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## Case Report

# Bilateral external and internal pudendal veins embolization treatment for venogenic erectile dysfunction

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## ABSTRACT

Erectile dysfunction (ED) or impotence is estimated to affect around 20–30 million men in the United States (Rhoden et al, 2002). Vascular etiology is purported to be the most prevalent cause of ED in the elderly population, with venogenic ED being the most common subtype (Shafik et al, 2007; Rebonato et al, 2014). A patient, who developed severe venogenic ED, was referred to interventional radiology after ineffective pharmaceutical treatments. Selective embolization of bilateral external and internal pudendal veins was performed through accessing the deep dorsal vein of penis. Subsequent venogram verified successful embolization with stasis within the outflow of the deep dorsal vein of penis. Close to 6 weeks after the procedure, the patient purports to be able to achieve approximately 65% of full penile erection and complete penile erection with penile stimulation and 0.25 mL injection of alprostadil after 25 minutes.

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## Introduction

Erectile dysfunction (ED) or impotence is described as continuous incapacity to attain and preserve a sufficient erection for a reasonably pleasurable sexual intercourse [1]. There are many different etiologies for ED [2]. Its etiologies can be neurologic, psychologic, endocrinologic, or vascular [2]. Vascular etiology is purported to be the most prevalent cause of ED in the elderly population, with venogenic ED being the most common subtype [2,3]. Venogenic ED is

defined as the failure of adequate venous blood retention in the penis during penile erection secondary to venous leakage [2]. Penile venous leakage is defined as veno-occlusive dysfunction of the penile veins, which allows venous blood to reflux during penile erection [2]. The pathophysiology of this condition is currently unknown [2]. However, increasing age, diabetes mellitus, pelvic radiation, androgen deprivation therapy, and radical prostatectomy are linked to venogenic ED [3]. Recently, an interventional approach to restore sufficient penile erection using

