Comparison of Patient's Satisfaction and Long-term Results of 2 Penile Plication Techniques: Lessons Learned From 387 Patients With Penile Curvature

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OBJECTIVE To compare the patient's satisfaction and long-term results of 2 penile plication procedures in patients with penile curvature.

METHODS This retrospective study included 387 patients with congenital penile curvature (n = 260) and Peyronie's disease (n = 127) who underwent surgical correction of penile curvature with penile plication procedures. Of the patients, 202 underwent plication of tunica albuginea with the Lue's 16-dot technique, while 185 underwent highly superficial excision of tunica albuginea with the modified Nesbit corporoplasty. Surgical outcomes and patient's satisfaction were compared between the 2 techniques in all patients.

RESULTS The mean duration of surgery was significantly shorter in the 16-dot plication technique (48.1 ± 7.5 minutes), compared with the modified Nesbit corporoplasty (63 ± 16.9 minutes) (P = .001). Complete penile straightening was achieved in 87.6% of the patients who underwent 16-dot plication technique and in 89.7% of the patients who underwent modified Nesbit plication, revealing no difference (P = .514). The rates of penile sensory loss (P = .001) and de-novo erectile dysfunction (P = .016) were significantly higher in the modified Nesbit corporoplasty than in the 16-dot plication technique, but rate of suture related complications was significantly higher in the 16-dot plication technique than in the modified Nesbit corporoplasty (P = .001). The patients with congenital penile curvature had significantly less ratio of postoperative penile length loss and de-novo erectile dysfunction than Peyronie's disease patients.

CONCLUSION Overall, both surgical techniques have very high success and satisfaction rates with very low complication rates. However, the types of complications are significantly different between the 2 surgical procedures. Therefore, patients with penile curvature should be informed about outcomes of penile plication procedures, and surgical method should be preferred based on patient's preference and surgeon's experience. UROLOGY 129: 106–112, 2019. © 2019 Elsevier Inc.

Penile curvatures can be either congenital or acquired. Congenital deformities include chordee with or without hypospadias and congenital curvature. The most common cause of acquired penile curvature is Peyronie's disease, but it can also be a result of penile and urethral surgery or trauma.[1]

If there is normal erectile function or good response to PDE-5 inhibitors in the presence of erectile dysfunction, surgical treatment of penile curvature includes penile plication, plaque incision or excision, and/or grafting procedures.[2-4] Penile plication procedures should be performed in men with adequate penile length, curvature of <60°, and absence of special deformities (eg, hourglass, hinge defect). Penile incision or excision and/or grafting procedures should be performed in men with short penis, curvature of >60°, and presence of special deformities (eg, hourglass, hinge defect). Penile plication procedures can be performed with excision corporoplasty, incision corporoplasty, plication only and combination of incision

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corporoplasty/plication together.[2-4] The modified Nesbit procedure, plication of the tunica albuginea with the Lue's 16 dot technique and incision/plication technique as modified by Levine are commonly used methods for correcting penile curvature.

There are few studies reviewing patient's satisfaction after penile plication procedures for penile curvature treatment.[5-11] However, no randomized study has compared patient's satisfaction and surgical outcomes of the plication techniques in the literature.

The aim of the study was to retrospectively compare the patient's satisfaction and long-term results of 2 penile plication procedures (modified Nesbit corporoplasty and Lue's 16-dot minimal tension plication procedure) in patients with penile curvature.

MATERIALS AND METHODS

The study included 495 patients who underwent surgical correction of penile curvature with penile shortening procedure in 3 tertiary university hospitals. An inform consent was taken from all patients. The institutional review board approved the study. Long-term communication (telephone and/or face-to-face interview) provided in 421 patients, and 387 of the patients who agreed to participate were included into the study. Of the 387 patients, 260 had congenital penile curvature, and 127 had Peyronie's disease. Related to the surgical procedure, 202 patients underwent plication of tunica albuginea with the Lue's 16-dot technique, while 185 patients underwent tunica albuginea excision with the modified Nesbit corporoplasty.

