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Original Research

Beautiful vulvas: expanding illustrative visual imagery of female genital cutting types

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Abstract

Background: Visual imagery has been used to educate healthcare providers, patients, and the lay public on female genital cutting (FGC) typology and reconstructive procedures. However, culturally inclusive, diverse, and anatomically accurate representation of vulvas informed by women possessing lived experience of FGC is lacking.
Aim: We sought to apply World Health Organization (WHO) FGC typology to the development of type-specific visual imagery designed by a graphic artist and culturally informed by women with lived experience of FGC alongside a panel of health experts in FGC-related care.
Methods: Over a 3-year process, a visual artist created watercolor renderings of vulvas with and without FGC across varying WHO types and subtypes using an iterative community-based approach. Somali women possessing lived experience of FGC were engaged alongside a team of clinician experts in FGC-related care. Women and clinicians provided descriptive input on skin color variation, texture, and skin tone, as well as the visual depiction of actions necessary in conducting a genital examination.
Outcomes: A series of vulvar anatomic illustrations depicting WHO FGC typology.
Results: FGC types and subtypes are illustrated alongside culturally informed descriptors and clinical pearls to strengthen provider competency in the identification and documentation of FGC WHO typology, as well as facilitate patient education, counseling, shared decision making, and care.
Clinical Implications: Ensuring equitable representation of race, gender, age, body type, and ability in medical illustrations may enhance patient education, counseling, and shared decision making in medical and/or surgical care. FGC provides a lens through which the incorporation of patient-informed and culturally relevant imagery and descriptors may enhance provider competency in the care of FGC-affected women and adolescents.
Strengths and Limitations: The strengths of this study include the development of visual imagery through an iterative community-based process that engaged women with lived experience of FGC alongside clinicians with expertise in FGC-related care, as well as the representation of historically underrepresented bodies in the anatomical literature. Study limitations include the lack of generalizability to all possible forms or practices of FGC given the focus on one geographically distinct migrant community, as well as the reliance on self-report given the inability to clinically verify FGC status due to the community-based methodology employed.
Conclusion: Patient-informed and culturally representative visual imagery of vulvas is essential to the provision of patient-centered sexual health care and education. Illustrations developed through this community-engaged work may inform future development of visual educational content that advances equity in diverse representation of medical illustrations.

Keywords: Female Genital Cutting/Mutilation; Female Circumcision; Visual Imagery; Medical illustration; Artistic Anatomy; Community-Based Participatory Research.

Introduction

Visual images are widely used in medical and patient education to enhance learning and understanding about health information. This combination of science and art has been useful to translate complex information to healthcare professionals and communities alike. Indeed, the addition of visual imagery to written or spoken text has been shown to significantly improve health education and comprehension and improve dialogue between providers and patients when compared with the use of text or verbal communication alone.[1] As a communication tool, medical imagery can contribute to and generate patient-centered conversation that is useful for clinical shared decision making between patients and providers—particularly related to surgical planning and techniques. Many styles of visual imagery exist including photographs, anatomical drawings, and less detailed, cartoon-like illustration; there is evidence that simplification of visual aids may help improve effective communication between healthcare providers and patients.[2] However, while simplified illustration may be effective, a preference for more detailed and realistic illustration has been identified by laypeople, as it seems more authentic and aesthetically appropriate.[3]

While visual imagery has enhanced medical learning across centuries, it may also be part of a hidden curriculum within the medical training environment. Unequal representations of race, gender, age, body type, and ability exist within the most common medical texts, and this lack of heterogeneity and equity may inadequately prepare future medical providers

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for the diversity of the populations that they will care for in their future careers.[4,5] This lack of exposure may contribute to implicit biases that could impact medical decision making and lead to inequities in care.[4,5] Furthermore, there has been a recognized gap in the literature regarding the representation of people of color in sexual health textbooks and human sexuality materials, contributing to colorism—the process that privileges lighter-skinned individuals over dark-skinned people—and potentially perpetuating racist body ideals.[6] Historically, the field of medical illustration has been dominated by those who are White and male—likely leading to depictions of bodies who are also, largely, White and male.[7] This bias toward White, male, cisgender, able-bodied individuals as visual norms may contribute to othering of those bodies who appear different. Recent discourse has created a call to action to elevate representation in all aspects of healthcare—including visual imagery—as a critical part of the journey toward equity in healthcare.[7]

Depictions of genital anatomy in medical texts have also, traditionally, reflected idealized human genital forms with limited expression of the full spectrum of genetic and cultural norms.[8] This limited expression may reflect social attitudes about what is considered normal or desirable and what is abnormal, leading to value judgments about the breadth of human genital forms. Wall[8] noted this in their review of the role of illustration in shaping conceptions of variant sexual anatomy and spoke to the importance of illustration (as compared with photographs) as a way to engage in discourse about variations in genital anatomy. Illustrations are more synthetic in nature, taking information from many different bodies, and can be viewed as affectively neutral and less voyeuristic than a photograph. Wall discusses illustration as a design strategy, noting that using side-by-side images showing variation can improve understanding of the breadth of different bodies—both for medical providers and for laypeople alike.

