Patients’ Guide to Phalloplasty Techniques

The St Peter’s Andrology Centre is an independent unit offering gender reassignment surgery to female-to-male patients funded by the NHS, primarily at the Hospital of St John and St Elizabeth’s in London.

The surgical team is the same as that which operates on the NHS at University College Hospital and the same treatment protocols are observed.

This document outlines the various procedures performed at our unit.

HYSTERECTOMY AND MASTECTOMY

Many patients have already had hysterectomy and mastectomy (chest surgery) performed before being referred to us for phalloplasty surgery.

Mastectomy is normally the first operation undergone by patients but there is no absolute reason why it cannot be undertaken at any stage in the process. We do not provide this service at present however.

In patients undergoing pubic phalloplasty (see below) we commonly perform open hysterectomy during the course of the procedure. If an open operation is necessary prior to phalloplasty, we prefer this to be done through a midline skin incision so that the possibility of a pubic phalloplasty is not compromised later. If a radial artery phalloplasty has already been decided on then a Pfannenstiel incision (transverse suprapubic) is perfectly acceptable although a laparoscopic procedure is preferable. Laparoscopic surgery leaves fewer scars and has a faster recovery which is important as patients will be having multiple operations later.

We do not perform hysterectomy on its own but can refer patients to a gynaecologist who offers laparoscopically assisted vaginal hysterectomy. It is possible to have a laparoscopic hysterectomy after having had a radial artery phalloplasty but it is easier if it is done before we connect up the neourethra (new urine tube) to the bladder. It may be that in future we will be able to offer this procedure at the time of radial artery phalloplasty.

PHALLOPLASTY

We use two main methods to create the phallus: radial artery phalloplasty and pubic phalloplasty. We have also performed metatoidioplasty and Gilles phalloplasty but in general terms do not recommend these techniques.

Despite advances in surgical techniques there is no perfect technique and each approach has its own drawbacks. Patients will need to consider the following factors when deciding which approach is most appropriate to their needs:

- standing to void
- locker room appearance
- penetrative sex
- scarring potential
- sexual sensation
- removal of visible and invisible female parts
- number of operations
- potential complications
- donor site problems
Operative Staging

We split the surgery into four manageable stages so that the surgeons do not get too tired and patients’ bodies get a rest in between each stage, which is also quite important.

- Stage 1 – formation of the phallus
- Stage 2 – formation of the urethra
- Stage 3 – glans sculpting, testicular prostheses etc
- Stage 4 – penile prosthesis

If a patient wants a neo-urethra (urinary passage through the phallus) then this has to be completed before Stages 3 and 4 as it is impossible to put a urethra in at a later stage. If there is an unsatisfactory result or complication from any stage then this is normally corrected before moving on to the next stage.

It is important to realise that there may be more than one operation involved at each stage and there should be at least three months in between each operation. Patients having all four stages will therefore take at least 12-18 months to complete their surgery even if there are no complications requiring extra admissions. It is not uncommon for the entire process to require two to three years (or even longer if there are problems fitting in the surgery around the requirements of holidays etc).

**Stage 1 – Formation Of Phallus**

**Radial Artery Phalloplasty (Forearm free flap phalloplasty)**

We have been doing these for the last six years or so using the original technique as described by Chang. The forearm flap has the thinnest skin and most reliable anatomy when compared to all the other free flap techniques and is also fairly easy to harvest. This is the procedure of choice if standing and voiding from the tip and phallus size are
the prime requirements. The main disadvantage for patients is the cosmetic appearance of the skin graft on the forearm where skin has been taken to construct the phallus.

Figure 2. Varying donor site defects on arms following radial artery phalloplasty. From left to right: severe defect one year after surgery, full thickness skin graft, split skin graft.

