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Long Term Results in Augmentation Phalloplasty through a 2-cm Incision: Technique, Anatomical Description in a Human Cadaver and Satisfaction Assessment

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Key Words
Augmentation phalloplasty • Suspensory ligament • Fat autoinjection • Satisfaction rate

Abstract
Objective: An increase in the length of the penis is feasible with techniques that either divide the penis' ligaments (fundiform and triangle) or use grafts to increase the size of the corpora. Girth enhancement can be done with fat autoinjection or with dermal grafts. We present our technique together with an anatomical description in a human cadaver. ***Patients and Methods:*** Forty patients underwent augmentation phalloplasty. To increase the length of the penis the ligament was divided through a small 2-cm incision at the base of the penis. Girth enhancement was achieved through fat autoinjection with fat taken from the inner thighs. The dissection of the ligament was also demonstrated in a human cadaver to allow for more explicit presentation of the anatomy of the area. A questionnaire was used to assess the patients' satisfaction. ***Results:*** Before operation all patients had a normal penis with a length 9.5 ± 2.2 cm (8.1–13.5 cm) in the flaccid state and 11.8 ± 1.9 cm (10.9–17.2 cm) in the erect state. The mean circumference was 9.9 ± 2.3 cm (7.6–11.8 cm). The increase in length 12 months post-operatively was 3.5 ±1.3 cm (2.3–5.1 cm) in the flaccid state, 1.8 ± 1.4 cm (1.4–3.2 cm) in the erect state and 3.5 ± 1.4 cm (2.1–5.2 cm) in girth. There was a statistically significant difference ($p < 0.005$) between pre-operative and post-operative status. The overall satisfaction rate was 67.5%, and 57.5% of the patients stated that the surgical outcome met their pre-operative expectations. ***Conclusion:*** Penile lengthening is technically possible provided that some basic principles are followed. Psychological disturbance though, might be present and such patients might not be pleased even after a successful operation.

Introduction

The size of the penis is considered to be an important factor for male self-esteem. Although the 'normal' size of the penis varies [1], men are often not capable of evaluating the proportion of their genitalia and have a tendency of underestimating the size of their phallus [2], a psychological disorder called dysmorphophobia. Sex education has been found very effective in the treatment of men complaining of a short penis [3], but still some men look for a surgical treatment of their 'problem'. Several techniques of augmentation phalloplasty have been described [4–11]. Total phalloplasty with additional placement of a penile implant for rigidity is also feasible and can be used either in transsexual operations or after penile agenesis or amputation [12–15].

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Table 1. Satisfaction rates 12 months following the operation

	Yes	No
Do you consider the increase of your penis significant?	31 (77.5%)	9 (22.5%)
Does it satisfy the image you had in mind pre-operatively, regarding the result of the operation?	23 (57.5%)	17 (42.5%)
Did you notice any change in the quality of your erections?	0	40 (100%)
Overall, are you pleased with the result of the operation?	27 (67.5%)	13 (32.5%)

We present our results of augmentation phalloplasty performed through a 2-cm incision as well as an anatomical description in a human cadaver.

Patients and Methods

From February to July 2005, we performed augmentation phalloplasty in 40 patients. The mean age of the patients was 28.3 years (range 22–45 years)and all of them had normal erectile function assessed with Rigiscan and Doppler. Penis measurements were done by the same doctor in a standardized way with the patient lying on the examination bed, at the same room temperature and reasonably relaxed. The length was measured from the base of the penis (over the pubic bone) to the tip of the glans and girth was measured in the mid-shaft of the penis. The erect penis was measured after intracorporeal injection of prostaglandin. Of course, variations might occur and therefore every effort was made to maintain the same conditions for all patients.

Since there was no medical indication in any of the cases (micropenis, buried penis, etc.), the operation was considered as esthetic surgery. In pre-operative counseling, the details of the operation, the possible complications and the expected results were discussed with the patients to clear up any possible illusions the patients might have about the outcome of the operation. The post-operative result was measured 12 months after the operation. In the fourth post-operative week the patient was instructed to use the Andro-Penis® (penis-extender, Andromedical ©, Spain), 30 min daily for 6 weeks and then for another 6 weeks with increasing force in order to avoid contraction of the penis. Paired *t* test was used for statistical analysis.

A simple 4-question questionnaire (table 1) was also used 12 months post-operatively to assess the satisfaction rate of the patients regarding the outcome of the operation.

Operative Technique: Lengthening of the Penis

The lengthening of the penis was done by dividing the suspensory ligaments (both midline and lateral branches: fundiform and triangle). While the patient was sedated, the area over the base of the penis and the pubic bone was injected with a solution made of 30 ml 2% xylocaine and 30 ml saline. A 2-cm incision was performed at the base of the penis and superficial veins were ligated. The suspensory ligament was identified and palpated with the index finger of the left hand while at the same time it was dissected with scissors near the pubic bone. Since the size of the incision did not allow clear vision at the time of the dissection, the index finger was used as a guide and as well for protection of the penis. The assistant put some traction of the penis so that the ligaments could be easily identified. Sharp or blunt dissection was used as necessary. The inferior part of the pubic bone was used as a landmark for the end of the dissection. Then, the pubic adipose tissues on either side were approximated to each other to fill the gap between the penis and the pubic bone and the incision was sutured. No filler or any kind of silicon material was used.