Female genital cutting (FGC) is a variation in human genital form that is typically not represented in medical texts and/or represented in ways that may not reflect patients' lived experience. FGC encompasses all procedures that involve the partial or total removal of the external female genitalia for cultural and/or nontherapeutic purposes.[9] FGC is a cultural practice found throughout 30 countries in Africa, Asia, the Middle East, and South America, as well as in migrant communities in Europe and North America, and affects over 200 million women and girls across the globe.[10] Multiple studies have documented the lack of readiness for healthcare providers in high-income countries to meet the needs of patients who have experienced FGC, including appropriate use of the World Health Organization (WHO) typology.[11-15] Patient-centered tools that guide healthcare providers in approaching the topic of FGC are one means of bridging gaps in clinical competency.[16]

Visual imagery of FGC in the form of illustrative sketches and photographic imagery have been used to educate healthcare providers on WHO FGC typology and surgical vulvar reconstructive procedures,[17-20] as well as to educate patients and the lay public.[21,22] When used in clinical conversation, visual imagery of vulvas and depictions of different FGC subtypes could facilitate more accurate clinical documentation by providers and reliable self-reports of FGC status by women.[23] However, in some instances, illustrative sketches have been different from the actual skin tone reflected in corresponding side-by-side photographs.[24] There is a need for culturally informed representation of FGC visual imagery that evolves through discursive input from women who possess the lived experience of FGC. Such an approach to the development of visual imagery could illustrate culturally inclusive and anatomically accurate depictions of WHO FGC typology that is more relatable than existing imagery. Additionally, the literature has few visual depictions of FGC-affected vulvas after vaginal delivery, and expanding the illustration of vulvas across the reproductive lifespan is needed. In particular, women who have experienced infibulation note changes in the way their bodies function after delivery (eg, increased urinary flow, different sensation during intercourse), and imagery could help explain some of those changes. We, the authors of this article, include clinicians who have utilized visual imagery of FGC with patients. Existing imagery has aided communication about FGC and documentation of FGC, while still having room for improvement.

Here, we describe the process of developing and using original vulva and FGC illustration based on the WHO FGC typology and provide clinical pearls for how these images could be utilized in practice with culturally diverse populations.[21] The original imagery was created by a graphic artist specialized in genital anatomical drawing using watercolor; imagery was designed to be esthetically pleasing and culturally accurate for Somali skin tones. Imagery included watercolor illustrations of all FGC subtypes (ie, type 1a/1b, type 2a/2b/2c, and type 3a/3b) and inclusion of postvaginal delivery FGC type 3. These illustrations are part of a larger study examining experiences of sexual pain among Somali women with FGC.[23] The illustrations were developed and used in conversation with study participants to help them accurately identify their FGC type without need for clinical examination. We argue that such an approach can inform the future development of visual educational content that advances equity in medical illustrations, particularly in sexual health care.

Method

Institutional Review Board approval

On June 20, 2019, the University of Minnesota Human Research Protection Program, Office of the Vice President of Research, approved this study (Institutional Review Board ID: STUDY00002117). The Institutional Review Board determined that the criteria for approval have been met and that this study involves no greater than minimal risk.

This project was part of a larger community-engaged study of sexual pain among women who have experienced FGC.[23] The development of anatomical illustrations of vulvas showing FGC types was a collaborative and iterative 3-year process among all authors with A.F. (an artist specializing in illustrating genitalia); N.C. and C.E.J.-A. (2 physician experts in FGC) primarily responsible for the technical accuracy of the drawings; and M.S., our most experienced bilingual female Somali interviewer, responsible for conducting the majority of the 75 interviews with Somali women. The physicians are experts in FGC—an obstetrician/gynecologist with over 2 decades of community-engaged research experience encompassing over 40 FGC-specific peer-reviewed publications, alongside clinical obstetric, gynecological, and surgical care throughout pregnancies and complications of FGC (C.E.J.-A.), and a family physician with 2 decades of clinical practice serving a large

Somali immigrant population including women with FGC needing pregnancy, labor and delivery, and gynecological care (N.C.). Our research study was grounded in a community-based participatory research approach.[25]

The study team also included a community partner, SoLaHmo, an organization that specializes in community-based participatory research approaches within intercultural communities composed of Somali community members and healthcare professionals and our 11-member Community Advisory Board composed of Somali health professionals, school administrators, and community leaders. All groups provided feedback regarding how to make the drawings culturally appropriate and representative of our study population—with particular attention to creating images that, while accurate, were not off-putting, offensive, confusing, or overwhelming. In addition, they assisted with simplifying the language used for labeling anatomical structures. We also focused on other factors such as realistic skin tone, color, and texture; dimensionality; artistic appeal; and representativeness.

A-.F.'s specialty is watercolors—the focus of her art degree. She has specialized in drawing diagrams of comparative anatomy of vulvas and penises for vaginoplasty surgery. To accurately portray FGC typology, she looked at less lifelike drawings of FGC[17,18,21] and expanded on these simpler images to make them more realistic and lifelike, with skin tones that reflected Somali female vulvas. In addition, a variety of diverse photos and drawings were sent to the artist, helping her to create final drawings that most accurately reflected the corresponding WHO typology. She created the drawings in watercolor, scanned the watercolor digitally (.jpg), then used Photoshop software (Adobe) to edit or redo the drawings as needed.

Our 2 physician experts in FGC, in concert with our artist, fine-tuned the color variation, texture, tone, and actions needed by the examiner (eg, insertion of gloved hand to indicate the need for manual retraction of the labia majora to assess the labia minora infibulation, type 3a). This aided the artist's ability to accurately convey subtleties important to distinguishing the FGC subtypes (eg, type 3a from 3b). Numerous iterations (50+) occurred until we achieved consensus regarding the best depiction of all FGC types, leading to the creation of 9 watercolor drawings representing an intact/uncut vulva for comparison purposes (Figure 1, uncut vulva) and the following FGC types: 1a, 1b, 2a, 2b, 2c, 3a (with gloved hand), 3b (before births/defibulation), and 3 (after multiple vaginal births and/or partial defibulation) (see Figures 2-9, respectively). In addition, the team developed a type 4 text description (ie, no removal of genital structures, rather represents all other procedures performed to the female genitalia for nonmedical purposes, examples given)(Figure 10). Finally, we collaborated on the development of culturally inclusive clinical pearls for medical providers who may be less familiar with anatomical variation after FGC.

