Feminizing genitoplasty in adult transsexuals: early and long-term surgical results

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OBJECTIVE

To examine the early and late surgical outcomes of feminizing genitoplasty (FG) in adult transsexuals in a UK single surgeon practice over a 10-year period.

PATIENTS AND METHODS

Computerized and manual databases were searched over the period 1994–2004 to identify patients who had undergone male to female FG. Case-notes were retrieved and analysed to identify epidemiological data, the number and type of perioperative problems, early results at outpatient review, late occurring problems and patient satisfaction. A telephone questionnaire was then conducted targeting all FG patients in our series. The questions were directed at identifying surgical complications, outcome and patient satisfaction.

RESULTS

In all, 233 case-notes were identified and 222 (95%) were retrieved. All patients had penectomy, urethroplasty and labiaplasty, 207 (93%) had formation of a neoclitoris, and 202 (91%) had a skin-lined neovagina. The median (range) age was 41 (19–76) years. The median hospital stay was 10 (6–21) days. A record of the first outpatient visit was available in 197 (84.5%) cases. The median time to follow up was 56 (8–351) days. Over all, 82.2% had an adequate vaginal depth, with a median depth of 13 (5–15) cm and 6.1% had developed vaginal stenosis. Three (1.7%) patients had had a vaginal prolapse, two (1.1%) had a degree of vaginal skin flap necrosis and one (0.6%) was troubled with vaginal hair growth. In 86.3% of the patients the neoclitorizes were sensitive. There was urethral stenosis in 18.3% of the patients and 5.6% complained of spraying of urine. Minor corrective urethral surgery was undertaken in 36 patients including 42 urethral dilatations, and eight meatotomies were performed. At the first clinic visit 174 (88.3%) patients were 'happy', 13 (6.6%) were 'unhappy' and 10 (5.1%) made no comment. Of the 233 patients, we successfully contacted 70 (30%). All had had penectomy and labioplasty, 64 (91%) had a clitoroplasty and 62 (89%) a neovagina. The median age was 43 (19–76) years and the median follow up was 36 (9–96) months. Overall, 63 (98%) had a sensate neoclitoris, with 31 (48%) able to achieve orgasm; nine (14%) were hypersensitive. Vaginal depth was considered adequate by 38 (61%) and 14 (23%) had or were having regular intercourse. Vaginal hair growth troubled 18 (29%), four (6%) had a vaginal prolapse and two (3%) had vaginal necrosis. Urinary problems were reported by 19 (27%) patients, of these 18 (26%) required revision surgery, 14 (20%) complained of urinary spraying, 18 (26%) had an upward directed stream and 16 (23%) had urethral stenosis. The patients deemed the cosmetic result acceptable in 53 (76%) cases and 56 (80%) said the surgery met with their expectations.

CONCLUSION

This is largest series of early results after male to female FG. Complications are common after this complex surgery and long-term follow-up is difficult, as patients tend to re-locate at the start of their 'new life' after FG. There were good overall cosmetic and functional results, with a sustained high patient satisfaction.

KEYWORDS

feminizing genitoplasty, transsexualism, gender dysphoria, surgical technique

INTRODUCTION

Feminizing genitoplasty (FG) in adult transsexuals was first reported in the medical literature in 1931 [1]. The operation currently involves the sequential removal of the male external genitalia and the formation of female external genitalia with the intent to satisfy the cosmetic and functional demands of each patient. Some patients opt not to have a vagina and simply undergo a cosmetic FG. However, most do request a vagina in which case it is necessary to create a space in the perineum extending between the front of the anus and rectum and the back of the prostate and bladder upto the level of the peritoneal pouch. Mobilized genital skin flaps are typically used to line this neovagina but occasionally various segments of colon or small bowel are used. In our practice a penoscrotal flap is preferentially used. Additionally a sensate clitoris is made from a proximal dorsal triangle of the glans penis maintained on its neurovascular bundle. The foreshortened male urethra is repositioned to lie between the clitoris and vagina, and labia majora are fashioned from the remaining genital skin.