**Operative technique**

A flap from the forearm skin is formed into a skin-lined tube that will eventually be the neourethra (Figure 3). This tube is then rolled up like a Swiss Roll within a larger flap which has the skin on the outside. This tube within a tube is then transplanted to the pubic area and microsurgical anastomoses made to connect the artery, veins and nerves. The radial artery from the arm is transplanted to provide a blood supply to the phallus via the inferior epigastric artery from the lower abdominal muscles.

Donor site defect

We currently use buttock skin crease full thickness grafts for the forearm grafts instead of using groin skin or abdominal skin. However if the patient has a considerable excess of abdominal skin, we will consider taking skin from the abdomen instead which has the same effect as a ‘tummy tuck.’ The disadvantage of groin skin is that pubic hair will grow on the forearm and using abdominal skin means another scar on the abdomen. The scar from buttock skin is easily hidden and the hair quality is fairly fine and appropriate for most forearms.
If a patient has no spare skin anywhere then we take split thickness skin graft from inner or back of thigh to cover the forearm. Split thickness skin graft is hairless, very sensitive to sunlight damage and also contracts more which may impair arm function. However we have not had significant problems with our patients in the long term. Full thickness skin does grow hair, is thicker, stretches more and looks and feels better. We recommend that patients avoid heavy sunlight exposure to the skin grafts for about two years.

If the forearm is of small size then we make a smaller phallus (12-13 cm rather than 14 cm) to aid skin closure, increase usable radial artery length and reduce forearm morbidity. This gives a very acceptable cosmetic result. We connect the sensory nerves up to the phallus and about 50% of our patients to date have touch sensation in the phallus. Nerves do grow slowly and it can take a long time for sensation to appear.

**Pubic Phalloplasty**

This is the operation of choice if no urethra is required but phallus size and penetrative sex is important. A patient having this option will then need to sit to void urine. If a urethra is required and the patient wishes to avoid the donor site defect associated with the radial artery phalloplasty, then a neourethra can be incorporated into a pubic phalloplasty. However, unless the phallus is particularly small (approximately 10 cm) it is extremely problematic to run this to the tip of the phallus.
**Operative technique**

A rectangular shaped skin flap is raised from the lower abdominal skin but still in continuity with the clitoral and pubic area. If there has been a transverse hysterectomy scar then we mark out the proposed flap, raise it and then put it back on the abdomen and wait for at least six weeks. This is to make sure that there is sufficient blood supply for a phallus to survive. The rectangular skin flap is folded in to form a tubular phallus.

Abdominal skin is mobilised and brought down to cover the defect. We use lateral hip skin flaps rotated in to help close the skin defect, which reduces the risk of the phallus being tethered upwards. The scar does go right across the abdomen but usually can be hidden by underpants. The main complaint from patients is that they lose their pubic hair using this technique.

If there is difficulty closing the skin defect then we initially allow the phallus to ride high (ie: pointing upwards) and then use groin crease skin flaps to drop the phallus down at a later stage, giving more pubic hair. This problem is more likely to arise in patients with little abdominal fat.

These phalluses can also be rather large particularly in girth and we have had to deliberately shrink a few patients to allow comfortable sexual intercourse with their partner. They have less sensation than the radial artery phalloplasties.

![Figure 6. Postoperative pubic phalloplasty](image)

**Metatodioplasty (Mini-phallus)**

This operation is selected by those who need to void standing but are not interested in phallus size or having penetrative sexual intercourse. It is not a common choice in our group of patients and in our experience many men having this operation later regret not having had a phallus constructed which allows them to have sexual intercourse.

**Operative technique**

This is a two-stage procedure. The first stage is essentially a join-up urethroplasty but the urethral opening is brought up to the tip of the clitoris rather than the side and the clitoris is formed into a pseudo-glands. The remaining non-hairy labial folds are excised and the hairy labial skin is dropped down to make the mini-phallus stick out more. Small testicular prostheses are inserted at a second operation if required.

