and sexual health in women who have undergone this practice, but to understand its effects, it is important to understand the historical and socio-cultural underpinnings of FGM/C.

FGC is an ancient cultural practice that predates the Abrahamic religions [1]. While the practice holds strong ties to ethnic and cultural identity, there is no association between FGM and religion as the practice exists amongst Muslims, Christians, and Jews (Abdulcadir et al. 2011). The WHO

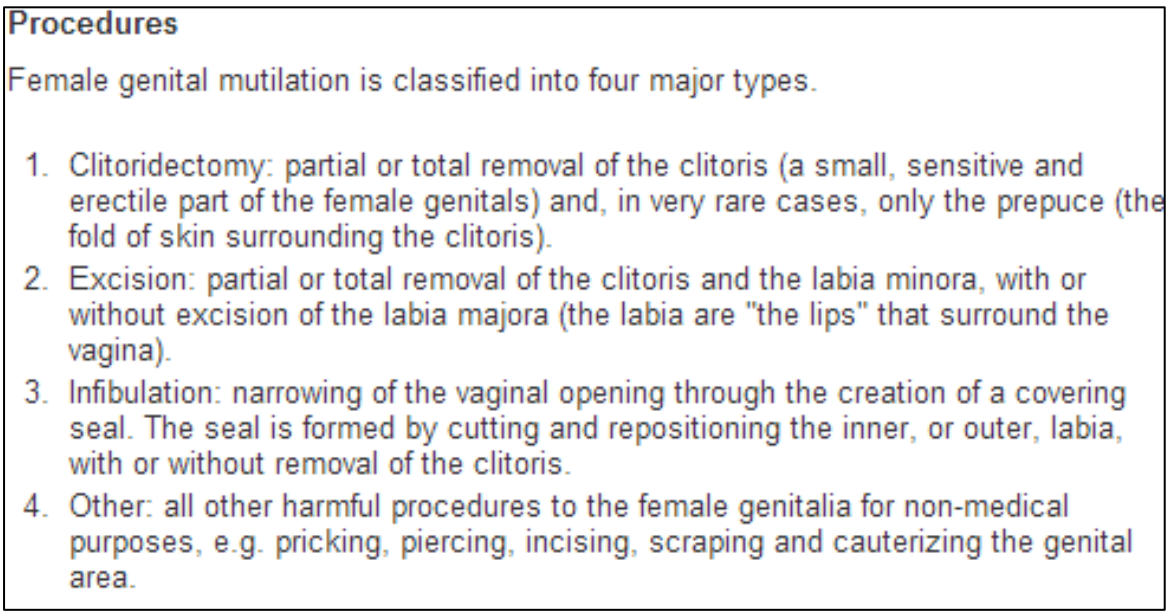
estimates approximately 125 million girls living in 29 countries in Africa and the Middle East have undergone a form of FGC. This practice is mostly carried out in young girls between infancy and the age of 9, and sometimes on adult women [3]. It is estimated that in Africa, 91.5 million girls below the age of 9 and women are living with the consequence of FGC, with 3 million girls at risk of undergoing the procedure each year. There are four main forms of FGC and varying subtypes under these forms. The WHO defines the practice as comprising "all procedures that involve the partial or total removal of the external female genitalia or other injury to the female genital organs whether for cultural or other non-therapeutic reasons" [4]. The procedure is usually performed by traditional circumcisers, as well as a small percentage of health care providers.

There are various cultural underpinnings associated with the practice of FGC, and though these exceed the scope of this thesis, they are important in understanding the complexity of discussion surrounding FGC. Societies heavily involved with the practice are commonly perceived as patriarchal societies. In these patriarchal societies, FGC is recognized as a traditional practice aimed at controlling female sexuality, ensuring the honor and identity of the cultural group, and protecting the virginity and chastity of the woman [6]. FGC is also associated with beauty as some cultures view the female genitals as unclean and ugly, constituting a male organ (the clitoris) in a female body, justifying the necessity to be removed. For example, among the Kono ethnic group of Sierra Leone, FGC (Bondo) signifies entry into the woman's ethnic group, while in Sudan; its purpose is to reduce a woman's vaginal opening [30]. In many other countries, FGC is viewed as a coming of age ritual [6, 7]. Other cultural reasons underlying the perpetuity of FGM include social pressures, family status, fertility, and assistance in childbirth [7]. The perception of FGC in cultures where it is commonly practiced conflicts with western opinion on

the practice. The root of the controversy over the appropriate terminology for this practice stems from the disputation between western societal values and the cultures where this practice is indigenous.