Results

WHO FGC types and subtypes are described alongside clinical pearls to aid healthcare providers when performing a vulvar examination.[21] Of note, in the original WHO classification schema, reference to excision of the clitoris does not denote the actual removal of the entirety of the clitoris, as this is anatomically inaccurate.[21] Only the external glans of the clitoris is in fact excised, as the body and crura of the clitoris remains largely intact, including the sexual erectile structures comprising the vestibular bulbs of the clitoris.[17,18]

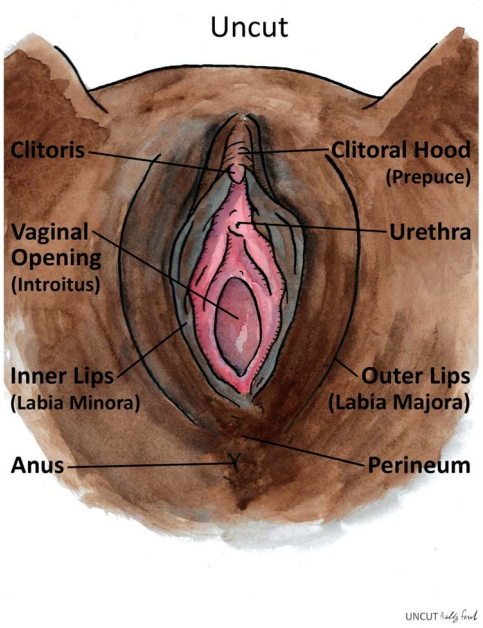

Figure 1. Uncut vulva.

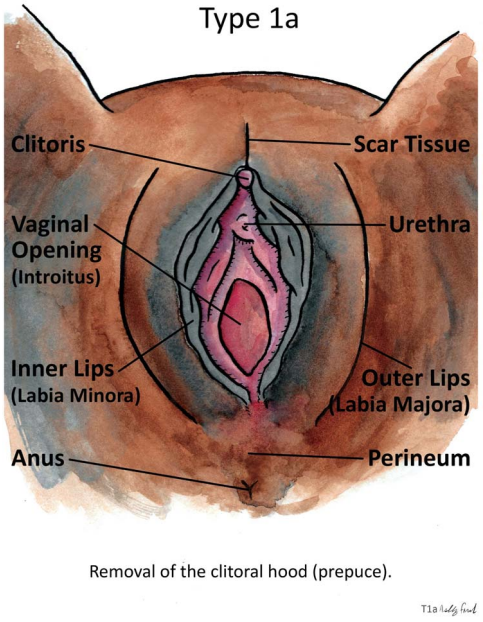

Figure 2. Type 1a: removal of the clitoral hood (prepuce).

FGC subtypes and images

Type 1 FGC

Type 1 FGC encompasses 1a (removal of the prepuce/clitoral hood) (Figure 2) and 1b (removal of the clitoris with the prepuce) (Figure 3). Types 1a and 1b are characterized by partial or total removal of the clitoris and/or prepuce (clitoral hood). Type 1a involves removal of the prepuce (circumcision), whereas type 1b involves removal of the head of the clitoris with the prepuce (clitoridectomy).

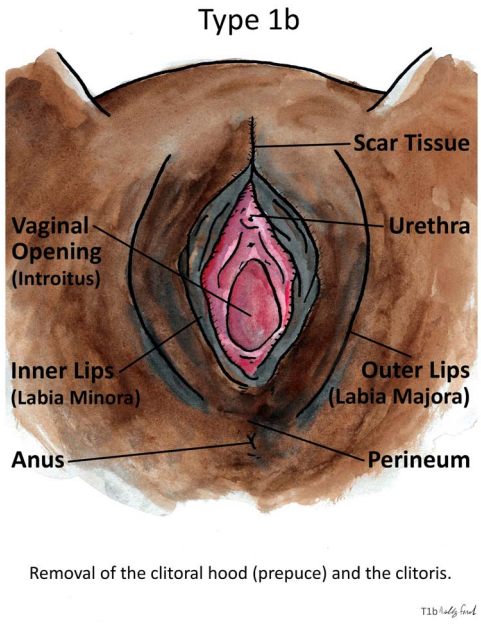

Figure 3. Type 1b: removal of the clitoral hood (prepuce) and the clitoris.

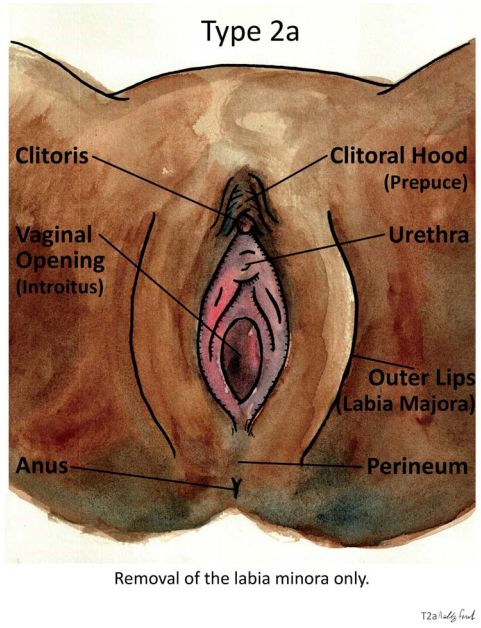

Figure 4. Type 2a: removal of the labia minora only.

