Original Research

Improvement of Erectile Dysfunction by Revascularization Surgery Following Urethroplasty in Patients with Pelvic Fracture

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Abstract: **Introduction:** Erectile dysfunction is one of the most common sexual disorders in men and affects one out of every five men over the age of 40 years. Penile revascularization is one of the methods for treating erectile dysfunction in these patients.

Methods: The participants were patients who had erectile dysfunction after a pelvic fracture. These patients had Urethroplasty for at least one year ago due to urethral trauma and also undergone penile micro vascularization surgery. Sexual activity was allowed from the second month accompanied with the administration of tadalafil and yohimbine prior to intercourse.

Results: In this study, 52 patients with the mean age of 30.65 ± 7 years (range: 24-45) were included. 24 patients (46%) were married. The mean time interval between pelvic fracture and surgery was 49.80 ± 16.30 months (range: 22 to 85). Complete response was seen in 9 cases (17.3%), relative responses in 18 (34.6%), and treatment failure in 25 cases (48.1%). The treatment results did not show any significant difference between the two dissimilar surgical procedures (Micheal versus-Virag) (P = 0.58).

Conclusion: Based on this case-series, it is concluded that penile revascularization surgery seems to have a relatively good effect on the improvement of vascular erectile dysfunction in patients with pelvic fracture urethral distraction effect following Urethroplasty**.**

Keyword: Erectile Dysfunction, Penile Revascularization, Pelvic Fracture, Intracavernosal Injection

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1. Introduction

Erectile dysfunction is one of the most common sexual disorders in men and affects one out of every five men over the age of 40 years (1). On the other hand, erectile dysfunction can be considered as a secondary disorder of systemic diseases such as diabetes, obesity, and hyperlipidaemia (2, 3). The quality of life in these patients has decreased and hence the treatment of these patients is also very important and can cost a lot to the patient and his family (4, 5). The urethral trauma is one of the most important causes of erectile dysfunction in Pelvic fracture patients and usually requires Urethroplasty. So far, several treatment methods such as the use of prosthetics in surgical procedures,

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as well as medication treatments are used in this field, depending on the patients' conditions and their response (6-8).

Penile revascularization is one of the other methods for treating erectile dysfunction in these patients (9-12). Various studies have already been done on the use of revascularization. For example, Zuckerman et al. reported 17 patients undergoing penis revascularization surgery and this treatment was successful in 82% of patients, and in unsuccessful cases, second surgery was successful (13). Another study conducted on 125 patients undergoing renal artery bypass graft surgery by Kayıgil et al., found that the results of the treatment were successful in 81.8% of the patients and 6.6% of the patients had side effects (14).

In the study of Kawanishi et al., the results showed that 51 patients underwent penile revascularization surgery had successful treatment in 85.9% of the patients, and a total of 4 patients had side effects (15). In a review study conducted by Babaei et al. in Tehran, researchers reported that penile revascularization surgery was an effective therapeutic approach, and patients under the age of 30 years and non-smokers were the most important factors in successful treatment outcomes (16). Accordingly, considering the importance of recognizing the preferred therapeutic methods, this study aimed to investigate the effect of penile revascularization surgery on erectile dysfunction in patients undergoing Urethroplasty following urethral trauma.

2. Method

The present descriptive case-series was performed on 52 patients recruited by convenience sampling method. The study participants were patients who had erectile dysfunction after a pelvic fracture and had Urethroplasty. Patients with impotence after 1 year they became candidate for penile micro vascularization surgery throughout last 8 years in Shiraz, Tabriz, Urmia and Shohada Tajrish Hospital, Tehran, Iran.

Initially, the demographic data of patients including age, marital status, smoking, as well as information related to the surgical procedures such as erectile response to papaverine, the time between the pelvic fracture to the surgery, the time interval between Urethroplasty and the penile revascularization surgery, the type of surgery, success and complications were collected and recorded. The biography and physical examination were performed by the researchers. All of the patients in this study had normal erection before the pelvic fracture. Also, most of these patients could not have intercourse by oral treatment. Although some patients have had intercourse with papaverine intracavernously. However, none of these patients reported sexual satisfaction in the erection.