The general procedure for FGC consists of four major forms that are generally closely linked to the four major types of FGC. These procedures are detailed below from the WHO Fact Sheet.

Figure 1: Procedures of Female Genital mutilation [3]



Procedures

Female genital mutilation is classified into four major types.

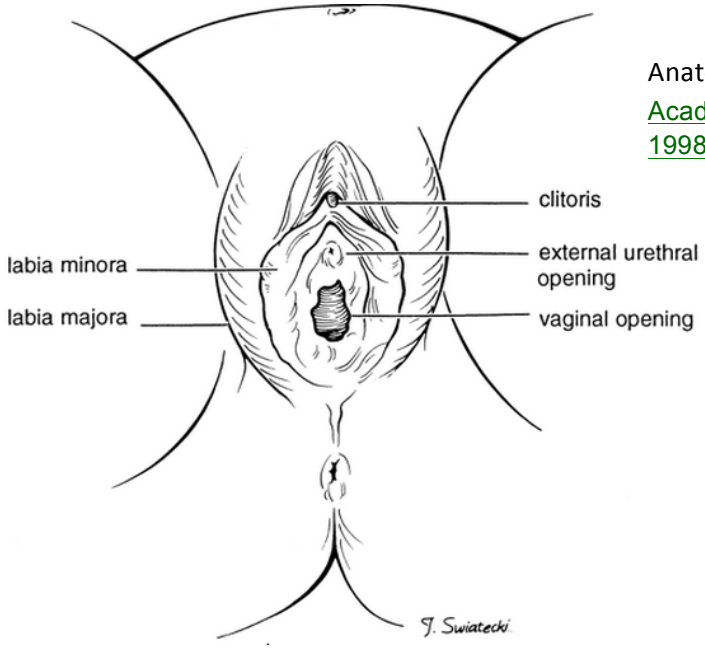
1. Clitoridectomy: partial or total removal of the clitoris (a small, sensitive and erectile part of the female genitals) and, in very rare cases, only the prepuce (the fold of skin surrounding the clitoris).
2. Excision: partial or total removal of the clitoris and the labia minora, with or without excision of the labia majora (the labia are "the lips" that surround the vagina).
3. Infibulation: narrowing of the vaginal opening through the creation of a covering seal. The seal is formed by cutting and repositioning the inner, or outer, labia, with or without removal of the clitoris.
4. Other: all other harmful procedures to the female genitalia for non-medical purposes, e.g. pricking, piercing, incising, scraping and cauterizing the genital area.

Fig 1: *World Health Organization description of the four main FGM procedures that underlie the four main forms of FGM.*

Table 1: The WHO classification of Female Genital Mutilation [2]

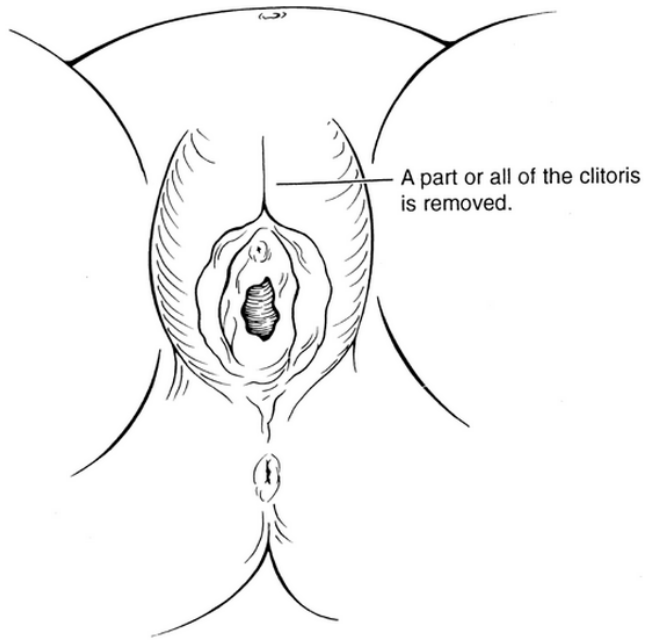
Type	Definition
I	Partial or total removal of the clitoris and/or the prepuce ***(clitoridectomy)*** ***Type Ia*** – removal of the clitoral hood or prepuce only ***Type Ib*** – removal of the clitoris with the prepuce
II	Partial or total removal of the clitoris and the labia minora, with or without excision of the labia majora ***(excision)*** ***Type IIa*** – removal of the labia minora only ***Type IIb*** – partial or total removal of the clitoris and the labia minora ***Type IIc*** – partial or total removal of the clitoris, the labia minora and the labia majora
III	Narrowing of the vaginal orifice with creation of a covering seal by cutting and appositioning the labia minora and/or the labia majora, with or without excision of the clitoris ***(infibulation)*** ***Type IIIa*** – removal and apposition of the labia minora ***Type IIIb*** – removal and apposition of the labia majora
IV	Unclassified: All other harmful procedures to the female genitalia for non-medical purposes, (i.e.: pricking, piercing, incising, scraping and cauterization)

