

# Successful management of cavernosal artery pseudoaneurysm using microcoil embolization

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**Abstract:** Erectile dysfunction (ED) is a common condition among men and has several causes. Among men under the age of 40, pelvic or perineal trauma is the most common cause of ED. Pelvic or perineal trauma often results in arterial injury as the likely mechanism of ED. We present the case of a 14-year-old male diagnosed with a pseudoaneurysm causing arteriogenic ED secondary to blunt force trauma to the perineum. We successfully managed arteriogenic ED with superselective embolization using microcoils. We also conclude through a review of the literature that microcoil and Gelfoam yield similar outcomes. We believe that it is important for urologists to be familiar with the various treatment techniques used by interventional radiologists in order to properly manage post-traumatic arteriogenic ED.

**Keywords:** Arteriogenic erectile dysfunction (arteriogenic ED); superselective embolization; post-traumatic erectile dysfunction

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## Introduction

Erectile dysfunction (ED) is a common condition among men and has several causes. In a multinational study of 27,839 men aged 20–75, the overall prevalence of ED was estimated to be 16% worldwide and 22% in the United States (1). Some of the etiologies of ED include neurologic, psychogenic, structural, hormonal, drug-induced, and vasculogenic (2). Among men under the age of 40, pelvic or perineal trauma is the most common cause of ED. Pelvic or perineal trauma often results in arterial injury as the likely mechanism of ED (3,4). In a study of 19 young men who suffered from ED after perineal trauma, cavernosal arterial injury was found in 37% (5). Therefore, arteriogenic ED is a typical presentation of men who suffer from pelvic or perineal trauma.

While post-traumatic, arteriogenic ED is discussed in the literature, there is currently no established standard management for this condition. Management instead depends upon physician experience and preference. We present a 14-year-old adolescent who was diagnosed with a cavernosal artery pseudoaneurysm secondary to blunt

perineal and pelvic trauma. He was successfully managed by vascular interventional radiology (VIR) with superselective microcoil embolization. We also review the current literature regarding the management techniques of post-traumatic, arteriogenic ED.

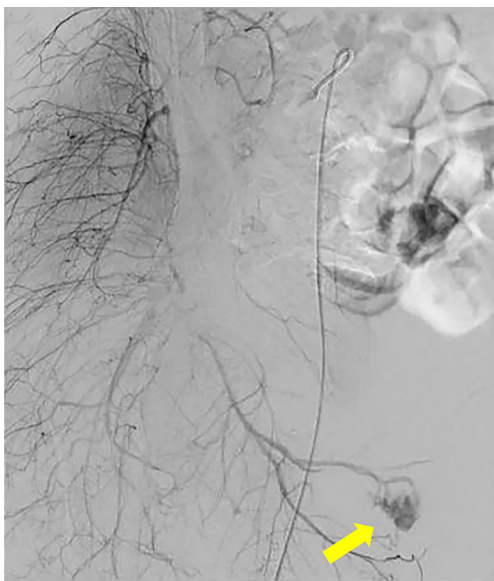
## Case presentation

A 14-year-old boy presented to the Urology clinic with a 2-month history of ED related to a blunt force straddle injury in which his urethra was damaged. The patient had been using a suprapubic catheter since the injury and was scheduled for reconstructive urethroplasty. Erectile function at the time of presentation was reported by the patient to be sufficient for penetration but insufficient for maintenance until orgasm. Penile duplex ultrasound after 5U Trimix and 80% erection demonstrated a right-sided corporal pseudoaneurysm with bilateral peak systolic volumes of 9 cm/sec on right and 27 cm/sec on left, and end-diastolic volumes of 2 and 4 cm/sec on the right and left respectively. It was determined at this time that the pseudoaneurysm had