Whatever technique is used, FG is complex surgery and outcomes depend not only on the technical experience of the surgeon but also upon the amount and quality of

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each patient's tissues available for genital reconstruction and most importantly on the realistic expectations of the patients themselves. This paper specifically examines the early and late surgical outcomes of FG in adult transsexuals in a UK single surgeon (T.R.T.) practice over a 10-year period.

PATIENTS AND METHODS

Using computerized and manual databases, a retrospective case-note review was conducted on all FG procedures done in Leicester since the Gender Identity service began in 1994. Case-notes were retrieved and analysed to identify epidemiological data, to determine the type and number of perioperative problems, early results at outpatient review, late occurring problems and patient satisfaction. The patients in this study were difficult to follow-up in the long-term as most were tertiary referrals and re-located at the start of their 'new life' after FG. To gain as much long-term information as possible, a telephone questionnaire was carried out on all contactable FG patients.

PATIENT MANAGEMENT

All patients had completed a 2 year 'real-life' test and received the recommendations from two independent psychiatrists regarding their suitability to undergo gender reassignment surgery. Patients were requested to achieve an agreed preoperative target weight and those wishing to minimize vaginal hair growth after FG were advised to consider using laser or electrolysis treatment of genital hair around the base of the penis and scrotum some months before surgery. All patients stopped their feminizing hormones 6 weeks before surgery to lessen the risk of deep venous thrombosis afterwards and patients were also asked to stop smoking. Patients undergoing vaginoplasty were admitted the day before surgery for bowel preparation with oral sodium picosulphate. Under general anaesthesia patients were carefully placed in the lithotomy position to avoid peripheral nerve injuries. If any procedure lasted >4 h the patients legs were laid flat for 20 min before being replaced in the lithotomy position. Prophylactic i.v. cefuroxime and metronidazole antibiotics were given at the induction of anaesthesia and continued for 72 h. Heparin (s.c.) and compression stockings were used routinely until patient discharge.

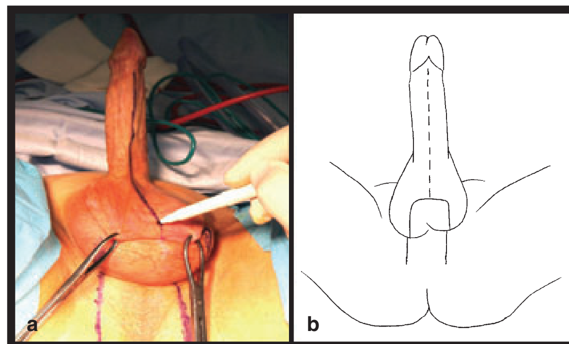

FIG. 1.
Anterior and posterior skin flaps marked out before incision.

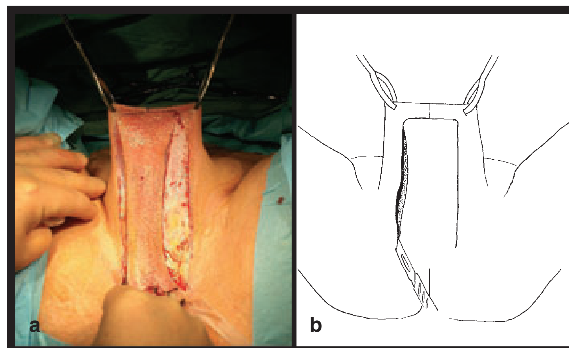

FIG. 2.
Dissection of the posterior (scrotal) flap.

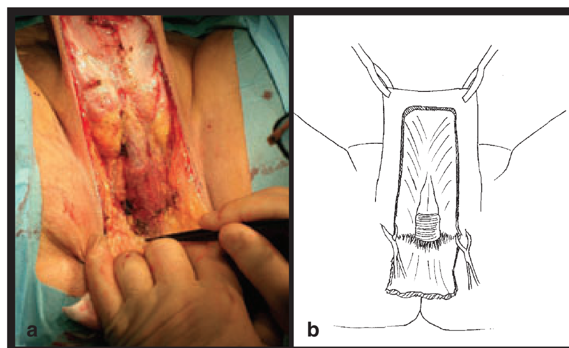

FIG. 3.
Formation of the neovaginal cavity by division of the transverse perine and recto-urethralis muscles.