Best results are obtained when there is significant clitoral enlargement from long-term testosterone treatment. If the clitoris is small then this is not a recommended procedure. One of the problems is that the urethral width is quite narrow for technical reasons and voiding difficulties and strictures are not uncommon.
Gilles Phalloplasty

We rarely perform this as it requires many stages of surgery and the final result is generally not as good as a pubic or radial artery phalloplasty. Using the fatty loose skin in the “love-handles” area on the side of the abdomen, tubes of skin are fashioned into what look like suitcase handles. These are gradually rotated bit by bit to the pubic area which can take many operations.

Hair Removal

We can refer patients to a company that provides a laser hair removal service. It runs centres in London and Manchester and the treatment can be undertaken either before surgery (when the areas concerned are relatively flat) or afterwards (when it can be seen exactly which hair requires removal). The treatment is not covered by the NHS and patients therefore have to pay for it themselves.
Stage 2 – Formation Of Neourethra

As previously outlined, this is still a major problem for pubic phalloplasty patients. Using a two-step technique we can form a urethral meatus (urinary opening) about a third to half way up the underside of the phallus. How far we can get it is totally dependent on how much hairless inner labial skin is available which varies from patient to patient.

Labial Urethroplasty

The first stage is a labial urethroplasty. Here a tube, made from one non-hairy labia, is tunnelled up the phallus as high as it will go with the bottom end being next to the clitoris.

Problems do occur with narrowing of the urinary meatus (opening on the phallus). When this happens we use buccal mucosa (lining of the inside of the cheek) or posterior auricular skin (from behind the ear) to correct this at a second procedure as putting new skin into this area seems to cause less problems than trying to use phallus skin for the correction.

Join-Up Urethroplasty

Whether the neourethra has been formed following a pubic phalloplasty or at the time of radial artery phalloplasty a join-up urethroplasty is needed before urine can flow through the new opening. This involves taking a strip of vaginal skin and the other non-hairy labia and using them to connect the native urethra (existing urine tube) to the previous opening next to the clitoris.
**Catheters**

Catheters are used for two main purposes. Firstly, they allow the patient to pass urine while the new urethra is healing. They also have an important role in keeping the size and shape of the neourethral lumen (passageway) in much the same way as a sleeper does after a piercing.

If they are removed too early then the lumen can narrow. However, being foreign bodies, catheters become completely colonised with bacteria within two weeks and can also cause mechanical irritation and therefore damage to the neourethra. A good compromise seems to be to leave the catheter in for between seven and ten days in phallic neourethras that have not yet been connected to the bladder. A shorter period is more desirable if possible.

In the join-up urethroplasty (or metatoidioplasty) two catheters are used. One is put through the abdomen into the bladder (suprapubic) and one through the neourethra to keep the lumen open. The luminal one is removed at seven days but the patient must void only through the suprapubic catheter until about day 21. At this point the patient performs a trial void through the neourethra and if all is well then the suprapubic catheter is removed.

**Getting the Urethra to the Tip**

A labial urethroplasty is limited in length to the length of the longest available segment of suitable labial tissue. Using multiple urethral segments gives rise to problems with strictures (narrowing) or fistula (leak) at the joins. In addition, if the blood supply to the neourethra is not good it will inevitably stricture down. This is why patients used to suffer unacceptably high complication rates when we attempted to get the urethra to the tip of a pubic phalloplasty and why nowadays we plan that the meatus should be only as far down the shaft as can be achieved using a single labial segment.

Clearly, this compromise is not ideal and we are still considering alternative methods to get the urethra of a pubic phalloplasty to be as anatomically accurate as that of a radial artery phalloplasty.

In the meantime, a significant number of patients opt for no urethra for an easier life.

