

Total Joint Arthroplasties in Transgender Patients: Unique Considerations for an Emerging Patient Population

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ABSTRACT

Currently, no studies exist on transgender patients undergoing orthopaedic procedures within the orthopaedic literature at large. This echoes a trend within medicine in general, where despite their unique characteristics, transgender patients are largely ignored in medical research. As gender reassignment surgery becomes more commonplace and these patients' age into joint arthroplasties, orthopaedic surgeons will rapidly be faced with treating this patient group. Unique considerations include medical comorbidities commonly associated with the patient population, deep vein thrombosis risk while on cross-gender hormone therapy, surgical positioning considerations, and social support implications after surgery. In addition, risk reductions for possible future gender reassignment surgeries include consideration for extended perioperative antibiotics and diligent surveillance for implant ingrowth issues. An emphasis is placed on being comfortable with transgender patients to ensure equal access to health care while ensuring understanding and accuracy in describing the risks of surgery that are unique to this patient population.

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The size of the transgender community is difficult to calculate because of lack of survey data that specifically ask about gender identity. That being said, the transgender population in the United States is estimated to be anywhere from 0.39% to 0.60% of the adult population, working out to approximately 1.5 million adults,^{1,2} with male-to-female (MTF) being more prevalent than female-to-male (FTM).² These numbers are believed to be on the conservative side and are likely to increase in the coming years (as they have increased since first being evaluated through national surveys in the early 2000's).² Transgender patients also skew on the younger side of the spectrum (age <50 years) when compared with their cis-gendered counterparts.² As acceptance and prevalence continue to progress, they will find themselves requiring orthopaedic interventions, which need to be considered in the context of their unique circumstances.

Transgender patients are more likely to have HIV and suffer from depression or anxiety, are 1.5× more likely to smoke, and have a 26× higher rate of previously attempted suicide.³ These are in addition to the medical and surgical complications that can arise from cross-gender hormone therapy and previous gender reassignment surgery.³ Currently, no data or review articles exist on transgender patients undergoing orthopaedic procedures within the orthopaedic literature at large. This echoes a trend within medicine in general, where despite their unique characteristics, transgender men and women are largely ignored in medical research.^{1,2} In addition, transgender treatment is not taught in conventional medical curricula, and too few physicians have the requisite knowledge and comfort level to appropriately care for their unique characteristics.³ This poses an ongoing barrier to appropriate health care and the potential for unexplained or unnecessary risks when the practitioner is unaware of these differences. This study will attempt to address these disparities by providing an overview of common medical comorbidities found in the transgender population, detailing common intraoperative issues that may be encountered (in both positioning and surgical approach), and reviewing literature to provide appropriate postoperative care to mitigate risks. Describing these concerns in the scope of performing a truly elective surgery with well-documented risks and an ability to mitigate those risks through optimization will allow orthopaedic surgeons to gauge the risk of complication that exists within this population.

Preoperative Considerations

Transgender patients encounter unique complications not only because of the use of cross-gender hormones but also because of previous medical and surgical interventions. These include endocrine abnormalities, increased clotting risk, cardiovascular risk, urethral complications, and bone density variations. The use of cross-gender hormone therapy is common in the transgender community and thus requires consideration in the perioperative period in how it will affect surgical risks and outcomes. Exogenous testosterone is used in FTM patients to induce virilization and suppress feminizing characteristics. Exogenous estrogen is used in MTF patients to help feminization while antiandrogenic agents are used as adjuncts to help suppress masculinizing features.⁴ Testosterone can be administered intramuscularly, subcutaneously, or transdermally; the use of oral

testosterone formulas is not available in the United States.⁴ Estrogen can be administered through all four routes listed above. In addition, antiandrogen adjuncts can include progesterone, medroxyprogesterone acetate, leuprolide, spironolactone or finasteride.⁴ Large fluctuations are seen in laboratory work (blood counts [decreased], hematocrit [decreased], and lipid panels [increased]), bone mineral density (BMD) (decreased), and sexual characteristics within the first year of initiation.⁴ This requires monitoring every 2 to 3 months, before stabilizing, and requiring less frequent monitoring (every 6 to 12 months).^{4,5} A surgeon should consider postponing elective surgeries until a stabilized medication dose and normalized laboratory values have been achieved.⁵ Values should be expected return to normal reference levels that are routinely used for laboratory values,⁵ and if this does not occur, referral to a specialist should be performed before surgery.

