

Clinical recommendations on penile reconstructive and prosthetic surgery: a consensus statement from the Asia-Pacific Society of Sexual Medicine

Eric Chung^{1,18,*} , Du-Geon Moon², Jiang Hui³, Hong-Chiang Chang⁴, Lukman Hakim⁵, Koichi Nagao⁶, Ronny Tan⁷, Siu King Mak⁸, Kavirach Tantiwongse⁹, Haocheng Lin³, Dung Ba Tien Mai¹⁰, Quang Nguyen¹¹, Hui Meng Tan¹², Yoshikazu Sato¹³, Bang-Ping Jiann¹⁴, Kwangsung Park¹⁵, Zhong Cheng Xin¹⁶, Hyun-Jun Park¹⁷

¹AndroUrology Centre, Brisbane QLD Australia

²Korea University Guro Hospital, Seoul, South Korea

³Department of Urology, Peking University Third Hospital, Beijing, China

⁴Medical College, National Taiwan University, Taipei, Taiwan

⁵Department of Urology, Airlangga University, Dr Soetomo Hospital, Surabaya, Indonesia

⁶Department of Urology, Toho University, Tokyo, Japan

⁷Advanced Urology Associates, Singapore

⁸Department of Surgery, Union Hospital, Hong Kong, China

⁹Department of Urology, Chulalongkorn University Hospital, Bangkok 10330, Thailand

¹⁰Department of Urology, Binh Dan Hospital, Ho Chi Minh City, Vietnam

¹¹Centre of Andrology and Sexual Medicine, Viet Duc University Hospital, Hanoi, Vietnam

¹²Subang Jaya Medical Centre, KL, Malaysia

¹³Department of Urology, Sanjukai Hospital, Sapporo, Japan

¹⁴Department of Urology, Kaohsiung Veterans General Hospital, Kaohsiung, Taiwan

¹⁵Department of Urology, Chonnam National University Medical School, Gwangju, South Korea

¹⁶Male Reproductive and Sexual Medicine, Department of Urology, The Second Hospital of Tianjin Medical University, Tianjin, China

¹⁷Pusan National University School of Medicine, Pusan National University Hospital, Busan, South Korea

¹⁸University of Queensland, Princess Alexandra Hospital, QLD, Australia

*Corresponding author: AndroUrology Centre, Suite 3, 530 Boundary St, Brisbane QLD 4000 Australia. Email: ericchg@hotmail.com

Abstract

Introduction: Penile reconstructive and prosthetic surgery remains a highly specialized field where potential complications can be devastating, and unrealistic patient expectations can often be difficult to manage. Furthermore, surgical practice can vary depending on locoregional expertise and sociocultural factors.

Methods: The Asia Pacific Society of Sexual Medicine (APSSM) panel of experts reviewed contemporary evidence regarding penile reconstructive and prosthetic surgery with an emphasis on key issues relevant to the Asia-Pacific (AP) region and developed a consensus statement and set of clinical practice recommendations on behalf of the APSSM. The Medline and EMBASE databases were searched using the following terms: “penile prosthesis implant,” “Peyronie’s disease,” “penile lengthening,” “penile augmentation,” “penile enlargement,” “buried penis,” “penile disorders,” “penile trauma,” “transgender,” and “penile reconstruction” between January 2001 and June 2022. A modified Delphi method was undertaken, and the panel evaluated, agreed, and provided consensus statements on clinically relevant penile reconstructive and prosthetic surgery, namely (1) penile prosthesis implantation, (2) Peyronie’s disease, (3) penile trauma, (4) gender-affirming (phalloplasty) surgery, and (5) penile esthetic (length and/or girth enlargement) surgery.

Main outcome measures: Outcomes were specific statements and clinical recommendations according to the Oxford Centre for Evidence-Based Medicine, and if clinical evidence is lacking, a consensus agreement is adopted. The panel provided statements on clinical aspects of surgical management in penile reconstructive and prosthetic surgery.

Results: There is a variation in surgical algorithms in patients based on sociocultural characteristics and the availability of local resources. Performing preoperative counseling and obtaining adequate informed consent are paramount and should be conducted to discuss various treatment options, including the pros and cons of each surgical intervention. Patients should be provided with information regarding potential complications related to surgery, and strict adherence to safe surgical principles, preoperative optimization of medical comorbidities and stringent postoperative care are important to improve patient satisfaction rates. For complex patients, surgical intervention should ideally be referred and performed by expert high-volume surgeons to maximize clinical outcomes.

Clinical implications: Due to the uneven distribution of surgical access and expertise across the AP region, development of relevant comprehensive surgical protocols and regular training programs is desirable.

Received: October 3, 2022. Revised: January 6, 2023. Accepted: January 16, 2023

© The Author(s) 2023. Published by Oxford University Press on behalf of The International Society of Sexual Medicine.

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<https://creativecommons.org/licenses/by-nc/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited.

For commercial re-use, please contact journals.permissions@oup.com

Strengths and Limitations: This consensus statement covers comprehensive penile reconstructive and prosthetic surgery topics and is endorsed by the APSSM. The variations in surgical algorithms and lack of sufficient high-level evidence in these areas could be stated as a limitation.

Conclusion: This APSSM consensus statement provides clinical recommendations on the surgical management of various penile reconstructive and prosthetic surgeries. The APSSM advocates for surgeons in AP to individualize surgical options based on patient condition(s) and needs, surgeon expertise, and local resources.

Keywords: penile prosthesis implant; Peyronie's disease; penile enlargement; penile augmentation; penile trauma; transgender; buried penis; clinical outcomes.

Introduction

Surgery remains the definite and likely most effective treatment for many penile disorders. In recent years, various organizations such as the American Urological Association (AUA), European Urological Association (EAU), International Consultation on Sexual Medicine (ICSM), Sexual Medicine Society of North America (SMSNA), and European Society for Sexual Medicine (ESSM) have published various clinical guidelines pertaining to the surgical treatments of common penile conditions such as erectile dysfunction (ED), Peyronie's disease (PD), transgender surgery or penile trauma.^{1–12} However, the lack of high-quality structured prospective randomized controlled clinical trials, especially in the field of penile surgery, has significantly hindered high-level evidence for clinical recommendations. Furthermore, various interplay factors such as variation in surgical protocols, complexity of the disease, and locoregional expertise have resulted in the lack of adoption of a single clinical guideline.

In the AP region, various sociocultural and economic factors coupled with inherent strong beliefs in traditional complementary medicines as well as stigma related to having sexual dysfunction and the fact that patients are often reluctant to choose an invasive treatment option, have resulted in many patients avoiding proper clinical consultation and seeking alternative (nonevidenced) treatment options^{13–16}. Penile surgery is usually undertaken as the last resort, although it is not uncommon for patients to seek surgery with unlicensed practitioners who may not be accredited clinicians due to surgical cost or misleading medical advertisements^{17,18}. The proliferation of “illegal” surgical centers offering various penile surgeries and the laxity in local government regulation are partly responsible for many patients receiving substandard care and, in some cases, undergoing “dangerous” surgery by poorly trained surgeons or non-medically or surgically trained providers^{15,18}. Hence, considerable challenges arise for clinicians treating patients who present with or want a certain penile reconstructive and/or prosthetic surgery for their penile condition(s) and to be able to draw a definitive surgical plan while assimilating relevant contemporary evidence-based recommendations into their clinical practice relevant to the AP region.