Culturally informed description of type 1 FGC

Often referred to as "sunna," which means "tradition" in Arabic and is often perceived culturally as mild changes, Figures 2 and 3 show representations of preserved inner and outer lips (labia minora and majora), with variation around the clitoral area. Participants describe sunna using descriptors such as "little-cut," "removed," "clitoris," "top-part," "stitch," and "not-sewn-together."[23]

Type 1 clinical pearls

Type 1a is very easy to miss if performing a cursory vulvar exam, as the genital alteration may be minimal—particularly if FGC occurred in the distant past. It is important for the clinician to discuss potential psychological impacts with the patient, rather than assume that only more extensive FGC is associated with psychological harm.

Type 2 FGC

Types 2a, 2b, and 2c are characterized by partial or total removal of the clitoris (clitoridectomy) and the labia minora, with or without removal of the labia majora (excision). Type 2a involves removal of the labia minora only (Figure 4). Type 2b involves partial or total removal of the clitoris (clitoridectomy) and removal of the labia minora (Figure 5). Type 2c involves partial or total removal of the clitoris, removal of the labia minora, and excision of the labia majora (Figure 6).

Culturally informed description of type 2 FGC

These types vary regarding removal of inner and outer lips (labia minora and majora) with or without removal of the clitoris. For certain populations, particularly in the East African context, women may describe the type of cutting they experienced as 1 of only 2 types, sunna (type 1) and pharaonic (type 3); their culture may not recognize or describe type 2 (the intermediary type).

Type 2 clinical pearls

Discordance can occur between patient self-report and clinician assessment of type during clinical vulvar examination, particularly regarding the type 2 subtypes. Patients may self-report sunna (or type 1) for any of the FGC type 2 subtypes, yet upon closer examination, it may be clear to the clinician that the patient has experienced type 2 FGC. Labial agglutination—the adhesions created after removal of the labia—may still occur with type 2 just by apposition of the woman/child's legs together during the healing process. At times type 2c FGC may even necessitate partial defibulation at the time of vaginal childbirth depending on the extent of the fused labial scar partially obstructing the urethral and/or vaginal orifice. On occasion the vulvar fusion may have fenestrations (based on the technique of the original procedure).

FGC type 3

Types 3a and 3b are characterized by a narrowing of the vaginal orifice with the creation of a covering seal by cutting and appositioning the labia minora and/or the labia majora (infibulation), with or without excision of the clitoris (clitoridectomy). Type 3a involves removal and appositioning of the labia minora with or without removal of the clitoris (Figure 7). Type 3b involves removal of the labia minora and majora and appositioning of the labia majora with or without excision of the clitoris (Figure 8). In addition, many women with an original type 3 FGC may have vulvar appearance that appears more like type 2c after vaginal childbirth and/or vulvar surgical reconstructive procedures (Figure 9).

Culturally informed description of FGC type 3

Type 3 FGC may be described as "pharaonic" by patients using descriptors such as "cut," "inner lips," "outer lips," "small-opening," "sewn-together," and "sewn-up." This term may be derived from the probable origin of FGC in pharaonic Egypt and is culturally understood as the more extreme version of FGC. Figures 7 and 8 depict versions of type 3 infibulation in which the lips (labia) are fused with or without removal of the clitoris.

