EJVES Vascular Forum (2021) 51, 1–4

CASE REPORT

Off Label Use of StarClose for Superior Gluteal Artery Puncture Closure Following Embolisation of an Internal Iliac Artery Type II Endoleak

Evan Norris *, **Brian Bronzo, Olufoladare Olorunsola**

California Pacific Medical Center, Interventional Radiology, San Francisco, CA, USA

Introduction: Embolisation of type II internal iliac artery endoleaks is challenging given limited options for obtaining transarterial access and for achieving access site haemostasis.
Report: An 86 year old woman who had undergone endovascular repair for an aorto-iliac aneurysm was found to have serial enlargement of the left common iliac artery portion of the aneurysm observed over a period of two years. At the time of the initial repair, the left internal iliac artery was embolised using coils, and then was covered by extending the iliac limb endoprosthesis into the external iliac artery. However, computed tomography angiography showed recanalisation of the previously coiled left internal iliac artery, thus allowing contrast to flow into the left common iliac aneurysm sac. Given that the internal iliac artery origin was covered and there was no visible collateral pathway, direct puncture of the superior gluteal artery was selected to access the left internal iliac artery in a retrograde fashion. This presented a challenge in terms of achieving haemostasis given the deep position of the arterial access site, which was unlikely to be amenable to manual compression. Off label StarClose was chosen for closure of the superior gluteal arterial access, with successful haemostasis and preserved patency of the vessel.
Discussion: Off label StarClose was used successfully to obtain haemostasis after obtaining percutaneous transgluteal access to the superior gluteal artery in order to embolise a type II endoleak arising from the internal iliac artery. Keywords: StarClose; Iliac artery type II endoleak; Arterial closure device; Haemostasis; Superiorgluteal artery

Article history: Received 12 November 2020, Revised 17 March 2021, Accepted 25 March 2021,
Keywords: Arterial closure device, Haemostasis, Iliac artery type II endoleak, StarClose, Superiorgluteal artery

INTRODUCTION

Type II endoleaks are common after endovascular aneurysm repair and may warrant embolisation if there is associated enlargement of the aneurysm sac. Embolisation of type II endoleaks arising from the internal iliac artery (IIA) can be particularly challenging given the limited options for transarterial access, as the endograft covers the IIA origin. Several reports have described a transgluteal approach in which the superior gluteal artery is punctured directly to gain access to the iliac system, although very few of these reports specifically address methods for obtaining haemostasis. Given the deep and often intrapelvic location of the superior gluteal arterial access, the ability to apply effective manual compression is limited. A case of trans-superior gluteal artery treatment of an internal iliac type II endoleak followed by the successful off label use of the StarClose SE Vascular Closure System (Abbott Vascular, Abbott Park, IL, USA) to achieve haemostasis while preserving the patency of the vessel is described.

CASE REPORT

An 83 year old woman presented with an incidentally discovered aneurysm of the infrarenal abdominal aorta and bilateral common iliac arteries (CIAs), extending to involve both iliac bifurcations. The maximum aneurysm diameter was 6.4 cm in the left CIA. She was treated with a Gore Excluder C3 stent graft (Gore Medical, Flagstaff, AZ, USA), which included an iliac branched endoprosthesis on the right. On the left, the IIA was embolised using Cook Tornado coils (Cook Medical, Bloomington, IN, USA) and then covered by extending the iliac limb into the external iliac artery. Focused angiographic images showing the left iliac repair are shown in Fig. 1. An initial follow up computed tomography angiography (CTA) obtained at one month demonstrated no endoleak and stable aneurysm size. The next CTA obtained two years later revealed a type II endoleak attributable to recanalisation of the previously coiled left IIA, allowing contrast to flow into the left CIA sac. There was associated enlargement of the left common iliac aneurysm to 6.7 cm. The next CTA obtained one year later showed persistence of the endoleak, with further enlargement of the left common

