

NEOPHALLOPLASTY WITH A REINNERVATED LATISSIMUS DORSI FREE FLAP: A FUNCTIONAL STUDY OF A NOVEL TECHNIQUE

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Abstract

Twenty-two patients with gender dysphoria underwent neophalloplasties using a novel technique. A latissimus dorsi musculocutaneous reinnervated free flap was used to allow voluntary rigidity of the neopenis. From the first 22 patients, 18 have obtained motoric function of the reconstructed penis; a "paradox erection" was obtained. Fourteen patients came for the examination after a follow-up period of a mean of 26.4 months. We evaluated the motility and shape changes of the neophallus measuring its different size and dimension during relax and muscle contraction. The range of neophallus length in relaxed position was between 7 and 17 cm (mean 12.2 cm), its circumference in the same position ranged between 13 and 20 cm (mean 13.7 cm). All patients were able to contract the muscle with an average length reduction of 3.08 cm and an average circumference enlargement of 4 cm. In this study, the dimensions and motility were quantified demonstrating the neophallus function and size changes during sexual intercourse.

Key words

Phalloplasty, Penis reconstruction, Latissimus dorsi free flap, Free muscle transfer, Gender dysphoria reassignment, Trans-gender surgery, Female-to-male, Neuroorrhaphy, Power muscle

INTRODUCTION

Penis reconstruction in female-to-male transsexuals is a common operation in specialised centres, but we have to confirm that not all of the transsexuals require this surgery. The needs of the patients are different in the concepts of the expected result of penis reconstruction.

Hoopes in 1969 thought that from the view of the patient, a simple abdominal tube pedicled flap phallus not containing a urethra provides considerable physiological security, a phallus serving the urinary function is entirely satisfactory, and a phallus capable of sexual activity is too much to be hoped for. He considered the "fear of discovery" a strongly motivating factor in many of these patients (22,23).

Edgerton and Meyer in 1973 stated that some patients expressed an interest only in achieving the ability to function sexually like a male, whereas others were more concerned with obtaining the voiding patterns like a male (11).

Later on, in 1983, *Edgerton* reported to have experienced that virtually all patients undergoing this type of reconstruction wished, almost equally, to be able to 1- stand while voiding, 2- have sufficient rigidity in the penile shaft that they may engage in sexual intercourse (12).

Although there appears to be an evolution in the wishes and goals of the patients, the boundaries of technical expertise have always influenced the interpretation by the surgeon of the patient's desire (27,35). *Davies and Matti* for example, in 1988, still commented that from the patients' interviews the operations provide a major goal for female gender reassignment, giving the patient the male symbol of a phallus even if it does not function correctly (9).

Several different neophallus techniques were described in past years. *Bogoras* in 1936 was the first to report on a total penile reconstruction using a single abdominal tube (5). After him, many authors described and published several different procedures with local flaps (8,16,28,33,34,40). However, in 1980s, neophalloplasty changed the direction. Actually the introduction of a microvascular free flap has changed the common opinion about operation selection. Free flap phalloplasty now represents the condition for obtaining the best result in this procedure (4,6,19,21,36,37,47). Nevertheless, useful techniques with local flaps are used by some authors, mainly for those cases of neophalloplasty where microsurgery is not possible (30,39).

Formerly, various methods, mostly a radial forearm free flap either alone or in combination with other flaps, were used for total phalloplasties with urethra in female-to-male transsexuals at the Department of Plastic and Cosmetic Surgery of Masaryk University in Brno (48,49,50,51). However, the difficulties with obtaining a functional urethra, mainly repeated surgeries for closures of fistulae, discouraged some transsexual patients from urethral reconstruction. Lately, the main concern of some of the patients was to obtain sufficient rigidity of the neophallus.

Since December 2001, a free reinnervated LD musculocutaneous flap has been employed to enable patients to have sexual intercourse and a soft flaccid penis in the quiescent phase. The technique used has been similar to that described by *Adamian et al* (1). The purpose of this study is to quantify the function, size, and shape changes of the neophallus.