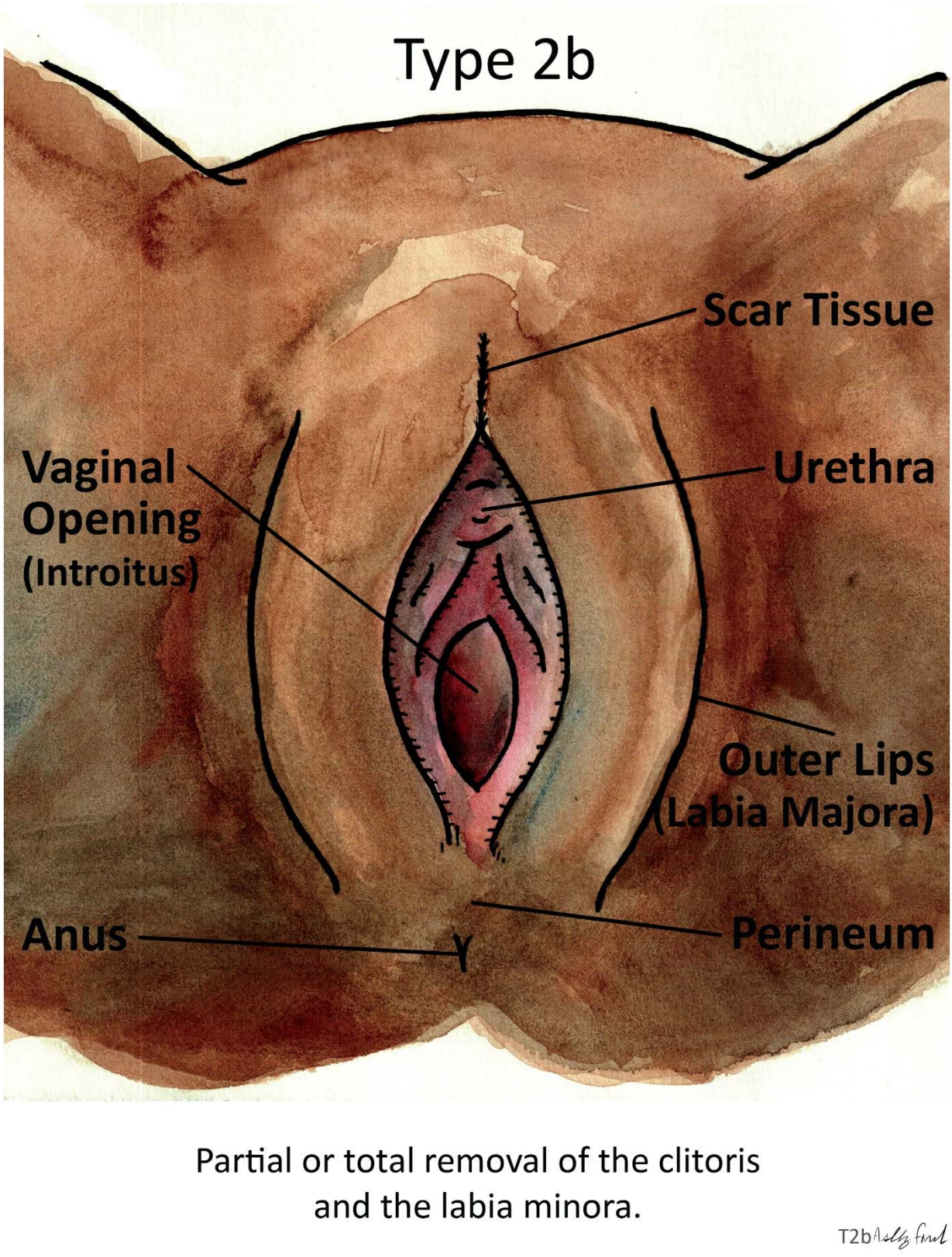

Figure 5. Type 2b: partial or total removal of the clitoris and the labia minora.

Type 3 clinical pearls

The infibulation (resultant fused labial scar) may be a result of the healing process that results in labial agglutination (fusion) and may not necessarily indicate surgical apposition of the tissues. In addition, the vulvar fusion may have fenestrations (based on the technique of the original procedure).

To aid in adequate visualization of type 3a, it is advised that one manually separate the labia majora with 2 digits to

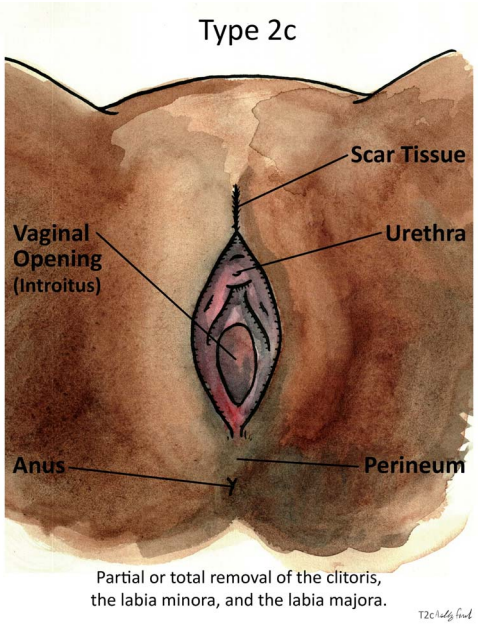

Figure 6. Type 2c: partial or total removal of the clitoris, the labia minora, and the labia majora.

reveal labial minoral fusion clearly (Figure 7). Defibulation is a surgical procedure performed to release the fused labial scar in type 3a/b and can be performed in the outpatient office or surgical suite setting under local, regional, or general anesthesia—when there are symptoms of posttraumatic stress disorder (PTSD), general anesthesia is recommended because of the risks of dissociation or reliving the trauma. This procedure is recommended for adolescent and adult women with type 3a/b FGC who experience genitourinary complications and/or sexual pain. It is also used to facilitate vaginal childbirth, gynecologic examinations, and procedures such as pap smears or catheter insertions. Defibulation should be individualized for each woman depending on her specific circumstances (eg, age, recollection of original FGC procedure and risks of triggering PTSD/flashbacks, scope of practice of the clinician, extent of vulvar scarring requiring revision/reconstruction, timing of delivery if pregnant).[26] It is also important to provide anticipatory guidance about possible changes in urinary flow postprocedure, which could be distressing if women are accustomed to slower flow. If the patient is unmarried, consideration should also be given to the timing of defibulation in proximity to one's eventual marriage. It may be deemed culturally important to the patient to preserve her FGC until marriage.

Many women with an original type 3a or 3b FGC may have a vulvar appearance more like type 2c after vaginal childbirth, defibulation, and/or other vulvar reconstructive procedures (eg, excision epidermal cyst inclusion or other vulvoplasty), particularly with increased parity or grand multiparity (Figure 9). It is important to document this in the medical records as distinct from how the vulva may have appeared at the time of the original FGC procedure.

Reinfibulation is the practice of reconstructing the original labial fusion after defibulation. Reinfibulation is illegal in some countries and U.S. states and is not recommended by professional organizations such as WHO[21] and International Federation of Gynecology and Obstetrics.[27] It is important to sensitively respond to the minority of patients who may request reinfibulation procedures at the time of vaginal childbirth because of their cultural and faith background and/or perceived genital self-image. It is important that counseling and education be tailored to fit patient preferences and allow for informed, person-centered decision making. In circumstances in which the patient has healthy sexual function, is autonomous in her decision making, and is cognizant of applicable country-specific laws—yet still desires reinfibulation—counseling and education should be offered using visual imagery. For these individuals, partial defibulation (that does not fully open the vaginal orifice) could be performed to the level of the urethral meatus while still practicing in accordance with laws and most professional guidelines.