All patients included in the study had normal erectile function with adequate penile length and degree of curvature >30° (<90° for congenital cases and <60° for acquired cases), difficulty or inability to achieve vaginal penetration, cosmetic reasons or psychological troubles, and absence of hourglass or hinge defect deformity. Normal erectile functions (peak systolic velocity of ≥35 cm/s and end diastolic velocity of <0 cm/s) were confirmed on color Doppler ultrasound in the patients with Peyronie's disease. The patients with congenital penile curvature did not have color Doppler ultrasound because all the patients, included in the study, reported normal erectile functions. Patients with erectile dysfunction, presence of history of penile surgery, short penis, chordee associated with hypospadias and degree of curvature >90°, and/or special deformities were excluded from the study. The patients with Peyronie's disease had at stabilized stage with the diagnosis of the disease at least more than 1 year. The patients with Peyronie's disease needed grafting surgery were not included in the study. All surgical procedures were performed by 3 surgeons (SÇ, RA, ÖY) in 3 tertiary university hospitals over the same historical time. Type of surgical procedure was performed randomly, and all surgeons performed the 2 surgical procedures without use of selection criteria.

Surgical Techniques

In both techniques, after a circumcision incision, the penis was degloved by dissection of the layer immediately superficial to the Buck fascia. An artificial erection with a tourniquet was obtained with normal saline infusion or pharmacologic agents. Side and degree of curvature were evaluated. Buck's fascia was incised on the opposite side of the deformity side.

In the modified Nesbit procedure, deep dorsal vein was removed, and neurovascular bundle (NVB) was dissected meticulously, using an optical magnification (3-5×) via medial dissection technique in patients with ventral curvature. Lateral dissection technique was used when NVB dissection was necessary in patient with lateral curvature. Dissection of corpus spongiosum was performed for patients with dorsal curvature. After the dissection, a pair of ellipsoid portions of highly superficial tunica albuginea were partially excised symmetrically on the opposite of curvature site. The defect was closed with watertight running 3-zero nonabsorbable braided polyester sutures (Ethibond, Dacron, Mersilene, Ti-Cron, or Politer) using inverted stitch technique. If the distance between the upper and lower bite lines of Allis clamp was >1 cm, more than 1 partial superficial tunica excision (without excision of cavernosal tissue) were performed to prevent dog-ear deformity.

The Lue's 16-dot plication technique was performed as described by Gholami and Lue.[7] The center of the curvature and the entry and exit points of sutures with 16 (2 pairs) or 24 (3 pairs) dots that approximately 0.5 cm. distant from each other were marked. Then 2-zero nonabsorbable braided polyester sutures (Ethibond, Dacron, Mersilene, Ti-Cron, or Politer) were placed through the full thickness of tunica albuginea and were tied with 5 knots with minimal tension. The sutures were placed on peri-dorsal vein, contralateral, and periurethral region of tunica albuginea in men with ventral, lateral, and dorsal curvature, respectively without tunica incision/excision and dissection of NVB or corpus spongiosum. If the nerve bundles crossed the path of sutures, we would pass the sutures under the nerve.

In both techniques, a final artificial erection demonstrates the penis to be perfectly straight. The Buck's fascia and skin were closed with an absorbable suture.

Evaluation of Assessment of Patients

Postoperative evaluation included surgical outcomes, self-photography on erection and patient's satisfaction using "patient global impression of improvement." The localization and degree of curvature were evaluated using intracavernosal injection of a vaso-active agent with or without penile color Doppler ultrasound or patient's photographs (frontal, dorsal, and lateral). The degree of curvature was measured via computer assisted program in the men taking photographs. It was confirmed that the patients had a rigid erection at the time of the photo. The stretched penile length from the pubic bone to the tip of glans was measured by the surgeons, as described in the published series.

Medical records were retrospectively reviewed to collect the patients' data. Long-term results and patient satisfaction were determined through a detailed and structured questionnaire. Presence of residual curvature, penile shortening, penile sensory lose, palpable bumps and knots, pain during erection, and erectile dysfunction were items used to evaluate the long-term results. Patient satisfaction was categorized in 4 groups: very satisfied, moderately satisfied, dissatisfied, and very dissatisfied. Surgical outcomes and patient's satisfaction were compared between the 2 techniques in all patients.