In selected patients (fat patients or after their demand, if that was feasible), fat over the pubic bone was removed with liposuction to enhance the result of the operation.

Operative Technique: Girth Enhancement of the Penis

Girth enhancement was done with autologous fat transfer by liposuction and injection of the fat into the penis. Through a small incision in the inguinal area, liposuction was performed. The harvested fat was cleared from the abundant saline and from the fibers, and then it was injected in the shaft of the penis through a small incision at both sides of its base starting from the corona and then pulling the needle back towards the base. Finally both incisions were sutured and tight underwear that compressed the thighs was put on the patients. The patients were discharged from the hospital the same day.

Anatomy of a Human Cadaver

An anatomical study was also performed in a human cadaver at the Department of Anatomy of Athens University. After removal of the skin and fat from the area between the symphysis and the penis, the fundiform ligament can be identified as a continuation of the linea alba. As one dissects deeper, this ligament continues as the ligament of the penis. The dissection of these ligaments mobilizes the penis allowing it to be pulled out once you apply a slight traction. The further the ligament is divided the more the penis is freed. In a deeper plane, the ligament is divided into left and right branches which attach each crus to the pubic rami (fig. 1). The inferior border of the pubic arch, which is the limit where one should stop dissecting, lays deeper, behind this separation. At this stage the penis can be pulled out or in fact placed in a lower position (fig. 2). By stopping the dissection at this stage, we do not risk creating a 'loose' penis even if in reality we are dealing with a penis that is now hanging a little bit lower than it used to be. It is important to note that, during the dissection one does not meet any vessel and so the risk of bleeding is minimal.

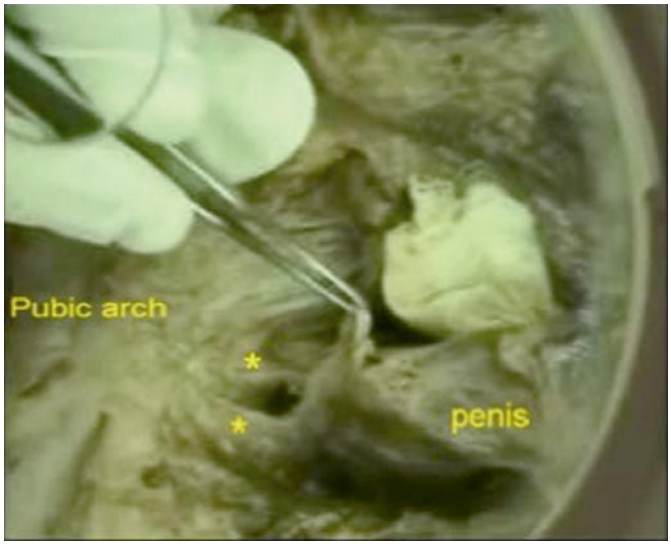

Fig. 1. The ligament after having been dissected and the 2 branches of the ligaments (marked with *) that attach the crura to the pubic rami.

Fig. 2. The new position of the penis moved away from the pubic bone.

Table 2. Changes in penis dimensions

	Pre-operative	Post-operative increase	p
Flaccid length, cm	9.5 ± 2.2 (8.1–13.5)	3.5 ± 1.3 (2.3–5.1)	0.0022
Erect length, cm	11.8 ± 1.9 (10.9–17.2)	1.8 ± 1.4 (1.4–3.2)	0.0035
Circumference, cm	9.9 ± 2.3 (7.6–11.8)	3.5 ± 1.4 (2.1–5.2)	0.0012

Fig. 3. Pre-operative measurement of the penis.

Fig. 4. Post-operative outcome of the penis.

Results

The duration of the operation was 66 min (55–80 min) and all patients were discharged the same day. The mean flaccid length pre-operatively was 9.5 ± 2.2 cm and the erect length was 11.8 ± 1.9 cm. Twelve months post-operatively the measurements of the penis were: mean increase in the flaccid length of the penis was 3.5 ± 1.3 cm (2.3–5.1 cm) while the increase in the erect penis was 1.8 ± 1.4 cm (1.4–3.2 cm). The increase in the circumference was 3.5 ± 1.4 cm (2.1–5.2 cm) (table 2). The pre-operative and immediate post-operative appearance of the penis is shown in figure 3, 4. The difference in all the

measurements post-operatively was statistically significant ($p < 0.005$) compared with the pre-operative status. There were no significant complications noted except in one patient who developed a small hematoma in the area of the incision that did not need any additional treatment and healed on its own.