Type 4 FGC

No removal of genital structures, rather, represents all other procedures performed to the female genitalia for nonmedical purposes (Figure 10). Examples given include pricking, pulling, piercing, incising, scraping, and cauterization. Because of the wide variation of possible findings, there is not a specific visual image for this subtype, but rather a list of words is provided (Figure 10).

Culturally informed description of type 4 FGC

Type 4 is primarily assessed via self-report of the procedure. Unless there is genital piercing, there may not be visible scarring from type 4 procedures. Words used by individuals who report type 4 FGC include "cutting," "burning," and "pricking."

Type 4 clinical pearls

It is important to note that while there may be no visible signs of altered genital anatomy, a woman/child who has experienced type 4 FGC may have vivid recollections of the procedure and may have experienced significant psychologic trauma (eg, PTSD) and harm.

Discussion

We developed these visual vulvar drawings to help inform the iterative, bidirectional, open dialogue that is necessary between patient and clinician/researcher, which can help uncover the evolution of a woman's vulvar anatomy across time and space—resulting in a more accurate assessment of FGC status. In addition, we recognized that diversity of depictions of vulvar anatomy is lacking and that there is a need for more representation of cross-culturally normative visual aids that destigmatize individuals who have experienced FGC by showing different vulvar anatomy. Across the FGC types/subtypes, women/girls who have experienced FGC may not have recollection of the original procedure (depending on the age at which FGC was performed) and may not have been informed that they were cut. Consequently, during a clinical evaluation, the healthcare provider may be the very first person to bring to her awareness that an alteration of her external genitalia has occurred. A trauma-informed, patient-centered approach may be critical in those instances. Use of visual imagery—particularly accessible, culturally informed illustrations—may help navigate that conversation.

Prior work with visual representation of FGC has relied on photography and simple cartoon-like drawings for the

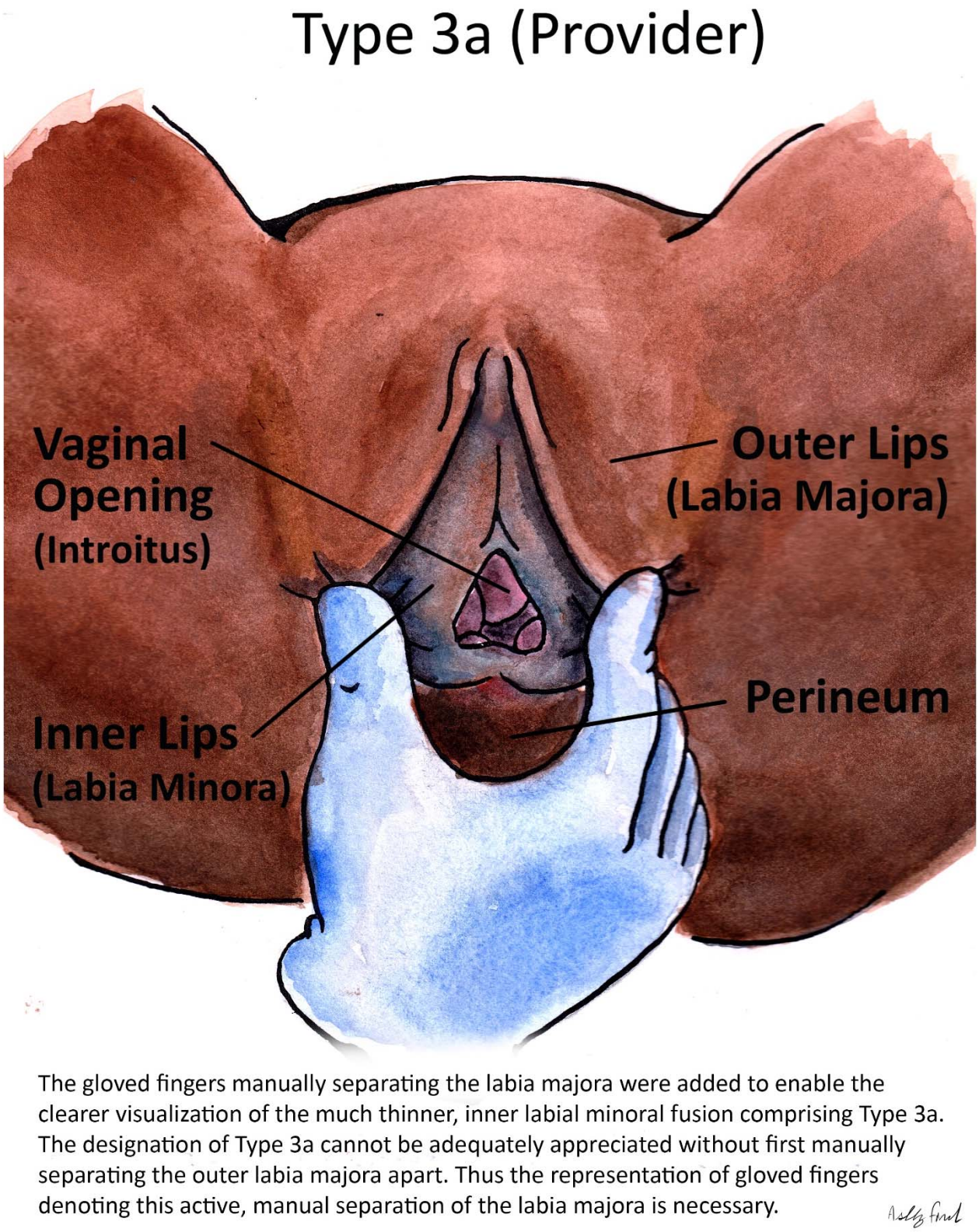

Figure 7. Type 3a: removal and sewing together/appositioning the labia minora without removal/excision of the clitoris (visualized by manual separation of the labia majora).