**Fistulae and Strictures**

If there is a urine leak or fistula it is commonly just inside the vaginal opening where the neourethra joins the native urethra. About 50% of minor leaks (a few drops) will heal spontaneously as long as the distal urethra (downstream segment) is not narrowed. We leave patients for a minimum of three months to allow this to happen and also to allow the tissues to thicken up so that a repair is more likely to succeed. There is no point attempting to repair it earlier as it will invariably make the hole even bigger. Rather than undergoing further surgery, some patients manage small fistulae by blocking them with a clean fingertip during voiding (ie: as if playing the flute) which is perfectly acceptable. If there is a lot of hairy skin inside the neourethra then small hair follicle infections can form abscesses which rupture to the outside forming new fistulae. This is why we try to use as little hairy skin as possible.

Similar principles apply if there is a stricture. The stricture needs to mature so that it does not narrow further after the repair has been performed. This may require a suprapubic catheter being inserted to divert the urine for a few weeks first. Some patients manage with regular self-dilation and generally as long as a size 14F catheter can get past the stricture, it is good enough to pass urine through. If a repair is necessary then we use local skin flaps, if available, otherwise buccal mucosa or posterior auricular skin.
Vagina
We do not offer a routine total vaginectomy service as this is risky surgery with significant bleeding problems. Because a piece of the front wall of the vagina is used both in metatoidioplasty as well as join-up urethroplasty the vaginal opening in all patients with a neourethra will be much narrowed. For the small number of patients who intend to continue using their vaginas we would suggest that they do not have the urethra formed. For patients who need to continue having cervical smears but have very narrow vaginal openings, we can sometimes widen this sufficiently to allow smears to be taken comfortably but not really enough for intercourse.

Clitoris
Sexual sensation is extremely important to all patients. The best way to preserve sensation in the clitoris is to leave it where it is. Often with cleverly placed testicular prostheses the clitoris will be hidden underneath and only visible when specifically looked for.

If hiding it is important, there are three options. The first is to incorporate it into the urethra during the join-up urethroplasty operation. It will be hidden under the skin but in the same anatomical position and therefore available for manual stimulation. The disadvantage is that it can make the urine flow very turbulent. A few patients have experienced severe discomfort as the jet of urine hits the clitoris and needed restiting of the clitoris out of the urethra. The second option is to mobilise the clitoris and move it as far down the labial neoscrotum as possible to hide it. The other option is to bury it under the skin where it is. For the last procedure the top layer of skin has to first be removed from the clitoris as otherwise patients will have recurrent abscess formation at the site.

With the radial artery phalloplasty patients it is possible to disconnect one of the nerves from the clitoris and attach it to the nerves that come with the phallus. There have been some reports from other units that when successful a large portion of the phallus skin becomes an erogenous zone, which is obviously desirable. We do not have extensive experience with this but if requested can offer the technique. However there is no guarantee of success and there will in any case be a 50% reduction in normal clitoral sensitivity.

Stage 3 – Glans Sculpting, Testicular Prostheses Etc
Regardless of which sort of phalloplasty has been undertaken, once the urinary tract has been completed patients move on to implantation of prostheses if required. Before the penile prosthesis itself is implanted (Stage 4) we implant the reservoir of the penile prosthesis together with testicular prostheses. We also take this opportunity to undertake glans sculpting and any carry out any final shaping that is necessary, excising skin tags or “dog-ears” and tidying up scars as necessary.
Previously these were performed as a series of procedures but we now tend to aim to do them all under the same anaesthetic.

Figure 11. Pubic phalloplasty following glans sculpting and implantation of testicular prostheses

**Glans Sculpting**

We use a modified Norfolk technique using full-thickness skin flaps and skin graft rather than split skin grafts. A circumferential skin flap (Fig 8a) is raised like the brim of a hat which is then rolled in (Fig 8b). The use of a full thickness skin flap allows a nice helmet or mushroom head to be created (Fig 8c). Skin graft is then wrapped fairly tightly around the bare fat below the head to cause a slight constriction as it heals to accentuate the bulbousness of the head (Fig 9). The appearance is that of a circumcised penis. As with all skin grafts the results are unpredictable but most patients have an acceptable cosmetic result. We used to use split-thickness skin grafts as in other units but have found that the cosmetic appearance in our hands is better with full thickness skin.