MATERIALS AND METHODS

All patients undergoing neophalloplasty with a reinnervated LD myocutaneous free flap were operated by one senior surgeon. The patients were followed up for 26.4 months at the mean and evaluated, measuring the size and dimension of the neophallus in relaxed and contracted positions.

Surgical technique

A longitudinal lazy “S” or transverse incision along the medial region of the thigh is done to expose the recipient vessels and the motor nerve of the gracilis muscle (medial circumflex femoral vessels and a branch of the obturator nerve to gracilis). An LD myocutaneous free flap of both length and width of approximately 14 cm with approximately 12 x 4 cm calf of muscle is designed on the back (*Fig. 1*). The distance of the skin paddle is set about 13 cm from the axilla. The pedicle is elongated by intramuscular dissection of the lateral branch of the thoracodorsal artery from the entry of the thoracodorsal artery to the latissimus dorsi muscle for about 3 to 4 cm. The skin paddle is designed over the lower three quarters of the muscle calf; the upper quarter of the muscle, which remains outside the cutaneous paddle, is later used for attachment to the pubic area.

The lateral branches of the thoracodorsal vessels are carefully protected. After the flap is harvested, it is rolled into a cylinder to obtain the desired shape. The skin margins are sutured together with an absorbable intradermal running suture (3-4/0 braided lactomer 9-11). The neurovascular thoracodorsal pedicle is divided at its origin or elongated with subscapular vessels. The donor site is in part sutured directly, and in part skin-mesh grafted. The flap is transferred and sutured to the recipient pubic area after the patient is turned into supine position. The muscle calf is attached with non-absorbable stitches (2-3/0 polypropylene) to the anterior layer of the rectus abdominis sheath. The thoracodorsal pedicle is passed through a subcutaneous tunnel to the thigh and anastomosed to the recipient vessels; the motor nerve suture is sutured to the anterior branch of the obturator nerve which runs to the gracilis muscle.

Postoperatively, the patients were advised to have the electrostimulation of the motor nerve and of the flap muscle done at a frequency of at least 3 times a week. After the beginning of active muscle movement, electrogymnastics continued 3 times a week until satisfactory voluntary movement of the muscle was obtained. s

Patients' examination

The patients were asked to perform several contractions of the neophallus by adducting the thigh and flexing the calf. The presence of muscle movement was documented by the physician. In the patients studied, after satisfactory voluntary movement of the muscle was obtained, the neophallus dimensions (length and circumference) were measured in the relaxed and contracted positions and the data recorded. The ability to have sexual intercourse and the onset of muscle movement were examined by means of a questionnaire.

RESULTS

All the flaps used for penile reconstruction in female-to-male transsexuals during the given period survived. The onset of muscle movement was noted at a mean of 4.25 months (ranging from 3 to 13 months). The range of neophallus length in relaxed position was between 7 and 17 cm (mean 12.2 cm); its circumference in the same position ranged between 13 and 20 cm (mean 13.7 cm) (*Fig. 2* of neophallus in relaxed state and contraction). All the patients examined were able to voluntarily contract the transferred LD muscle with an average length reduction of 3.08 cm and an average circumference augmentation of 4 cm, which represents an augmentation of 0.6 cm in diameter (*Tab. 1*) (*Fig. 3* of phallus in measurement). The ability of sexual intercourse is also shown in *Table 1*.

