Article published online: 2023-02-06

Gender Affirming Surgery in Nonbinary Patients: A Single Institutional Experience

Allison C. Hu, MD[1] Mengyuan T. Liu, MD[1] Candace H. Chan, BS[1] Saloni Gupta, BS[1] Brian N. Dang, MD[1] Gladys Y. Ng, MD, MPH[2,3] Mark S. Litwin, MD, MPH[2,3] George H. Rudkin, MD[1,3] Amy K. Weimer, MD[3,4] Justine C. Lee, MD, PhD[1,3]

[1] Division of Plastic and Reconstructive Surgery, University of California, Los Angeles, David Geffen School of Medicine, Los Angeles, California
[2] Department of Urology, University of California, Los Angeles, David Geffen School of Medicine, Los Angeles, California
[3] UCLA Gender Health Program, University of California, Los Angeles, David Geffen School of Medicine, Los Angeles, California
[4] Department of Medicine, University of California, Los Angeles, David Geffen School of Medicine, Los Angeles, California

Address for correspondence Justine C. Lee, MD, PhD, FACS, Division of Plastic and Reconstructive Surgery, University of California, Los Angeles, 200 Medical Plaza, Suite 460, Los Angeles, CA 90095-6960 (e-mail: justine@ucla.edu).

Arch Plast Surg 2023;50:63–69.

Abstract

Background An increasing number of nonbinary patients are receiving gender-affirming procedures due to improved access to care. However, the preferred treatments for nonbinary patients are underdescribed. The purpose of this study was to investigate the goals and treatments of nonbinary patients.

Methods A retrospective study of patients who self-identified as nonbinary from our institutional Gender Health Program was conducted. Patient demographics, clinical characteristics, surgical goals, and operative variables were analyzed.

Results Of the 375 patients with gender dysphoria, 67 (18%) were nonbinary. Over half of the nonbinary patients were assigned male at birth ($n = 57$, 85%) and nearly half preferred the gender pronoun they/them/theirs ($n = 33$, 49%). A total of 44 patients (66%) received hormone therapy for an average of 2.5 ± 3.6 years, primarily estrogen ($n = 39$). Most patients ($n = 46$, 69%) received or are interested in gender-affirming surgery, of which, almost half were previously on hormone therapy ($n = 32$, 48%). The most common surgeries completed or desired were facial feminization surgery ($n = 15$, 22%), vaginoplasty ($n = 15$, 22%), mastectomy ($n = 11$, 16%), and orchiectomy ($n = 9$, 13%). Nonbinary patients who were assigned male at birth (NB-AMAB) were more often treated with hormones compared to nonbinary patients assigned female at birth (NB-AFAB) (72% vs. 30%, $p = 0.010$). Conversely, patients who were AFAB were more likely to complete or desire surgical intervention than those who were AMAB (100% vs. 63.0%, $p < 0.021$).

Conclusion Majority of nonbinary patients were assigned male at birth. NB-AFAB patients all underwent surgical treatment, whereas NB-AMAB patients were predominantly treated with hormone therapy.

Keywords
- gender dysphoria
- nonbinary
- gender-affirming surgery
- facial feminization surgery
- reconstructive craniofacial surgery

received
January 25, 2022
accepted after revision
June 30, 2022

DOI https://doi.org/10.1055/s-0042-1758383.
eISSN 2234-6171.

Thieme Medical Publishers, Inc., 333 Seventh Avenue, 18th Floor, New York, NY 10001, USA

Introduction

In the United States, the prevalence of transgender individuals is estimated to be 0.5%, with over one in three individuals with gender dysphoria identifying as gender nonconforming or nonbinary.[1,2] The term nonbinary describes a gender identity that is not male or female; some may define their nonbinary gender identity as being a combination of these genders, neither of them, or no gender at all.[3] These patients may present as feminine, masculine, both, or neither, regardless of their sex assigned at birth.[3] There is also an apparent generational difference, with nonbinary individuals being younger on average compared to binary transgender individuals.[1,4–6]

An increasing number of nonbinary patients are receiving gender-affirming procedures due to improved access to care.[7] This is congruent with a rise in number of providers who are familiar with the nuances of this patient population, as well as expanded insurance coverage.[8,9] Similar to reconstructive surgeries for binary transgender patients, these procedures can range from facial surgery to top surgery (e.g., chest and breast reconstruction) and bottom surgery (e.g., genital or reproductive tract reconstruction). Although specific surgeries used to treat binary patients are largely the same as those available to nonbinary patients, the desired surgical interventions nonbinary patients seek are varied and have been previously poorly described.