Figure 12 Glans sculpting

**Testicular Prostheses**

The size we put in depends on the looseness of the hairy labial skin. If a join-up urethroplasty has been previously performed then there may be less available skin on the side that has been operated on. Another consideration is the amount of space between the thighs. Often two perfectly positioned testes will migrate once the patient returns to normal activity resulting in one testis going lower and the other upwards to the phallus. We would sometimes put a large prosthesis on the side where the pump for the erection device will sit as the large pump fits nicely in the space created with this size of prosthesis. Otherwise the smaller pump is used. On the other side a medium prosthesis is inserted to keep the two about level. In terms of appearance the medium and large look about the same size post-operatively!
We use liquid silicone gel as well as solid silicone gel prostheses. The former are squishier and easier to insert. However, if they rupture then they lose shape and become deformable. There does not appear to be any significant detrimental effect on the patient if this happens and it is very easy to replace the ruptured testis. The solid ones cannot rupture and lose their shape but are harder to fit.

**Excise Excess Skin**
We will excise any untidy bits of skin usually at the end of wound lines and frequently use these bits of skin as skin graft for the glans sculpting rather than excising a new piece of skin. Many patients want to have the natural curve at the side of their hips flattened. This is not due to our surgery but due to their natural shape and requests for this to be done by us are declined. We will on occasion refer to our local plastic surgeon if they require extensive remodelling of mastectomy and abdominal scars as well. All other patients should seek to have this reshaping surgery done at their local hospital, as it is not part of our phalloplasty service.

**Stage 4 – Penile Prosthesis**
The history of phalloplasty has two holy grails: the first being to pass urine from the tip of the phallus and the second to be able to have penetrative sex. The potential problems with the construction of the urethra have already been discussed earlier. To understand the theory behind penile prosthesis for phalloplasty it is first necessary to understand how the natural penis in genetic XY males functions.

**Normal Male Anatomy**
The penis consists of three tubes. The two larger tubes lie side by side on the top and contain the erectile tissue. The smaller tube contains the urethra and also forms the whole glans or head of the penis and lies underneath. The erectile tissue tubes, called corpora cavernosum, are made of a tough but partially elastic fibrous tissue (tunica) that is anchored to the lower end of the pubic bone. Anchorage provides stability of the erect penis and prevents the penis falling back with penetrative sex. The elasticity of the tunica allows some expansion of the width and length of the erect penis. The tough fibrous nature of the tunica allows the pressure inside the erect penis to rise well above the normal blood pressure and makes it hard and rigid. The erectile tissue inside the corpora is like a sponge in that it can expand greatly in size with blood when erect allowing a significant difference in appearance between the flaccid and erect penis. All these factors need to be artificially reproduced in the phallus.

**Rigidity and Stability**
Incorporating pieces of bone or cartilage inside the phallus to make it rigid has been tried. The problem is anchoring it to the pubis as although this could be done one would not then be able to move the phallus around and it would be permanently stiff and in the same position. In any case, cartilage gradually softens so it is ineffective in the long term.

We use bone anchors to attach the penile prosthesis to the lower edge of the pubic bone. These are metal screws with permanent sutures connected to them that are then attached to the penile prosthesis. Rather than putting sutures through the prosthesis, we use a Dacron sock or sheath to recreate the tunica of the corpora cavernosum. This is then attached to the bone with the bone anchors. Dacron is synthetic material used in vascular surgery to replace or repair major blood vessels such as the aorta and is very tough. Over time, it becomes very fibrotic and effectively functions like the real tunica and protects the prosthesis buried inside. If the prosthesis needs replacing, we just open
the Dacron sheath and change the prosthesis over without having to reconnect things to the bone again. Our preference if possible is to use a complete sheath but if space in the phallus is limited, we will just use a sock at the bottom end leaving the top end bare. This covers the anchorage and protective functions of the tunica.