* Corresponding author. California Pacific Medical Center, Interventional Radiology, 1101 Van Ness Avenue, San Francisco, CA 94109, USA.
E-mail address: ecnorris13@gmail.com (Evan Norris).

https://doi.org/10.1016/j.ejvsvf.2021.03.002

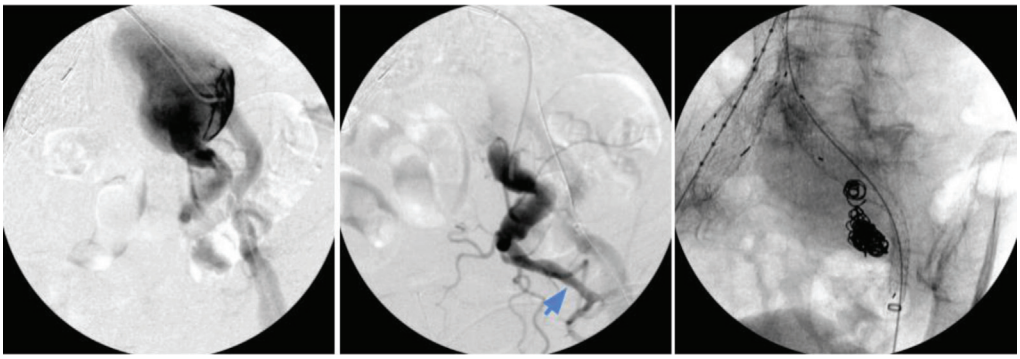

Figure 1. Left panel: digitally subtracted angiographic image with injection of the left common iliac artery aneurysm. Centre panel: digitally subtracted angiographic image with selective injection of the left internal iliac artery; its branches include the superior gluteal artery (blue arrow). Right panel: endovascular aneurysm repair with extension of the left iliac limb into the external iliac artery after embolising the internal iliac artery.

iliac aneurysm to 7.1 cm, at which point embolisation was indicated (the patient was now 86 years old).

There was no identifiable collateral pathway on CTA that would allow sac catheterisation via lower or upper limb access, thus the decision was made to access directly the left superior gluteal artery. Vascular surgery and the blood bank were made aware of the procedure and were on standby, given the risk of uncontrollable haemorrhage. The patient was positioned prone under general anaesthesia. Transgluteal ultrasound afforded suboptimal visualisation of the superior gluteal artery branches; therefore, the superior gluteal artery trunk was cannulated under fluoroscopic guidance using a 22 G Chiba needle (Cook Medical) targeting mural calcifications using oblique fluoroscopic views. The site of arterial entry was intrapelvic (deep to the greater sciatic notch; Fig. 2). A 0.018″ Cope guidewire (Cook Medical) was advanced through the needle. An AccuStick conversion set (Boston Scientific, Marlborough, MA, USA) was used to upsize to an Amplatz wire (Cook Medical), and a 6 F sheath was then placed with its tip reaching the IIA. Contrast injection through the sheath revealed recanalisation of the previously coiled IIA with contrast flowing into the CIA aneurysm sac (Fig. 3), which was subsequently catheterised. Two 16 mm × 40 cm 0.021″ Concerto detachable coils (Medtronic, Dublin, Ireland) were deployed within the aneurysm sac to provide a scaffold. Next, n-butyl

