



Phalloplasty and Penile Prosthesis Implantation for Micropenis

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ABSTRACT

Since pre-historical times, small penis has been a major topic of discussion among males. Adult males and parents of small children consult physicians with a self-diagnosis of micropenis. This potential diagnosis creates significant anxiety in parents. However, simply by conducting a urogenital examination and by measuring the penis size, diagnosis can be validated. Determining whether the penis size is within a normal range can serve to reduce anxiety and protect patients from redundant surgical operations. In recent years, various tissue flaps are being used for the surgical treatment of micropenis. In parallel to developments in microsurgery, free flaps incorporating sensory nerves are being preferred. Prosthetic implantations are currently the best solution for generating erection after the application of tissue flap. However, these implantations differ significantly from penile prostheses used for erectile dysfunction. We must wait for the sensation recovery of the phallus prior to the implantation of the prosthesis, and three-piece inflatable prostheses must be preferred. Even though contemporary successful operations provide sufficient results for patients, obtaining an erection in phalloplasty patients remains to be the subject of ongoing research.

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INTRODUCTION

Penis has the functions of urinating standing up and sexual intercourse. For performing these functions, the length of penis must be 7.5 cm and above. With regard to age, a penile length below the nomogram specified by Schonfeld and Beebe (1) is called micropenis. Furthermore, patients whose urethras are not orthotopic are classified as microphallus (2). In a newborn, the normal length of penis is accepted to be 3.4 ± 0.37 cm. The measurement values of <2.5 cm are evaluated as micropenis (3). Although long-term data are unavailable, most patients are unsatisfied with their penile appearance; however, they mostly have sufficient sexual function (4).

Real micropenis develops because of hormonal abnormalities after the 12th gestational week. This condition is basically classified into three groups as follows: hypogonadotropic hypogonadism (pituitary/hypothalamic insufficiency), hypergonadotropic hypogonadism (primary testicular insufficiency), and idiopathic. The reasons for developing micropenis are given in the following table in detail.

Etiologies

- I. Testosterone secretion deficiency
 - A. Hypogonadotropic hypogonadism
 1. Isolated Kallmann's syndrome
 2. Pituitary hormone deficiency
 3. Prader-Willi syndrome

4. Laurence-Moon syndrome
5. Bardet-Biedl syndrome
6. Rud's syndrome
- B. Primary hypogonadism
 1. Anorchidism
 2. Klinefelter and poly-X syndromes
 3. Gonadal dysgenesis (incomplete form)
 4. Luteinizing hormone receptor defects (incomplete form)
 5. Testosterone steroidogenesis genetic defects (incomplete form)
 6. Noonan syndrome
 7. Trisomy 21
 8. Robinow syndrome
 9. Bardet-Biedl syndrome
 10. Laurence-Moon syndrome
- II. Testosterone activity defects
 - A. Growth hormone/insulin-like growth factor-I deficiency
 - B. Androgen receptor defects (incomplete forms)
 - C. 5- α -reductase deficiency (incomplete forms)
 - D. Fetal hydantoin syndrome



III. Developmental anomalies

A. Aphallia

B. Extrophia Cloaca

IV. Idiopathic

V. Other congenital malformations that are related to 3, 4, 1

Micropenis/phallus develops because of androgen deficiency between the 14-15th week and 24th week of pregnancy. Testes developing from the 6th week become susceptible to the luteinizing hormone that is secreted by the fetus, and thus, the phallus is formed by the androgen produced by the fetus. Androgens that are required for the growth of penis comprise testosterone through 5- α -reductase enzyme. While evaluating patients with micropenis/phallus, it is important to assess the function of the penis and its size. The length of the vagina is normally approximately 8 cm, and it is expected of an erect penis to reach this length for penetration. The presence of normal vascular system in an 8-cm penis prevents the indication of phalloplasty; however, phalloplasty can be indicated for the presence of a vascular pathology in a same-sized micropenis (4).

DISCUSSION

Recently, various tissue flaps have been commonly used in the surgical treatment of patients with micropenis. Phalloplasty was first applied using a tube flap, which was defined by Bogoraz in 1936, in multiple sessions for treating patients with micropenis/phallus (5). In parallel with the developments in microsurgery up to date, free tissue flaps, including sensory nerves, have been started to be used. The aim of phalloplasty is to have a functional urethra that helps in urinating standing up and to provide a neophallus with an acceptable esthetic size, sensation, and rigidity that are enough for sexual intercourse. Various techniques have been used for providing rigidity. These techniques include acrylic bone, bone grafts, and malleable and inflatable penile prosthesis. Permanent and continuous rigidity is provided with free osteocutaneous fibular flaps and osteocutaneous radial forearm flaps. In contrast, in latissimus dorsi myocutaneous free flap, short-term sexual intercourse is possible with muscle contraction. Free radial forearm flap phalloplasty, which was defined by Chang et al. in 1984, is still the most commonly used method, and it is accepted as the standard technique for penile reconstruction worldwide. When this technique was first applied, it was used for providing costal cartilage rigidity. Although a sensationally developed neophallus, which is sufficient for a sexual intercourse, is obtained with this technique, physiological tumescence is impossible in the neophallus (4-8).