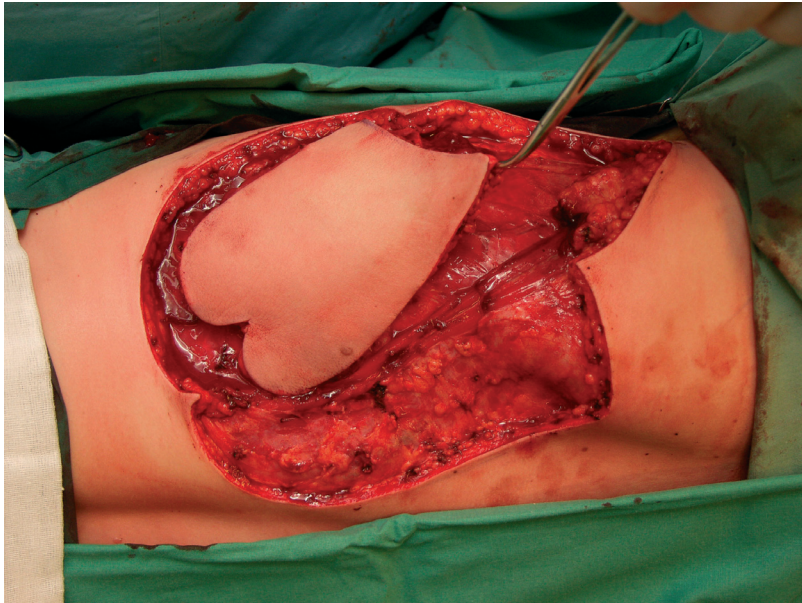


Fig. 1

Table 1

Patient	Length relax/contraction	Circumference relax/contraction	Sexual intercourse
1	12cm/9cm	14.5cm/16.5cm	Yes
2	11cm/8cm	13cm/14cm	No
3	17cm/15cm	20cm/21cm	Did not try
4	7.5cm/5.5cm	17cm/18cm	No
5	9cm/8cm	17cm/17.5cm	Yes
6	10cm/7.5cm	16cm/18cm	No
7	12cm/10cm	18cm/20cm	Did not try many times
8	13cm/11cm	14cm/15cm	Yes
9	15cm/10cm	18cm/21cm	Did not try - no opportunity
10	15cm/10cm	16cm/19cm	No opportunity
11	10cm/8cm	13cm/14cm	So-so
12	12cm/9cm	18.5cm/20cm	Only partially
13	13cm/9cm	15.5cm/16.5cm	Yes
14	14.6cm/8cm	14cm/17cm	Yes
Mean	12.22/9.14	13.68/17.68	

DISCUSSION

At the Department of Plastic and Cosmetic Surgery of St. Anne's Faculty Hospital in Brno, Czech Republic, 38 patients with gender dysphoria underwent sex reassignment using a novel technique. All the patients were operated on by one surgeon. The reinnervated LD free flap was used to allow voluntary rigidity. The reinnervation was permitted suturing the anterior branch of the obturator nerve of the gracilis with the thoracodorsal motor nerve. After the follow-up period, all of the examined patients were able to contract and elevate the neopenis. Flexion of the calf and adduction of the thigh induced muscle contraction; repeated contractions were also possible. Although the muscle contraction shortened and widened the neophallus, it became suitable for sexual intercourse. The significance of the extent of this movement may be a matter of discussion. Nevertheless, the muscle contraction produced a significant stiffening of the neophallus. This "paradox" or "reverse" erection (stiffening, but shortening and widening of the neophallus) enabled sexual intercourse by inserting either a contracted or a non-contracted neophallus into the vagina and by subsequent repeated intermittent contractions and releases of the muscle. The size of the neophallus proved to be crucial in view of the ability of penetration. Some difficulties arose in overweight patients when the neophallus