OPERATIVE TECHNIQUE

After marking out posterior scrotal and anterior penile skin flaps (Fig. 1a,b) a 1 : 100 000 solution of adrenaline is injected to reduce cutaneous bleeding. A long inverted U-shaped scrotal skin flap based on posterior scrotal vessels is carefully developed (Fig. 2a,b) to expose the underlying bulbospongiosus muscle, penile crura and perineal body (Fig. 3a,b). A transverse incision through the perineal body guided tactilely by a 16 F urethral sound and finger in the patient's rectum allows safe sequential division of the transverse perinei, puborectalis and recto-urethralis muscles thereby gaining access to the fascia of Denonvillier. Staying behind this fascia it is relatively easy to bluntly push the rectum backwards away from the prostate and bladder all the way to the peritoneal pouch (Fig. 4a,b). Bilateral partial division of the pubo-rectalis is important to provide adequate vaginal introital width. The penile flap is raised using a circumferential coronal sulcus incision and a mid-line vertical ventral penile shaft incision extending from the coronal sulcus to the apex of the scrotal flap (Fig. 5a,b). Bilateral orchidectomy is next performed followed by mobilization of the preputial skin, which can increase the length of the penile flap by 2 cm. The bulbospongiosus muscle is then excised and the penile urethra transected and mobilized

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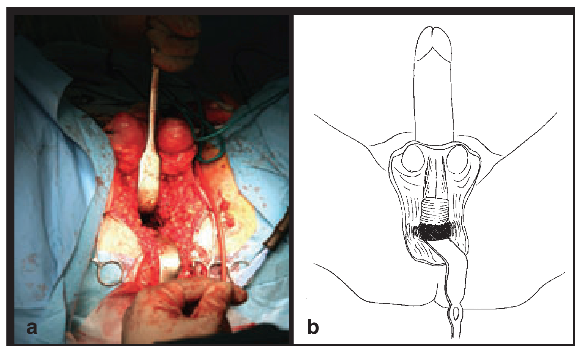