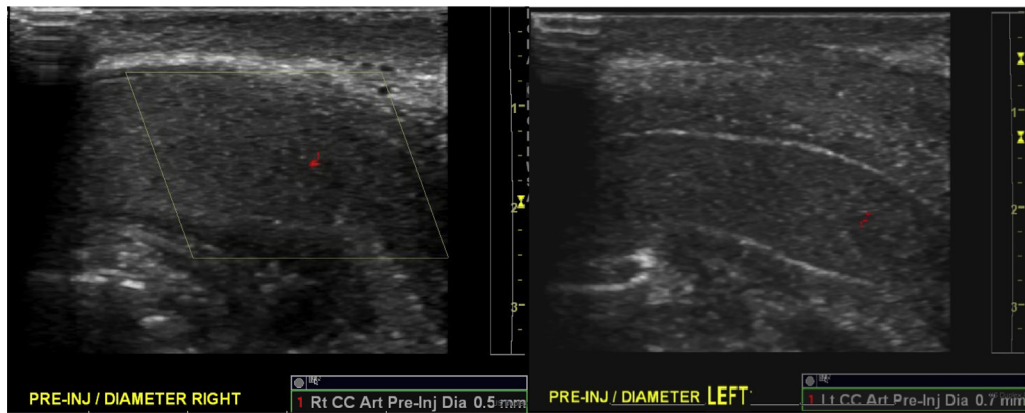
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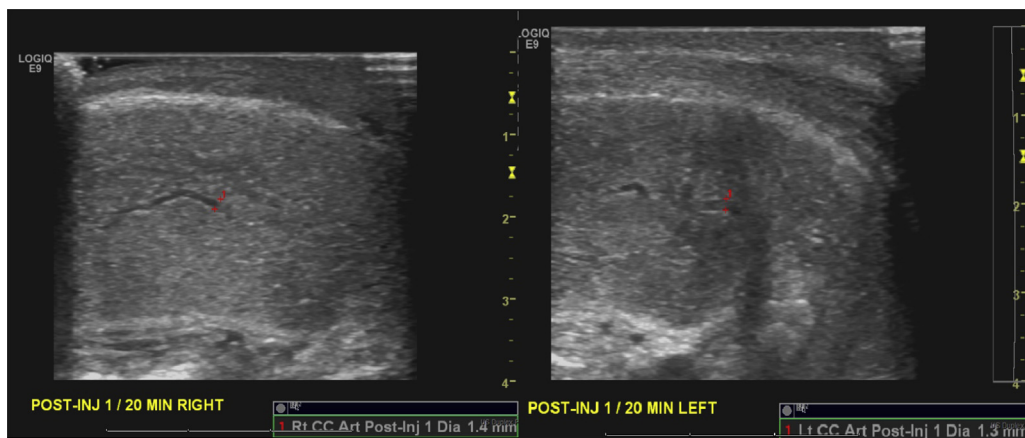
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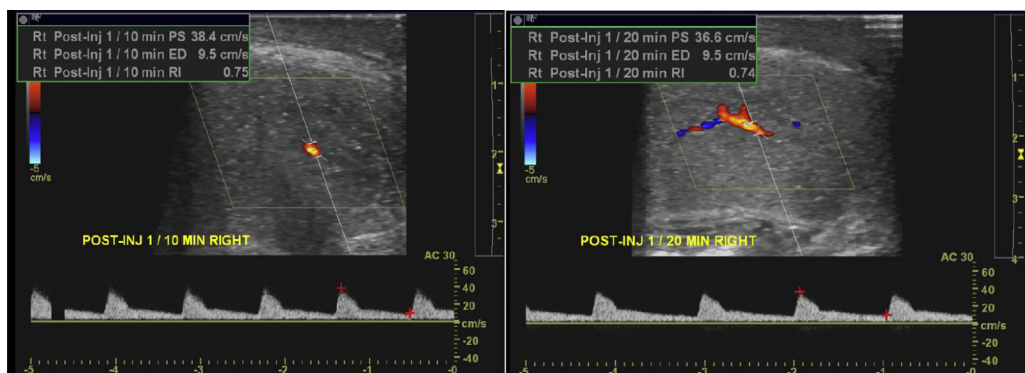
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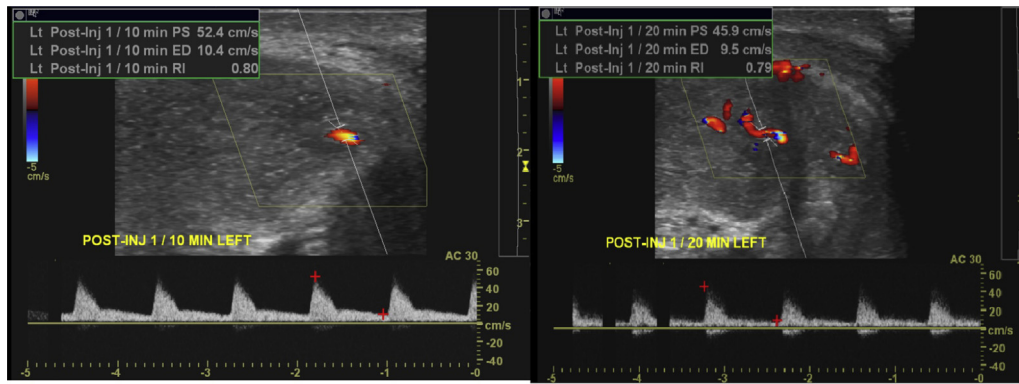
**Fig. 1** – The ultrasound images of the prealprostadiil injection diameters of the right and left corpus cavernosal arteries. Right cavernosal artery measures 0.5 mm. Left cavernosal artery measures 0.7 mm.



**Fig. 2** – The diameters of the cavernosal arteries 20 minutes after injection of alprostadil. Right cavernosal artery diameter measures 1.4 mm. Left cavernosal artery diameter measures 1.3 mm.



**Fig. 3** – The Doppler waveforms at 10 minutes and 20 minutes measurements after the injection of alprostadil in the right cavernosal artery. Peak systolic velocity in the right cavernosal artery measures 38.4 cm/s and end-diastolic velocity measures at 9.5 cm/s. It is important to note that the end-diastolic velocity does not rise.