In addition to regular medical clearances, the surgeon should consider endocrine and cardiac clearance for transgender patients. Osteoporosis is a notable risk factor, even in those younger than 60 years, if sex hormone levels remain too low through exogenous supplementation. In addition, antiandrogen medications have shown to produce drastically lower BMD in MTF patients than cis-gendered patients.^{4,7} Recommendations suggest transgender patients should be screened at an earlier age for osteoporosis.⁴ Establishing a stable hormone therapy level and BMD before surgery through endocrine clearance will ensure optimal survivability of the total joint and assist in decision making and surgical planning when choosing an implant (cemented versus non-cemented). Cardiovascular risk is increased in patients taking exogenous estradiol, showing higher rates of cardiovascular events, myocardial infarction, venous thromboembolism (VTE), and stroke than those not taking them.^{4,8} Exogenous testosterone has not been shown to increase cardiac risk in FTM patients.⁴ Patients may be unaware of this added risk and may not have been previously assessed for this due to their age and/or medical history; therefore, baseline cardiac evaluation should be performed before surgery.

Although many transgender patients are able to realize their gender identity without surgical intervention, an ever-increasing portion of the gender-dysphoric population is seeking gender-confirming surgery.⁹ For the patient being affirmed, common procedures can include genital surgery (“bottom surgery”), chest contouring (“top surgery”), and facial reconstruction. Although the timing of many of these procedures is important to note in relation to their planned arthroplasty to ensure

proper healing and aesthetic result for the patient, the stage and timing of their “bottom surgery” is of particular importance. According to the World Professional Association for Transgender Health, in order for a patient to be a candidate for genital surgery, they must meet the following criteria: persistent, well documented gender dysphoria, capacity to make a fully informed decision and to consent for treatment, age of majority, well-controlled medical/mental health if present, 12 continuous months of hormone therapy, and 12 months of living in a gender role congruent with their gender identity.¹⁰ For the MTF patient, the most common genital operation is vaginoplasty with some variation of the penile inversion procedure.¹¹ Importantly, the prostate is left intact to avoid complications such as incontinence and urethral strictures. For the FTM patient, the most common procedures are metoidioplasty, pedicled locoregional flap phalloplasty (ie, anterolateral thigh flap), and free flap phalloplasty (ie, radial forearm, lateral arm, and latissimus dorsi). For most of these patients, the ability to void while standing up is an important goal necessitating a urethroplasty in each procedure; however, the timing and reconstructive technique used for creation of the neourethra can vary and in some instances be performed in a delayed fashion.⁹ A suprapubic catheter is often used in these patients in the postreconstructive period while the neourethra is allowed to heal for a period of 4 to 5 weeks.⁹ The location and manner in which each patient voids should be noted before any surgical procedure to avoid potential postoperative complications or confusion among medical staff not familiar with the care of transgender patients.

Intraoperative Considerations

It is important to note that FTM patients may still have functioning female reproductive organs. Therefore, before surgery, FTM patients must undergo pregnancy testing if within the recommended age group from the American Society of Anesthesiologists.¹² Discussion of this testing should be approached with compassion and a clear explanation as to why it is still needed, even if the patient identifies as male.

Anesthesia considerations in transgender patients must consider not only structural changes that may be present in the patient but also metabolic differences in those taking exogenous hormones. Transgender women may have completed a laryngoplasty and/or chondroplasty to alter the voice pitch, which have the poten-

tial complications of vocal cord damage and reduction of tracheal lumen or stenosis, all of which may affect intraoperative airway management and require caution during intubation.¹² In regard to anesthetic agent use in those using exogenous estrogen, the general consensus is that there is no known drug-to-drug interaction between estrogen and any commonly used anesthetic agent.¹² However, a response to that study noted that estrogen is known to decrease pseudocholinesterase activity.¹³ They also cautioned using reversals agents such as sugammadex, which has known to poorly interact with estrogen-containing birth control and decrease its effectiveness (patients should use alternative contraceptive for 7 days after receiving the medication).¹³ It is not known how this drug may interact with exogenous hormones received by transgender women and what unintended consequences it may have.

Although positioning of any patient undergoing arthroplasty is important to ensure a safe and efficient surgery, special care must be taken with patients who have undergone phalloplasty. An understanding of the type of neophallus created and its blood supply can prevent untoward kinking or pressure on the vasculature and avoid unintended or unrecognized tissue ischemia. This is especially important in those who have undergone free flap phalloplasty, where the arterial recipient vessels include the inferior epigastric and femoral vessels with or without vein grafting.⁹ Neuroorrhaphy is also performed to the dorsal clitoral and/or ilioinguinal nerves.⁹ The presence of these neurovascular structures must be taken into account when positioning and performing an anterior approach total hip arthroplasty, as previous surgical procedures may have altered the anatomic landmarks. During lateral decubitus positioning, placement of the stabilizing posts must be monitored carefully. The use of Stuhlberg clamps with pressure directly applied to the anterior superior iliac spines, rather than the use of a pegboard post where pressure may be placed at the mid symphysis, would lower the risk of unintentional vessel compression (Figure 1). No concerns were identified in regard to positioning for a total knee arthroplasty or in the use of a tourniquet for such procedures, as these lie well distal to any potential anastomosis sites.