Considering the above-mentioned challenges, the Asia Pacific Society of Sexual Medicine (APSSM) evaluates contemporary evidence on several common penile conditions and aims to provide a set of consensus statements and evidence-based surgical recommendations on various penile reconstructive and prosthetic surgeries to guide clinicians in the AP region.

Methods and materials

This APSSM consensus committee panel on penile prosthetic and reconstructive surgery was initiated by the lead author

(E.C.), and key opinion leaders and executive committee members within the APSSM with extensive surgical knowledge and experience in complex penile surgeries across Australia, China, Japan, Indonesia, Malaysia, Singapore, South Korea, Taiwan, Thailand, and Vietnam were invited to serve in this consensus panel. All invited experts agreed to participate in this working committee and contemporary literature concerning various penile conditions and relevant penile surgical techniques, including published clinical guidelines by major urological and sexual medicine organizations were incorporated into this consensus statement^{1–12}. No Institutional Review Board approval was needed due to the specific design of this research.

The MEDLINE and EMBASE databases were searched for the following terms “penile prosthesis implant”, “Peyronie's disease”, “penile lengthening”, “penile augmentation”, “penile enlargement”, “buried penis”, “penile disorders”, “penile trauma”, “transgender”, and “penile reconstruction” between January 2001 to June 2022. Given the limited prospective and randomized-controlled trials involving penile surgery, a full Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol was not adopted; instead, a narrative approach was taken using a modified Delphi method with multiple rounds of discussion and feedback until a consensus agreement was achieved. The panel was tasked to review specific clinically relevant areas in penile reconstructive and prosthetic surgery, namely (1) penile prosthesis implantation, (2) Peyronie's disease, (3) penile trauma, (4) gender-affirming (phalloplasty) surgery, and (5) penile aesthetic (length and/or girth enlargement) surgery. Clinical findings were internally discussed, and each panelist provided an opinion on each of the subheadings. All authors agreed fully on the list of clinical recommendations in this consensus statement [Box 1]. The quality of evidence was graded based on the Oxford Centre for Evidence-Based Medicine recommendations¹⁹ and a clinical principle was given in the absence of strong scientific data. Specific emphasis is placed on locoregional surgical expertise and socioeconomic and cultural issues relevant to the AP region.

Box 1: Consensus Statement on Clinical Recommendations

1. Penile prosthesis implantation

- The selection of a PPI device is dependent on device characteristics, cost, availability of local resources, surgeon's expertise, and patient's preference (Clinical Principle).
- Strict patient selection and counseling, and careful preoperative medical management are important, especially in high-risk patients (Level 2, Grade B).

- Appropriate perioperative precautions should be undertaken, and individual components of the PPI device should be prepared in a sterile manner and according to the manufacturer's guidelines (Clinical Principle).
- Safe surgical techniques coupled with evidence-based surgical principles and vigilant postoperative care are paramount to ensure optimal clinical outcomes and excellent patient satisfaction rates (Level 2, Grade B).

2. Peyronie's disease (PD)

- Proper preoperative counseling and setting realistic patients' expectations are important given penile surgery can be associated with penile length loss, recurrent penile curvature, ED, and altered penile sensation (Clinical Principle).
- Penile plication is a simpler, minimally invasive surgery and tends to preserve potency in most patients but invariably results in penile length loss and does not address complex PD (Level 2, Grade B).
- Penile graft reconstructive surgery can address patients with complex penile deformity or lost penile size with PD, but there is a higher risk of altered glans sensation, recurrent curvature (and/or loss of penile size from graft contracture) and ED in the long term (Level 2, Grade B).
- Complex penile reconstruction with concurrent placement of PPI and/or use of graft material is a demanding surgery with potentially serious complications and should be performed by surgeons with extensive prosthetic and reconstructive experience (Level 2, Grade B).

3. Penile trauma

- Penile trauma such as penile fracture, strangulation, partial avulsion, or amputation and complete loss of the penis is considered a urological emergency and requires surgical reconstruction depending on the extent of injury, state of the patient, and local expertise (Clinical Principle).
- Specific aims of penile reconstructive surgery are to restore defect(s) and provide good functional and cosmetic outcomes (Level 2, Grade B).
- Patients should be cautioned about potential long-term complications (such as penile deformity, sensory alteration, and sexual dysfunction) (Level 2, Grade B).

4. Gender-affirming (total phallic reconstruction) surgery

- Total phallic reconstructive (gender-affirming) surgery is often complex and should take into account the patient's expectations, desired goals, and surgeon's expertise (Clinical Principle).
- Regardless of surgical techniques, patients should be informed of the potential complications and the high likelihood of additional

procedure(s) since suboptimal cosmesis, and functional complications are common (Level 3, Grade C).

- The insertion of PPI in the neophallus requires adherence to safe surgical principles to avoid its unique set of complications (Clinical Principle).

5. Penile aesthetic (length and/or girth enlargement) surgery

- A variety of penile aesthetic techniques including injectable materials are available but lacks clear guideline and standardization of the procedures (Clinical Principle).
- It is important to distinguish between a buried penis and micropenis (Clinical Principle).
- Judicious care should be taken to address both physical and psychological aspects of the penile aesthetic problem, while safe surgical techniques and realistic expectations are essential for favorable psychological and surgical outcomes (Clinical Principle).
- While short-term benefits can be derived from these penile aesthetic procedures, long-term complications such as aesthetic appearance, altered penile sensation, penile deformity, sexual dysfunction, and loss of the penis are real material risks (Level 3, Grade B).

Penile prosthesis implantation Clinical evidence

The modern penile prosthesis implant (PPI) has been around for nearly 5 decades, and the continued advances in surgical knowledge and device technology have improved clinical outcomes and patient satisfaction rates^{1,2,20}. The PPI can be largely divided into malleable (semirigid) and inflatable prostheses (available as 2 piece and 3 piece based on whether it has a separate reservoir and pump). In the AP region, Boston Scientific and Coloplast devices are readily available. The Boston Scientific Company (Marlborough, MA, USA) released the Tactra malleable device and the AMS 700 inflatable PPI series (namely LGX, CX, and CXR)²¹, while the Coloplast Company (Minneapolis, MN, USA) manufactured the Genesis malleable implant and the Coloplast Titan inflatable PPI series (as Titan [standard], narrow base, and extra-large cylinders)²². The InhibiZone coated AMS 700 series is not available in many AP countries. Similarly, both Zephyr ZSI 475 (Zephyr Surgical Implants SRAL, Geneva, Switzerland)²³ and the Infla10 series (Rigicon INC, Ronkonkoma, NY, USA)²⁴ did not have regulatory approval and/or were not available in many AP countries. A malleable penile prosthesis involves easier to perform surgical procedures, has fewer mechanical issues, and costs less than an inflatable penile prosthesis. However, the inflatable PPI is often regarded as a superior device as its mechanics simulate a more natural penile erection and provide a larger penile size when the device is fully inflated²⁵. Contemporary literature regarding long-term follow-up on inflatable PPI shows close to 80% mechanical survival at 10 years for primary implants, up

to 10% risk of surgical complications, and more than 85% patient satisfaction rates^{26–31}.

The PPI should be offered to men who have medical refractory ED or wish to undergo a definitive surgical treatment^{1–3,25}. Men with ED should undergo routine blood tests to screen for potential cardiometabolic diseases such as diabetes mellitus (DM) and hypogonadism^{1,2,32,33} since the presence of ED itself serves as an important marker for predicting future cardiovascular disease^{32,33}. The need for a mandatory penile color duplex ultrasonography (CDU) in every man with ED is considered unnecessary since this test often does not change the decision-making for PPI surgery, although it can be helpful for confirming if patients will benefit from a concurrent PPI at the time of their penile reconstructive surgery (such as in PD)^{34–36}. There is no need for patients to undergo a nocturnal penile tumescence test prior to consideration for PPI, and similarly, a pelvic angiography test is not recommended unless the patient has a known history of pelvic trauma and is contemplating potential penile revascularization surgery³⁷.