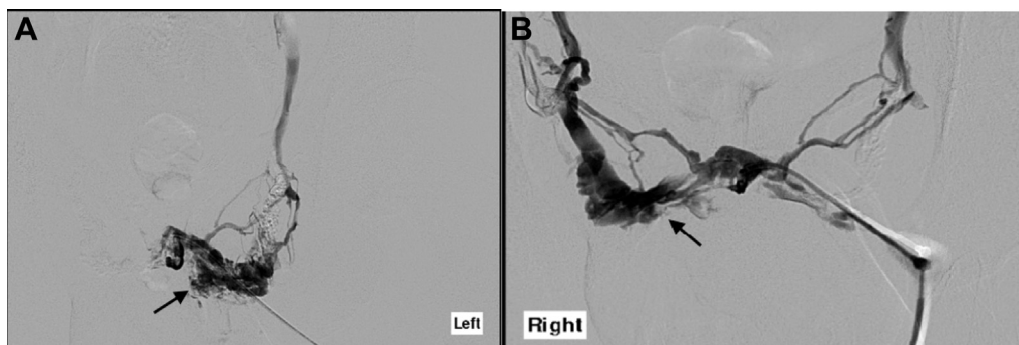
**Fig. 4** – The Doppler waveforms at 10 minutes and 20 minutes measurements after the injection of alprostadil in the left cavernosal artery. Significant venogenic leak is noted. Peak systolic velocity in the left cavernosal artery measures 52.4 cm/s and end-diastolic velocity measures at 9.5 cm/s. It is important to note that the end-diastolic velocity decreased from the 10 minutes and 20 minutes measurements signifying venous leakage.

selective embolization of insufficient veins have been clinically studied as an alternative to invasive surgical treatment [3,4]. Success of the interventional approach makes this procedure an attractive treatment option, as it is less invasive and more cosmetically pleasing than surgical approach [3]. This case describes a patient who has been treated with this currently uncommon approach and who has a very severe form of venogenic ED most likely contributed by radical prostatectomy.

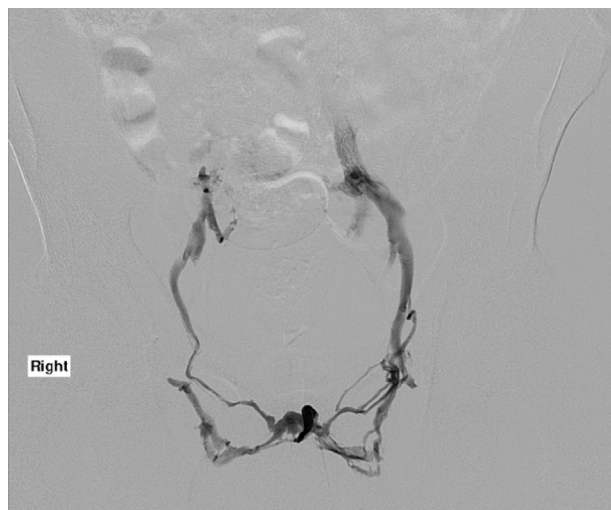
### Case report

Our patient is a 65-year-old male with history of prostate cancer. He has undergone robot-assisted laparoscopic radical prostatectomy and then subsequently developed ED. Injectable alprostadil (synthetic prostaglandin E1) was prescribed, but the medication lost its efficacy even with increased doses. Switching to injectable Trimix (containing alprostadil, papaverine, and phentolamine) did not yield significant improvement. Ultrasound of the right and left corpus cavernosal arteries showed diameter of 0.5 mm of