Fig 2: An image of a normal female genital.



Anatomy of a normal Female Genital (from American Academy of Pediatrics, PEDIATRICS Vol. 102 No. 1 Jul 1998, pp. 153-156)

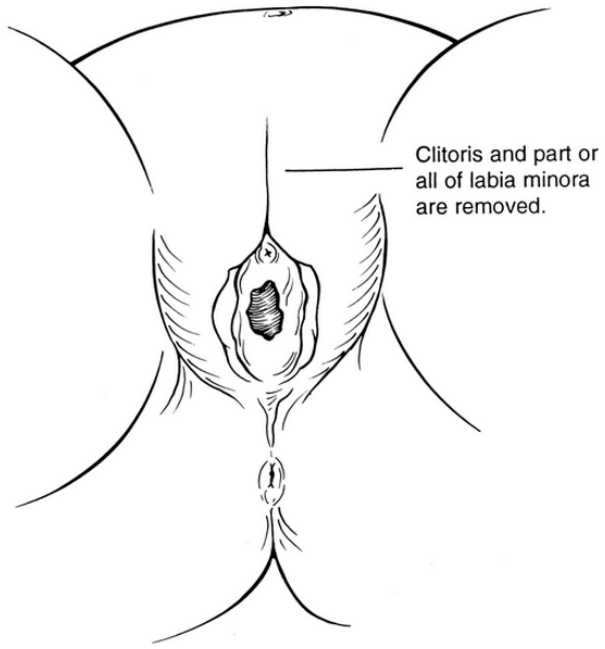
Fig 3: Type I Female Genital Mutilation involves the partial or total removal of the clitoris and/or the prepuce – also known as clitoridectomy. Subdivided into two smaller subtypes [6]



Clitoridectomy/Type I FGM: Removal of the skin around the clitoris with/without removal of the clitoris.

(from American Academy of Pediatrics, PEDIATRICS Vol. 102 No. 1 Jul 1998, pp. 153-156)

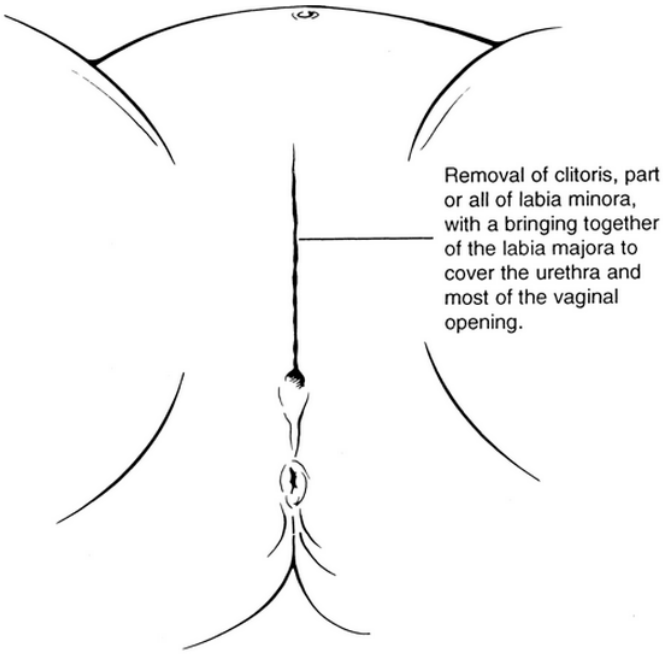
Fig 4: Type II FGM involves the partial or total removal of the clitoris and labia minora without excision of the labia majora – also known as excision. Subdivided into three small subtypes [6]



Excision/Type II FGM: Removal of the entire clitoris and part or all of the labia minora.