Patients with a history of DM, poor cardiovascular status, prior radiation therapy, neurological diseases, immunosuppression, steroid use, smoking, or urinary catheterization should be counseled regarding potentially higher risks of penile prosthetic complications^{1,38–40}. Hence, judicious preoperative medical management of patients with DM and those with cardiovascular disease on blood thinners or chronic medical illnesses (respiratory or renal) should be undertaken, including consultation with the appropriate specialist(s) to optimize the patient's state of health. Patients with poorly controlled DM, especially those with high glycosylated hemoglobin (> 8.5%) are associated with a higher risk of penile prosthesis infection^{4,41,42}. Nonetheless, recent data show that a well-controlled intraoperative glycemic level can be equally important^{1,43,44}. Patients should cease antiplatelets and anticoagulants prior to surgery, although it is safe to perform PPI surgery in patients taking aspirin⁴⁵. Those at high risk of thromboembolism should be considered for a more aggressive perioperative management strategy with appropriate bridging therapy and input from the relevant specialist(s) (such as a hematologist or vascular surgeon)¹.

It is imperative that the informed consent process should incorporate a detailed discussion on the type of PPI, its pros and cons, other treatment alternatives, cost of surgery, and potential surgical complications, especially pertaining to the perceived loss of penis length^{1,46,47}. It is advisable that patients choose a surgeon who can provide the best quality care in IPP surgery given that published literature shows that an appropriately trained and safe surgeon with high-volume expertise in penile prostheses can deliver better clinical outcomes^{1,48}. The selection of whether a patient receives malleable or inflatable PPI is largely dependent on several factors, such as the device local registration status, cost, and characteristics; the surgeon's expertise, and the patient's preference¹. Patients should be screened for infection (skin or urine) before surgery, and appropriate perioperative precautions should be undertaken to minimize surgical contamination, such as a preoperative shower with antibacterial agents, intraoperative hair removal, alcoholic formulations for skin preparation, and proper protective surgical attire^{1,2,46}. It is recommended that patients receive perioperative intravenous and postoperative oral antibiotic prophylaxis in this AP region. The choice

of prescribed antibiotics is often based on the surgeon's preference, patient's medical history, and local institution antibiotic guidelines^{1,46,49–51}. Ideally, the prescription of antifungals should be done in consultation with an infectious disease physician and is usually reserved for unusual cases (poorly controlled DM or infected prosthetic salvage cases)^{1,46,52}.

There are specific advantages and disadvantages in different surgery approaches (such as penoscrotal or infrapubic), and the preferred surgical method is often based on surgeon experience, the patient's specific anatomy, and whether a concurrent penile reconstructive surgery is undertaken^{1,46,53,54}. Adherence to safe surgical principles and meticulous intraoperative attention during the placement of PPI are essential to ensure excellent surgical outcomes and minimize complications^{1,46}. Individual components of the PPI device should be prepared in a sterile manner and according to the manufacturer's guidelines^{1,46}. The PPI should be cycled at the time of surgery to ensure the device is placed in the correct anatomical space and provides a satisfactory penile cosmesis⁴⁶. Recognizable prosthetic-related complication(s) at the time of surgery should be addressed promptly and adequately, and PPI surgery should be terminated in the presence of a urethral injury^{1,46}. Specialized tools (such as cavernotomes) and advanced surgical adjuvant techniques (such as penile modeling or graft reconstruction) can be utilized in complex surgery, and in cases of significant penile fibrosis, a narrow cylinder-sized implant (or malleable implant) can be used^{1,46,55–57}. There are currently no universal guidelines on postoperative care, and the use and choice of analgesia, antibiotics, and surgical dressing can vary depending on the surgeon's preference and local institution practice^{1,58}. The timing of initial device cycling is largely based on the patient's postoperative comfort level and the surgeon's own practice¹. Patients should be able to cycle the device easily and any postoperative problems should be addressed promptly by the clinicians.

Summary recommendations for PPI

- The selection of a PPI device is dependent on device characteristics, cost, availability of local resources, surgeon expertise, and patient preference (Clinical Principle).
- Strict patient selection and counseling and careful preoperative medical management are important, especially in high-risk patients (Level 2, Grade B).
- Appropriate perioperative precautions should be undertaken, and individual components of the PPI device should be prepared in a sterile manner and according to the manufacturer's guidelines (Clinical Principle).
- Safe surgical techniques coupled with evidence-based surgical principles and vigilant postoperative care are paramount to ensure optimal clinical outcomes and excellent patient satisfaction rates (Level 2, Grade B).

Peyronie's disease

Clinical evidence

It is generally agreed that spontaneous resolution of PD is not common given that this is a progressive penile condition characterized by a penile curvature and/or deformity with often a palpable plaque, occasional pain, hinge defect, and ED in advanced cases^{6–9}. Penile CDU is useful for patient

counseling and serves as an important preoperative workup to ascertain the likelihood of postoperative ED by assessing the tunical plaque and underlying cavernosal smooth muscle appearance and vascular parameters^{36,59}. It is important to develop a personalized treatment plan with realistic expectations and treatment goals when dealing with men with PD since psychosexual stressors are common^{9,60}. The current oral medical therapy has not been very effective once the disease process is stable and lacks a high level of evidence⁶⁻⁹. While intralesional injection therapy is likely more effective than oral drugs, especially in collagenase *Clostridium histolyticum* therapy, this drug is neither approved nor available in the AP region^{61,62}. Other intralesional drugs such as verapamil, steroids, or interferon alpha can be offered for off-label use. Penile traction therapy can be a useful adjunct but requires strict compliance and tolerance to the traction application⁶⁻⁹.

Penile reconstructive surgery provides the fastest and most effective PD treatment, although it is generally recommended that patients wait until the PD is stable (no penile pain or change in curvature for at least 3 months) and have failed conservative treatment⁶⁻⁹. It is important to provide adequate preoperative counseling to set patient expectations, because penile reconstructive surgery can be associated with penile length loss, recurrent penile curvature, ED, and altered penile sensation^{6-9,63}. The complexity of penile deformity, the status of erectile function, the surgeon's expertise, and the patient's preference are key preoperative factors that determine the choice and success of the surgery^{9,60,63}.

Penile plication is generally recommended for men with penile curvature less than 60 degrees and those without hinge defects or hourglass deformities⁶⁻⁹. Various plication techniques have been described, although a modified Nesbitt without tunica excision is the preferred method. Other modifications such as the Yachia technique and Lue's 16-dot procedure have been described and can be effective in select cases^{6,7,9}. The proposed advantages of penile plication are that this procedure is simple, minimally invasive, and tends to preserve erectile function in most patients. However, the plication procedure invariably results in penile length loss, and it is estimated that a male loses around 1 cm of actual penile length with every 30 degrees of penile curvature correction⁹. Furthermore, penile plication may worsen the existing hourglass or hinge effect, particularly if larger plication is used^{6,9}.