Statistical Analysis

For statistical analyses SPSS (Statistical Package for the Social Sciences Inc, Chicago, ABD) version 17.0 package program was employed, and P values less than .05 was considered to be statistically significant. Descriptive statistics for continuous variables were expressed, and also tabulated as mean ± standard deviation, and for categorical variables as frequencies, and percentages (%). t test,

Pearson's chi-square, Likelihood Ratio, Fisher's exact test, and Mann-Whitney *U* test were used for this study where appropriate.

RESULTS

In all patients (n: 387), the mean age and follow-up period of the patients were 33.78 ± 16.27 years (range 16-81) and 40.72 ± 30.73 months (range 6-144), respectively. The mean angle of curvature was 42.24 ± 7.75 degrees (range 30-80). Curvature side was ventral in 167 (43.1%), lateral in 74 (19.1%), and dorsal in 102 (26.4%) of the patients. Complex penile curvature with more than 1 direction was determined in 44 (11.4%) of the patients.

Of the patients who underwent the 16-dot plication technique (n: 202), 93 (46%) had a ventral curvature, 49 (24.3%) had a dorsal curvature, 43 (21.3%) had a lateral curvature, and 17 (8.4%) had a complex curvature with more than 1 direction. Of the patients who underwent the modified Nesbit corporoplasty (n: 185), 74 (40%) had a ventral curvature, 53 (28.6%) had a dorsal curvature, 31 (16.8%) had a lateral curvature, and 27 (14.6%) had a complex curvature with more than 1 direction, revealing no significant differences in the angle of curvatures between the 2 techniques (P = .231, .327, .258, and .056, respectively).

There were no significant differences in the mean age, angle of curvature, and postoperative follow-up period of the patients between the 2 surgical techniques groups (Table 1). However, mean duration of surgery was significantly shorter in the 16-dot plication technique (48 ± 7.5 minutes), compared with the modified Nesbit corporoplasty (63 ± 16.9 minutes) (P = .001). The rates of early postoperative complications, including superficial wound infection, penile hematoma, and urethral injury were 3.8% in the modified Nesbit corporoplasty and 2.5% in the 16-dot plication technique, revealing no significant difference between both techniques (1.2% vs 1.5%, 2.1% vs 1%, and 0.5% vs none (P = .999, .432, and .478, respectively).

Long-term outcomes of the 2 surgical procedures are shown in Table 2, regardless of their etiology of penile curvature. Complete penile straightening was achieved in 87.6% of the patients who underwent 16 dot plication technique and in 89.7% of the patients who underwent modified Nesbit plication, revealing no difference (P = .514). Regardless of their etiology of penile curvature, the rates of penile sensory loss (P = .001) and de-novo erectile dysfunction (P = .016) were significantly higher in the modified Nesbit corporoplasty than in the 16-dot plication technique, but rate of suture related complications were significantly higher in the 16-dot plication technique than in the modified Nesbit corporoplasty (P = .001).

In terms of penile curvature etiology, results shown in Tables 3 and 4. Regardless of the surgical techniques, the patients with congenital penile curvature had significantly lower penile length loss, affecting sexual activity and de-novo erectile dysfunction than Peyronie's disease patients, postoperatively.

DISCUSSION

Nesbit corporoplasty and their modifications have been widely used for correction of penile curvature.[12-14] Many variations in plication technique have been described since then.[14-16] One of these is the 16-dot plication technique, which is a minimal tension technique using parallel plications, described by Gholami and Lue in 2002.[7]

In general, patient's satisfaction and success rates of Nesbit corporoplasty and their modifications and plication procedures are similar. However, the rates of late postoperative complications are different from each other. Especially, this difference may become more apparent depending on the disease which is the cause of the curvature. Since there is no standardization for reporting on outcome measures in the literature, it is very difficult to compare surgical techniques with each other.[8,9,14]