(from American Academy of Pediatrics, PEDIATRICS Vol. 102 No. 1 Jul 1998, pp. 153-156)

Fig 5: Type III FGM involves the Narrowing of the vaginal orifice – also known as infibulation. Subdivided into two smaller subgroups [6]



Infibulation/Type III FGM: Removal of the entire clitoris, some or all of labia minora, and excision of labia.

(from American Academy of Pediatrics, PEDIATRICS Vol. 102 No. 1 Jul 1998, pp. 153-156)

Short-term and Long-term Sequelae of FGC

There are various short-term and long-term complications associated with FGC. Immediate complications can occur with any type and may include shock, pain, hemorrhage, urine retention, and injury to adjacent genital structures (WHO Fact Sheet). Long-term consequences are more prevalent with increasing severity and extent of cutting, but may also occur with types I and II, and these include: keloids, apareunia, increased risk of childbirth complications and newborn deaths, epidermal inclusion cysts, keloids, chronic urinary tract infections, and may have an impact women's sexual functions [1, 10]. Of all the complications stemming from FGC, the most widely discussed is altered sexual function. This is because of the obscurity surrounding the methods of assessing sexual function in women with FGC. However, the physiology of the human body and the processes associated with structure and function are a constantly evolving

field as new insights are gleaned on physiologic and pathophysiologic mechanisms. For this reason, I have honed the scope of my thesis to the pathophysiological mechanism of the effects of FGC.

Purpose and Objective:

This study will review the evidence on FGC including the physiologic and anatomic changes that occur to the body as a result. Exploring the topic of women's sexual health demands a critical analysis of the existing evidence, taking into consideration differences in experiences of sexual dysfunction based on the type and severity of cutting, the cultural/ethnic context, and one's lived experience in countries where this practice is indigenous, compared to the experiences of women living in a Western context where the practice of FGC is not condoned or upheld. However, this study evades discussion of cultural/ethnic variances of FGC practice as well as the differences in sexual experience amongst women without FGC. The scope of this study excludes the disparities of sexual dysfunction that exist amongst women with FGC in correlation to the type of FGC undergone. Hence, the objective of this thesis is to examine the physiological mechanisms underlying the effect of FGC on genital structures honing in on what is known concerning the neurobiology of altered genital sensation and nervous system signaling, which will inform our understanding of physiologic processes that occur as a result of FGC. The existence of juxtaposing the evidence on the outcome of altering the neural wiring to the clitoris and related structures creates uncertainty on the effect of FGC on sexual health and function. This is further compounded by the wide variation in sexual experience and expression across cultures and severity of FGC practiced. Thus it raises many questions: Does neural rewiring occur after interference with the nervous system signaling to the clitoris? Is there a shift in sexual sensation among 'cut' women away from their genitals to other body parts? Is there a partial or complete

alteration in sexual function in women with FGC? The scope of this thesis involves exploring answers to these complex questions.

Methods:

For this thesis, I conducted a systematic review to investigate the pathophysiology of FGC. I performed literature searches of the following databases: Pubmed, Science Direct, Medline (Ovid), and Cochrane systematic reviews. Combinations of the following keywords were used: "sexual function," "physiologic," "sexual dysfunction," "female," genital sensation," "orgasm," "female genital cutting," "female genital modification." The initial search including various combinations above returned an average of 1163-1242 studies. Articles associated with male sexual function, legislative actions against FGC, and sexual dysfunction in patients with other ailments were excluded. A review of abstracts and keywords were used to exclude inapplicable articles. In addition, 70 research studies obtained from Dr. Crista Johnson-Agbakwu were cross-referenced and organized based on content, data, and relevance to the focus of this thesis. Abstracts and full text reviews were performed on three-quarters of the initial studies after exclusion of a third of the articles based on their irrelevance or shift from this study's focus. Ensuing this, a third of the articles were excluded based on their methods of acquiring data Studies that utilized the sexual quality of life (SQOL-F score) survey and questionnaires for assessment of sexual function were omitted because they lacked accurate depictions of clitoral physiology and pathophysiology or evidence of neural processing of the female genitals. Full text analysis and data abstraction was performed on the remaining articles. An extraction sheet was used to ascertain the sample size, methods, setting, demographics, goal, and variables of interest of the study. Important references from reviewed articles were also cross-referenced for inclusion in the study. The inclusion criteria included: physiology of female vulva, populations

with prevalence/practice of FGC, neural signaling to the vulva, pathophysiological mechanism of sexual function, and pathophysiology of FGC. A total number of 30 English language research articles were included in this review in addition to non-literary sources.