Cartilage or bone grafts that are used for providing rigidity have some complications, such as resorption and fracture. In malleable prostheses, some complications, including compression necrosis and migration, are more common. In inflatable penis, complications, such as compression necrosis and migration, are less frequent because prostheses are inflated only when sexual intercourse is required. Sensation in the newly formed neophallus (protective sensation) develops in approximately 12 months. Inflatable penis prostheses applied in the second session at the end of this period offer better functional results and sexual pen-

etration ability compared with other techniques. In literature, there are a few studies on penile prostheses implantation after phalloplasty. Inflatable penile prosthesis implantation was first applied by Scott in 1973 for providing erectile function in a neophallus. Puckett and Montie used this technique for transsexual (female to male) patients for the first time in 1977. In 1994, Jordan applied different hydraulic prostheses to penis trauma, intersex, and transsexual patients, and he reported a success rate of 60% for eight patients (8).

Hoebeke et al. (9) published a study including their third largest series until that day with 35 patients in 2003. In that study, all patients underwent radial forearm flap phalloplasty, 10 patients were applied a single-piece hydraulic penis prosthesis and 25 patients were applied a three-piece hydraulic penis prosthesis. The success rate was reported to be 80%. Complications were stated to be partial necrosis (n=1), infection (n=2), perforation (n=1), and mechanical deficiency (n=1).

To reduce postoperative complications to the minimum in patients who will be applied prosthesis, perineal regions must be washed with antiseptic solutions and shaved for decreasing bacterial colonization. Moreover, prophylaxis must be performed, and antibiotic therapy must be continued to be administered until the 48th hour (10).

Moreover, the largest series, including 129 patients, was published by Hoebeke et al. (11) in 2010. While 76 of these patients (58.9%) continued their lives after the application without any problem, revision or removal of prosthesis was required in 53 patients (41.1%) because of some reasons, such as infection (11.9%) and erosion. In the İstanbul Medical Faculty, 14 patients have been applied free radial forearm flap phalloplasty since 1992. Eleven prosthesis applications have been performed in total. Three-piece inflatable prostheses have been used in all prosthesis implementations. Two of them were patients who underwent prosthesis revision because of mechanical deficiency. In three patients, urethral fistula developed, and six patients are married and have satisfying sexual lives. As stated in this study,



Figure 1. 5- α -reductase enzyme deficiency

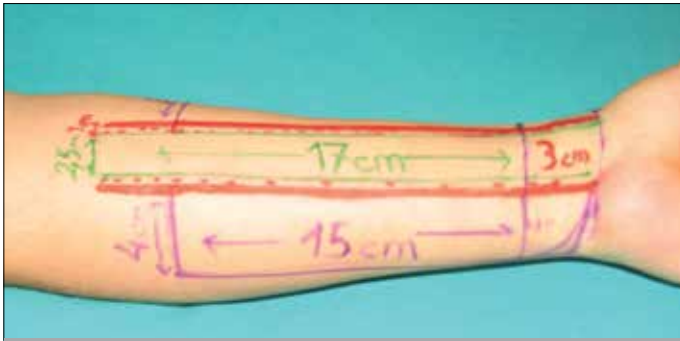


Figure 2. Planning the flap from the forearm of patient



Figure 3. Postoperative view



Figure 4. View on the postoperative 10th day

prosthesis implantations after phalloplasty significantly differ from prosthesis applications in normal patients. First, there are no penile crurales and cavernous bodies in the formed phallus, and the risk for malposition is high. Second, neophallus tissue is completely different from the normal penis tissue, and it poses a serious risk for infection and perforation. Third, patients who undergo phalloplasty are generally young individuals, and they are sexually more active. This increases the risk for the occurrence of mechanical problems (Figure 1-4). Penile prostheses appear to be the best solution for obtaining erection after phalloplasty. For penile prosthesis implementation, the development of sensation must be definitely expected in the phallus, and three-piece inflatable prostheses must be preferred.

CONCLUSION

Although rare and encountered by urologists at any time, such patient groups must be seriously approached and provided psychological support. Patients must be informed regarding these surgical procedures and their success rates and complications.

Rarely performed surgeries, such as phalloplasty, must be conducted by a team of specialists. Although successful operations are performed in parallel with the development of technology, new surgical techniques and prostheses should be developed to obtain lower rates of complications and higher rates of patient satisfactions. As the number of published case series increases, the experience of physicians increase and satisfactory results are obtained.

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