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"THROUGH-THE-STRUT" RE-ENTRY TECHNIQUE: A SUCCESSFUL ENDOVASCULAR SALVAGE OF IATROGENIC SUBINTIMAL STENT DEPLOYMENT IN THE COMMON ILIAC ARTERY

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ABSTRACT

Introduction: Endovascular-first strategies for aortoiliac occlusive disease (AIOD) are standard, yet they carry risks of iatrogenic complications. Subintimal stent deployment is a rare but limb-threatening event that traditionally requires emergency open surgery. This report describes a successful endovascular bailout using a novel through-the-strut re-entry technique.

Case presentation: A 58-year-old male with diabetes and a 40 pack-year smoking history presented with rest pain and cyanosis of the right first toe (Rutherford 4). Imaging confirmed severe right common iliac artery (CIA) stenosis. During intervention, a 0.035" hydrophilic wire inadvertently created a subintimal dissection. A 7 – 57 mm balloon-expandable stent (Besmooth) was deployed within the false lumen, causing acute limb ischemia. The complication was managed by navigating a 5F JR catheter through the misplaced stent's struts to re-access the true lumen. After sequential balloon dilatation through the struts (4F to 7F), an 8 – 100 mm self-expanding Lifestent was deployed to re-line the artery, crushing the initial stent against the wall. Immediate blood flow was restored. The ankle-brachial index improved from 0.4 pre-procedure to 1.1 after intervention. At 6-month follow-up, the patient remained asymptomatic with a patent "stent-in-stent" complex on CTA.

Conclusion: Iatrogenic subintimal stent deployment can be successfully salvaged through the "through-the-strut" technique. This approach avoids the high morbidity of emergency open bypass in high-risk patients and provide an effective endovascular bailout strategy to restore true lumen perfusion and avoid emergency surgical conversion in selected patients..

Keywords: *Endovascular bailout, through-the-strut technique, iliac artery stenosis, iatrogenic dissection*

1. INTRODUCTION

Aortoiliac occlusive disease (AIOD) remains a significant cause of morbidity, often requiring intervention to restore limb perfusion and quality of life. Over the past decade, endovascular therapy has eclipsed open surgery as the first-line treatment for most Trans-Atlantic Inter-Society Consensus II (TASC II) lesions due to its minimally invasive nature and favorable short-term outcomes [1]. However, the increasing complexity of these procedures, particularly in cases involving chronic total occlusions or severely calcified vessels, carries a documented risk of iatrogenic complications.

Among these, iatrogenic arterial dissection is a particularly formidable challenge. It typically occurs during the initial wire crossing or when advancing delivery systems, potentially leading to the creation of a false lumen. The most critical technical error occurs when a stent is inadvertently deployed within this false lumen, a "geographic miss" that can compress the true lumen and cause acute limb-threatening ischemia [2]. Such scenarios traditionally mandated urgent conversion to open surgical bypass; however, the evolution of specialized "bailout" techniques now allows for endovascular salvage.

In this report, we present the case of a 58-year-old male with severe right common iliac artery stenosis where a balloon-expandable stent was mistakenly deployed into a false lumen. We aim to analyze the clinical decision-making process and the specific endovascular maneuvers—including the use of a "re-entry" strategy through the stent struts—used to successfully restore flow to the true lumen [3]. This case highlights the importance of early recognition and technical adaptability in managing complex iatrogenic errors in the catheterization laboratory.

2. CASE PRESENTATION

2.1. Patient History and Clinical Presentation

A 58-year-old male patient presented to our institution with a one-month history of progressive claudication in the right lower extremity. His walking distance had diminished to approximately 20 meters, accompanied by rest pain and cyanosis of the right first toe. The patient's medical history was significant for hypertension, type 2 diabetes mellitus, and a heavy smoking habit (40 pack-years). On physical examination, the right femoral pulse was markedly diminished compared to the left, and the right foot showed signs of chronic limb-threatening ischemia (CLTI), specifically Rutherford category 4. The pre-procedural ankle-brachial index (ABI) of the right lower extremity was 0.4, consistent with severe perfusion impairment and critical limb ischemia.

Computed tomography angiograp hy (CTA) of the abdominal aorta and lower extremities revealed severe, eccentric stenosis of the right common iliac artery (CIA) with heavy calcification, consistent with a TASC II B lesion.

The patient was scheduled for elective endovascular revascularization. Under local anesthesia, a 6F sheath was placed in the left common femoral artery for diagnostic purposes, and a pigtail catheter was positioned at the aortic bifurcation. Retrograde access was obtained via the right common femoral artery (ipsilateral).