Results:

Over the past decade, there has been a growing discussion over the long and short term sexual sequelae of FGC with focus on its impact on the sexuality of women. However, the matrix of assessing sexual function in women with FGC presents itself with contradicting results. To effectively assess effects of FGC on sexual function, a review female genitalia anatomy and function is essential.

The clitoris is a small projection covered by the prepuce (a hood of skin) that is sensitive to stimulation. Anatomically, the clitoris is comparable to the male penis in that it contains erectile tissue, though not to the same magnitude as in men [30]. The clitoral structure is positioned "deep to the labia minora, inferior to the pubic arch, consisting of the junction of erectile bodies: posteriorly paired vestibular bulbs, and anteriorly, crura that takes an inferior concave shape and joins distally to form a single corpora" [12]. The body of the clitoris extends several centimeters along the inferior public rami. There are a variety of specialized nerve endings in the vulva that generate impulses to the spinal cord and converge on the vagus nerve, eliciting sexual arousal and genital sensitivity in women [9, 10]. Mosczkowicz et al elucidated the distribution of neurotransmitters and nerves in the clitoris, which comprises the concept of neural signaling to the female genitals.

These nerves participate in afferent and efferent pathways responsible for the generation of sexual arousal. Other major genital structures that produce sexual pleasure and sexual arousal include: the "labia minora/introitus; the clitoral shaft, glans, and bulbs (also known as the vestibular or vaginal bulbs); the periurethral glans (mucous membrane surrounding the urethral meatus from the clitoris to the anterior introital edge); the urethra; Halban's fascia (the space between anterior wall of vagina and bladder); the G-spot (paraurethral gland area), and the anterior fornix erogenous zone (anterior fornix of vagina)" [11]. Type I and II FGC usually involves cutting of the glans (tip of the clitoris) preserving the integrity of the majority of the clitoral tissue. However, with Type III FGC, closure of the labia minora and majora generally leaves the actual clitora, in at least 50% of cases, as it becomes buried beneath the vulvar scar. Furthermore, discussions of the normal human sexual cycle aids with our understanding of the effects of FGC on the overall sexual experience of women. According to Masters and Johnson, the human sexual cycle consists of 4 phases [13]. This cycle begins with excitation – a period in which a woman becomes sexually excited, experiencing several physiologic changes to her body. This period of the sexual cycle is characterized by increased heart rate, rise in blood pressure, heavy breathing, myotonia, increased activity of the parasympathetic component of the autonomic nervous system, vasocongestion, swelling of the nipples, and involuntary muscle contraction [11, 13]. There are other biological responses in this phase that affects the structure of the genitals such as: swelling of the labia majora and minors due to venous engorgement and erection of the clitoris [13]. Kaplan's model (1979) and Basson's model (2001) are other models of sexual response endorsed by women. In Basson's model, a central tenet is the concept that "women frequently approach and engage in partnered sexual activity not from an intrinsic sexual desire, but from a position of sexual neutrality" [33]. The Kaplan model is similar to Masters and

Johnsons with the addition of a sexual desire phase before the excitation phase [11]. All three models represent the sexual response cycle of women. The body also experiences "increased blood flow to the clitoral cavernosal and labial arteries resulting in increased clitoral intracavernous pressure, tumescence, protrusion of the glans clitoris, and eversion and engorgement of the labia minora" [15]. The plateau phase involves the continuous thrusting motion of the penis into the vaginal orifice (plateau of the excitement phase – coitus). Masters and Johnson propose that "motion of the labia minora resulting from thrusting of the penis pulls down on the clitoral hood and thereby creates friction to the clitoris" producing sexual pleasure [13]. However, in another study by Shere Hite, direct stimulation of the clitoris for many women contributes to increased sexual pleasure and orgasm [14]. Orgasm is the next component of this cycle. Orgasm is the release of sexual tension built up during the plateau phase. This phase consists of muscle spasms, muscle contractions (vaginal, uterus), rapid breathing, high blood pressure, and rapid intake of oxygen [29]. Various studies report that clitoral stimulation heavily influences the experience and extent of an orgasm [11, 13, and 14]. According to these studies, the clitoris plays an essential role in orgasms by transforming all sexual stimulation that lead to orgasm. The last phase of the sexual cycle is the resolution phase wherein the body returns to its normal resting state. During this time, there is decreased heart rate, blood flow, breathing, and involuntary contractions.