As previously mentioned, patients who have undergone phalloplasty frequently encounter urethral complications because of the addition of urethral length and have reported urethral stricture rates as high as 51%.¹⁴ Owing to anatomic variations, the knowledge required to pass a foley in these patients is complex, with a high potential for injury (either because of the presence of a

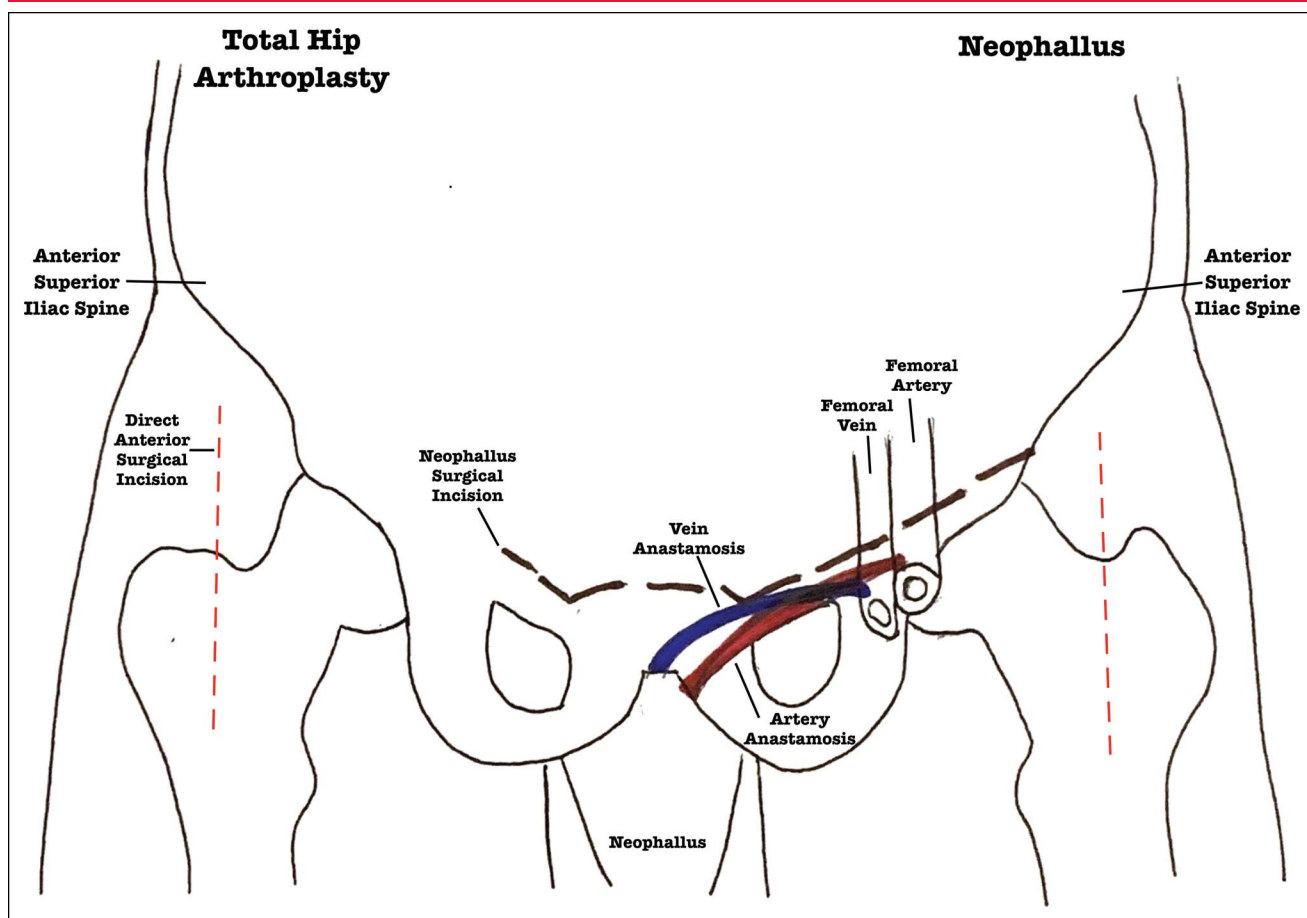
Figure 1

Image showing the anatomic placement of a phalloplasty anastomosis in reference to major pelvic anatomic landmarks, in addition to its relation to a direct anterior total hip incision placement.

stricture or by a lack of recognizing that a prostate is still present). Urology should be consulted in advance of any elective surgical procedure in the event that a foley catheter will have to be placed. This knowledge needs to be passed along to nursing staff in the operating room and on the inpatient floor to prevent unintended injury to the patient.