In Peyronie's disease patients who have preoperative normal erectile function, satisfaction rates of Nesbit corporoplasty and their modifications and plications procedures were reported as 74%-94% and 52%-98%, respectively. Also, these rates were reported as 80%-99% and 71%-100%, respectively in patients with congenital penile curvature who have preoperative normal erectile function.[1,8,9,14] In the literature, success rate of penile straightening for Nesbit corporoplasty and penile plication procedures is ranging between 57%-100% and 73%-96%, respectively.[14,17] Gholami and Lue reported that straight erections rate was 93% for 6 months and 85% for long-term (mean 2.6 year) in patients with penile curvature who underwent the Lue's 16-dot technique.[7] Andrews et al evaluated the reason for poor outcome of the Nesbit corporoplasty for Peyronie's disease over a 20-year period.[18] They reported that 8.6% of patients (31/359) had a penile deformity of >30° after procedure. Of these cases, 3 (9.6%) had the deformity immediately, and the penis was initially straight but develop curvature at an average of 2.5 months in 8 (25.8%), and the remaining 20 (64.5%) initially had a straight penis after surgery but the deformity recurred after a mean of 11 months.[18] In the light of these studies and our findings, immediately and short-term postoperative severe (>30°) curvature might develop due to surgical error, suture cutting, and/or suture failure in patients with congenital penile curvature and some Peyronie's disease patients. But long-term postoperative severe (>30°) curvature might develop due to disease progression in many Peyronie's disease patients. In our series, we found a higher risk for recurrent deviation

Table 1. Mean age, angle of curvature, duration of surgery, and postoperative follow-up period of the patients in both surgical techniques

	16-dot Plication Technique (n:202)	Modified Nesbit Corporoplasty (n:185)	*P* Value
Mean age (y)	33.3 ± 16.7	34.3 ± 15.9	.991
Mean angle of curvature (degree)	40.7 ± 7.4	43.9 ± 7.8	.638
Mean duration of surgery (min)	48.1 ± 7.5	63.3 ± 16.9	.001
Post-operative follow-up period (mo)	36.6 ± 29.1	42.3 ± 31.9	.222

Table 2. Regardless of the etiology, postoperative clinical characteristics of all patients with penile curvature

	16-dot Plication Technique (n:202)	Modified Nesbit Corporoplasty (n:185)	*P* Value
Complete penile straightening	177 (87.6%)	166 (89.7%)	.514
Residual curvature	25 (12.4%)	19 (10.3%)	.514
<15°	13 (6.4%)	11 (6%)	.842
15-30°	8 (4%)	5 (2.7%)	.493
>30°	4 (2%)	3 (1.6%)	.999
Perceived shortening of penis	105 (52%)	93 (50.3%)	.737
Difficulty in sexual intercourse, affected by penile shortening	5 (2.5%)	5 (2.7%)	.999
Penile sensory loss	11 (5.4%)	56 (30.3%)	.001
Difficulty in sexual intercourse, affected by penile sensory loss	2 (1%)	5 (2.7%)	.266
Palpable bumps or knots under the penile skin	71 (35.1%)	35 (18.9%)	.001
Unpleasant feeling of bumps or knots under the penile skin	8 (4%)	5 (2.7%)	.493
De-novo pain during erection	11 (5.4%)	5 (2.7%)	.176
Difficulty in sexual intercourse, affected by de-novo pain during erection	2 (1%)	1 (0.5%)	.999
De-novo erectile dysfunction	1 (0.5%)	8 (4.3%)	.016
Overall satisfaction	184 (91. 1%)	167 (90.3%)	.782
Very satisfied	155 (76.7%)	142 (76.8%)	.996
Moderately satisfied	29 (14.4%)	25 (13.5%)	.811
Dissatisfied	13 (6.4%)	14 (7.6%)	.662
Very dissatisfied	5 (2.5%)	4 (2.1%)	.999

in the patients with Peyronie's disease than in the patients with congenital penile curvature.