Figure 6: The female sexual Cycle diagram – Masters and Johnson model (1984)

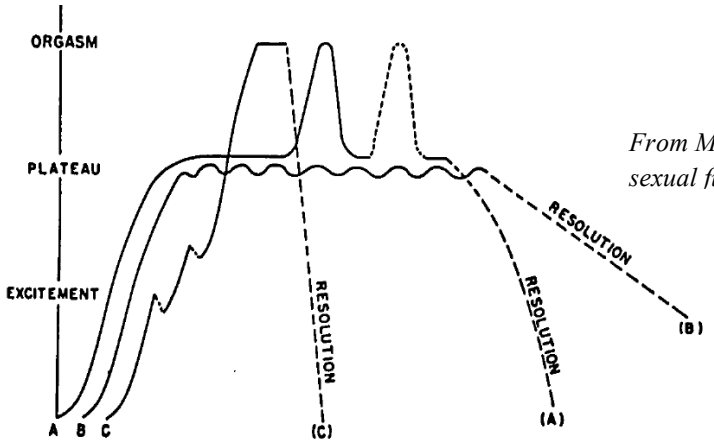


FIG. 1. *The female sexual response. (From Masters and Johnson.[4] By permission.)*

Image of the Female Sexual Cycle

From Martin Weisber's publication: Physiology of femal sexual function

Figure 7: The female Sexual cycle diagram – Basson's Model (2001)

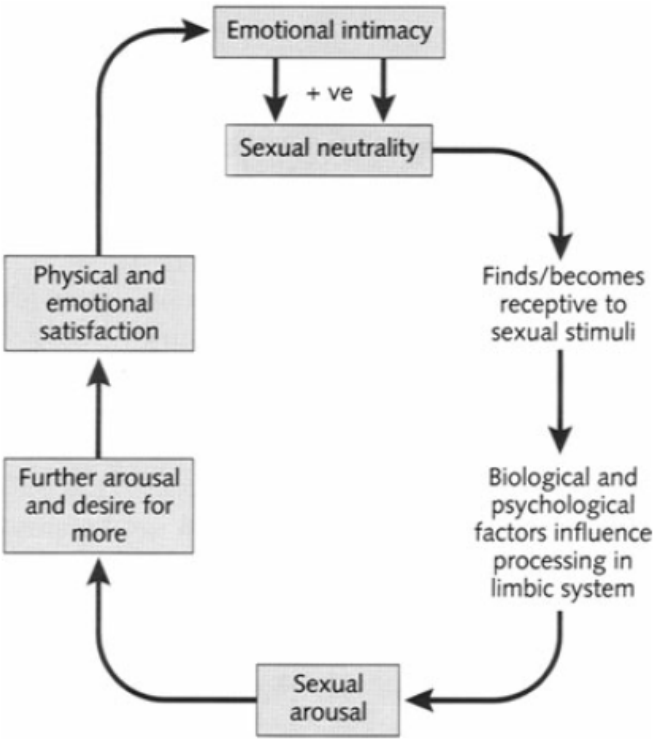


Figure 4 Basson model of female sexual response (adapted from Basson R, J Sex Marital Ther 2001;27:33–43).

The partial or total excision of the clitoris as seen in women with FGC could affect the physiology of female genitalia [19]. In the human body, every system has a specific function that utilizes specialized structures. Thus, the revision of the female genital could potentially result in alteration of its function and the sexual health of women who have undergone FGC. This is only a theoretical hypothesis in that there are many processes utilized by the body to respond to changes in the environment. Neural rewiring is one method of adaptation believed to explain changes in sexual function as a result of FGC, which is similar to changes in sexual function which may occur in patients after spinal cord injury [25]. Dissecting the validity of this proposed theory requires a complete understanding of the neural supply to the clitoris and the pathway of neural signaling to the female genitals.