At first, for the participants in the study, Papaverine-Induced excitation and Doppler sonography were used to differentiate cases of arterial disorders. Then, patients with arterial disorders were confirmed by pudendal artery angiography Patients with Pudendal artery insufficiency were candidate for penis micro vascularization surgery. The type of surgery was determined based on the results of angiography. The patients who underwent angiography and contrast agent passed their arteries, undergone Micheal II surgery, and other patients, or those with multiple stenosis in their arteries were undergone Virag surgery. All of these patients done Doppler ultrasonography from the deep inferior epigastric arteries to identify their openness and their health for arterial bypass. During the surgery, patients underwent general anesthesia in supine position in order to prep and drape the entire abdomen and genital area. Before surgery, a Foley catheter was inserted into the urethra and then, with a crescent incision in the upper part of the penis in the suprapubic area, a separation of the penis shaft was performed from Buck's Fascia. In the next step, under a magnification of loop x 4, we identified the common penis artery (CPA) and controlled with 4-0 silk suture. For the separation of the deep inferior epigastric artery and with the assurance of openness of the artery with Para median incision of the skin, the anterior fascia of the rectus shaft was cut lengthwise from three centimeters above the inguinal ligament to one centimeter above the navel and with dissection of the abdominal rectus muscle, the deep inferior epigastric artery (IEA) and vein were observed. Using the microscopic technique, the collateral branches were carefully ligated and cut out and then the IEA was cut and ligated in the upper part and was passed it under the inguinal ligament in the medial region, and then microvascular anastomosis was done after injection of heparin 5,000 units and 5-minute time for proper circulation using a microscope with a magnification of 20 x with prolene 8-0 suture, that is the IEA was anatomized to the CPA as end to side. During surgery, diluted papaverine was regularly used to prevent arterial spasm.

Immediately after surgery, patients received intravenous heparin for 72 hours and converted to warfarin for six months. On the first day of surgery, aspirin started daily and continued for 12 months. Doppler ultrasonography was performed to ensure the anastomosis openness before discharge and a week after discharge. If the anastomosis was open, treatment continued with drugs. If thrombosis occurred medications were discontinued and the patient was candidate for penis prosthesis.

Patients without complication who in the first week after surgery, were visited monthly along with the use of aspirin and warfarin. Sexual activity was allowed from the second month accompanied with the administration

of tadalafil and yohimbine prior to the intercourse. Self-reported sexual satisfaction was sought using a single question. If patients were satisfied with sexual activity using this approach method, they would have been considered as a complete success. If they were unable to do, they would have performed Intra Cavernosal Injection (ICI) using papaverine for the intercourse in the third month, which if erection happened, they would have been considered as a relative success and in the case of non-response to ICI, the result was reported as unsuccessful. Three-month visit follow-up while using warfarin for six months and aspirin for one year were considered for patients with successful, and patients with unsuccessful results, were candidates for penis prosthesis. Data were analyzed using SPSS software version 21. The mean and standard deviations were used for quantitative, and for qualitative variables. Independent t-test was used to compare the quantitative variables and the Chi square test was used to compare qualitative variables. The results of all statistical tests less than 0.05 were considered significant.

3. Result

In this study, 52 patients with the mean age of 30.65 ± 7 years (range: 24-45) were included. 24 patients (46%) were married. The mean time interval between pelvic fracture and surgery was 49.80 ± 16.30 months (range: 22 to 85). Complete response was seen in 9 cases (17.3%), relative responses in 18 (34.6%), and treatment failure in 25 cases (48.1%). The treatment results did not show any significant difference between the two different surgical procedures (P = 0.58) (Table 1). Also the mean time interval between the occurrence of pelvic fractures and revascularization surgery in patients with treatment failure (51.89 ± 17.1 months) was significantly higher than patients with complete response (22 ± 1.53 months) and same result were seen in the relative response (27.32 ± 4.9 months) (P = 0.02).