FIG. 4. *The neovaginal space accommodating long Langdon retractors.*

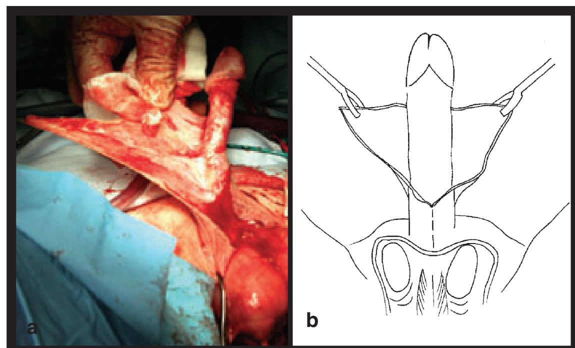

FIG. 5. *Raising the anterior (penile) flap.*

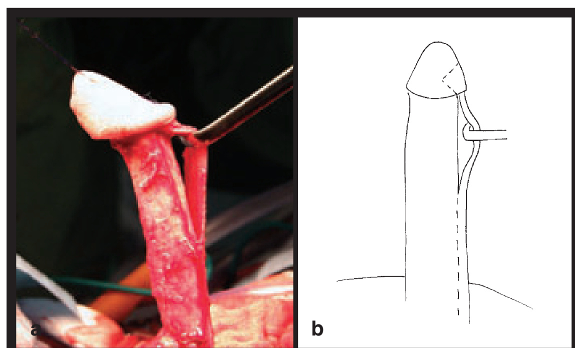

FIG. 6. *Dissection of the neurovascular bundle of the neoclitoris.*

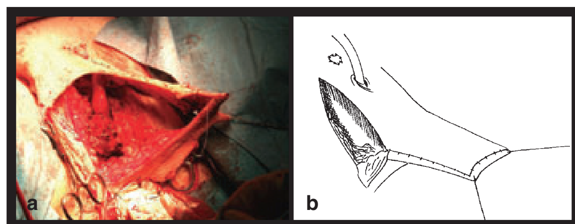

FIG. 7. *Apposition of the neovaginal flaps before inversion.*

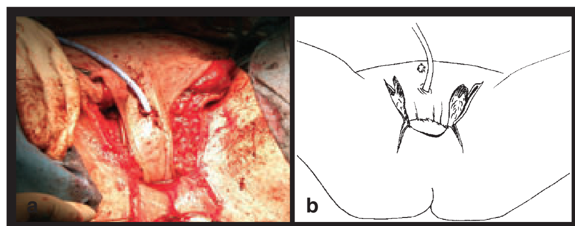

FIG. 8. *The neovaginal flaps inverted into the preformed space.*

inferiorly down to the bulb. A sensate clitoris is created by freely mobilizing the dorsal penile neurovascular bundle attached distally to a 0.5 cm equilateral triangle of glans penis (Fig. 6a,b). The penile crura are next divided and oversutured flush with the ischio-pubic rami. The innervated triangle of glans penis (neoclitoris) and foreshortened urethra are then separately brought out through appropriate juxtaposing midline vertical incisions in the anterior penile flap and sutured in place. A 14 F urethral catheter is placed. The apices and sides of the penile and scrotal skin flaps are sutured together (Fig. 7a,b) and inverted into the newly created perineal space (Fig. 8a,b). Labia majora are constructed either in a 'W' or 'V' pattern as determined by tissue availability or patient request (Fig. 9a). Vacuum drains are placed alongside the vagina before its inversion. If appropriate, a clitoral hood is next created using an inverted V-Y plasty starting ≈3 cm above the sutured neoclitoris. A vaginal pack is inserted and held in place by a two layered compression dressing (Fig. 9b).

After surgery patients are nursed supine and received clear oral fluids only for 5 days. The outer compressive perineal dressing and wound drains are removed on day 2. The inner perineal dressing and vaginal pack are removed on day 5 and patients mobilized and commenced on solids. On day 6 the urethral catheter is removed and on day 7 patients are taught how to perform vaginal douching and dilatation (the later three times per day for 15 min each session using a set of graduated dilators). Patients are discharged home on day 8 with instructions to recommence their feminizing hormones at 3 weeks and to attend an out-patient follow-up at 8 weeks. They are instructed to increase the size of the vaginal dilators at appropriate intervals.

RESULTS

Between 1994 and 2004, 233 cases were identified as having had FG procedures and 222 (95%) case-notes were retrieved. All the patients had undergone penectomy, urethroplasty and labiaplasty. A neoclitoris was created in 207 (93%) and 202 (91%) opted for a skin-lined vagina. The median (range) age of the patients was 41 (19–76) years and the median hospital stay was 10 (6–21) days.

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PERIOPERATIVE COMPLICATIONS

There were 15 (6.8%) episodes of infection requiring antibiotic treatment; in two of these there was a MRSA vaginal infection. Seven (3.2%) cases required operative treatment for postoperative bleeding; five from the urethra and two from the clitoris. A degree of skin flap necrosis occurred in six (2.7%) cases and four (1.8%) developed a vaginal prolapse. Two (0.9%) cases had a deep venous leg thrombosis and one of these (0.5%) had a nonfatal pulmonary embolism. One (0.45%) case sustained a rectal injury, which was recognized at surgery and closed primarily without sequelae.

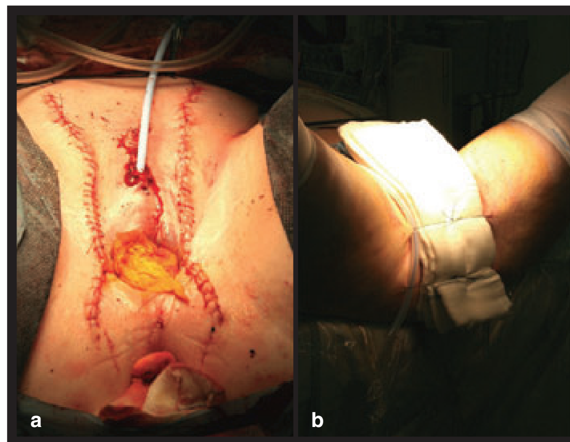

FIG. 9.
The labial flaps closed in a 'V' configuration (a) and the dressing sutured in place (b).