**Penile prostheses**

There are two main classes of penile prosthesis, the malleable and inflatable models. The malleable or semi-rigid prostheses consist of a silicone rod with a flexible steel core which allows it to be both stiff and bendable. A newer type has interlocking metal segments with a cable connector instead of a steel core allowing flexibility and when the cable is manipulated, the whole thing locks and becomes rigid. There are no external moving parts and they are to all purposes indestructible. They have been used in phalloplasty, as they are simple to insert. Unfortunately, the drawback is their rigidity, which exerts constant pressure on the skin in spite of the Dacron sheath, and erosions are common. Also having a permanently stiff phallus is very inconvenient.

Because of the above problems with the semi-rigid prostheses most centres now offer inflatable prostheses. This is essentially a balloon that can be filled with fluid to create rigidity when an erection is needed. This is much more like the normal erectile spongy tissue. We cannot however reproduce the elastic function of the tunica because the phallus skin is fixed in size.

Inflatable prostheses come in three basic models from various companies. They all consist of three components which are the cylinders, pump and reservoir. The pump regulates the flow of fluid between the reservoir and cylinders, thereby controlling the erections. The cylinders give the rigidity for penetration and the reservoir stores the fluid when no erection is required. The fluid used is usually saline but x-ray contrast is sometimes used. A one-part inflatable has all three components combined in one cylinder. The pump is at the glans end whilst the reservoir is at the bone end with the cylinder in the middle. A two-part inflatable has the reservoir and cylinder combined in the cylinders with a separate pump. The reservoir is at the bone end with the rest of the cylinder being the inflatable component. A three-part inflatable has the cylinders, pump and reservoir as three separate components.

![Figure 13. Three piece inflatable penile prosthesis (AMS 700CX)](image)
There are a number of advantages of the inflatable over the semi-rigid. Firstly, it functions more naturally. Secondly, in the flaccid state there is much less pressure on the skin and so less likelihood of erosion. The cylinders can expand in girth and with a high pressure of fluid inside can be just as hard as a semi-rigid device. Disadvantages include a higher infection rate because it has more components and also a mechanical breakdown risk as there are moving parts. Fortunately mechanical breakdown is now rare and the devices themselves come with a lifetime warranty from the companies.

**Current technique**

We use three-part inflatables for all patients. We have stopped using the one-part prosthesis for a number of reasons. Firstly, they were too rigid and had similar problems as semi-rigid implants with erosions. Secondly there was not a lot of difference between the flaccid and erect states. Thirdly the deflation mechanism depends on bending the prosthesis in the middle and a number of patients were finding that during intercourse, if the phallus got slightly bent in the heat of the moment, the prosthesis would start deflating which dampened events rather. We found that the two-part inflatable prostheses were more flexible but were still rather stiff and therefore not as good as the three-part prosthesis.

The body will form a non-elastic fibrous capsule around all foreign material. This happens within four weeks around all the components of the inflatable prosthesis. If the capsule around the reservoir is of smaller volume than the reservoir then there may be problems with autoinflation. This involves the phallus erecting spontaneously and it may be impossible to deflate the prosthesis completely. If this happens the prosthesis effectively functions as a semi-rigid implant with all its attendant problems. We get round this problem by inserting the reservoir completely full during the Stage 3 surgery so that the capsule is the same size as the full reservoir. The penile implant is inserted three months later and a little fluid is released from the reservoir to further decrease the pressure and reduce the risk of autoinflation. The reservoir is usually inserted next to the bladder under the pubic bone where it cannot be felt. With patients who have had a radial artery phalloplasty the vascular anastomoses are near here so we sometimes put the reservoir into the abdomen near the umbilicus (belly-button) or through a separate incision in the inguinal area.