Despite the recent growing interest in transgender and nonbinary health, the preferred treatments for nonbinary patients are underinvestigated.[10] Studies are often focused on surgical techniques or outcomes, rather than the specific surgical preferences and needs of these patients. In fact, most studies either exclude the gender nonconforming patient population, combine all non-cisgender individuals, or further stratify them in a binary fashion. This is problematic as there are remarkable differences in binary transgender and nonbinary development and characteristics.[10,11]

Similarly, there are significant differences between the percentage of binary and nonbinary individuals who desire hormonal therapy, with only 49% of nonbinary individuals desiring treatment compared to 95% in the binary population.[1] The percentage of nonbinary patients who ultimately undergo hormonal treatment is even less.

As more nonbinary patients seek treatment, it is important to recognize their unique health necessities and provide appropriate, high-quality care. In this study, we investigated the clinical management strategies for both nonbinary patients who were assigned male at birth (NB-AMAB) and nonbinary patients assigned female at birth (NB-AFAB). Our goal was to report the patient preferences as well as the ultimate treatments rendered in this population.

Methods

This study was approved by University of California, Los Angeles Institutional Review Board #19-001482 and #001571.

Patient Selection

A retrospective study of patients from the University of California, Los Angeles was performed to evaluate treatment preferences and modalities in nonbinary patients. Inclusion criteria were patients who identified as nonbinary, defined as providing a gender identity not exclusively male or female. Specific gender identities included "nonbinary," "genderqueer," "nonconforming," "gender fluid," or analogous terms. Patient demographics, characteristics, and desired or completed surgeries were collected from patient records in March 2020.

Table 1 Surgical requests by type of gender-affirming surgery

Gender-affirming surgery	Request
Mastectomy	Gender neutral Natural appearance Does not want chest wall appearance of female Does not want male physique Reduction breast size Flat chest Appearance of male chest/masculine appearance of chest
Facial feminization surgery	Androgynous appearance Widow's peak Lower forehead Overelevated eyebrows Pointed chin
Breast augmentation	Body as female-only appearance
Bottom surgery	No visible sex organs
Orchiectomy	Absence of testosterone

Patient Goals and Surgical Requests

A list of common reconstructive goals by nonbinary patients is reported in ►**Table 1**. These clinical requests were grouped into the recommended gender-affirming surgery.

Surgical Techniques

All gender-affirming mastectomies were performed as bilateral mastectomy with free nipple graft (double incision technique). Facial feminization maneuvers, bottom surgeries, and other gender-affirming surgery have been described previously.[12–17]

Statistical Analyses

All data were analyzed using SPSS software Version 25 (IBM, Chicago, IL). Descriptive statistics were performed to evaluate demographic variables such as age, sex assigned at birth, preferred gender pronoun, hormone treatment, and surgical intervention. Chi-square test was used to analyze categorical variables. *t*-Test was used to analyze continuous variables such as age and duration of hormone therapy. A *p*-value of 0.05 was considered significant.

Results

Patient Characteristics

Sixty-seven (18%) nonbinary patients (mean age 30.6 ± 11.3 years) were reviewed. Most nonbinary patients were

Table 2 Patient demographics in the total nonbinary cohort and compared between male and female sex assigned at birth

	All nonbinary, $n = 67$	Male sex assigned at birth, $n = 57$	Female sex assigned at birth, $n = 10$	p-Value[a]
Age at review, mean ± SD	30.7 ± 11.3	30.5 ± 11.1	31.3 ± 12.7	NS
Sex at birth, *n* (%)		57 (85)	10 (15)	< 0.001
Preferred gender pronoun, *n* (%)				
They/them/theirs	33 (49)	26 (46)	7 (70)	NS
She/her/hers	23 (34)	23 (40)	0 (0)	0.013
He/him/his	7 (10)	6 (11)	1 (10)	NS
She/her/hers and they/them/theirs	2 (3)	1 (2)	1 (10)	NS
She/her/hers and he/him/his	1 (2)	1 (2)	0 (0)	NS
Age aware of gender identity, mean ± SD	16.8 ± 4.0	16.4 ± 8.1	19.1 ± 7.8	NS
Age at first transition consultation, mean ± SD	28.3 ± 9.8	28.5 ± 10.2	27.0 ± 7.2	NS
Age at first treatment, mean ± SD	28.1 ± 10.2	28.3 ± 10.9	27.2 ± 7.1	NS
Socially transitioned, *n* (%)	58 (87)	50 (88)	8 (80)	NS