In contrast, penile graft reconstruction should be reserved for patients with severe curvature (greater than 60 degrees) and is effective to address penile hinge defect or hourglass deformity or in men who do not wish to lose penile length with surgery⁶⁻⁹. Three types of graft materials utilized are autologous grafts, allografts (or xenografts), and synthetic grafts, although it is advisable to avoid a synthetic graft due to the higher risks of material infection, tissue fibrosis, and potential allergic reaction^{60,64}. The choice of graft material and surgical technique often depends on the surgeon experience, availability of graft material, and patient preference^{9,60}. Meticulous surgical care in neurovascular bundle dissection is paramount to minimize postoperative ED and glans complications (such as sensory numbness)⁶⁻⁹. Other complications, such as penile hematoma, graft complications (/hematoma, contracture, and harvest-site morbidities), recurrence of curvature, and ED in the longer term, as well as the failure to gain any meaningful length, are serious postoperative concerns related to penile graft reconstruction^{60,65}.

A PPI provides an effective solution for men who have pre-existing ED or are at high risk of postoperative ED following penile graft reconstructive surgery^{1,2,6-9}. An inflatable PPI offers higher functional and patient satisfaction rates than a malleable implant, and there is no statistically significant difference in terms of clinical outcomes and patient satisfaction rate between the Boston Scientific AMS 700 series and Coloplast Titan devices^{60,66}. While the implantation of penile prosthesis alone can be sufficient to straighten minor penile curvature, those with residual curvature may require manual modeling with an inflated device while those with complex PD may need to undergo additional penile plication or grafting at the time of PPI surgery⁶⁻⁹. Various surgical tools (such as cavernotomes) and techniques to remove the fibrotic tunical (and cavernosal tissues) have been described, but these procedures should ideally be performed by surgeons with extensive prosthetic and reconstructive experience^{1,6,60}. While novel surgical techniques to improve penile lengthening and girth at the time of PPI using various modified sliding techniques have been reported^{67,68}, these adjuvant maneuvers are associated with higher complication rates and more serious complications such as glans necrosis and loss of penis, especially in high-risk patients (those with cardiovascular disease, DM, smoking, previous prosthesis explantation, and radiation therapy)^{1,9,60}.

Summary recommendations for Peyronie's disease

- Proper preoperative counseling and setting realistic patients' expectations are important given penile surgery can be associated with penile length loss, recurrent penile curvature, ED, and altered penile sensation (Clinical Principle).
- Penile plication is a simpler, minimally invasive surgery and tends to preserve potency in most patients but invariably results in penile length loss and does not address complex PD (Level 2, Grade B).
- Penile graft reconstructive surgery can address those with complex penile deformity or lost penile size with PD, but there is a higher risk of altered glans sensation, recurrent curvature (and/or loss of penile size from graft contracture) and ED in the long term (Level 2, Grade B).
- Complex penile reconstruction with concurrent placement of PPI and/or use of graft material is a demanding surgery with potentially serious complications and should be performed by surgeons with extensive prosthetic and reconstructive experience (Level 2, Grade B).

Penile trauma

Clinical evidence

Penile trauma can be caused by a variety of conditions such as penile fracture, strangulation, partial avulsion or amputation, and complete loss of the penis¹⁰⁻¹². While these conditions should be considered a urological emergency, many males often present late due to embarrassment and psychological, social, and ethical reasons⁶⁹.

A penile fracture usually involves a tear in the tunica albuginea with or without a rupture of the corpus cavernosum and corpus spongiosum (urethral injury). Preoperative imaging tests such as penile CDU or magnetic resonance imaging tests can be useful if the clinical diagnosis is uncertain and may guide the treatment algorithm^{10-12,70,71}. Immediate surgical

exploration, evacuation of hematoma, and repair of the underlying tunica defect (and urethral injury) are generally recommended to provide faster recovery and minimize long-term complications (such as prolonged penile pain, hematoma, and deformity)^{72,73}. However, it is important to counsel the patient that subsequent penile curvature and sexual dysfunction can occur in a penile fracture^{10–12,69}.

Penile soft-tissue injury secondary to penile strangulation or entrapment can be a form of compartment syndrome that requires urgent treatment to avoid permanent penile damage^{10–12}. A unique situation of penile strangulation caused by a jade ring inserted into the base of the penile shaft has been regularly encountered in the AP region as jade is a prized ornament and purported to have medical or mystical value. Various techniques ranging from penile aspiration, cutting (foreign material), or reconstruction can be utilized depending on the exact cause, duration of injury, and availability of local resources^{10,74}. After the offending object is removed, closer inspection of the extent of penile tissue injury and exclusion of urethral injury should be undertaken, followed by appropriate reconstructive surgery to repair the penile defects^{10,12}.

Penetrating penile (or external genitalia) trauma should be assessed adequately to exclude significant deeper tissue injury since tissue recovery is largely dependent on the depth and surrounding tissue damage from shear forces^{10,12,75}. The primary treatment strategy involves aggressive surgical debridement, removal of foreign material, and preservation of viable tissue, which at times may necessitate multiple procedures^{10,12}. Early consultation with the plastic surgical team is advisable and suitable dressing should be applied for wound care. When primary repair of genital tissue is not feasible, tissue reconstruction can be achieved with the use of skin graft(s) or a variety of pedicled or free flaps¹². For simplicity, penile reconstruction can be subdivided into the repair of skin loss alone and reconstruction of the penile glans and/or shaft. Cosmetic (such as poor graft take or uneven skin color) or functional (such as penile deformity, sensory change, or sexual dysfunction) outcomes may vary depending on the extent of tissue repair in glans reconstruction following penile glans or distal penile shaft injury^{10,12}. Penile preservation should be always attempted, leaving total corpora cavernosa (neophallus) reconstruction as a last resort only^{10,12,75}. Patients who have suffered partial amputation of the penis or those with residual but reasonable penile stump length (not less than 3 cm so that the patient can still void standing up) can be offered other adjunctive surgical options such as the division of the suspensory ligament or removal of the suprapubic fat pad to maximize the length of the residual penile stump^{10,12}. The aims of the surgery are to preserve native penile tissue and enable the patient to void standing up and have a reasonable erect penile length for sexual penetration^{10,12,75}. Total phallic reconstruction (phalloplasty) with penile prosthesis implantation should be offered if all conservative measures fail, the patient is not capable of penetrative sexual intercourse, or in the presence of severe psychological distress^{10,12,75}.

Current literature on penile transplant surgery is scarce, and this complex surgery is associated with serious psychological impacts, the need for lifelong immunosuppression, the potential for organ rejection, multiple procedures, and suboptimal functional and cosmetic outcomes⁷⁶. A comprehensive evaluation is needed to manage issues surrounding bioethics, regulatory oversight, funding concerns, safety, efficacy, and feasibility of a penile transplant program^{77,78}. Candidates

for penile transplant must be screened to ensure that they are clinically, physically, and psychologically suitable, and surgery is performed under ideal conditions only in a select few major institutions with proven track records on organ transplantation^{79,80}. Postoperative care for penile transplant patients is often complex due to the aforementioned risks and will need to be personalized based on the patient's needs and the institution's expertise^{77–80}.

Summary recommendations for penile trauma

- Penile trauma such as penile fracture, strangulation, partial avulsion, or amputation and complete loss of penis is considered a urological emergency and requires surgical reconstruction depending on the extent of injury, state of the patient, and local expertise (Clinical Principle).
- Specific aims of penile reconstructive surgery are to restore defect(s) and provide good functional and cosmetic outcomes (Level 2, Grade B).
- Patients should be cautioned about potential long-term complications (such as penile deformity, sensory alteration, and sexual dysfunction) (Level 2, Grade B).