The neural supply to the pelvis is divided into two neural pathways: the supralevator pathway that consists of autonomic nerves (inferior hypogastric plexus IHP) and the infralevator pathway comprising somatic nerves (pudendal nerve PN) [12]. Both nerve pathways drive sexual arousal through stimulation of the clitoris, increasing blood flow to the clitoral cavernosal and labia arteries [15]. The autonomic and somatic nerve pathways are responsible for clitoral erection while the spongious nerve of the parasympathetic pathway controls the engorgement of the vestibular bulb by causing an increased blood flow to this region [12, 15]. In addition, "the medial preoptic, anterior hypothalamic region, and related limbic-hippocampal structures" within the central nervous system are innervated in response to sexual arousal, transmitting their electrical signals through the sympathetic and parasympathetic pathways to higher order brain structures [15]. Further studies on the significance of the neurological signaling in the preservation of sexual function includes research on white female New Zealand rats which

demonstrated that pelvic-nerve stimulation induces increased vaginal and clitoral blood flow, increased vaginal wall pressure and length, and decreased vaginal vascular resistance, thereby increasing the intensity of sexual arousal and sexual pleasure [16, 28].

In his investigation of the neural supply to the clitoris, Moskowicz et al report that "disruption of the neural integrity is likely to interfere with normal sexual functioning", although it is possible that certain psychological and relationship factors may influence the sexual experience of a woman [12]. All types of FGC may exhibit a neuronal impact; either through direct cutting of the nerve or through damage to nerves that innervate the surrounding muscles and vulva [1].

While some women with FGC report painful sexual experiences, lower rates of orgasm, sexual arousal, genital sensation, and overall sexual pleasure, other women disclose dissimilar experiences [18]. Infibulated women (Type III FGC) demonstrated higher female sexual function index (FSFI) mean scores in desire, arousal, orgasm and satisfaction in comparison to the control group of uncut women [18]. Catania et al also revealed no significant differences between cut and uncut women in lubrication and pain suggesting that FGC has no negative effect on the psychosexual life of women [18]. Ninety percent of women without FGC can experience orgasm; however, only 25% always reach orgasm during intercourse [18, 27]. A national telephone survey of western women in Australia demonstrated that 86% of women experienced an orgasm with manual/clitoral rubbing and/or oral stimulation (cunnilingus) as compared to penile-vaginal intercourse, 90% with only manual and/or oral stimulation, and 50% with penile-vaginal intercourse only [17]. There is a plethora of research describing the increased sensitivity of the clitoris and surrounding regions, and the importance of the clitoris for heightened sexual experience. Studies also suggest that "women with an excised clitoris experience lower rates of orgasm than women with an intact clitoris during clitoral stimulation" [17]. There is evidence

that women can experience orgasms from vaginal stimulation alone, others from both clitoral and vaginal stimulation, and others from only clitoral stimulation [1, 17] probably as a result of the structure of the clitoris. Some women with FGC report experiencing orgasm during penile-vaginal intercourse and this is no different from women who experience orgasm from clitoral stimulation. However, the validity of this statement is dependent on the Type of FGC and the extent of excision/infibulation performed. With type II FGC (clitoral excision), roughly 25% of women report experiencing orgasm, while in most women with type III FGC, the clitoris is just buried beneath the scar and not actually cut. Hence these women may still retain genital sensation and capacity for clitorally-derived orgasms in addition to vaginally-derived orgasms [31]. Many women report experiencing orgasm from "simply stimulation of the surgical site" though the extent of stimulation varies with type [31]. According to Fuambai, the "clitoris has many potentials for arousal as each individual contains a unique pattern and distribution of nerves" capable of compensation in case of injury [31]. This mechanism of compensation occurs because of "the extensive neural network linking the clitoris to the spinal column with two separate roots and nerve endings so plentiful" that stimulation of surrounding regions produces waves of sensation that result in orgasm [31]. It was recently suggested in a study on clitoral reconstruction that there are remnants of clitoral tissue after circumcision that could become stimulated during intercourse to produce sexual pleasure [19]. The available evidence on the sexual quality of life (SQOL-F score) in women with FGC versus control women (women without FGC) demonstrates reduced satisfaction, orgasm, arousal, lubrication, and overall sexual quality, but similar desire and pain score [21, 22, and 23]. Furthermore, women who undergo defibulation (opening of the scar) surgeries report significant improvements in sexual arousal, lubrication, pain, sexual desire and overall sexual satisfaction [24]. Another method of

restoration with increasing popularity is clitoral reconstructive surgeries which seek to return clitoral anatomy and function by mobilizing residual clitoral tissue that is buried beneath the scar, and bringing it up to the skin's surface, recreating a new clitoral glans. Women with FGC who have undergone this procedure demonstrate improved clitoral function, sensitivity and increased orgasmic rates [19].