4. Discussion

The urethral trauma is one of the most important causes of erectile dysfunction in patients with pelvic fracture and usually requires Urethroplasty. So far, several treatment approaches such as the use of prosthetics, as well as medication treatments are used depending on the patients' conditions and their response (2,17). Penile revascularization is one of the approaches for treating erectile dysfunction in these patients (9,10). Accordingly, considering the importance of recognizing the preferred therapeutic methods, this study aimed to investigate the effect of penile revascularization surgery on impotence patients undergoing Urethroplasty following pelvic fracture urethral trauma.

In this study, 52 patients undergone penile revascularization surgery, while Virag was selected for 21 cases and Micheal in 31 patients. All of the patients had normal erection before the pelvic fracture, but after the traumatic pelvic fracture were impotence. All of these people suffered from severe urethral trauma that were underwent Urethroplasty. None of these patients had not atherosclerotic risk factors and only one patient had a history of smoking. In this study, 27 patients had successful erection for intercourse, among which complete response, relative response, and treatment failure were observed in 17.3%, 34.6%, and 48.1% of the patients, respectively. Two patients also had postoperative complications. One of them, who was under Virag surgery, suffered from glans hyperemia two weeks after surgery, which lasted for up to four weeks using conservative treatment, but due to the progression of the ulcer to the penis, we had to ligate the anastomosis. The other patient suffered from rectus sheath hematoma after surgery that conservatively treated and completely recovered after a month.

Patients in our study were followed for about six months, with ultrasound check at discharge, in the first week of postoperative surgery, and the first month after surgery, of which 25 unsuccessful surgeries were reported, that is 10 patients at discharge, 13 patients in the first week of postoperative surgery and 2 patients in the first month after discharge that had experienced of anastomosis thrombosis. Of the 27 successful surgery, the 10 married patients had complete success using tadalafil one hour before sexual activity, and 17 single patients had a relative successful erection and had normal erection if using papaverine.

The findings of present study were consistent with

Table 1: Frequency distribution of response to treatment among patients according to their type of surgery

Variable		Complete response		Partial response		Failure		Total	
		n	%	n	%	n	%	n	%
Surgery	**Micheal**	4	12.90	11	35.48	16	51.61	31	100
	Virag	5	23.81	7	33.33	9	42.86	21	100
	Total	9	17.31	18	34.62	25	48.08	52	100

P=0.58 for comparison of Micheal versus Virag procedures

other studies. For instance, a study (13) in the United States on 17 patients undergone penile revascularization surgery found that treatment results were successful in 82% of patients, and in unsuccessful cases, the second surgery was successful. In our study, overall success rate in first surgery was 52%. In another study in Turkey on 125 patients undergone penile vascular revascularization surgery it was found that the results of the treatment were successful in 81.8% of patients, while 4.6% experienced complications (14).

Examination of 51 patients in Japan (15) with arteriogenic ED caused by localized arterial lesions revealed that the treatment was successful in 85.9% of patients, and a total of 4 patients had experienced complications. In our study only 2 patients were complicated, but the effectiveness observed in our study was about half of the study in Japan aforementioned earlier, which might be due to different causes of impotence. Our patients were traumatic pelvic fracture with total effect of obliteration and thrombosis for long time in penile vasculature. However, the Japanese study used patients with only a small lesion in penile vasculature.

In a review study conducted in Iran, penile revascularization surgery was an effective treatment and the most important factors influencing the successful therapeutic outcomes in those who were younger than 30 years of age without smoking history (16).

A study conducted by Melman et al. found that 18 patients undergoing penile revascularization surgery had a success rate of 78% (18), which is still in arteriogenic erectile dysfunction, which is more than the success obtained in our study. Nevertheless, this report was one of the earliest cases of penile revascularization and was different from traumatic causes.