Gender affirming (total phallic reconstruction) surgery

Clinical evidence

The choice of the total phallic reconstructive technique is often based on the surgeon's expertise although this shared decision-making will need to be tailored to the patient's expectations, body habitus, pre-existing comorbidities, and previous surgical procedures^{60,74}. The desired goals in terms of neophallus size, genital sensation, and sexual and voiding functions should be discussed in detail and transgender patients must be fully counseled about the pros and cons as well as expected outcomes of each type of phalloplasty^{74,81,82}. The radial free forearm flap and anterolateral thigh flap are more commonly performed than the suprapubic pedicled pubic flap and latissimus dorsi flap techniques⁸³. The preservation of the dorsal clitoral nerve is critical to preserving sensation in the neophallus^{1,74}. Regardless of surgical techniques, patients should be informed of the potential complications and the high likelihood of additional procedure(s), because suboptimal cosmesis and functional complications (such as wound-related complications, urethral stricture, or fistula) are common^{81–83}.

PPI surgery in the neophallus after gender-affirming surgery is complex and should be reserved until the neourethra has healed, and in patients with reasonable genital sensitivity^{1,3,74}. Unique complications such as device malposition and distal erosion of the device in a neophallus can occur since the neophallus lacks proper corporal bodies and tunica albuginea to confine the PPI cylinder^{1,84}. Identification of the vascular supply to the neophallus is critical and this can be aided with the use of intraoperative penile CDU^{1,74}. An inflatable PPI is thought to be superior to a malleable implant for cosmetic reasons and potentially is associated with a lower risk of distal cylinder erosion since there is less constant pressure of the cylinder tip against the distal neophallus flap^{1,3,74,81}. The new ZSI 475 (Female-to-Male) FtM device (Zephyr Surgical Implants SRAL, Geneva, Switzerland) designed specifically for a female-to-male gender assignment surgery was released in 2016 and consists of a large single

cylinder of varying lengths (12, 15, or 17 cm), with a large, more glans-like distal tip and large stainless steel and silicone proximal base for pubic bone fixation, as well as a pump that resembles a normal testicle⁸⁵.

The decision to place 1 or 2 cylinders is largely dependent on the size of the neophallus. The proximal cylinder tip can be anchored to the pubic bone either with permanent sutures or within a graft-cylinder complex (such as Dacron polyester vascular graft) to prevent proximal cylinder displacement^{1,84}. The IPP reservoir should be inserted on the opposite side of the neophallus vascular supply while the placement of the pump is performed in the neoscrotum (often together with a contralateral testicular implant)^{1,84}.

Summary recommendations for gender-affirming (total phallic reconstruction) surgery

- Total phallic reconstructive (gender-affirming) surgery is often complex and should take into account the patient's expectations, desired goals, and surgeon's expertise (Clinical Principle).
- Regardless of surgical techniques, patients should be informed of the potential complications and the high likelihood of additional procedure(s) since suboptimal cosmesis, and functional complications are common (Level 3, Grade C).
- The insertion of PPI in the neophallus requires adherence to safe surgical principles to avoid its unique set of complications (Clinical Principle).

Penile aesthetic (length and/or girth enlargement) surgery

Clinical evidence

Penile aesthetic surgery is often sought after by males who are not happy with the appearance of their penis. This could be attributed to many factors such as penile dysmorphism, a misconception of the male genital norms, a small or buried penis, or an actual penile abnormality (such as PD)^{60,74}. The increased exposure of pornographic materials and advertisements on aesthetic appearance in popular social media have contributed to many males seeking penile aesthetic surgery⁶⁰. Furthermore, there are no clear guidelines or standardization of the procedures in this vulnerable subgroup. A buried penis is a medical condition in which the overlying prepubic skin and fat obscure a normal-sized penis, making it appear smaller or less visible^{86,87}. It is important to distinguish this condition from micropenis, which is defined by an erect penile length of at least 2.5 standard deviations smaller than the mean human penis size⁸⁸.

While advances in surgical techniques and the development of novel agents in this field have made possible aesthetic improvements in the male genitalia, it is important to address any underlying psychological and physical issues before consenting these patients for aesthetic penile surgery^{60,86,87}. Clinical evaluation should include a detailed examination of the male genitalia (such as penile stretched length, size, plaque, and prepubic fat pad) while digital photographs and penile CDU can be useful to document relevant clinical findings pertaining to the proposed aesthetic surgery^{60,74}. Evaluation of the patient's reason(s) for the aesthetic surgery, exclusion of psychiatric problems, and documentation of the patient understanding of the realistic expectations are critical

factors to ensure satisfactory outcomes for both the patient and surgeon^{60,89}. Many of these penile aesthetic procedures, which are often promoted as relatively safe surgeries with minimal risks, can have poor long-term aesthetic outcomes and importantly, significant complications such as altered sensation, ED, and loss of the penis^{74,86,87,89-92}.

For penile lengthening surgery, the release of the suspensory ligament of the penis is one of the commonest techniques to achieve an increase in the flaccid penile length and is usually coupled with a V-Y advancement flap based distally at the penopubic junction, with or without the use of a silicon spacer (such as a testicular implant as interposition graft between the divided suspensory ligament and pubic bone) to prevent reattachment of the penis to the pubis and subsequent penile contracture^{74,86,87,89-95}. For males with a buried penis, in addition to suspensory ligament release, other adjuvant surgical procedures such as suprapubic liposuction or lipectomy (escutcheonectomy), ventral phalloplasty, and insertion of malleable implants may be used to increase perceived or enhanced actual penile length to give greater patient satisfaction and better cosmetic outcomes^{60,74,93-97}. If an escutcheonectomy is not performed properly, there is an increased risk of reburying and recurrence of the buried penis. Meticulous surgical care should be taken to avoid compromising the neurovascular bundle and ensuing postoperative altered penile sensation or ED^{60,74,87,94}. Complications such as wound breakdown or contracture, cosmesis (unnatural humped appearance at the base of the penis), and penile instability can be issues for which additional procedures may need to be performed^{74,89}. Pre- or postoperative penile traction therapy with the use of penile weights or stretching devices is generally advisable⁶⁰. Scrotoplasty with excision of the scrotal web or excess scrotal skin can often be performed concurrently to improve the overall aesthetic appearance of the male genitalia⁶⁰.

In penile girth enhancement or augmentation surgery, it can be difficult to create a symmetric expansion of the penile shaft girth and aesthetic appearance of the penile girth in relation to the glans penis shape. Various agents can be injected into the penile dartos fascia to increase penile girth^{74,91-94}. The autologous fat injection method has the advantages of no tissue rejection and readily available material but is technique dependent and can give rise to unique complications such as penile asymmetry and unsightly irregularities from uneven fat injections, resorption, or calcification⁹¹⁻⁹⁴. Synthetic materials such as injectable liquid silicone or hyaluronic acid can be injected into the penile shaft or glans penis with reasonably good short-term results^{92,94}. However, patients should be cautioned regarding penile asymmetry due to potential granulomatous (paraffinoma) reactions, swelling, penile distortion, and migration of these synthetic materials^{98,99}. Furthermore, inadvertent damage to blood vessels and nerves by a non-hyaluronic acid agent can result in altered sensation and ED⁹⁹. Various autologous grafts (such as dermal fat and vein) or allografts (such as cadaveric or regenerative tissue matrix) have been placed as strips within the dartos fascia to provide a symmetric increase in penile girth^{60,74,91-94}. Similarly, a pre-manufactured silicone implant (Penuma) cast can be inserted subcutaneously in the penis to address a retractile penis, mild penile deformity, and inadequate girth¹⁰⁰. However, these grafts will need to be secured proximally and distally with sutures to prevent migration, and scar formation can cause penile shortening or curvature^{1,101}.