**Figure 1** Successful management of cavernosal artery pseudoaneurysm using microcoil embolization (6).

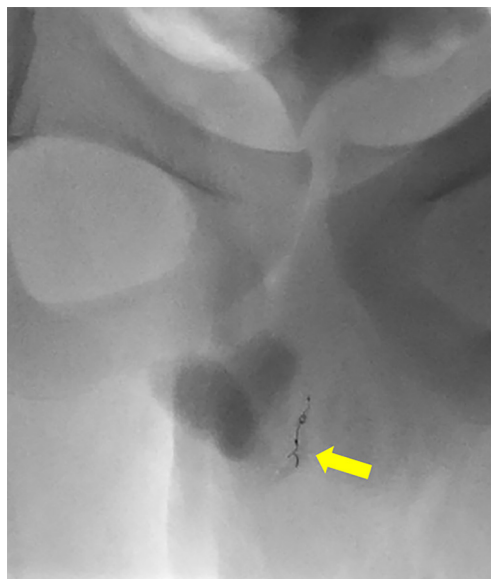
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**Figure 2** Visualization of the pseudoaneurysm on contrast angiography (arrow, the pseudoaneurysm).

a reasonable likelihood of resolving spontaneously and it was safe to proceed with reconstructive surgery as planned. About 10 months after urethroplasty and removal of the suprapubic catheter, the patient was able to attain 50% erection not sufficient for penetration. Referral to interventional radiology was made at this time. Repeat duplex ultrasound revealed that the right-sided corporal pseudoaneurysm had not spontaneously closed.

Superselective angiography of the right bulbar penile artery (*Figure 1*) demonstrated a complex appearing pseudoaneurysm with measurements of 2.4 cm × 1.2 cm (*Figure 2*).



**Figure 3** Deployment of the microcoil (arrow, the deployed microcoil).



**Figure 4** Complete cessation of blood flow into the pseudoaneurysm (arrow, the absence of the pseudoaneurysm and blood flow at the site of the microcoil).

A 2 mm × 4 cm detachable Concerto microcoil was placed within the pseudoaneurysm and feeding vessel (*Figure 3*). Post-embolization angiography demonstrated complete cessation of blood flow into the pseudoaneurysm and redistribution of flow to the distal aspect of the cavernosal artery (*Figure 4*). Post-

**Table 1** Review of the recent literature reporting the treatment of post-traumatic arteriogenic ED with superselective angiographic embolization

Author	Year	Angiographic diagnoses	Embolization material	Erectile function at follow-up
Dallas <i>et al.</i> (10)	2017	Cavernosal artery pseudoaneurysm and cavernosal-urethral fistula; urethralgia	Microcoil	Normal
José <i>et al.</i> (11)	2016	Pudendal artery pseudoaneurysm	Microcoil	Normal
Celtikci <i>et al.</i> (9)	2014	Pudendal artery pseudoaneurysm and AVF	Microcoil	Normal
Tan <i>et al.</i> (12)	2011	Corporal AVF	Gelfoam	Normal
Ringe <i>et al.</i> (13)	2010	Corporal AVF; high flow priapism	Microcoil	Normal
Sandler <i>et al.</i> (14)	2008	Cavernosal pseudoaneurysm; high flow priapism	Gelfoam	Normal
Towbin <i>et al.</i> (15)	2007	Cavernosal AVF; high flow priapism	Microcoil	Normal
Lee <i>et al.</i> (16)	2003	Cavernosal pseudoaneurysm; high flow priapism	Microcoil	Normal
Volkmer <i>et al.</i> (17)	2001	Cavernosal AVF; high flow priapism	Gelfoam	Normal
Talic <i>et al.</i> (18)	2000	Cavernosal AVF; high flow priapism	Gelfoam	Normal
Mourikis <i>et al.</i> (19)	2000	Cavernosal pseudoaneurysm; high flow priapism	Microcoil	Normal
de Pablo Cárdenas <i>et al.</i> (20)	1999	14 cases of high flow priapism in children secondary to trauma	Microcoil; Gelfoam	Normal
Neubauer <i>et al.</i> (21)	1998	Cavernosal AVF; high flow priapism	Ethibloc	Normal
Miller <i>et al.</i> (22)	1995	Asymmetric cavernosal arterial flow; high flow priapism	Gelatin sponge pledgets	Normal
		Cavernosal AVF; high flow priapism	Autologous thrombus	Normal
		Cavernosal AVF; high flow priapism	Gelatin sponge slurry	Normal
		Cavernosal pseudoaneurysm; high flow priapism	Gelatin sponge pledgets	Normal
		Cavernosal pseudoaneurysm; high flow priapism	Gelatin sponge slurry	Normal

AVF, arteriovenous fistulae; ED, erectile dysfunction.

embolization penile duplex ultrasound demonstrated complete resolution of the pseudoaneurysm. At 6-week follow-up after procedure patient reported marked symptomatic improvement.