EARLY OUT-PATIENT REVIEW

A record of the first outpatient visit was available in 197 (84.5%) cases and the median (range) time to follow-up was 56 (8–351) days. Of these 11/180 (6.1%) had developed vaginal stenosis. However, 148 (82.2%) had adequate vaginal depth and 21 (11.7%) had inadequate depth as judged clinically by digital examination or recorded from patient observation. In 103 cases, the depth was measured recording a median depth of 13 (5–15) cm. Three (1.7%) cases had a vaginal prolapse, two (1.1%) had a degree of vaginal skin flap necrosis and one (0.6%) was troubled with vaginal hair growth.

A neoclitoris was formed in 183/197 cases; 158 (86.3%) were sensitive, five (2.7%) were insensitive and in 20 (10.9%) no comment was recorded. Four (2.2%) cases with sensate clitorizes described sensations as being painful or uncomfortable.

Urethral stenosis occurred in 36 (18.3%) patients and 11 (5.6%) complained of spraying of urine. However, 147 (74.6%) stated they had no urinary problems and in 14 (7.1%) urinary status was not recorded. In nine (4.6%) patients urethral engorgement occurred on sexual arousal. Minor corrective urethral surgery was undertaken in 36 patients including 42 urethral dilatations but over time eight meatotomies were performed.

Cosmetically 2.5% of patients complained of excessive labial tissue and requested a reduction labioplasty. At the first out-patient visit, 174 (88.3%) patients were 'happy' overall with the functional and cosmetic results of their surgery, 13 (6.6%) were 'unhappy' and in 10 (5.1%) no comment was recorded.

LATE FOLLOW-UP

Of the 233 patients, only 70 (30%) responded to the telephone questionnaire. Of the non-responders, 110 (47%) had no current active telephone number and 54 (23%) did not answer the calls. All 70 responders had had penectomy, orchidectomy and labioplasty, 64 (91%) also had a clitoroplasty and 62 (89%) a neovagina. The median (range) age of the 70 responders was 43 (19–76) years and median follow-up was 36 (9–96) months.

The median vaginal depth of 13.5 (2.5–18.0) cm was considered adequate by 38 (61%) patients and 14 (23%) had or were having regular vaginal intercourse. Vaginal hair growth concerned 18 (29%) patients but only one required removal of a hair ball. Four (6%) had a vaginal prolapse and two (3%) had vaginal stenosis.

Clitoral sensation was reported by 64 patients who had a neoclitoris formed and 31 (48%) were able to achieve clitoral orgasm. However, nine (14%) patients complained of uncomfortable clitoral sensation. Despite this, no patient elected to have their clitoris removed.

Nineteen (27%) patients had had LUTS. Of these 14 complained of urinary spraying and 18 had an upwardly directed urinary stream; 16 (23%) patients developed urinary stenosis and eight of these had undergone meatotomy.

The overall cosmetic result of FG procedures was acceptable in 53 (76%) cases and 56 (80%) said the surgery met with their expectations.

DISCUSSION

In the present study we assessed the aesthetic and functional results of FG in a large UK series over time. The most striking finding of this study was that the long-term follow-up of this nomadic tertiary referral group of patients was very problematic with only 70 (30%) patients contactable at a mean of 3 years after surgery. One explanation for this might be that having undergone a rigorous 2 year real-life test and complex surgery (FG), sometimes in association with breast augmentation and other cosmetic surgery, most transsexuals simply wish to get on with their lives in their chosen gender role and prefer to compartmentalize their past. Firm conclusions regarding the long-term surgical outcomes of FG in adult transsexuals are poorly documented to date, so it is interesting to be able to review in the present series the outcomes of 62 complete FGs at a mean follow-up of 3 years. In particular, the current series allows comparison of early- and late-surgical outcomes (Table 1), which is helpful both to guide future patients' expectations but also to inform the surgical team where technical modifications are necessary to improve patient outcomes. From both aspects it is helpful to analyse the individual stages of the FG procedure.