Abbreviations: NS, not significant; SD, standard deviation.
[a]*p*-Values obtained from chi-square tests for categorical, and *t*-test for continuous variables between male sex assigned at birth and female sex assigned at birth cohorts.

assigned male sex at birth ($n = 57$, 85%) (►**Table 2**). Almost half of the nonbinary patients preferred the gender pronoun they/them/theirs ($n = 33$, 49%), followed by she/her/hers ($n = 23$, 34%), then he/him/his ($n = 7$, 10%). A few patients used two gender pronouns ($n = 3$, 5%).

Nonbinary patients were aware of their gender identity at a mean age of 16.8 ± 4.0 years, but did not meet with a physician to discuss transitioning until mean age of 28.3 ± 9.8 years. Of those who received medical or surgical treatment ($n = 51$), average age at first treatment was 28.1 ± 10.2 years old. Most patients had socially transitioned ($n = 58$, 88%) at the time of the study (►**Table 2**).

Medical Transition

Six patients used breast binders (9%) and two patients underwent voice therapy (3%) (►**Table 3**). A total of 44 nonbinary patients (66%) received hormone therapy for an average of 2.5 ± 3.6 years. Majority of patients ($n = 39$, 58%) received estrogen, while five patients (8%) received testosterone.

Surgical Transition

Eighteen patients (27%) received some type of gender-affirming surgery, majority of whom were previously on hormone therapy ($n = 11$, 61%) (►**Table 3**). A total of 46 patients (69%) desired or completed gender-affirming surgery. Common surgeries included facial feminization surgery ($n = 15$, 22%), vaginoplasty ($n = 15$, 22%), subcutaneous mastectomy with nipple reconstruction ($n = 11$, 61%), orchiectomy ($n = 9$, 13%), and breast augmentation ($n = 8$, 12%). The most common initial gender-affirming surgery completed were mastectomy ($n = 9$, 50%) and orchiectomy ($n = 5$, 28%). Breakdown of completed versus desired surgeries are demonstrated in ►**Fig. 1**.

Nonbinary Assigned Male at Birth versus Nonbinary Assigned Female at Birth

When comparing nonbinary patients who were assigned male or female at birth, there were no significant differences in age at presentation, mean duration of hormone therapy, completion of both surgery and hormone therapy, or age at first gender-affirming surgery (►**Table 3**). However, NB-AMAB patients were significantly more often treated with hormones compared to NB-AFAB patients (72% vs. 30%, $p = 0.010$). Conversely, there was a significantly greater proportion of NB-AFAB patients who underwent surgical intervention compared to NB-AMAB (100% vs. 14%, $p < 0.001$). The most common initial gender-affirming surgery completed was mastectomy ($n = 9$, 90%) for NB-AFAB patients and orchiectomy ($n = 5$, 63%) for NB-AMAB patients.

When comparing the number of NB-AMAB and NB-AFAB patients who had either completed or were interested in gender-affirming surgery, NB-AFAB patient rates were still significantly higher despite an increase in NB-AMAB patient interest in gender-affirming surgery (100% vs. 63%, $p = 0.021$) (►**Table 3**). NB-AMAB patients were interested in several different gender-affirming procedures, such as facial feminization surgery ($n = 13$, 23%), vaginoplasty ($n = 13$, 23%), and breast augmentation ($n = 8$, 14%) (►**Fig. 1**). NB-AFAB patients, on the other hand, had no additional surgical desires. Finally, while most surgical treatments completed generally corresponded to sex assigned at birth, one NB-AMAB patient underwent mastectomy due to breast development after estrogen therapy.