## Discussion

We present a 14-year-old adolescent who was diagnosed with a cavernosal artery pseudoaneurysm secondary to blunt perineal and pelvic trauma who was successfully managed with superselective microcoil embolization. Post-traumatic, arteriogenic ED is typically caused by blunt force trauma to the perineum or incidental trauma sustained during a

urologic procedure resulting in arteriovenous fistulae (AVF) or pseudoaneurysm (3). The management of post-traumatic, arteriogenic ED with superselective embolization is well described in the literature. However, there is no consensus regarding the best materials to be used (7). We believe that microcoil and Gelfoam are the preferred techniques for embolization of these defects given their similar outcomes, however choosing between them is a matter of physician preference.

Doppler ultrasound (US) has an important role in the management of post-traumatic arteriogenic ED. Doppler US is used to establish the relationship of ED to trauma as

well as to categorize arteriogenic ED based on the pattern of blood flow (8). After embolization of pseudoaneurysms and AVFs, Doppler US is also used to evaluate the cessation of flow through embolized lesions. Doppler US findings vary depending on the type of lesion causing arteriogenic ED, therefore it is important to be able to recognize these findings (3). It should be noted however that diagnosis of arteriogenic ED should be confirmed by penile arteriography (8).

VIR treatment options for pseudoaneurysms and AVFs include procedures such as coil embolization, covered stent placement, stent-assisted coil embolization and transcatheter application of cast-forming agents (Gelfoam) (9). *Table 1* shows a review of the recent literature describing embolization of AVFs and pseudoaneurysms causing ED or high flow priapism.

What can be appreciated is that with all embolization techniques chosen, outcomes are very similar. Erectile function at follow-up returned to normal in all reports—unfortunately results may be biased because negative outcomes are rarely reported. Previous studies have estimated preservation of erectile function after angiographic embolization to be 80% at long term follow-up (8). What can also be appreciated from the literature is an overall trend in recent years towards the use of microcoil for pseudoaneurysms and AVFs, likely due to their versatility. Microcoil fibers elicit a thrombogenic response, causing superimposed thrombosis and vessel occlusion. Coils also range in diameter from submillimeter to several centimeters, and include configurations such as straight, helical, spiral, and various three-dimensional shapes, making them a uniquely versatile option. Gelfoam is also a commonly used material for embolization of cavernosal artery. Gelfoam is available as a sponge or a powder. The sponge form is typically used for large vessel embolization, as in the case of arteriogenic ED. Vessels embolized with Gelfoam recanalize over the ensuing weeks to months, however, this recanalization can be unpredictable. Autologous clot is also used in the setting of large vessel embolization but clots tend to lyse too quickly for effective treatment (23,24). Given the similar outcomes observed between microcoil and Gelfoam, it can therefore be concluded that both options are equally valid. Our study is limited by having a case report with short follow-up following embolization of cavernosal artery.

## Conclusions

Trauma is the most common cause of ED in men under the age of 40. Arteriogenic ED resulting from the formation of

pseudoaneurysm or AVF is a typical presentation of post-traumatic ED. We presented the case of a 14-year-old adolescent diagnosed with a pseudoaneurysm causing arteriogenic ED secondary to blunt force trauma to the perineum. We conclude through successful management of this case that superselective embolization is a safe and effective treatment modality for pseudoaneurysm causing arteriogenic ED. We conclude through a review of the literature that the use of microcoil and Gelfoam as the embolizing technique yield similar outcomes. We believe that it is important for urologists to be familiar with the various VIR treatment techniques in order to properly manage post-traumatic arteriogenic ED.

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## Footnote

*Conflicts of Interest:* The authors have no conflicts of interest to declare.

*Informed Consent:* Written informed consent was obtained from the patient for publication of this report and any accompanying images.

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