education of clinicians caring for those who have been affected by FGC. As we discussed previously, patients may find vulvar photography too jarring, creating feelings of embarrassment, worry, and disgust, rather than curiosity.[8] In contrast, patients may find cartoon-like drawings childish (M. Salad, B.S. and Z. Sheikh, B.A., oral communication, June 3, 2022).[28] We assert that our artistic watercolor images, while realistic but less jarringly so, are more acceptable for discussion with patients

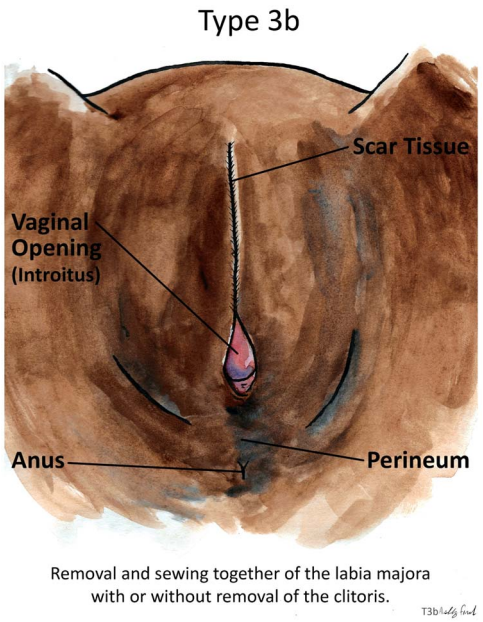

Figure 8. Type 3b: removal and sewing together/appositioning the labia majora with or without removal/excision of the clitoris.

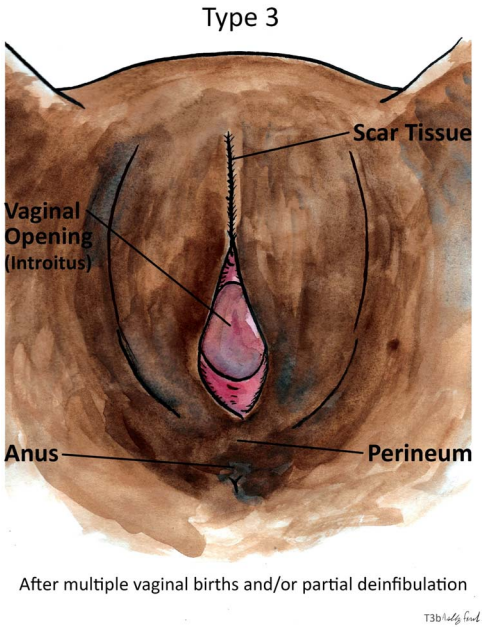

Figure 9. Vulvar appearance after vaginal childbirth and/or vulvar surgical reconstructive procedures for an individual with original type 3 FGC (may resemble Type 2c).

about their bodies. At the same time, using anatomical labels that are more colloquial and culturally informed, rather than medical terminology, invites the patient into the conversation about their body. These labels can help provide anatomical orientation, and allow time for reflection and conversation, enabling them to further share their own cultural reflections, phrases, or personal perspectives so that they are engaged in and driving the conversation about their experience with FGC.

An added strength of these images is related to their community-based development and their contribution to the representation of diverse bodies in the anatomical literature.

- pricking
- piercing
- incising
- scraping
- pulling
- cauterization/burning

Figure 10. Examples of Type 4 procedures that may be performed on female genitalia for nonmedical purposes.

These images were developed within a community-based participatory research process, with feedback obtained from clinicians and community members during the production of the images. Language used to describe anatomical parts was developed during conversations with community members and a culturally representative Community Advisory Board. Several of the images went through multiple adjustments during the feedback process. Attention was taken to use skin tones more representative of most of the population affected by FGC. This is important because medical illustrations have been dominated by the majority gaze, leading to underrepresentation of Black and Brown bodies, females, and those who are differently abled,[7] and is particularly lacking in the human sexuality literature.[6] These images provide anatomical orientation using nonscientific language reflective of words/phrases known by the lay community, and have skin tones that are varied, yet more inclusive of the greater population. We argue that providers and patients, teachers and students, researchers, and research participants will benefit from seeing diversity in imagery and language represented in medical illustrations—more accurately representing their respective populations. They could be used to offer counseling and education to inform patient autonomy and patient-centered shared decision making when considering surgical and/or nonsurgical (eg, psychological counseling, psychotherapy, sex therapy, pelvic floor physical therapy) interventions.

The WHO FGC classification scheme[21] was originally designed to create a standardized nomenclature used globally by healthcare practitioners, researchers, policymakers, and other stakeholders to describe and compare varying types and degrees of cutting procedures performed on the vulvas of women and girls. The challenge, however, is that while the extent and severity of cutting and its resultant health morbidity generally increases with progression from type 1 to type 3, there are exceptions. Within all FGC types, health morbidity may differ in severity based on the precise anatomical location and amount of tissue cut and/or removed. Tissue cut and/or removed may also vary within FGC subtypes. Type 4, in contrast, is not usually more severe than types 1-3 with respect to modification of the vulva, but in some instances can be quite extensive. In addition, the prevalence and severity of psychologic and psychosexual morbidity may vary based on age and psychosocial circumstances unrelated to the extent of anatomic genital tissue excised.[10] Moreover, ambiguity may arise in societies in which FGC is dichotomized along sociocultural norms that designate principally 2 forms of FGC, sunna (denoting types 1, 2, and possibly 4) vs pharaonic

(denoting type 3).[29] These images may assist in the dialogue surrounding the patients' experience with FGC; however, we acknowledge that being able to specifically distinguish type 2 may be more difficult if only relying on a woman's self-report—even with the use of the images—without performing a clinically verified genital exam.