5. Conclusion

Based on the results of this case-series study in several centers, it is concluded that penile revascularization surgery seems to have a relatively good effect on the improvement of vascular erectile dysfunction in patients with pelvic fracture following Urethroplasty. This procedure can open new horizons for treating this group of patients to rescue them from penile prosthesis at younger ages. Although more studies are recommended with a larger sample size and randomized clinical designs in order to generalize the obtained results.

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7. Conflict of interest

All authors declare that there is no conflict of interest in this study.

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9. Author's contributions

All the authors have the same contribution.

10. Reference

1. Manning M, Junemann K-P, Scheepe Jr, Braun P, Krautschick A, Alken P. Long-term followup and selection criteria for penile revascularization in erectile failure. The Journal of urology. 1998;160(5):1680-4.

2. Tanagho E, McAninch J. Smith's general urology: McGraw-Hill Prof Med/Tech; 2007.

3. Allameh F, Azghandi S, Karkan MF. Is Chemotherapy Related with Erectile Dysfunction in Non-Urologic Cancer Patients? International Journal of Cancer Management. 2018(In Press).

4. Rowland DL, Patrick DL, Rothman M, Gagnon DD. The psychological burden of premature ejaculation. The Journal of urology. 2007;177(3):1065-70.

5. Alizadeh M, Azar A. Longterm Survival Of Arterio-Venous Fistulas In Ckd Patients-Effect Of Multiple Factors. The Journal of Vascular Access. 2013;14(1).

6. Hosseini J, Ardebili FS, Fadavi B, Haghighatkhah H. Effects of Anastomotic Posterior Urethroplasty (Simple or Complex) on Erectile Function: a Prospective Study. Urology journal. 2018;15(2):33-7.

7. Mirzazadeh M, Fallahkarkan M, Hosseini J. Penile fracture epidemiology, diagnosis and management in Iran: a narrative review. Translational andrology and urology. 2017;6(2):158.

8. Razzaghi MR, Karkan MF, Ghiasy S, Javanmard B. Laser application in iran urology: a narrative review. Journal of lasers in medical sciences. 2018;9(1):1.

9. Dicks B, Bastuba M, Goldstein I. Penile revascularization—Contemporary update. Asian journal of andrology. 2013;15(1):5.

10.Sharlip ID. Penile revascularization in the treatment of impotence. Western Journal of Medicine. 1981;134(3):206.

11.McDougal WS, Jeffery RF. Microscopic penile revascularization. The Journal of urology. 1983;129(3):517-21.

12.Shaw WW, Zorgniotti AW. Surgical techniques in penile revascularization. Urology. 1984;23(5):76-8.

13.Zuckerman JM, McCammon KA, Tisdale BE, Colen L, Uroskie T, McAdams P, et al. Outcome of penile revascularization for arteriogenic erectile dysfunction after pelvic fracture urethral injuries. Urology. 2012;80(6):1369-74.

14.Kayıgil O, Okulu E, Aldemir M, Onen E. Penile revascularization in vasculogenic erectile dysfunction (ED): Long-term follow-up. BJU international. 2012;109(1):109-15.

15.Kawanishi Y, Kimura K, Nakanishi R, Kojima K, Numata A. Penile revascularization surgery for arteriogenic erectile dysfunction: the long-term efficacy rate calculated by survival analysis. BJU international. 2004;94(3):361-8.

16.Babaei AR, Safarinejad MR, Kolahi AA. Penile revascularization for erectile dysfunction: a systematic review and meta-analysis of effectiveness and complications. Urology journal. 2009;6(1):1-7.

17.Goldstein I. Penile revascularization. The Urologic clinics of North America. 1987;14(4):805-13.

18.Melman A, Riccardi JR. The success of microsurgical penile revascularization in treating arteriogenic impotence. International journal of impotence research. 1993;5(1):47-52.