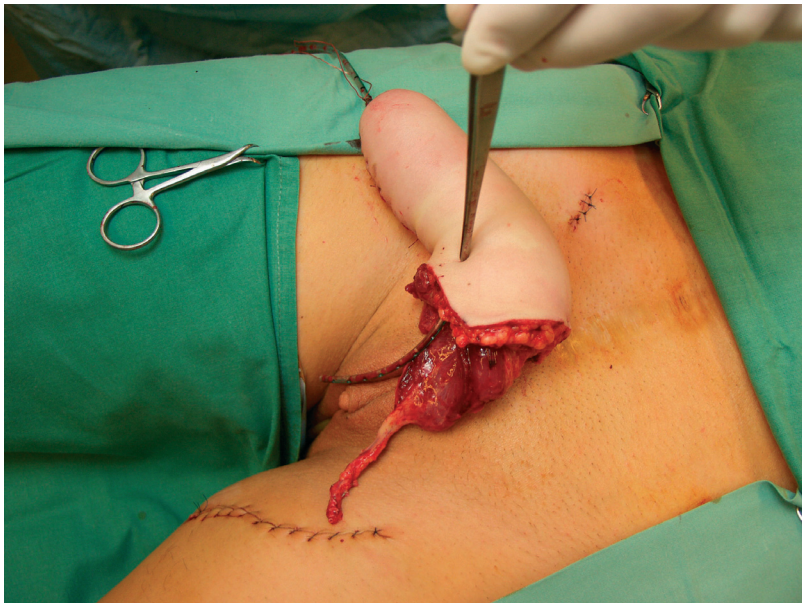
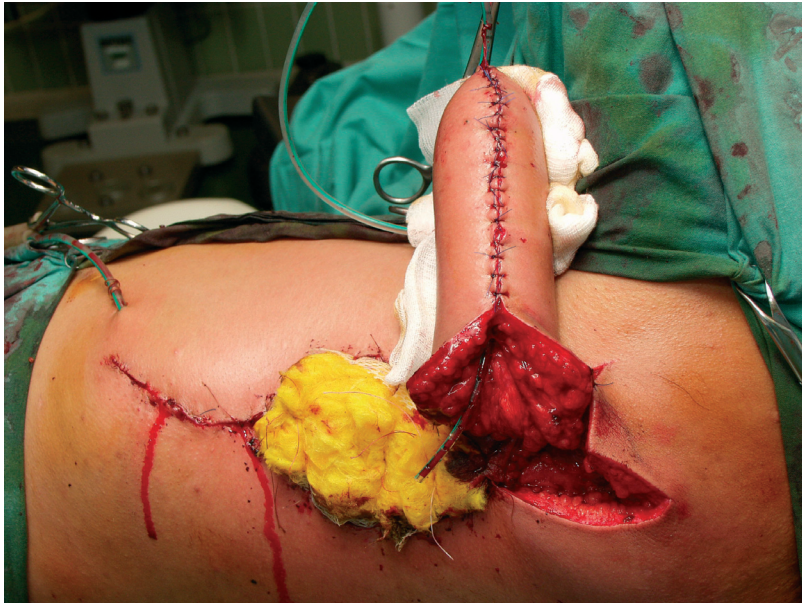