VAGINOPLASTY

A depth of ≈ 15 cm for the perineal space can be achieved in all patients but established vaginal depth depends on adequate skin for genital reconstruction, avoiding early necrosis of the vaginal flaps and the patient's

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Variable	Follow-up Early	Late
Number of cases	197	70
Adequate vaginal depth, n/N (%)	148/180 (82.2)	38/62 (61)
Median (range):		
measured vaginal depth, cm	13 (5–15)	13.5 (2.5–18)
n/N (%):		
Urethral stenosis	36/197 (18.3)	16/70 (23)
Clitoral sensation	158/183 (86.3)	63/64 (98)
Overall satisfied with FG	174/197 (88.3)	56/70 (80)

TABLE 1
The early (mean 8 weeks) and late (mean 3 years, range 0.75–8) results of FG

commitment to long-term vaginal dilatation. Patients with true micropenis or a small circumcised penis will not achieve this vaginal depth with simple infolding of mobilized penoscrotal flaps alone and in these cases it might be more appropriate to primarily construct a vagina from a bowel segment, typically the sigmoid colon. However, to date, there is no significant long-term outcome data on the use of enteric vaginoplasties in adult transsexuals. In those patients whose penile length is equivocal it might be necessary to supplement penoscrotal skin flaps with free-skin grafts. The use of additional free-skin grafts is itself associated with vaginal necrosis and stenosis and requires the prolonged use of a stent or vaginal dilatation. Contributing factors to produce vaginal skin flap necrosis are, advanced patient age, smoking and perioperative vaginal infection. Finally, patients who fail to dilate appropriately after surgery will inevitably lose depth and introital width.

Introital width is just as important as vaginal depth and bilateral partial incisions in the puborectalis during formation of the perineal space is a key manoeuvre in producing a functional vaginal.

In the present series 148/180 (82.2%) patients had adequate vaginal depth at early follow-up but this declined to 38/62 (61%) at late follow-up. Historically, using penoscrotal skin flaps, Small [2] achieved satisfaction with neovaginal depth in 10 of 11 patients at 7–35 months after surgery. Eldh [3] reported successful results in 17 of 20 (85%) patients at 32 months. Rubin [4] using an inverted penile skin technique recorded satisfactory vaginal depth in 11 of 13 patients at 42 months. However, there are published vaginal stenosis rates of 5–66%. Analysed by technique vaginal stenosis was documented in 6–15% using penoscrotal skin flaps [2,3,5], 5–55% with inversion of penile skin only [4–15] and 8–45% using free-skin grafts [16–19].

In a study by van Noort and Nicholai [5], an attempt was made to compare postoperative results from a penile skin tube-lined vagina vs a penoscrotal flap-constructed vagina. In 27 adult transsexuals, 11 neovaginas were formed using penile skin only (group 1) and in 16 using penoscrotal flaps (group 2). The results were determined by interview and clinical examination. The patients' were aged 21–57 years and all cases were operated on by one surgeon. There was more vaginal hair growth in group 2 (seven vs zero patients). However, this was only perceived as a problem by two patients. Vaginal stenosis occurred in four patients from group 1, two of these had sustained a recto-vaginal fistula. Two further patients in group 1 required salvage surgery with a colonic neovagina to improve depth. Stenosis occurred in only one patient in group 2, again due to a recto-vaginal fistula.

Overall, the cosmesis was judged good with both techniques. Both vaginal depth and width were subjectively and objectively better in group 2. There were similar rates of operative complications with both techniques but functional aspects were better in group 2 (the penoscrotal flap technique).

Although 21 patients in the present series felt they had an inadequate vaginal depth at follow-up, only 11/180 (6.1%) had vaginal stenosis. Despite a low stenosis rate and 61% satisfaction rate for vaginal depth at the long-term follow-up, only 14/62 (23%) patients were using their neovagina for regular intercourse in a cohort where the median age was 43 years. This is at variance with eight published papers [2,4,5,13,20–23] recording vaginal intercourse rates of 54–91% but with fewer patients studied (median number of patients 16, range 10–89).