right and 0.7 mm of left (Fig. 1). After injecting with alprostadil, the diameter increased to 1.4 mm on the right and 1.3 mm on the left corpus cavernosal arteries (Fig. 2). Penile Doppler ultrasound of the right cavernosal artery showed no rise in end-diastolic velocity from 10 minutes to 20 minutes (Fig. 3). The left cavernosal artery displayed adequate arterial inflow of peak systolic velocity greater than 50 cm/s (Fig. 4), but the end diastolic velocity decreased after 20 minutes signifying venous leakage (Fig. 4). Thus, ED due to venous leakage was diagnosed. Targeted embolization of venous leakage sites by percutaneous approach was chosen as the treatment option. Deep dorsal vein of the penis was accessed percutaneously through Seldinger technique using 4 French angled taper glide catheter and a glide guidewire. Venogram of deep dorsal vein and bilateral external and internal pudendal veins were performed and venous leakage sites were determined where the contrast dye pooled, which gave it a cloudy appearance (Fig. 5A and B). Selective embolization with n-butyl cyanoacrylate glue of bilateral external and internal pudendal veins was performed and successful embolization with stasis within the outflow of the deep dorsal vein of the penis was verified by additional



**Fig. 5** – Digital subtraction angiography with venous leakage to the left pudendal veins (A) and the right pudendal veins (B). Black arrows indicate the location of pooled venous blood giving it a cloudy appearance.



**Fig. 6 – Digital subtracted angiography of the external and internal pudendal veins postembolization using n-butyl cyanoacrylate (NBCA) glue. Venogenic leak is not noted postprocedure.**

venogram (Figs. 6 and 7). After close to 6 weeks' post-procedure, the patient was seen at the urology clinic for a follow-up evaluation. The patient expressed that he was able to achieve approximately 65% of full penile erection without medication. By adding 0.25 mL injection of alprostadil and penile stimulation, he was able to achieve complete penile erection after 25 minutes. The patient had similar results with venous constriction band instead of alprostadil injection. By comparison, before the embolization procedure, the patient was unable to achieve any degree of penile erection with or without medication. Complications from the procedure consisted of an instance of partial erection approximately 50%-65% while standing or sitting on a stool without mental arousal. The patient also experienced hemorrhoids, but it quickly resolved. The patient denied erections lasting longer than 4 hours, fever, chills, dysuria, or trouble voiding. Overall, the procedure has been fairly successful. The patient went from being fully impotent even with impotent medications to achieve approximately 65% of full penile erection without medication after the procedure and 25 minutes after 0.25 mL injection of alprostadil and penile stimulation achieve full penile erection.

## Discussion

ED is linked to increasing age, long-term conditions, and different procedures such as radical prostatectomy [1,3]. In this patient, a history of radical prostatectomy is suspected to be the most likely etiology of the venogenic ED. Treatment with phosphodiesterase type 5 inhibitors is usually of minimal efficacy [3]. Prostaglandin injection therapy demonstrates a better outcome initially, but it requires continuous use and often loses its efficacy over time such as in this case [3].



**Fig. 7 – Angiography of the external and internal pudendal veins postembolization with bone structure view for better orientation.**

Therefore, a more long-term solution is needed. Besides injectable medications, conventional treatments of venogenic ED consist of penile constrictor rings, penile vacuum pumps, penile prostheses, and ligation of the deep dorsal vein of the penis [3]. Recently, an interventional approach using selective embolization of veins implicated in venous insufficiency has been clinically studied as an alternative for conventional venogenic ED treatments [4]. It offers more long-term efficacy compared with nonsurgical treatments and is less invasive and more cosmetically pleasing than surgical option [3,4]. The clinical study performed by Rebonato et al [3] consisted of 18 patients with moderate to severe venogenic ED with significant improvement for 16 patients, out of which 7 patients no longer suffered from ED at the end of follow-up. The medical history of patients is not described. In our case, the patient suffered from full impotence even with medication and a history of radical prostatectomy before the onset of venogenic ED. This procedure allowed the patient to have full penile erection supplemented by stimulation and impotence medication. This case gives credence to the safety and high efficacy of this procedure for severe form of venogenic ED with a history of radical prostatectomy. Future patients who develop complete impotence due to venous leakage after radical prostatectomy may greatly benefit from this mostly unused percutaneous procedure and additionally benefit from minimally invasive and thus also cosmetically pleasing nature of this technique.

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