A paucity of the literature exists in regard to the effect of BMD on implant placement and longevity; however, the drastic reduction in BMD found particularly in transgender women (MTF) after the initiation of exogenous hormones may affect implants.^{6,7,15} A study by Delgado-Ruiz et al¹⁵ looked at how exogenous hormone administration affected dental implants based on surrounding bone density. He found that patients with low BMD were more likely to have implant loosening, early implant failure, lower osseointegration, and lower likelihood of being able to load the implant immediately. It is not unreasonable to extend these findings to press-fit implant design, and surgeons

should use caution during implant selection, having cemented options available as backup in both hip and knee arthroplasties.

Postoperative Considerations

If an inpatient stay is required after surgery, it is important that transgender patients are treated with respect and correct/desired pronouns are used. A patient should be asked which pronoun they prefer to use as part of the preoperative assessment. Simple tasks, such as room assignments and how the patient is addressed by supporting floor staff, can be of the key to a satisfying surgical experience. Large portions of transgender patients find themselves uncomfortable seeking health care and discussing health matters that may relate directly to their sex.¹⁶ Studies have noted that carefully noting the patient's preferred name and confirming how they wish to be addressed can improve patient comfort.¹² Patients

should be roomed according to their gender identity if shared rooms are necessary. If the gender and sex of the patient cannot be separated in the medical chart, perform careful planning before room assignments to avoid any confusion.¹² Discussing a private room for added patient safety is appropriate; however, placing a patient in a private room may contribute to feelings of isolation.¹² To avoid any complications because of miscommunications or a lack of trust in the healthcare providers, consider these small details in the planning of their hospital stay.

Deep vein thrombosis (DVT) risk in transgender women (MTF) receiving exogenous hormones is poorly studied and understood. When looking at the cisgender female exogenous hormone supplementation (either through estrogen therapy or hormone replacement therapy in postmenopausal women), all types of exogenous estrogen has shown increased DVT risk, in some cases as high as a fourfold increase in DVT rates.^{17,18} In addition, men who receive exogenous estrogen as part of treatment of prostate cancer also show a substantial increase in DVT incidence.¹⁷ The few retrospective studies looking at MTF DVT risk while using exogenous hormone therapy show that DVT rates are highest in those taking oral estrogen supplementation and lowest in those receiving transdermal estrogen supplementation.^{17,18} Recommendations to lower this risk include avoiding the use of progestin supplementation in addition to estrogen, avoiding ethinyl estradiol (highest VTE risk) and converting to transdermal estrogen supplementation if possible.¹⁸ The orthopaedic surgeon should discuss all these options to lower the risk of DVT/VTE preoperatively, in addition to treating the patient as a high-risk VTE patient postoperatively with more aggressive anticoagulation beyond the standard aspirin currently recommended.

Long-term survival of implants placed in transgender patients has no substantiated follow-up. Surveillance of implants in the postoperative period may require more diligence in those at the earlier stages of transitioning because those who begin exogenous estrogen administration after an arthroplasty has been performed will experience a rapid rate of bone loss, which may affect implant stability.^{6,7,15} Therefore, it is our recommendation that additional follow-up during initiation of hormone therapy be undertaken to catch potential complications early. Long-term infection risk with subsequent gender-conforming surgeries (particularly where surgery might involve bowel perforation risk) is unknown, and recommendations cannot be made at this time.

Summary

As gender reassignment becomes more commonplace and these patients' age into joint arthroplasties, orthopaedic surgeons will commonly treat this patient group. No treatment guidelines exist on how to address this unique patient population when considering them for elective orthopaedic procedures. This study attempts to mitigate that by providing an overview of the transgender literature in how it may pertain to orthopaedic procedures (Table 1, <http://links.lww.com/JAAOS/A780>). An emphasis should be placed on being comfortable with transgender patients to ensure equal access to health care while providing understanding and accuracy in describing the risks of surgery that are unique to this patient population.

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