Loss of penile length in the Nesbit corporoplasty and plication procedures has been reported as 17.4%-100% and 41%-90%, respectively, in patients with Peyronie's disease, and 0%-50% and 16%-74%, respectively, in patients with congenital penile curvature.[1,8,9,14] Objective evaluation of loss of penile length is difficult because of subjective and nonstandardized measurements in the published series. Theoretically, penile shortening is

Table 3. Postoperative clinical characteristics of the patients with congenital penile curvature according to the surgical techniques

	16-dot Plication Technique (n:139)	Modified Nesbit Corporoplasty (n:121)	*P* Value
Complete penile straightening	126 (90.6%)	113 (93.4%)	.418
Residual curvature	13 (9.4%)	8 (6.6%)	.418
<15°	9 (6.5%)	6 (5%)	.601
15-30°	3 (2.2%)	2 (1.7%)	.999
>30°	1 (0.7%)	0	.999
Perceived shortening of penis	72 (51.8%)	57 (43.5%)	.173
Difficulty in sexual intercourse, affected by penile shortening	2 (1.4%)	1 (0.8%)	.999
Penile sensory loss	6 (4.3%)	36 (29.8%)	.001
Difficulty in sexual intercourse, affected by penile sensory loss	1 (0.7%)	2 (1.7%)	.599
Palpable bumps or knots under the penile skin	47 (33.8%)	23 (19.0%)	.007
Unpleasant feeling of bumps or knots under the penile skin	4 (2.9%)	3 (2.5%)	.999
De-novo pain during erection	7 (5%)	3 (2.5%)	.346
Difficulty in sexual intercourse, affected by de-novo pain during erection	1 (0.7%)	0	.999
De-novo erectile dysfunction	0	1 (0.8%)	.465
Overall satisfaction	130 (93.5%)	110 (90.9%)	.430
Very satisfied	111 (79.9%)	95 (78.5%)	.790
Moderately satisfied	19 (13.6%)	15 (12.4%)	.761
Dissatisfied	7 (5.1%)	9 (7.4%)	.421
Very dissatisfied	2 (1.4%)	2 (1.7%)	.999

Table 4. Postoperative clinical characteristics of the patients with Peyronie's disease according to the surgical techniques

	16-dot Plication Technique (n:63)	Modified Nesbit Corporoplasty (n:64)	*P* Value
Complete penile straightening	51 (81%)	53 (82.8%)	.785
Residual curvature	12 (19%)	11 (17.2%)	.785
<15°	4 (6.3%)	5 (7.8%)	.999
15-30°	5 (7.9%)	3 (4.7%)	.492
>30°	3 (4.8%)	3 (4.7%)	.999
Perceived shortening of penis	33 (52.4%)	36 (56.3%)	.662
Difficulty in sexual intercourse, affected by penile shortening	3 (4.8%)	4 (6.3%)	.999
Penile sensory loss	5 (7.9%)	20 (31.3%)	.001
Difficulty in sexual intercourse, affected by penile sensory loss	1 (1.6%)	3 (4.7%)	.619
Palpable bumps or knots under the penile skin	24 (38.1%)	13 (20.3%)	.027
Unpleasant feeling of bumps or knots under the penile skin	4 (6.3%)	2 (3.1%)	.440
De-novo pain during erection	4 (6.3%)	2 (3.1%)	.440
Difficulty in sexual intercourse, affected by de-novo pain during erection	1 (1.6%)	1 (1.6%)	.999
De-novo erectile dysfunction	1 (1.6%)	7 (10.9%)	.033
Overall satisfaction	54 (85.7%)	57 (89.1%)	.570
Very satisfied	44 (69.8%)	47 (73.5%)	.653
Moderately satisfied	10 (15.9%)	10 (15.6%)	.969
Dissatisfied	6 (9.5%)	5 (7.8%)	.732
Very dissatisfied	3 (4.8%)	2 (3.1%)	.680