Summary recommendations for penile aesthetic surgery

- A variety of penile aesthetic techniques including injectable materials are available but lacks clear guideline and standardization of the procedures (Clinical Principle).
- It is important to distinguish between a buried penis and micropenis (Clinical Principle).
- Judicious care should be taken to address both physical and psychological aspects of the penile aesthetic problem, while safe surgical techniques and realistic expectations are essential for favorable psychological and surgical outcomes (Clinical Principle).
- While short-term benefits can be derived from these penile aesthetic procedures, long-term complications such as aesthetic appearance, altered penile sensation, penile deformity, sexual dysfunction, and loss of the penis are real material risks (Level 3, Grade B).

Conclusions

This APSSM consensus statement provides a set of evidence-based clinical recommendations on the surgical management of various penile reconstructive and prosthetic surgeries. Penile reconstructive and prosthetic surgery remains a highly specialized field since it aims to address both cosmesis and functional outcomes where potential surgical complications can be devastating while unrealistic patient expectations can often be difficult to manage. Furthermore, given the variations in surgical techniques and uneven distribution of surgical access and expertise across the AP region, there is a need to standardize clinical protocols and promote regular surgical workshops. The APSSM advocates for surgeons in the AP region to individualize surgical options based on the patient's condition(s) and needs, the surgeon's expertise, and the availability of local resources.

Funding

None declared.

Conflict of interest: There is no conflict of interest to declare.

References

1. Chung E, Bettocchi C, Egydio P, *et al.* The International Penile Prosthesis Implant Consensus Forum: clinical recommendations and surgical principles on the inflatable 3-piece penile prosthesis implant. *Nat Rev Urol.* 2022;19(9):534–546.
2. Levine LA, Becher E, Bella A, *et al.* Penile prosthesis surgery: current recommendations from the International Consultation on Sexual Medicine. *J Sex Med.* 2016;13:489–518.
3. Osmonov D, Christopher AN, Blecher GA. Clinical recommendations from the European Society of Sexual Medicine exploring partner expectations, satisfaction in male and phalloplasty cohorts, the impact of penile length, girth and implant type, reservoir placement, and influence of comorbidities and social circumstances. *J Sex Med.* 2020;17:210–237.
4. Darouiche RO, Bella AJ, Boone TB, *et al.* North American consensus document on infection of penile prostheses. *Urology.* 2013;82:937–942.
5. Burnett AL, Nehra A, Breau RH, *et al.* Erectile dysfunction: AUA Guideline. *J Urol.* 2018;200(3):633–641.
6. Chung E, Ralph D, Kadioglu A, *et al.* Evidence-based management guidelines on Peyronie's disease. *J Sex Med.* 2016;13(6):905–923.
7. Nehra A, Alterowitz R, Culkin DJ, *et al.* Peyronie's disease: AUA guideline. *J Urol.* 2015;194(3):745–753.
8. Hatzimouratidis K, Eardley I, Giuliano F, *et al.* EAU guidelines on penile curvature. *Eur Urol.* 2012;62(3):543–552.
9. Chung E, Gillman M, Tuckey J, La Bianca S, Love C. A clinical pathway for the management of Peyronie's disease: integrating clinical guidelines from the International Society of Sexual Medicine, American Urological Association, and European Urological Association. *BJU Int.* 2020;126(Suppl 1):12–17.
10. Morey AF, Broghammer JJA, Hollowell CMP, McKibben MJ, Souter L. Urotrauma Guideline 2020: AUA Guideline. *J Urol.* 2021;205(1):30–35.
11. Summerton DJ, Kitrey ND, Lumen N, Serafetinidis E, Djakovic N, European Association of Urology. EAU Guidelines on iatrogenic trauma. *Eur Urol.* 2012;62(4):628–639.
12. Bryk DJ, Zhao LC. Guideline of guidelines: a review of urological trauma guidelines. *BJU Int.* 2016;117(2):226–234.
13. Lewis LJ. Examining sexual health discourses in a racial/ethnic context. *Arch Sex Behav.* 2004;33(3):223–234.
14. Irfan M, Hussain NHN, Noor NM, Mohamed M, Sidi H, Ismail SB. Epidemiology of male sexual dysfunction in Asian and European regions: a systematic review. *Am J Mens Health.* 2020;14(4):1557988320937200.
15. Ho CC, Singam P, Hong GE, Zainuddin ZM. Male sexual dysfunction in Asia. *Asian J Androl.* 2011;13(4):537–542.
16. Tan HM, Low WY, Ng CJ, *et al.* Prevalence and correlates of erectile dysfunction (ED) and treatment seeking for ED in Asian men: the Asian Men's Attitudes to Life Events and Sexuality (Asian MALES). *J Sex Med.* 2007;4(6):1582–1592.
17. Atiyeh BS, Chahine F, Abou GO. Social media and plastic surgery practice building: a thin line between efficient marketing, professionalism, and ethics. *Aesthet Plast Surg.* 2021;45(3):1310–1321.
18. Swanson E. The commercialization of plastic surgery. *Aesthet Surg J.* 2013;33(7):1065–1068.
19. Guyatt GH, Oxman AD, Kunz R, *et al.* for the GRADE Working Group. Going from evidence to recommendations. *BMJ.* 2008;336:1049.
20. Chung E. Penile prosthesis implant: scientific advances and technological innovations over the last four decades. *Transl Androl Urol.* 2017;6(1):37–45.
21. The Boston Scientific AMS 700 series. Accessed January 6, 2022. <https://www.bostonscientific.com/en-US/products/penile-prosthesis/ams-700-inflatable-penile-prosthesis.html>.
22. The Coloplast Titan series. Accessed January 6, 2022. <https://www.coloplastmenshealth.com/erectile-dysfunction/penile-implants/titan-inflatable-penile-implant/>.
23. The Zephyr ZSI475 series. Accessed January 6, 2022. <https://www.zsimplants.ch/en/products-en/erectile-dysfunction>.
24. The Rigicon Infla 10 series. Accessed January 6, 2022. <https://www.rigicon.com/inflatable-penile-prosthesis>.
25. Chung E. Translating penile erectile hydraulics to clinical application in inflatable penile prosthesis implant. *Curr Sex Health Rep.* 2017;9(2):84–89.
26. Chierigo F, Capogrosso P, Deho F, *et al.* Long-term follow-up after penile prosthesis implantation—survival and quality of life outcomes. *J Sex Med.* 2019;16(11):1827–1833.
27. Çayan S, Aşçı R, Efesoğlu O, *et al.* Comparison of long-term results and couples' satisfaction with penile implant types and brands: lessons learned from 883 patients with erectile dysfunction who underwent penile prosthesis implantation. *J Sex Med.* 2019;16:1092–1099.
28. Atri E, Wong V, Barengo NC, Polackwich AS. A comparison between AMS700 and Coloplast Titan: a systematic literature review. *Cureus.* 2020;12(11):e11350.
29. Chung E, Van CT, Wilson I, Cartmill R. Penile prosthesis implantation for the treatment for male erectile dysfunction: clinical