A question often posed by clinicians and researchers is how to assign the correct FGC-type designation when women have undergone prior defibulation procedures. Is she to be classified based on her original FGC type? Or by the current appearance of her vulva? As increasing numbers of vaginal births and associated laceration repairs may further distort vulvar anatomy, how does parity affect this classification? Other procedures (eg, vulvar repair of epidermal inclusion cysts, clitoral reconstruction) performed on the vulva may further alter vulvar anatomy. Thus, inaccuracies may occur if women are being asked to self-report their own FGC status, as is common in large population-based cohort studies.[30,31] These same inaccuracies may also occur if clinicians are not trained to specifically ascertain the historical type of FGC that was originally performed, particularly if the patient's original FGC is different from their current vulvar appearance. Clinical documentation of FGC status in the medical records should capture as much detail as can be derived from the patient's history of the original FGC procedure, any ensuing procedures that may have transpired in the interim, as well as the current vulvar appearance on the day of the actual genital examination. Visual imagery may be useful to orient patients while gathering historical information.

These images have limitations. Despite our best efforts, it is not possible to create images that are generalizable of all possible forms of FGC. For example, representing type 4 FGC with one image is impossible given the variety of type 4 procedures. Future development of several images to represent different experiences of FGC type 4 could be considered. Additionally, these images were designed while working with one geographically distinct migrant community of Somali women in Minneapolis-St. Paul—and while they are culturally representative of that community, they may not be fully generalizable to the wider global community affected by FGC. Further research would be useful to test the appropriateness of these images across the wider community. Finally, while these images were developed with input from community members affected by FGC and were used during research to help understand and explore research participants' experiences of FGC, there were no clinically verifiable genital examinations performed during the process.

As medical illustrations continue to evolve toward more racially conscious and inclusive imagery in patient care and education, health professional training, and research, emerging innovative technologies such as 3-dimensional interactive Web-based applications,[32] simulation-based mastery learning,[33] and virtual reality platforms[34] must also follow suit, while seeking to avoid the inherent pitfalls[35] and potential for perpetuation of bias and harm.[36]

Conclusion

Visual imagery is an essential component of patient-centered sexual health education, counseling, and care for FGC-affected women and adolescents. There is room for expansion of imagery that reflects diverse variations in skin tone and vulvar anatomy across the FGC spectrum so that women feel seen and represented in the imagery that they are reviewing. Visual imagery of FGC not only informs shared decision making, but also equips clinicians with tools for lifelong learning. Equitable representation of race, gender, age, body type, and ability in medical illustrations should be requisite in sexual health care and can be further enhanced when patient-informed and culturally relevant.

Author contributions

N.C. (Conceptualization-Lead, Formal analysis-Equal, Investigation-Lead, Methodology-Lead, Validation-Equal, Visualization-Lead, Writing – original draft-Lead, Writing – review & editing-Lead), C.E.J.-A. (Conceptualization-Supporting, Formal analysis-Equal, Investigation-Lead, Methodology-Lead, Validation-Equal, Visualization-Lead, Writing – original draft-Lead, Writing – review & editing-Lead), A.F. (Data curation-Supporting, Investigation-Supporting, Methodology-Lead, Visualization-Lead), M.S. (Data curation-Lead, Investigation-Supporting, Methodology-Supporting, Visualization-Supporting, Writing – original draft-Supporting, Writing – review & editing-Supporting), J.J.C. (Funding acquisition-Equal, Investigation-Supporting, Project administration-Equal, Supervision-Equal, Writing – review & editing-Supporting), M.C. (Writing – review & editing-Supporting), B.E.R. (Data curation-Supporting, Funding acquisition-Equal, Investigation-Supporting, Methodology-Supporting, Project administration-Equal, Supervision-Equal, Visualization-Supporting, Writing – original draft-Supporting, Writing – review & editing-Lead).

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Conflict of interest

None declared.

Data availability

Currently, we are conducting data cleaning and data analysis. The final dataset will be stripped of identifiers prior to release for sharing. However, we believe that there remains the possibility of deductive

disclosure of subjects with unusual characteristics. Thus, we will make the data and associated documentation available to users only under a data-sharing agreement that provides for: (1) a commitment to use the data only for research purposes and to protect the identify any individual participant; (2) a commitment to securing the data using appropriate computer technology; and (3) a commitment to destroying or returning the data after analyses are completed. A long-term data sharing and preservation plan will be used to store and make the data publicly accessible beyond the life of the project. The data will be deposited into the Data Repository for the University of Minnesota (DRUM), http://hdl.handle.net/11299/166578. This University Libraries' hosted institutional data repository is an open access platform for dissemination and archiving of university research data. Date files in DRUM are written to an Isilon storage system with two copies, one local to each of the two geographically separated University of Minnesota Data Centers. In addition, DRUM provides long-term preservation of digital data files for at least 10 years using services such as migration (limited format types), secure backup, bit-levelchecksums, and maintains a persistent DOIs for data sets, facilitating data citations. In accordance to DRUM policies, the (DE identified) data will be accompanied by the appropriate documentation, metadata, and code to facilitate reuse and provide the potential for interoperability with similar data sets.

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