FGC has been shown to have adverse effects on the sexual function of women [21]. So what then explains the diversity and mixed responses from women with FGC? This could result from some women's aversion to sex, their lack of both clitoral and vaginal orgasm, or the absence of a desire for sex – all which are also attributable to uncircumcised women [31]. Many sex researchers view the brain as the most powerful sexual organ, hence, a woman's perception of and expectation from sex may be influenced by her environment, her desires, her body image, her culture, and other non-psychological determinants of sexual gratification [31]. Western aversion towards FGC creates stigmatization of circumcised women in the diaspora, and may influence the attitudes of these women towards their sexual experience [31]. Einstein's investigation on the potential neural changes of FGC sheds light on this issue. Einstein proposes that neural rewiring occurs in FGC as a result of damage to the nerve endings from the vulva, retrograde degeneration, and reorganization in the brain and spinal cord circuits [25]. The concept of convergence of somatosensory and motor neurons on higher order circuits in the cortex could potentially influence neural rewiring. Multiple somatosensory inputs converge on the same higher order neurons in the thalamus and cortex, as a result, loss of input from a neuron results in reorganization of the sensory cortex – a concept known as plasticity. Other neural inputs converging on that region of the somatosensory cortex expand their receptive field and increase their activity. Therefore, rather than an absence in sensation, FGC could promote altered

sensation, and experience of sexual arousal and pleasure through other neural pathways. Einstein further explains that the excision of the clitoris does not necessarily eliminate the ability to experience orgasm [25]. Recent studies postulate the existence of internal clitoral tissue that upon stimulation could promote arousal and orgasm. It is also proposed that women possess an alternate pathway to orgasm via the vagus nerve making it possible for women with FGC to maintain a normal sexual quality of life. This shift in focus to non-traditional erogenous sites as potential participants in female sexual function explains the varying reports of sexual experience in women with FGM [1]. Ofonofua et al demonstrated that cut women report their breast as the most sexually sensitive body part in comparison to uncut women who endorse greater clitoral sensitivity. The establishment of new erogenous sites allows for alternate methods of achieving sexual arousal and pleasure. Hence, FGC does not attenuate women's sexual feelings, and both cut and uncut women may depict similar level of sexual activity and experience [32]. It is also necessary to recognize the cultural implications surrounding this practice. Though this paper evades discussion of the socio-cultural outcomes of this practice, the cultural milieu deeply influences women's attitudes toward the practice. There is a psychological facet that influences women's perception of the practice as a duty to their husbands and their community which may impact their sexual experience [17].

Conclusion:

There are many reported health complications associated with FGC. However, the full extent of the impact of FGC on the sexual health and sexual experience of women is still inconclusive due to shortcomings in current methods of assessing sexual function [17]. Methods like the sexual quality of life score (SQOL-score) and the female sexual function index (FSFI) questionnaire fail to take into account the demographic differences and cultural underpinnings of the women

thereby producing inaccurate results. Exploring the physiologic and neurobiological mechanisms involved with function of the genitals helps broaden the discussion on FGC. It provides an understanding for the differing reports on women's experience with FGC that reconciles with the biology of the body [25]. Fuambai explains that variations in surgery in alliance with individual neurobiology and psychological makeup of individuals make it difficult to resolve the impact of FGC on sexual function [31]. Ethnographic data divulge that, like uncircumcised women, many women with different forms of FGC do experience different types of orgasm with/without a partner through a variation of techniques; this is dependent on individual biological and psychosocial conditions [31]. This understanding promotes Western tolerance for this practice by refuting known misconceptions of FGC as a completely negative practice. Additionally, the neurobiologic view of "FGC moves this traditional practice and the bodies of the women on which it is practiced beyond a focus on genitalia and reproductive health to the entire body via the nervous system" (Einstein, 2008). A shift in focus prompts improvements in the quality of care these women receive. It encourages culturally-sensitive counseling, education, healthcare, and outreach to communities still in practice. Though this review focuses on the pathophysiology of FGC, a comprehensive study on the impact of FGC on sexual health of women requires a "mixed-method, interdisciplinary and community-based approach" to fully understand the socio-cultural context surrounding pleasure and pain [1]. This study adds to the available evidence about the pathophysiologic mechanisms underlying the impact of FGC from a neurologic perspective. Advancement in knowledge on the biology of the vulva in women with FGC, can inform the development of evidence-based guidelines to improve the care of women with FGC.

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