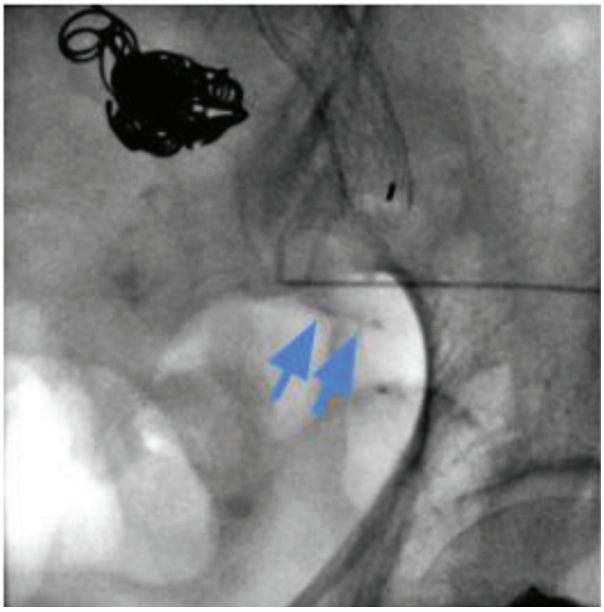

Figure 2. Mural calcifications (blue arrows) demarcate the inferior wall of the superior gluteal artery, allowing a needle to be directed into the vessel lumen under fluoroscopic guidance. The site of arterial entry is deep to the greater sciatic notch.

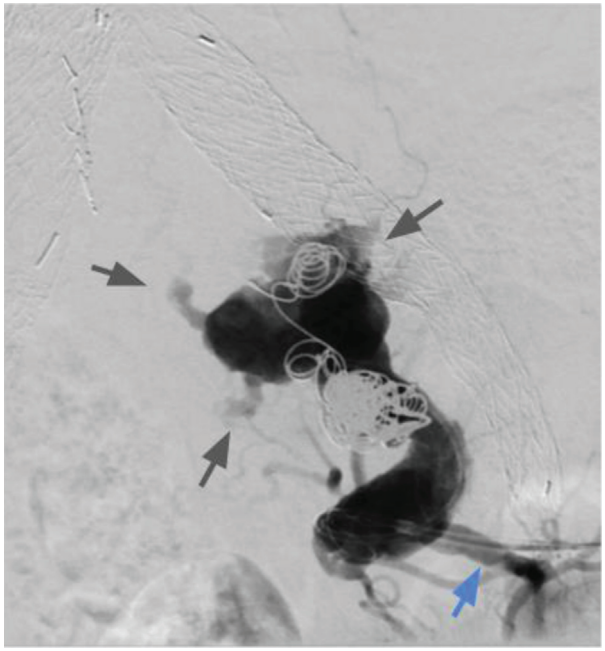

Figure 3. Digitally subtracted internal iliac artery injection demonstrating recanalisation of the previously embolised internal iliac artery, with contrast filling the caudal portion of the common iliac artery aneurysm sac (black arrows). The aneurysm sac and internal iliac artery (as demarcated by the coils) are superimposed in this projection. A blue arrow shows the superior gluteal artery where accessed.

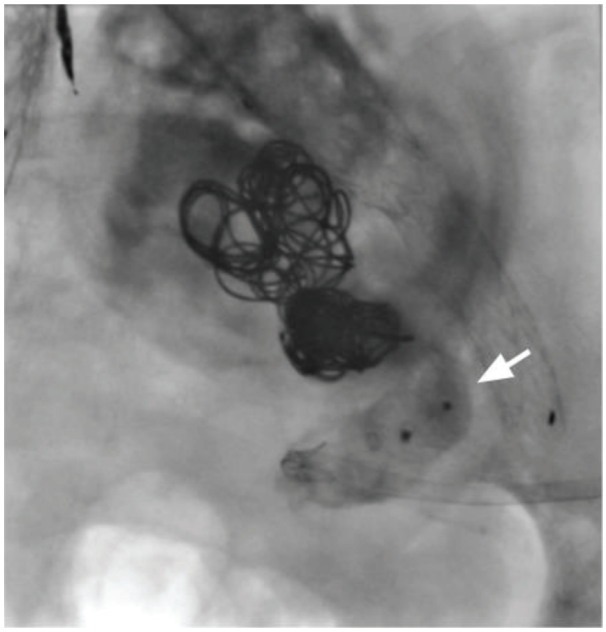

Figure 4. Post-treatment fluoroscopic image without injection showing additional coils deployed within the filling portion of the aneurysm, radio-opaque glue distributed diffusely throughout the aneurysm sac, and an Amplatzer plug within the internal iliac artery (white arrow).