For the small group of patients with an inadequate sized vagina after a penoscrotal flap genitoplasty who continue to request a functioning vagina the salvage option of an enteric vaginoplasty is best although free full thickness skin grafts remain an alternative.

The most serious complication related to the formation of a neovagina is rectal injury with subsequent fistula formation. Incidences of 0–25% have been reported for this dreaded complication [9,13,21]. The key to avoiding this complication is to carefully check for an inadvertent proctoctomy after mobilization of the prostate and bladder by DRE and if a rectal defect is discovered, to close the defect appropriately. A covering colostomy is not necessary.

In the present series, vaginal prolapse occurred in eight of 233 patients; all simply involved the posterior vaginal wall and only three to date have requested a repair.

Vaginal hair growth was reported as bothersome in up to 28% of long-term follow-up patients in the present series with one patient requiring removal of a hair ball. There is little evidence to suggest that this complication can be reliably prevented by the use of laser or electrolytic depilation before FG.

CLITOROPLASTY

The present results show that the pedicled glans neoclitoris was sensitive in 86.3% of cases at a median follow-up of 8 weeks and in 98% of cases at 3 years. This difference might represent resolution of neuropraxia over time and was previously reported by Hage *et al.* [24]. In the present series 48% of patients could achieve clitoral orgasm at the long-term follow-up but 14% patients reported unpleasant clitoral sensation. In no patient was this severe enough to request excision of the clitoris. A clitoral hood was formed if requested at 6 months after FG in the present series but now it is constructed at the same time as FG. Patients should be aware that pubic hair might grow under the hood despite depilation techniques before surgery.

URETHROPLASTY

Overall, the commonest problem after FG was the development of LUTS. At early follow-up urethral stenosis was a problem for 18.3% of patients that resolved in most cases with

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urethral dilatation alone. At the long-term review, 23% of patients had had degrees of urethral stenosis and eight had required meatotomy. Minor problems with urine spraying and upward direction of the urinary stream were reported by 14 (20%) and 18 (26%) patients, respectively; none of these required corrective surgery.

Engorgement of the urethral stump during sexual arousal was reported by nine (4.6%) patients at early follow-up. This has prompted us latterly to modify our urethroplasty technique to include the use of plicating sutures on the corpus spongiosum of the urethral stump. Karim *et al.* [25] previously recommended formal removal of all erectile tissue from around the urethra during urethroplasty to prevent engorgement.

LABIOPLASTY

The FG used in our centre does not create labia minora but outer labia are typically constructed using bilateral V-Y-plasties of perineal and scrotal skin. This created well-defined cosmetically acceptable labia majora in most patients in the present series with only 2.5% undergoing corrective labioplasty.

PATIENT SATISFACTION

At a median follow-up of 8 weeks, 174 (88.3%) patients reported that they were 'happy' with the functional and cosmetic results of their surgery; 13 (6.6%) were 'unhappy' with the overall outcome. At a median follow-up of 3 years, overall satisfaction had reduced slightly to 53 (76%) patients but 56 (80%) patients felt that their preoperative expectations had been realized by FG surgery.

These patient satisfaction rates compare very favourably with previously reported series of FG in male adult transsexuals [5,10,15,17,23,26–30]. The FG technique used in the present study has inherent problems regarding the attainment of a cosmetically acceptable, non-hair bearing, functional vagina and clitoris in all patients but the overall satisfaction rate at a median follow-up of 3 years is we think acceptable. Refinements to urethral reconstruction to lessen stenosis and postoperative urethral engorgement as well as methods for harvesting and growing genital skin *in vitro* in amounts sufficient for any vaginoplasty are currently being developed.

In the present series of FG in male adult transsexuals postoperative complications were common and in particular the long-term follow up of patients was difficult. However, most complications were minor and readily amenable to corrective secondary surgery. Furthermore, good overall cosmetic and functional results were achieved with a sustained high patient satisfaction rate of 80% at a median follow-up of 3 years in the absence of any major surgical morbidity.

CONFLICT OF INTEREST

None declared.

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Abbreviation: **FG**, feminizing genitoplasty.

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