inevitable with Nesbit corporoplasty and penile plication procedures, but this rarely affects coital function.[18] Moreover, some authors reported that penile shortening could be seen after penile lengthening procedures, although it seems to be theoretically impossible.[19,20] In a series, evaluating 16 years of experience with 359 patients who underwent surgery due to Peyronie's disease, Ralph et al reported that all patients had penile shortening, but only 6 (1.6%) patients had coital difficulties because of this complication.[21] Similarly, Savoca et al reported that postoperatively significant shortening of the penis occurred in 36 of 279 patients (16.5%) with the Nesbit corporaplasty. Of these patients, only 5 (1.8%) complained of coital difficulties, because of excessive shortening.[22] Taylor and Levine analyzed outcomes of tunica albuginea plication or partial plaque excision with human pericardial grafting in 218 patients with Peyronie's disease.[10] They found that the tunica albuginea plication group expressed a slightly more percentage of post-operative length loss (69%) than the grafting group (59%). They also reported that 84% of the plication group and 79% of the grafting group would have their respective surgery again, with 82% of the plication group and 75% of the grafting group either satisfied or extremely satisfied. Greenfield et al analyzed factors affecting loss of length in 68 patients with Peyronie's disease treated with tunica albuginea plication.[23] They found that a greater curvature assessed objectively was associated with greater loss. In another study, Gholami and Lue reported 132 patients undergoing the 16-dot plication procedure, 41% experienced objective loss of penile length, however, 7% of patients stated that loss of penile length affected sexual activity.[7] We found that rate of perceived penile shortening was approximately 50% in both groups, but only 10 (2.6%) patients complained of penile shortening, causing difficulty in sexual intercourse. Seven of these 10 patients (70%) had Peyronie's disease. These findings support the theory that penile shortening may develop not only due to surgery but also progression of Peyronie's disease.[14,19,20]

The exact etiology of penile sensory changes is unknown, but it is attributed to traumatization of dorsal NVBs.[1,2,4,8] Rates of penile sensory changes in the Nesbit corporoplasty and their modifications and plications procedures have been reported as 2%-21% and 3%-32%, respectively, in the Peyronie's disease patients, and 2%-75% and 2%-37%, respectively, in the patients with congenital penile curvature.[9,24] Leonardo et al compared the multiple parallel plication (Ebbehoj & Metz modified) technique to the Nesbit corporoplasty in patients with congenital curvature.[25] They observed significant difference between the 2 procedures, concerning the reduction of sensibility in the glans and the foreskin following surgery, in favor of the plication procedure (37% vs 75%, $P = .03$). In our study, we found that penile sensory changes were more prevalent in the patients who underwent modified Nesbit corporoplasty than in the patients, undergoing 16-dot plication technique, especially for ventral and lateral curvature, regardless of their etiology of curvature. Unlike the modified Nesbit procedure, when the ventral penile curvature is corrected via 16-dot plication technique, which needs no dissection of the NVB may explain this difference.

Other common postoperative complaints of plications and Nesbit procedures and their modifications are suture related complications such as palpable suture knots, suture granuloma, bother from suture, and discomfort/pain

during erection. Although very different outcomes have been reported, in general, following penile plication surgeries, suture related complications occur in one-third of the patients. However, these complications rarely cause discomfort during sexual intercourse.[9] In our study, we found that suture related complications were more common in the 16-dot penile plication procedure than in the modified Nesbit corporoplasty (40.6% and 21.6%, respectively, $P = .001$). Traditionally, nonabsorbable sutures are used for penile plication and corporoplasty due to possibility of recurrence after the suture material was absorbed. Hsieh et al suggested that using absorbable suture material for corporeal plication was related to decreasing suture related complications.[26] However, it is debatable whether or not the use of absorbable suture materials results in an increased recurrence rate. Leonardo et al reported that none of the patients who underwent penile plication using a nonabsorbable suture showed a significant recurrence, but significant relapse that needed surgical revision occurred in 3 patients who were using absorbable (dexon 2/0) sutures.[25] Oppositely, Basiri et al compared the results of corporeal plication using absorbable (Vicryl) versus nonabsorbable (Nylon) sutures for the treatment of congenital penile curvature, and they reported that success and patient's satisfaction rate were similar between the 2 groups, but suture related complication was significantly lower in the Vicryl group than in the Nylon group (6%-39% respectively, $P = .04$).[27]