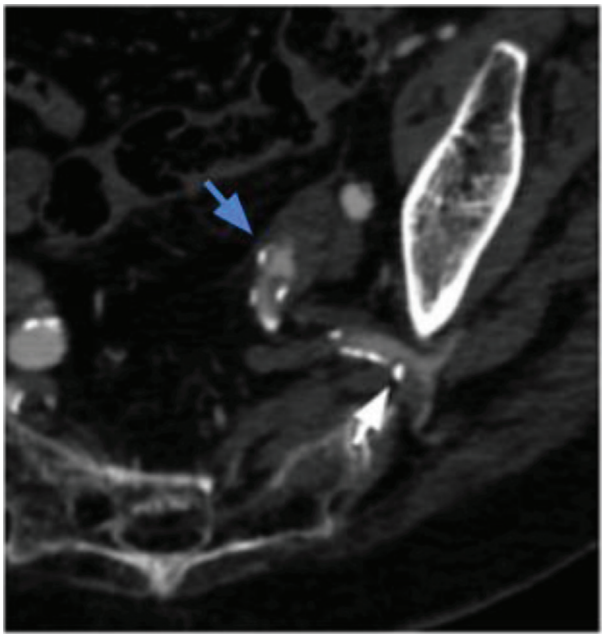

Figure 5. Axial image from a six month follow up computed tomography angiogram showing the StarClose clip (white arrow) along the outside wall of the patent superior gluteal artery. Although the clip appears slightly oblique relative to the vessel, this does not appear to correlate with failure. Notably, mural calcifications are seen involving the intrapelvic segment of the superior gluteal artery. The internal iliac artery (blue arrow) remains patent peripheral to the site of embolisation.

cyanoacrylate was used to fill the flow channel in a 2:3 mixture with lipiodol. Finally, a 12 mm Amplatzer II vascular plug (St. Jude Medical, Minnesota, MN, USA) was deployed in the IIA (Fig. 4). A completion arteriogram confirmed no further flow within the common iliac aneurysm sac and allowed measurement of the superior gluteal artery calibre (5 mm at the point accessed). The decision was made to use StarClose off label to seal the arteriotomy. Following blunt dissection to the level of the vessel, the vascular closure device was deployed in the usual fashion with the wire removed and without the need for subsequent manual compression. The patient was placed on bed rest for four hours without clinical evidence of significant bleeding. Routine CTA obtained the next day demonstrated no evidence of pelvic haemorrhage or soft tissue haematoma. A six month follow up CTA demonstrated preserved patency of the superior gluteal artery and its branches, with the StarClose clip positioned just outside the vessel (Fig. 5). The aneurysm sac remained stable in size without radiographic evidence of a persistent endoleak.

DISCUSSION

Type II endoleaks fed by the IIA present a challenge in terms of obtaining access for embolisation in the absence of well developed collateral circuits. Direct puncture of the superior gluteal artery has occasionally been presented as a solution; however, approaches to achieving access site haemostasis need to be considered given the deep position of the vessel and the lack of a bony structure against which manual compression can be applied.[1] In previous reports, occlusive embolisation of the superior gluteal artery has been described using coils, glue, or vascular plugs, thus sacrificing the vessel.[2–4] In another report, Gelfoam (Pfizer, New York, NY, USA) was used as a temporary embolic.[5] In contrast to these methods of occluding the vessel, arterial closure devices aim to seal an arteriotomy while preserving vessel patency. Theoretically, this reduces the risk of distal ischaemia and simultaneously preserves the vessel for potential future access. A decision was made to use StarClose, which is indicated for closure of the common femoral artery following catheterisation with a 5 or 6 F sheath.[6] Of note, the superior gluteal artery in this case met the minimum vessel calibre that is recommended for on label use of StarClose in the common femoral artery ($\geq$ 5 mm), although it is recognised that the superior gluteal artery may be of smaller calibre in many patients. Additionally, it is acknowledged that the overlying nitinol clip deployed with the StarClose device could theoretically hamper vascular re-access.