The next problem is the capsule that forms around the cylinders. Unless patients start pumping up the cylinders very early on, they may find that the erection is not stiff enough as the cylinders cannot expand. This is less common if a Dacron sheath completely enveloping the cylinders is used. We get patients to start cycling the prosthesis on a daily basis at two weeks, sometimes earlier depending on pain control. Because we do not have to worry about the reservoir, we often let patients go home with the cylinders partly inflated to maintain the shape. The phallus has to be kept pressed up against the abdomen during this time. If it is bent downwards then it may be possible to loosen the bone anchor screws at the base, which will make penetration impossible as there will then be no stability.

If we put a pump into a new space created in the hairy labial skin then it would be too painful for patients to cycle the prosthesis postoperatively and this would lead to long-term difficulties in operating it correctly. We therefore always try to get at least one large testis prosthesis in during the Stage 3 surgery on the side of the proposed pump so that we can put the pump into this precreated space later. This means that it should not be too painful to cycle the prosthesis and some patients can even do it within a few days.
Normally only one cylinder is used because together with the Dacron sheath it is quite bulky and gives sufficient rigidity. If there is a urethra then there is very rarely sufficient space for two cylinders. Some of the larger pubic phalluses need two cylinders because of their girth. It is important to leave some fat between the cylinder and the skin to prevent erosion in the future.

Patients are advised not to attempt intercourse for at least six weeks to give time for the capsules to form and more importantly to allow the bone anchors to become rock solid and provide support for the implants. We also advise all patients to use condoms to help prevent infection getting in through tiny abrasions in the phallic skin and to help with lubrication.

![Figure 14. Pubic phalloplasty with inflatable penile prosthesis: (a) inflated and (b) deflated](image)

**Complications**

The two enemies of penile implants are infection and erosion. The latter problem is minimised by all the above techniques. Infection is by far the biggest problem. It is usually introduced at the time of initial surgery from bacteria on the patient’s skin. If there is infection we are fighting a losing battle and the end result is that the whole implant has to come out and we start again. We utilise strict aseptic technique and use perioperative antibiotics for the patients. In addition, patients have an antiseptic bath preoperatively and have nasal antibiotic cream to kill the bacteria in their nose. The space in the phallus is washed with antiseptic solution as well as antibiotics as is the Dacron sheath. We try to avoid the implant touching the skin during surgery which also helps. Recently we have been using antibiotic impregnated prostheses (AMS 700CX with Inhibizone or Mentor Titan Alpha 1). Our preference at present is for the AMS implant as it has a softer cylinder tip, which is less likely to erode. In a large series reported from America there has been a significant reduction in infection problems even with patients who have had multiple implant revisions and other high-risk groups.

A sensate phallus is less likely to have erosion problems as innervated skin is tougher and provides early warning signals in the form of pain if the prosthesis is getting too close to the skin.

**CONCLUSION**

In the absence of the ideal technique each patient needs to make an informed choice of the procedure which best meets their individual requirements. This inevitably requires a degree of compromise. The radial artery phalloplasty gives the best results in terms of urinary function but is an extremely traumatic procedure with long-term damage to the donor arm. The scars from the pubic phalloplasty are far less conspicuous and the procedure itself involves shorter stays in hospital though generally more of them and
spread out over a longer period of time. Standing to urinate should be possible with the
pubic phalloplasty but attempting to extend the urinary opening to the tip of the phallus
is extremely problematic. If standing to urinate is the only consideration then a
metatoidioplasty may be the preferred option but our experience is that most such
patients return later requiring a cosmetically acceptable phallus and/or sexual function.
Sensation may be possible with the radial artery phalloplasty but should not be expected
in the pubic phalloplasty. Whether a patient opts for the pubic phalloplasty or the radial
artery phalloplasty he can expect to end up with a cosmetically acceptable phallus
suitable for penetrative sexual intercourse.