Erectile dysfunction may be seen after surgical correction of penile curvature, especially when these procedures are performed due to Peyronie's disease. However, it is debatable that this complication results from whether hemodynamic changes that due to surgery or the progression of pre-existing erectile dysfunction, progression of Peyronie's disease, accompanying co morbidities, and aging.[1] Cantoro et al found no change in erectile functions in terms of subjective (symptom score) and objective (penile Doppler sonography) assessment in 60 patients who underwent penile plication due to congenital penile curvature.[28] We found that de-novo erectile dysfunction rate after modified Nesbit corporoplasty was more than the Lue's 16-dot technique. However, 8 of 9 patients who had de-novo erectile dysfunction had Peyronie's disease. Therefore, we might think that the only reason for de-novo erectile dysfunction is not having the Nesbit procedure. Peyronie's disease and additional risk factors may play a role in the development of de-novo erectile dysfunction after Nesbit procedure and their modifications. It is always important to assess erectile functions before surgery, and patients should be informed that erectile dysfunction may be developed after surgery.[11,18]

Our study has some limitations: type of the 2 surgical procedures was performed randomly by the 3 surgeons without use of selection criteria over the same period. Therefore, selection bias could affect the outcomes of the study. Another limitation would be measurement of the degree of curvature via computer assisted program in some men, taking photographs, although it was confirmed that the patients had a rigid erection at the time of the photo. However, these could be dependent on angulation and penile rigidity. Although, our study is retrospective, it has large number of patients and long term follow-ups. There is no prospective randomized controlled trial comparing the surgical techniques of penile curvature in the literature. In the evaluation of retrospective studies, it is clear that the satisfaction and success rates of plication procedures and Nesbit corporoplasty and their modifications are similar.[10,17,23,25,29] Nesbit procedure and their modifications are more time consuming and associated with penile sensory change, but suture related complications are more often in the plication procedure.

CONCLUSION

Overall, both surgical techniques have very high success and satisfaction rates with very low complication rates. However, the types of complications are significantly different between the 2 surgical procedures. Therefore, patients with penile curvature should be informed about outcomes of penile plication procedures, and surgical method should be preferred based on patient's preference and surgeon's experience.

References

1. Mobley EM, Fuchs ME, Myers JB, et al. Update on plication procedures for Peyronie's disease and other penile deformities. *Ther Adv Urol*. 2012;4:335–346.
2. Chen R, McCraw C, Lewis R. Plication procedures-excisional and incisional corporoplasty and imbrication for Peyronie's disease. *Transl Androl Urol*. 2016;5:318–333.
3. Hatzimouratidis K, Eardley I, Giuliano F, et al. EAU guidelines on penile curvature. *Eur Urol*. 2012;62:543–552.
4. Capoccia E, Levine LA. Contemporary review of Peyronie's disease treatment. *Curr Urol Rep*. 2018;19:51–61.
5. Daitch JA, Angermeier KW, Montague DK. Modified corporoplasty for penile curvature: long-term results and patient satisfaction. *J Urol*. 1999;162:2006–2009.
6. Van Der Horst C, Martínez Portillo FJ, Seif C, et al. Treatment of penile curvature with Essed-Schröder tunical plication: aspects of quality of life from the patients' perspective. *BJU Int*. 2004;93:105–108.
7. Gholami SS, Lue TF. Correction of penile curvature using the 16-dot plication technique: a review of 132 patients. *J Urol*. 2002;167:2066–2069.
8. Kadioglu A, Akman T, Sanli O, et al. Surgical treatment of Peyronie's disease: a critical analysis. *Eur Urol*. 2006;50:235–248.
9. Makovey I, Higuchi TT, Montague DK, et al. Congenital penile curvature: update and management. *Curr Urol Rep*. 2012;13:290–297.
10. Taylor FL, Levine LA. Surgical correction of Peyronie's disease via tunica albuginea plication or partial plaque excision with pericardial graft: long-term follow up. *J Sex Med*. 2008;5:2221–2228.
11. Paez A, Mejias J, Vallejo J, et al. Long-term patient satisfaction after surgical correction of penile curvature via tunical plication. *Int Braz J Urol*. 2007;33:502–507.
12. Nesbit RM. Congenital curvature of the phallus: report of three cases with description of corrective operation. *J Urol*. 1965;93:230–232.
13. Pryor JP, Fitzpatrick JM. A new approach to the correction of the penile deformity in Peyronie's disease. *J Urol*. 1979;22:622–623.