Only one other reported case of an arterial closure device used in a similar setting was found. Menon et al.[7] reported successful haemostasis using Angio-Seal (Terumo, Tokyo, Japan) within an unspecified posterior branch of the IIA accessed for endoleak embolisation. In the present report, more precise details regarding the name and location of the artery accessed are provided. Notably, the arterial access point in the present case was located within the bony pelvis and therefore unlikely to be amenable to manual compression. For this reason, vascular surgery was on

standby in case of uncontrollable haemorrhage, and a vascular closure device was chosen. The StarClose was selected specifically given abundant institutional experience with this device, noting that closure devices that do not require guidewire removal prior to closure could leave the door open to additional salvage measures. Although there is no literature addressing the use of StarClose in the present setting, the device demonstrates a similar safety and efficacy profile relative to other closure devices for common femoral artery haemostasis.[8] Future investigations will be necessary to determine the reproducibility of the results, and the potential for similar use in other sufficiently large vessels in similarly challenging locations.

CONCLUSION

Type II endoleaks of the iliac system can be embolised by accessing the superior gluteal artery directly; however, ensuring haemostasis at the access site is a concern given the deep position of the vessel. A case in which StarClose was used off label to achieve successful haemostasis in this setting is reported. Further reports are necessary to establish the reproducibility of the results and more broadly to investigate the applicability of closure devices in other challenging locations.

REFERENCES

1 Herskowitz MM, Walsh J, Jacobs DT. Direct sonographic-guided superior gluteal artery access for treatment of a previously treated expanding internal iliac artery aneurysm. *J Vasc Surg* 2014;**59**:235—7.
2 Werner-Gibbings K, Rogan C, Robinson D. Novel treatment of an enlarging internal iliac artery aneurysm in association with a type 2 endoleak via percutaneous embolisation of the superior gluteal artery through a posterior approach. *Case Rep Vasc Med* 2013;**2013**:861624.
3 Patel SD, Perera A, Law N, Mandumula S. Case report. A novel approach to the management of a ruptured Type II endoleak following endovascular repair of an internal iliac artery aneurysm. *Br J Radiol* 2011;**84**:e240—2.
4 Tigkiropoulos K, Lazaridis I, Stavridis K, Tympanidou M, Karamanos D, Saratzis N. Inferior gluteal artery surgical access for embolization of large internal iliac artery aneurysm in a hostile abdomen. *J Surg Case Rep* 2019;**2019**:rjz098.
5 Kabutey NK, Siracuse JJ, Gill H, Kundi R, Meltzer AJ, Schneider DB. Percutaneous transgluteal coil embolization of bilateral internal iliac artery aneurysms via direct superior gluteal artery access. *J Vasc Surg* 2014;**60**:226—9.
6 Abbott Vascular. *StarClose SE vascular closure system*. Available at: https://www.cardiovascular.abbott/int/en/hcp/products/peripheral-intervention/starclose-se-vascular-closure-system.html. [Accessed 25 March 2021].
7 Menon PR, Agarwal S, Rees O. Direct puncture embolisation of the non-coil-embolised internal iliac artery post EVAR — a novel use of the Angio-Seal closure device. *CVIR Endovasc* 2018;**1**:6.
8 Lucatelli P, Fanelli F, Cannavale A, Corona M, Cirelli C, D'Adamo A, et al. Angioseal VIP® vs. StarClose SE® closure devices: a comparative analysis in non-cardiological procedures. *J Cardiovasc Surg (Torino)* 2017;**58**:80—6.