Fig. 2
Neophallus in relaxed and contracted position

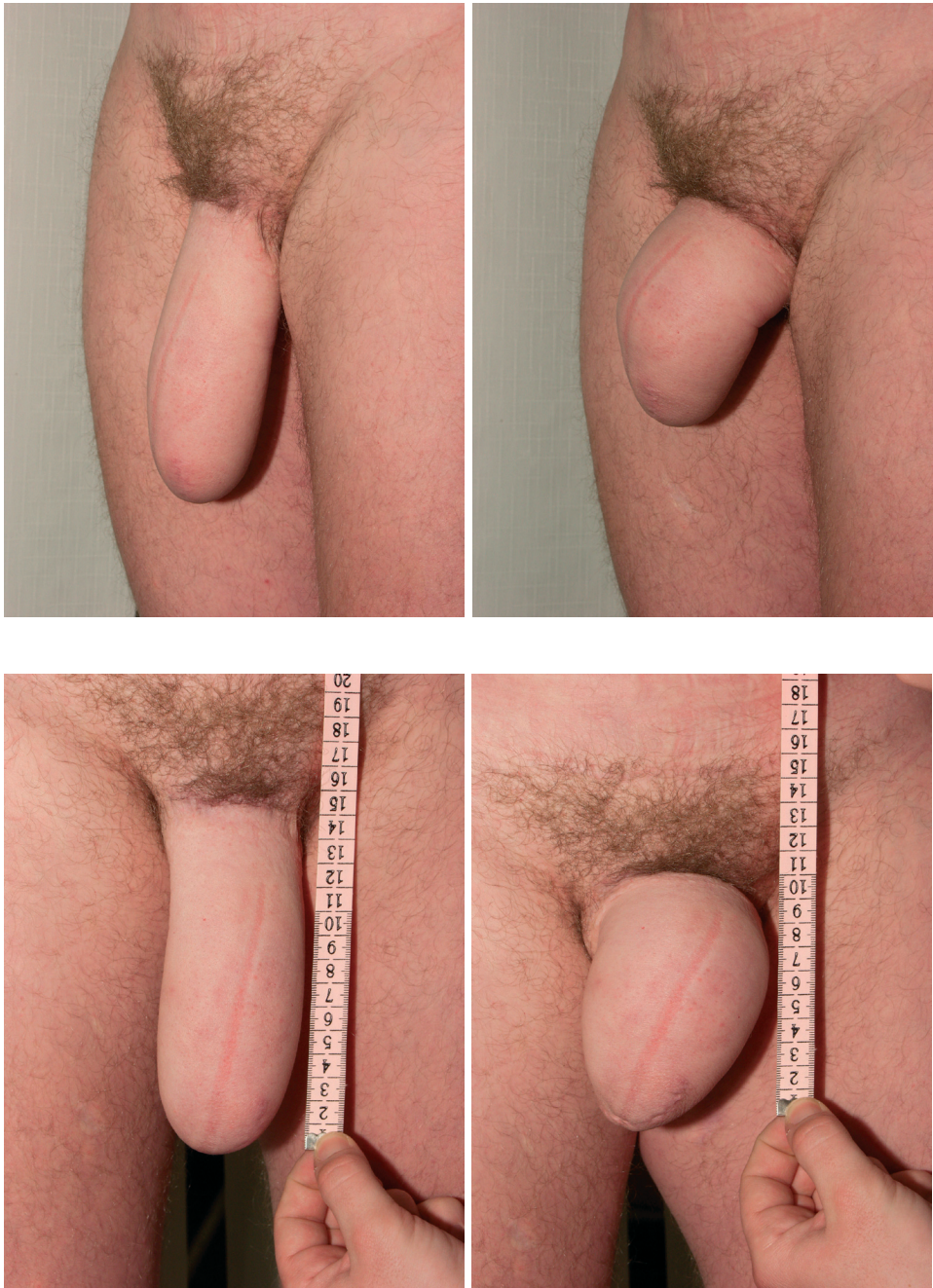


Fig. 3
Measurement of the neophallus

was too thick. Five of the patients who performed sexual intercourse used muscle contraction to stiffen the penis. Some of them also moved the muscle by adducting the thigh and flexing the calf during sexual intercourse, which produced changes of size and shape of the phallus. Seven of the patients did not have the opportunity for sexual intercourse, and 2 performed it only partially (*Tab. 1*). We consider the selection of the recipient obturator nerve as favourable, because the contraction of adductors and gracilis muscles permits a strong intentional movement of the transplanted muscle, but does not cause negligible involuntary movements of the neophallus during walking. However, certain limitations were seen due to fading of the muscle after prolonged repeated contractions.

CONCLUSION

The chance of this safe technique to achieve voluntary rigidity in order to allow sexual intercourse by means of the transplanted muscle's activation, without the use of any prosthesis, make it our first-choice procedure in phallic reconstruction for female-to-male gender dysphoria, when it is indicated. The muscle contraction of the neophallus leads to changes of diameter length and shape – the “paradox erection” (stiffening but widening and shortening of the neopenis); some of the patients are able to take advantage of these properties for sexual intercourse.

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