Of the 57 NB-AMAB patients, 28 desired but had not undergone gender-affirming surgery. The reasons for not having undergone gender-affirming surgery in this cohort are listed in ►**Table 4**. The primary reason for not undergoing gender-affirming surgery was wanting to trial medical

Table 3 Medical and surgical treatments

	All nonbinary, $n = 67$	Male sex assigned at birth, $n = 57$	Female sex assigned at birth, $n = 10$	*p*-Value
Breast binding, *n* (%)	6 (9)	0 (0)	6 (60)	< 0.001
Voice therapy, *n* (%)	2 (3.0)	2 (3.5)	0 (0)	NS
Hormone therapy, *n* (%)	44 (66)	41 (72)	3 (30)	0.010
Duration hormone therapy (y), mean ± SD	2.5 ± 3.6	2.5 ± 3.8	2.4 ± 0.6	NS
Type of hormone				
Estrogen	39 (58)	39 (68)	0 (0)	0.001
Testosterone	5 (8)	2 (4)	3 (30)	0.003
Other	4 (6)	4 (7)	0 (0)	NS
Completed GAS, *n* (%)	18 (27)	8 (14)	10 (100)	< 0.001
Completed or interested in GAS, *n* (%)	46 (69)	36 (63)	10 (100)	0.021
Completed GAS and hormone therapy, *n* (%)	11 (16)	8 (14)	3 (30)	NS
Completed/interested in GAS and completed hormone therapy, *n* (%)	32 (48)	29 (51)	3 (30)	NS
Age at first surgery, mean ± SD	31.8 ± 11.3	37.1 ± 13.7	27.5 ± 7.2	NS
First surgery, *n* (%)				
Breast reduction	1 (2)	0 (0)	1 (10)	0.016
Facial feminization surgery	2 (3)	2 (4)	0 (0)	NS
Mastectomy	9 (13)	0 (0)	9 (90)	< 0.001
Orchiectomy	5 (8)	5 (9)	0 (0)	NS
Vaginoplasty	1 (2)	1 (2)	0 (0)	NS
Completed and desired surgery, *n* (%)				
Body feminization, NOS	1 (2)	1 (2)	0 (0)	NS
Breast augmentation	8 (12)	8 (14)	0 (0)	NS
Breast reduction	2 (3)	1 (2)	1 (10)	NS
Facial feminization surgery	15 (22)	15 (26)	0 (0)	NS
Hair transplant	1 (2)	1 (2)	0 (0)	NS
Hysterectomy ± oophorectomy	1 (2)	0 (0)	1 (10)	0.016
Labiaplasty	1 (2)	1 (2)	0 (0)	NS
Mastectomy	11 (16)	1 (2)	10 (100)	< 0.001
Orchiectomy	9 (13)	9 (16)	0 (0)	NS
Penectomy	1 (2)	1 (2)	0 (0)	NS
Sex change from male, NOS	1 (2)	1 (2)	0 (0)	NS
Tracheal shave	4 (6)	4 (7)	0 (0)	NS
Vaginoplasty	15 (22)	15 (26)	0 (0)	NS
Voice surgery	6 (9)	6 (11)	0 (0.0)	NS

Abbreviations: GAS, gender-affirming surgery; NOS, not otherwise specified; NS, not significant; SD, standard deviation.

treatment first ($n = 8$, 29%) and awaiting surgery ($n = 8$, 29%). Other patients were not yet ready for surgery but desired surgery in the future ($n = 6$, 21%) or were still doing voice therapy prior to voice surgery ($n = 3$, 11%). Only two patients (7%) experienced issues with insurance coverage. Lastly, one patient (4%) deferred surgery due to lacking a support system.

Discussion

This study evaluated the preferences of both nonbinary assigned male at birth (NB-AMAB) and nonbinary assigned female at birth (NB-AFAB) patients, as well as the medical and surgical care they received. We found that nonbinary individuals comprised of 18% of our total transgender