- outcomes and lessons learnt after 955 procedures. *World J Urol.* 2013;31(3):591–595.
30. Wilson SK, Delk J, Salem E, Cleves M. Longterm survival of inflatable penile prostheses: single surgical group experience with 2384 first-time implants spanning two decades. *J Sex Med.* 2007;4:1074–1079.
 31. Trost LW, McCaslin R, Linder B, Hellstrom WJG. Long-term outcomes of penile prostheses for the treatment of erectile dysfunction. *Expert Rev Med Devices.* 2013;10(3):353–366.
 32. Nehra A, Jackson G, Miner M, et al. The Princeton III consensus recommendations for the management of erectile dysfunction and cardiovascular disease. *Mayo Clin Proc.* 2012;87(8):766–778.
 33. Mulhall JP, Giralaldi A, Hackett G, et al. The 2018 revision to the process of care model for evaluation of erectile dysfunction. *J Sex Med.* 2018;15:1280–1292.
 34. Meuleman EJ, Hatzichristou D, Rosen RC, et al. Diagnostic tests for male erectile dysfunction revisited. Committee Consensus Report of the International Consultation in Sexual Medicine. *J Sex Med.* 2010;7:2375–2381.
 35. Barham DW, Chen IK, Reeves A, et al. Surgeon variations in the perioperative evaluation of penile prosthesis patients. *Int J Impot Res.* 2022; <https://doi.org/10.1038/s41443-021-00521-9>.
 36. Chung E, Yan H, De Young L, Brock GB. Penile Doppler sonographic and clinical characteristics in Peyronie's disease and/or erectile dysfunction: an analysis of 1500 men with male sexual dysfunction. *BJU Int.* 2012;110(8):1201–1205.
 37. Dicks B, Bastuba M, Goldstein I. Penile revascularisation—contemporary update. *Asian J Androl.* 2013;15(1):5–9.
 38. Carvajal A, Benavides J, Garcia-Perdomo HA, Henry GD. Risk factors association with penile prosthesis infection: systematic review and meta-analysis. *Int J Impot Res.* 2020;32(6):587–597.
 39. Hebert KJ, Kohler TS. Penile prosthesis infection: myths and realities. *World J Mens Health.* 2019;37(3):276–287.
 40. Pineda M, Burnett AL. Penile prosthesis infections—a review of risk factors, prevention, and treatment. *Sex Med Rev.* 2016;4(4):389–398.
 41. Dick BP, Yousif A, Raheem O, Hellstrom WJG. Does lowering the haemoglobin A1c reduce penile prosthesis infection: a systematic review. *Sex Med Rev.* 2020;S2050-0521(20):30068–30068.
 42. Gon LM, de Campos CCC, Voris BRI, Passeri LA, Fregonesi A, Riccetto CLZ. A systematic review of penile prosthesis infection and meta-analysis of diabetes mellitus role. *BMC Urol.* 2021;21(1):35.
 43. Huynh LM, Huang E, El-Khatib FM, Gross MS, Yafi FA. A systematic review of literature regarding whether immediate pre-operative haemoglobin A1c or serum glucose are risk factors for infection following penile prosthesis implantation. *Urology.* 2021;152:12–54.
 44. Osman MM, Huynh LM, El-Khatib FM, et al. Immediate pre-operative blood glucose and hemoglobin a1c levels are not predictive of postoperative infections in diabetic men undergoing penile prosthesis implant. *Int J Impot Res.* 2021;33(3):296–302.
 45. Culkin DJ, Exaire EJ, Green D, et al. Anticoagulation and antiplatelet therapy in urological practice: ICUD/AUA review paper. *J Urol.* 2014;192(4):1026–1034.
 46. Chung E, Mulhall J. Practical considerations in inflatable penile implant surgery. *J Sex Med.* 2021;18(8):1320–1327.
 47. Trost LW, Baum N, Hellstrom WJG. Managing the difficult penile prosthesis patient. *J Sex Med.* 2013;10:893–907.
 48. Onyeji IC, Sui W, Pagano MJ, et al. Impact of surgeon case volume on reoperation rates after inflatable penile prosthesis surgery. *J Urol.* 2017;197(1):223–229.
 49. Wolf JS Jr, Bennett CJ, Dmochowski RR, et al. Urologic Surgery Antimicrobial Prophylaxis Best Practice Policy Panel. Best practice policy statement on urologic surgery antimicrobial prophylaxis. *J Urol.* 2008;179:1379–1390.
 50. Gross MS, Phillips EA, Carrasquillo RJ, et al. Multicenter investigation of the micro-organisms involved in penile prosthesis infection: an analysis of the efficacy of the AUA and EAU guidelines for penile prosthesis prophylaxis. *J Sex Med.* 2017;14(3):455–463.
 51. Dropkin BM, Chrisholm LP, Dallmer JD, et al. Penile prosthesis insertion in the era of antibiotic stewardship— are postoperative antibiotics necessary? *J Urol.* 2020;203(3):611–614.
 52. Giles C, Lamont-Friedrich SJ, Michl TD, Griesser HJ, Coad BR. The importance of fungal pathogens and antifungal coatings in medical device infections. *Biotechnol Adv.* 2018;36(1):264–280.
 53. Palmisano F, Boeri L, Cristini C, et al. Comparison of infrapubic vs penoscrotal approaches for 3-piece inflatable penile prosthesis placement: do we have a winner? *Sex Med Rev.* 2018;6:631–639.
 54. Trost LW, Boonjindasup AG, Hellstrom WJ. Comparison of infrapubic versus transscrotal approaches for inflatable penile prosthesis placement: a multi-institution report. *Int J Impot Res.* 2015;27:86–89.
 55. Chung E. Penile prosthesis implant in the special populations: diabetics, neurogenic conditions, fibrotic cases, concurrent urinary incontinence, and salvage implants. *Asian J. Androl.* 2020;22(1):39–44.
 56. Tran H, Goldfarb R, Ackerman A, Valenzuela RJ. Penile lengthening, girth, and size preservation at the time of penile prosthesis insertion. *Sex Med Rev.* 2017;5(3):403–412.
 57. Shah BB, Kent M, Valenzuela R. Advanced penile length restoration techniques to optimize penile prosthesis placement outcomes. *Sex Med Rev.* 2021;9:641–649.
 58. O'Rourke TK, Erbella A, Zang Y, Wosnitzer MS. Prevention, identification, and management of post-operative penile implant complications of infection, hematoma, and device malfunction. *Transl Androl Urol.* 2017;6(Suppl 5):S832–S848.
 59. Chung E, Brock GB. Duplex sonographic study of impotent men with Peyronie's disease: is veno-occlusion the cause? *J Sex Med.* 2011;8(12):3446–3451.
 60. Chung E. Penile reconstructive surgery in Peyronie's disease: challenges in restoring normal penis size, shape and function. *World J Mens Health.* 2018;36:e10–e17.
 61. Chung E, Yafi FA. Pharmacotherapy in Peyronie's disease: a state-of-the-art review on established contemporary and emerging drugs. *Expert Opin Pharmacother.* 2022;23(9):1035–1042.
 62. Chung E, Scott S, Wang J. A state-of-art review on collagenase *Clostridium histolyticum* and Peyronie's disease: drug profile, clinical evidence and safety outcomes. *Expert Opin Biol Ther.* 2020;20(6):559–564.
 63. Chung E, Wang R, Ralph D, Levine L, Brock G. A worldwide survey on Peyronie's disease surgical practice patterns among surgeons. *J Sex Med.* 2018;15(4):568–575.
 64. Hatzichristodoulou OD, Kubler H, Hellstrom WJG, Yafi FA. Contemporary review of grafting techniques for the surgical treatment of Peyronie's disease. *Sex Med Rev.* 2017;5(4):544–552.
 65. Chung E, Cledinning E, Lessard L, Brock GB. Five year follow-up of Peyronie's graft surgery: outcomes and patient satisfaction. *J Sex Med.* 2011;8(2):594–600.
 66. Chung E, Solomon M, DeYoung L, Brock GB. Comparison between AMS 700 CX and Coloplast Titan inflatable penile prosthesis for Peyronie's disease treatment and remodeling: clinical outcomes and patient satisfaction. *J Sex Med.* 2013;10(11):2855–2860.
 67. Wilson SK, Wen L, Egydio PH. Evolution of techniques for aesthetic penile enlargement during prosthesis placement: a chronicle of the Egydio non-grafting strategy. *Int J Impot Res.* 2020; <https://doi.org/10.1038/s41443-020-00379-3>.
 68. Egydio PH. An innovative strategy for non-grafting penile enlargement: a novel paradigm for tunica expansion procedures. *J Sex Med.* 2020;17(10):2093–2103. *Sex Med Rev.* 2021;9:641–649.
 69. Simms A, Baradaran N, Breyer LTF, BN. Penile fractures: evaluation and management. *Urol Clin North Am.* 2021;48(4):557–563.