According to the questionnaire, 31 (77.5%) patients considered the increase of their penis significant and 23 (57.5%) stated that it fulfilled their expectations. Overall, 27 (67.5%) patients were pleased with the operation (table 2). There were no cases of erectile dysfunction.

Discussion

The penis, which most of the times remains hidden underneath our clothes, is considered important to men and we also presume that women have a special interest in this part of a man's body. But, are the penis and specifically, the size of the penis really that important to women? In a recent study, 375 sexually active women were asked about this [16]. Less than one- fourth (21%) stated 'size does matter'. Probably, the best way to interpret this result is that sex does matter and size might play a role but definitely is not the cornerstone of lovemaking or of a healthy relationship. Nevertheless, the demand for a bigger penis is something that men still seek help for from an andrologist or a plastic surgeon.

In our cadaver anatomical description, the dissection of the ligament moved the penis 3 cm from its original position (fig. 2). Individual anatomical differences might offer different results but as we demonstrated in the cadaver, the dissection of the ligament can definitely offer immediate positive post-operative results. The main problem is the long-term results. During healing, contraction is possible which decreases the apparent length of the penis. Since the division of the ligament does not change the total length of the corpora bodies, the lengthened penis is actually a penis pulled out from its original position. This is the reason why the gain in the flaccid state might decrease or even disappear in the erect state, when the erect penis proximate the pubic bone towards its original position. Real increase in the length of the penis is not possible unless the corpora bodies are dissected and grafts are used or if the disassembly technique with the additional use of various tissues, like cartilage is used [6, 8].

What are the advantages of our technique? Although surgical expertise is of paramount importance in these operations we believe that our small 2-cm incision not only offers better cosmetic results but minimizes scarring and penis retraction. Also, for the same reason, in the fourth post-operative week our patients start to apply tension to their penis with the Andro-Penis®, 30 min daily for 6 weeks and then for another 6 weeks with increasing force. We believe that our technique minimizes scaring and the use of the Andro-Penis® further contributes to the avoidance of retraction. The success rates following lengthening procedures either after dissection of the ligament or by using different techniques (disassembly technique or grafts) vary from a length gain of 1–5 cm in the flaccid state [5, 8, 10], and 1.5–3 cm when erect [4, 6]. Our patients at 12 months post-operatively have minimal scarring and the gain in the length of the penis is significant (3.5 cm in the flaccid state and 1.8 cm when erect), which compare favorably with results reported in the literature. We must point out that the best results come from the fact that liposuction from the area over the pubic bone was performed together with the release of the ligament.

Penis' ligaments are consider to contribute to the stability of the penis and possibly to the upwards orientation during erection. Extensive release of the ligaments might cause the penis to lose its stability and perhaps lose upwards orientation, making intercourse problematic and needing manual assistance for penetration. If the landmarks we mentioned are followed, such a problem will not appear and none of our patients complained for such a side effect.

Girth gain is usually between 1.1–2.1 cm regarding diameter [4, 9] and 2.0–3.0 cm regarding circumference [5]. In general, fat injection is a faster procedure, but up to 90% of the injected fat can be absorbed during the first year with a 50% absorption rate being more common [17, 18]. Top-ups can be performed at later stages and this is a relatively easy procedure. A dermal graft needs hospital stay, and is relatively more difficult but more stable [5] while saphenous venous grafting is technically a significantly more challenging operation [4]. In our patients at 12 months post-operatively and after fat absorption, the mean increase in the circumference was 3.5 cm which is in accordance with the results reported by others [5].

There were no complications in our patients although several complications have been reported by others such as cosmetic deformities and disappointment from the result of the operation [5, 6, 8–11, 17–19]. Irregular residual fat nodules, skin deformity and scarring, as well as scrotalization are the most severe complications while penile retraction and shortening of the penis are probably the complete failure of a lengthening procedure.

Over half of the patients (57.5%) stated that the post-operative result is what they had in mind before the operation. This further contributes to the idea that many men who seek penis lengthening operations do not have logical expectations and a lot of the patients kept on dreaming for a 'megapenis'. Nevertheless, probably due to our extensive pre-operational counseling, the majority of our patients (77.5%) consider the increase in the size of their penis significant, giving an overall satisfaction rate of 67.5%. This further supports the need for careful and extensive pre-operative counseling to clear up any illusions the patients might have about the post-operative results. All patients maintain their erectile capacity intact.

Our study has its limitations because different techniques were used (ligaments' dissection and penis stretching) together with suprapubic fat removal in selected patients and one can not actually extract results from each technique independently, nevertheless we believe that we have described a complete unified method for penis augmentation together with interesting anatomical details. Lengthening of the penis is possible but limitations do exist and pre-operative counseling of the patient is mandatory. We must still consider these operations to be experimental and they should be carried out by a skilled surgeon after having the nature of the operation explained in details to the patient.

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