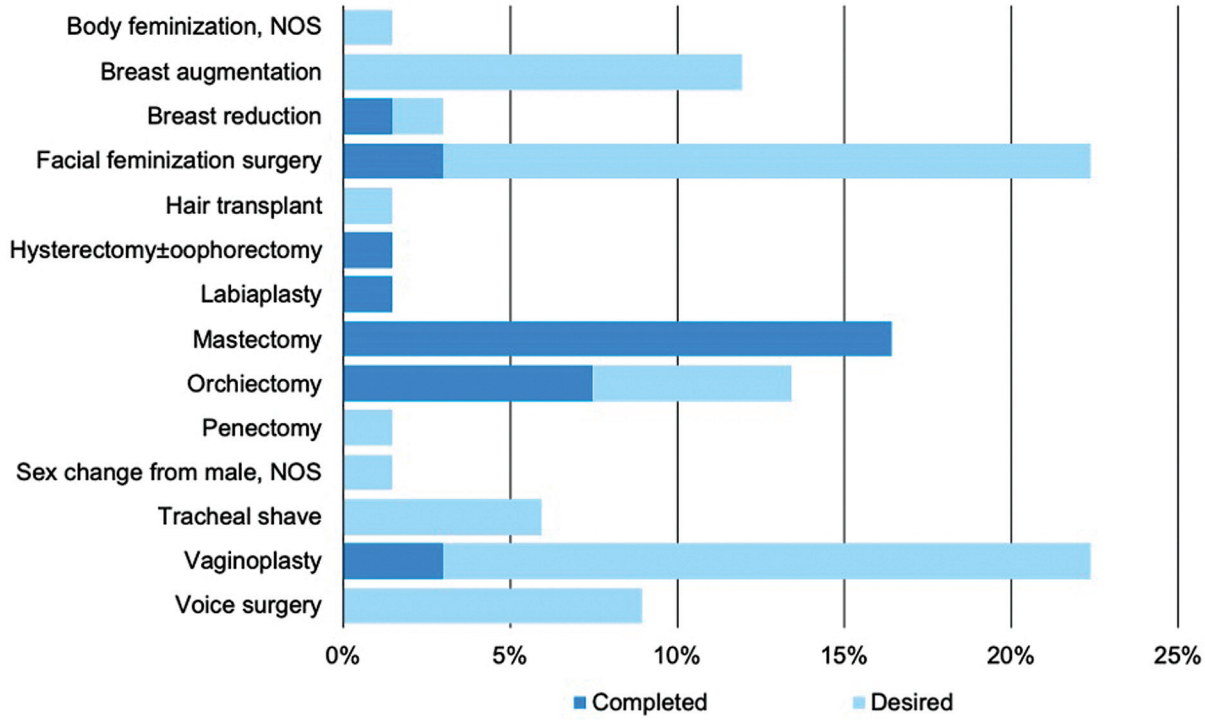

Fig. 1 Completed and desired gender-affirming surgeries in nonbinary patients. Percentage of completed (dark blue) and desired (light blue) gender-affirming surgeries in nonbinary patients. NOS, not otherwise specified.

Table 4 Reasons nonbinary assigned male at birth patients desired gender-affirming surgery but have yet to undergo surgery

Reason	No. of patients (%), $n = 28$
Trial medical therapy	8 (29)
Still doing voice therapy	3 (11)
Awaiting surgery	8 (29)
Not ready for surgery or wants surgery in the future	6 (21)
Insurance issue or payment issue	2 (7)
Lack of support system	1 (4)

population. This value is lower than reported by the 2016 U.S. Transgender Survey at approximately 35%.[1,2] However, the survey study consisted of all respondents with gender dysphoria, whereas our transgender cohort consisted of those seeking treatment. Further, while our value is higher than that reported by Esmonde et al of 13%, their cohort only consisted of transgender patients who completed gender-affirming surgery.[3]

Our study population was primarily assigned male sex at birth (85%). This was higher than previous reports, which have reported between 0 and 50% of nonbinary patients were assigned male sex at birth.[3,6] This discrepancy is likely explained by the relatively small sample size of the total nonbinary population included in these studies, including ours. Our cohort was also relatively young at an average age of 31 years at presentation and 32 years at first gender-affirming surgery, which correlates with previous reports demonstrating nonbinary individuals to be younger compared to binary individuals.[1,4–6]

In our cohort, 100% of the NB-AFAB patients and 63% of the NB-AMAB patients have completed or are interested in gender-affirming surgery. All NB-AFAB patients underwent top surgery. Conversely, only 14% of NB-AMAB patients completed or desired breast augmentation. More NB-AMAB patients were interested in facial feminization surgery (26%) or vaginoplasty (26%). Previous reports have shown transgender men self-reporting gender-affirming surgery prevalence rates of 42 to 54%, transgender women at around 28%, and nonbinary individuals at around 9%.[1,18]

We demonstrate in our cohort that a small percentage of NB-AMAB individuals actually underwent gender-affirming surgery (14%). This was not due to a lack of desire for surgery, but rather due to other circumstances. Most of these patients were either still undergoing nonsurgical therapy such as voice therapy or hormonal therapy or were awaiting surgery. Only two patients were denied insurance approval.