70. Kristinsson S, Johnson M, Ralph D. Review of penile reconstructive techniques. *Int J Impot Res*. 2021;33(3):243–250.
71. Cozzi D, Verrone GB, Agostini S, et al. Acute penile trauma: imaging features in the emergency setting. *Radiol Med*. 2019;124(12):1270–1280.
72. Kominsky H, Beebe S, Shah N, Jenkins LC. Surgical reconstruction for penile fracture: a systematic review. *Int J Impot Res*. 2020;32(1):75–80.
73. Falcone M, Garaffa G, Castiglione F, Ralph DJ. Current management of penile fracture: an up-to-date systematic review. *Sex Med Rev*. 2018;6(2):253–260.
74. Ralph D, Gonzalez-Cadavid N, Mirone V, et al. Trauma, gender reassignment, and penile augmentation. *J Sex Med*. 2010;7(4 Pt 2):1657–1667.
75. Guizhong L, Feng H, Guangling H, Libo M, Kun L, Yuming S. Management of penile defects: a review. *J Reconstr Microsurg*. 2012;28(5):293–296.
76. Tuffaha SH, Cooney DS, Sopko NA, et al. Penile transplantation: an emerging option for genitourinary reconstruction. *Transpl Int*. 2017;30(5):441–450.
77. Jonczyk MM, Tratnig-Frankl P, Cetrulo CL Jr. Genitourinary vascularized composite allotransplantation: a review of penile transplantation. *Curr pin Organ Transplant*. 2019;24(6):721–725.
78. van der Meerwe A, Moosa MR, Barsdorf N. Ethical and societal challenges in penile transplantation. *Curr Opin Organ Transplant*. 2020;25(6):594–600.
79. Ngaage L, Elegbebe A, Sugarman J, et al. The Baltimore Criteria for an ethical approach to penile transplantation: a clinical guideline. *Transpl Int*. 2020;33(5):471–482.
80. Lake IV, Girard AO, Lopez CD, et al. Penile transplantation: lessons learned and technical considerations. *J Urol*. 2022;207(5):960–968.
81. Kang A, Aizen JM, Cohen AJ, Bales GT, Pariser JJ. Techniques and considerations of prosthetic surgery after phalloplasty in the transgender male. *Transl Androl Urol*. 2019;8(3):273–282.
82. Yao A, Ingarciola MJ, Lopez CD, et al. Total penile reconstruction: a systematic review. *J Plast Reconstr Aesthet Surg*. 2018;71(6):788–806.
83. Morrison SD, Shakir A, Vyas KS, Kirby J, Crane CN, Lee GK. Phalloplasty: a review of techniques and outcomes. *Plast Reconstr Surg*. 2016;138(3):594–615.
84. Rooker SA, Vyas KS, DiFilippo EC, et al. The rise of the neophallus: a systematic review of penile prosthetic outcomes and complications in gender-affirming surgery. *J Sex Med*. 2019;16(5):661–672.
85. Neuville P, Moreal-Journal M, Cabelguenne D, Ruffion A, Paparel P, Terrier JE. First outcomes of the ZSI 475 FtM, a specific prosthesis designed for phalloplasty. *J Sex Med*. 2019;16(2):316–322.
86. Zaccaro C, Subira D, Lopez-Diez I, Manfredi C, Ascencios-Vargas JP, Moncada-Iribarren I. History and future perspectives of male aesthetic genital surgery. *Int J Impot Res*. 2022;34(4):327–331.
87. Bettocchi C, Checchia AA, Falagario UG, et al. Male esthetic genital surgery: recommendations and gaps to be filled. *Int J Impot Res*. 2022;34(4):392–403.
88. Hatipoglu N, Kurtoglu S. Micropenis: etiology, diagnosis and treatment approaches. *J Clin Res Pediatr Endocrinol*. 2013;5(4):217–223.
89. Marra G, Drury A, Tran L, Veale D, Muir GH. Systematic review of surgical and nonsurgical interventions in normal men complaining of small penis size. *Sex Med Rev*. 2020;8:158–180.
90. Thomas C, Navia A. Aesthetic scrotoplasty: systematic review and a proposed treatment algorithm for the management of bothersome scrotum in adults. *Aesthet Plast Surg*. 2021;45:769–776.
91. Vardi Y, Har-Shai Y, Gil T, Gruenwald I. A critical analysis of penile enhancement procedures for patients with normal penile size: surgical techniques, success, and complications. *Eur Urol*. 2008;54:1042–1050.
92. Hehemann MC, Towe M, Huynh LM, El-Khatib FM, Yafi FA. Penile girth enlargement strategies: what's the evidence? *Sex Med Rev*. 2019;7:535–547.
93. Alter GJ, Salgado CJ, Chim H. Aesthetic surgery of the male genitalia. *Semin Plast Surg*. 2011;25(3):189–198.
94. Furr J, Hebert K, Wisenbaugh E, Gelman J. Complications of genital enlargement surgery. *J Sex Med*. 2018;15(12):1811–1817.
95. Davoudzadeh EP, Davoudzadeh NP, Margolin E, Stahl PJ, Stember DS. Penile length: measurement technique and applications. *Sex Med Rev*. 2018;6(2):261–271.
96. Smith-Harrison LI, Piotrowski J, Machen GL, Guise A. Acquire buried penis in adults: a review of surgical management. *Sex Med Rev*. 8(1):150–157.
97. Chung E, Ng BHS, Wang J. Can malleable penile prosthesis implantation improve voiding dysfunction in men with concurrent erectile dysfunction and buried penis? *Investig Clin Urol*. 2021;62(3):305–309.
98. Downey AP, Osman NI, Mangera A, Inman RD, Reid SV, Chapple CR. Penile paraffinoma. *Eur Urol Focus*. 2019;5(5):894–898.
99. Romero-Otero J, Manfredi C, Ralph D, et al. Non-invasive and surgical penile enhancement interventions for aesthetic or therapeutic purposes: a systematic review. *BJU Int*. 2021;127(3):269–291.
100. Wilson SK, Picazo AL. Update on the Penuma an FDA-cleared penile implant for aesthetic enhancement of the flaccid penis. *Int J Impot Res*. 2022;34(4):369–374.
101. Elist JJ, Valenzuela R, Hillelsohn J, Feng T, Hosseini A. A single-surgeon retrospective and preliminary evaluation of the safety and effectiveness of the Penuma silicone sleeve implant for elective cosmetic correction of the flaccid penis. *J Sex Med*. 2018;15(9):1216–1223.