14. Ralph DJ. The Nesbit and plication procedures for Peyronie's disease. In: Levine LA, ed. *Peyronie's Disease: A Guide to Clinical Management*. Totowa, NJ: Humana Press; 2007:133–144.
15. Essed E, Schroeder FH. New surgical treatment for Peyronie disease. *Urology*. 1985;25:582–587.
16. Ebbehøj J, Metz P. New operation for "krummerik" (penile curvature). *Urology*. 1985;26:76–78.
17. Kadioglu A, Sanli O, Akman T, et al. Surgical treatment of Peyronie's disease: a single center experience with 145 patients. *Eur Urol*. 2008;53:432–439.
18. Andrews HO, Al-Akraa M, Pryor JP, et al. The Nesbit operation for Peyronie's disease: an analysis of the failures. *BJU Int*. 2001;87:658–660.
19. Kadıoğlu A, Salabaş E, Özmez A, et al. Peyronie's disease surgery: surgical outcomes of 268 cases. *Turk J Urol*. 2018;44:10–15.
20. Helal MA, Lockhart JL, Sanford E, et al. Tunica vaginalis flap for the management of disabling Peyronie's disease: surgical technique, results, and complications. *Urology*. 1995;46:390–392.
21. Ralph DJ, al-Akraa M, Pryor JP. The Nesbit operation for Peyronie's disease: 16-year experience. *J Urol*. 1995;154:1362–1363.
22. Savoca G, Scieri F, Pietropaolo F, et al. Straightening corporoplasty for Peyronie's disease: a review of 218 patients with median follow-up of 89 months. *Eur Urol*. 2004;46:610–614.
23. Greenfield JM, Lucas S, Levine LA. Factors affecting the loss of length associated with tunica albuginea plication for correction of penile curvature. *J Urol*. 2006;175:238–241.
24. Tornehl CK, Carson CC. Surgical alternatives for treating Peyronie's disease. *BJU Int*. 2004;94:774–783.
25. Leonardo C, De Nunzio C, Michetti P, et al. Plication corporoplasty versus Nesbit operation for the correction of congenital penile curvature. A long-term follow-up. *Int Urol Nephrol*. 2012;44:55–60.
26. Hsieh JT, Liu SP, Chen Y, et al. Correction of congenital penile curvature using modified tunical plication with absorbable sutures: the long-term outcome and patient satisfaction. *Eur Urol*. 2007;52:261–266.
27. Basiri A, Sarhangnejad R, Ghahestani SM, et al. Comparing absorbable and nonabsorbable sutures in corporeal plication for treatment of congenital penile curvature. *Urol J*. 2011;4:302–306.
28. Cantoro U, Polito M, Lacetera V, et al. Plication corporoplasty for congenital penile curvature: our results with long-term follow-up. *Int Urol Nephrol*. 2014;46:1741–1746.
29. Poulsen J, Kirkeby HJ. Treatment of penile curvature—a retrospective study of 175 patients operated with plication of the tunica albuginea or with the Nesbit procedure. *Br J Urol*. 1995;75:370–374.

EDITORIAL COMMENT

This is a nonrandomized report on comparing 2 penile plication surgeries for penile curvature disorders. The majority of the patients are for congenital curvature but there were 127 patients with Peyronie's disease, almost equally divided to have undergone modified Nesbit corporoplasty or 16 dot plication technique. The results are from 3 institutions and thus more than 1 surgeon's results are presented. Selection criteria for how assignment to either surgical procedure was done is lacking so selection bias is possible. It is well-presented and represents a significant number of patients and evaluation measures are comprehensive. It is a valuable contribution to the literature. A previous review article on plication procedures for Peyronie's disease lists 8 previously reported comparative studies and the authors of this paper include only 2 in their discussion section.[1] In the discussion the authors mentioned a theoretical advantage for "penile lengthening" as regards to loss of penile length. I would contend that most honest studies for grafting procedures have reported significant loss of penile length. We should eliminate the common categories mentioned in many reports of "penile shortening" versus "penile lengthening" procedures for correction of penile curvature. In fact, even with treatment of erectile dysfunction penile shortening is often a postoperative complaint by the patient.

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Reference

1. Chen R, McCraw C, Lewis R. Plication procedures-excisional ad incisional corporoplasty and imbrication for Peyronie's disease. *Transl Androl Urol*. 2016.

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