While only 30% of our NB-AFAB patients underwent hormone therapy, the majority (71%) of our NB-AMAB patients underwent hormone therapy. Esmonde et al found that 64% of their NB-AFAB patients received testosterone. Why fewer of our NB-AFAB patients underwent hormone therapy may be explained by general preference against the more systemic effects of hormone therapy such as body hair growth and muscle development. In addition, while testosterone therapy has little effect on AFAB breast size, all of the NB-AFAB patients did undergo mastectomy.

On the other hand, hormone therapy may have been adequate in achieving the desired features in our NB-AMAB patients.

Only one of our NB-AFAB patients underwent or desired bottom surgery, and the procedure was a hysterectomy. On the other hand, completed and desired genital surgery in NB-AMAB patients was relatively high (5 and 25%, respectively) compared to previous reports demonstrating that in NB-AMAB, 1% have had vaginoplasty or labiaplasty, with 11% desiring these surgeries.[1] We may see that as bottom surgery becomes more available, more NB-AMAB patients will undergo these procedures.

Although chest surgery is one of the most commonly completed gender-affirming procedures, we did not have a single patient who underwent breast augmentation, despite 14% of the NB-AMAB patients desiring this surgery. This is comparable to the aforementioned study by Esmonde et al that similarly found that no patients in their study population underwent breast augmentation, as well as reports that demonstrated a 1% completion and 16% desire for breast augmentation.[1,3] This suggests that top surgery was a smaller priority to NB-AMAB patients compared to facial or bottom surgery. In addition, top surgery for NB-AMAB patients is rarely covered by insurance compared to for NB-AFAB patients. As many patients alter their desires and expectations based on what they assume will be covered, we suspect that financial aspects are in part behind this. The most common surgery in the NB-AMAB group was orchiectomy, with 9% undergoing this procedure. This is consistent with their desire to decrease testosterone through estrogen therapy.

Compared to transgender men respondents in the 2015 U.S. Transgender Survey, completed and desired mastectomies in NB-AFAB patients in our study were comparable at 97 and 100%, respectively.[1] Completed and desired hysterectomy rates were much higher in the transgender men group (71%) compared to the NB-AFAB group (10%). This suggests that both NB-AFAB and transgender men groups strongly desired chest masculinization, but differed in desires for changing their internal reproductive anatomy. Completed and desired voice surgery (19% vs. 11%), facial feminization surgery (50% vs. 26%), breast augmentation (51% vs. 14%), orchiectomy (58% vs. 16%), tracheal shave (37% vs. 7%), and vaginoplasty (66% vs. 26%) were all higher in the transgender women respondents compared to our NB-AMAB patients.[1] This marks an important clinical difference between these two groups, as the desire for all gender-affirming surgery is lower in the NB-AMAB population than in the transgender women population.

There are several important limitations to our study. The generalizability of the findings presented here is limited by the retrospective nature of the study and single-institution patient cohort. Our population was also largely assigned male sex at birth, which further limits the generalizability of the data. While we had a relatively robust sample size, some clinical and surgical characteristics had smaller numbers of patients contributing to the potential for type II error. Furthermore, nonbinary individuals may identify themselves anywhere on a wide spectrum from masculine to feminine, so to categorically group these patients inherently overlooks their differences. Finally, we did not utilize postoperative patient satisfaction surveys or patient-reported outcomes. Future studies should focus on outcomes of surgery and identify areas in our health care system that can better serve this population.

This retrospective study is among the first investigations aimed at describing the planning and goals of nonbinary patients seeking gender-affirming treatment. After examining the frequency of top surgery, bottom surgery, facial surgery, voice surgery, and hormone therapy, our data demonstrated that NB-AFAB patients in our cohort desired and underwent surgical treatment, whereas NB-AMAB patients were predominantly treated with hormone therapy. This study furthers examines the care of nonbinary patients and illuminates many nuances in the decision-making process due to circumstance and cost concerns. While the ultimate treatment plan of gender nonbinary patients necessitates individualized approaches due to the diversity in goals of each patient, our experience allows for a starting point for physicians in gender health care for the purposes of determining potential referrals and common pathways of other nonbinary patients.

Authors' Contribution

A.C.H.: Conceptualization, methodology, validation, formal analysis, validation, investigation, writing - original draft, writing – review and editing; M.T.L.: investigation, writing – review and editing; C.H.C.: investigation, writing – review and editing; S.G.: investigation, writing – review and editing; B.N.D.: investigation, writing – review and editing; G.Y.N.: methodology, writing – review and editing; M.S.L.: methodology, writing – review and editing; G.H.R.: methodology, writing – review and editing; A.K.W.: methodology, writing – review and editing; J.C.L.: Conceptualization, methodology, validation, resources, writingreview and editing, supervision, funding acquisition.

Ethical Approval

This study was approved by University of California, Los Angeles Institutional ReviewBoard #19-001482 and #001571.

Funding

This work was supported by the Bernard G. Sarnat Endowment for Craniofacial Biology (J.C.L.) and the Jean Perkins Foundation (J.C.L.). J.C.L. is additionally supported by the National Institutes of Health/NIDCR R01 DE028098.

Conflict of Interest

All authors have no financial interests including products, devices, or drugs associated with this manuscript. J.C.L. is a medical education consultant for Stryker. All sources of funds supporting the completion of this manuscript are under the auspices of the University of California, Los Angeles.

References

1 James S, Herman J, Rankin S, Keisling M, Mottet L, Anafi Ma. The Report of the 2015 U.S. Transgender Survey; 2016
2 Winter S, Diamond M, Green J, et al. Transgender people: health at the margins of society. Lancet 2016;388(10042):390–400
3 Esmonde N, Heston A, Jedrzejewski B, et al. What is "Nonbinary" and What Do I Need to Know? A primer for surgeons providing chest surgery for transgender patients. Aesthet Surg J 2019;39 (05):NP106–NP112
4 Clark BA, Veale JF, Townsend M, Frohard-Dourlent H, Saewyc E. Non-binary youth: access to gender-affirming primary health care. Int J Transgenderism 2018;19:158–169
5 Kuper LE, Nussbaum R, Mustanski B. Exploring the diversity of gender and sexual orientation identities in an online sample of transgender individuals. J Sex Res 2012;49(2-3):244–254
6 Koehler A, Eyssel J, Nieder TO. Genders and individual treatment progress in (non-)binary trans individuals. J Sex Med 2018;15 (01):102–113
7 Padula WV, Heru S, Campbell JD. Societal implications of health insurance coverage for medically necessary services in the U.S. transgender population: a cost-effectiveness analysis. J Gen Intern Med 2016;31(04):394–401
8 Schechter LS, Cohen M. Gender confirmation surgery: a new frontier in plastic surgery education. Plast Reconstr Surg 2016; 138(04):784e–785e
9 Morrison SD, Chong HJ, Dy GW, et al; Transgender Educational Study Group. Educational exposure to transgender patient care in plastic surgery training. Plast Reconstr Surg 2016;138(04):944–953
10 Scandurra C, Mezza F, Maldonato NM, et al. Health of non-binary and genderqueer people: a systematic review. Front Psychol 2019;10:1453
11 Monro S. Non-binary and genderqueer: an overview of the field. Int J Transgenderism 2019;20(2-3):126–131
12 Gray R, Nguyen K, Lee JC, et al. Osseous transformation with facial feminization surgery: improved anatomical accuracy with virtual planning. Plast Reconstr Surg 2019;144(05): 1159–1168
13 Miller TJ, Wilson SC, Massie JP, Morrison SD, Satterwhite T. Breast augmentation in male-to-female transgender patients: technical considerations and outcomes. JPRAS Open 2019;21:63–74
14 Boas SR, Ascha M, Morrison SD, et al. Outcomes and predictors of revision labiaplasty and clitoroplasty after gender-affirming genital surgery. Plast Reconstr Surg 2019;144(06):1451–1461
15 Dunford C, Bell K, Rashid T. Genital reconstructive surgery in male to female transgender patients: a systematic review of primary surgical techniques, complication profiles, and functional outcomes from 1950 to present day. Eur Urol Focus 2021;7(02):464–471
16 Bared A, Epstein JS. Hair transplantation techniques for the transgender patient. Facial Plast Surg Clin North Am 2019;27 (02):227–232
17 Marks DH, Awosika O, Rengifo-Pardo M, Ehrlich A. Dermatologic surgical care for transgender individuals. Dermatol Surg 2019;45 (03):446–457
18 Kailas M, Lu HMS, Rothman EF, Safer JD. Prevalence and types of gender-affirming surgery among a sample of transgender endocrinology patients prior to state expansion of insurance coverage. Endocr Pract 2017;23(07):780–786