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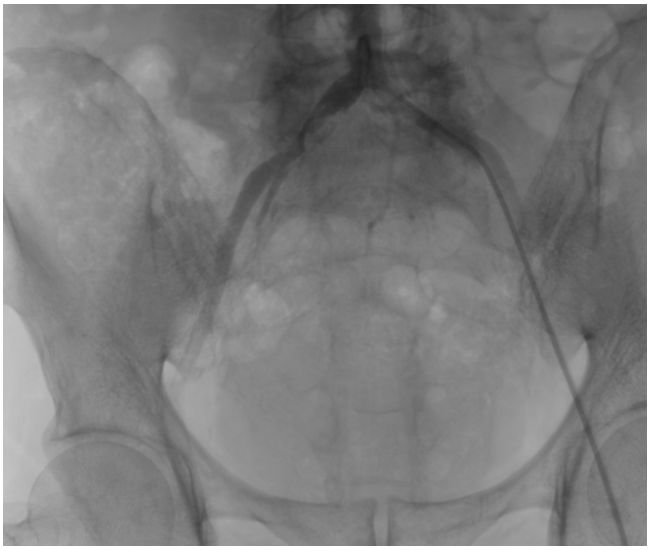

Figure 1. Contralateral angiography showing a heavily calcified stenotic right common iliac artery

During the initial attempt to cross the lesion from the right side using a 0.035" hydrophilic Terumo guidewire (Terumo Corp., Tokyo, Japan), resistance was encountered. However, the operator believed the wire had successfully crossed the stenosis. Without adequate multi-angle fluoroscopic confirmation, a 7 x 57 mm Besmooth balloon-expandable stent (Bentley InnoMed, Hechingen, Germany) was deployed.

Post-stenting angiography immediately revealed a severe limb-threatening iatrogenic complication: The proximal end of the stent was located within a false lumen created by the guidewire dissection, while the distal end remained in the true lumen. This "geographic miss" resulted in total occlusion of the true lumen and secondary thrombosis within the false lumen, leading to acute loss of flow to the right leg.

Figure 2. Intra-operative DSA showing the stent deployed in the false lumen and absence of antegrade flow

Bailout Strategy and Technical Solution Given the critical iatrogenic situation, an urgent endovascular "bailout" was initiated by a senior interventionalist. The primary challenge was to re-enter the true lumen, which was now compressed by the stent in the false lumen.

A 5F JR (Judkins Right) diagnostic catheter was advanced from the right femoral access. Using a combination of a 0.035" hydrophilic guidewire and the JR catheter, the operator meticulously probed the mid-portion of the previously deployed Besmooth stent. Under roadmap guidance from the contralateral pigtail catheter, the guidewire was successfully passed through the metallic struts (cell) of the stent, navigated across the dissected subintimal plane, and finally re-entered the true lumen of the common iliac artery. Intravascular ultrasound (IVUS) was not available during the procedure. Therefore, true lumen re-entry was confirmed using contralateral angiography, roadmap guidance, and contrast injection through the catheter under digital subtraction angiography (DSA).

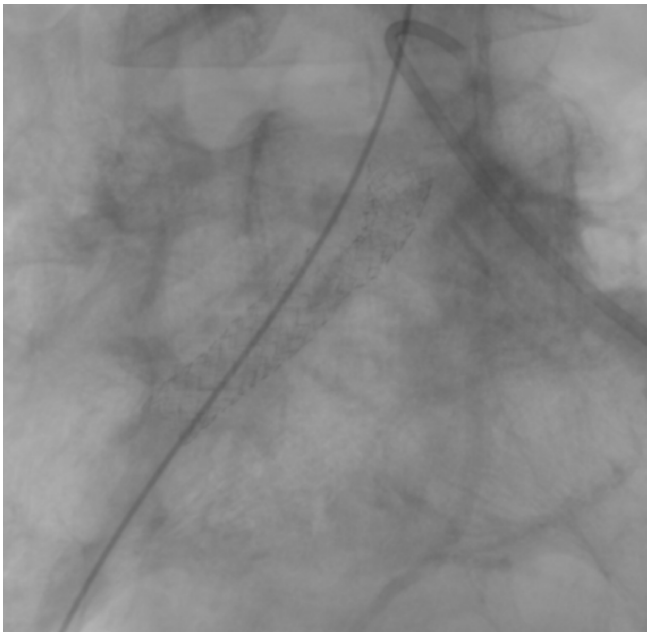

Figure 3. Hydrophilic guidewire traversing the stent strut with successful re-entry into the true lumen

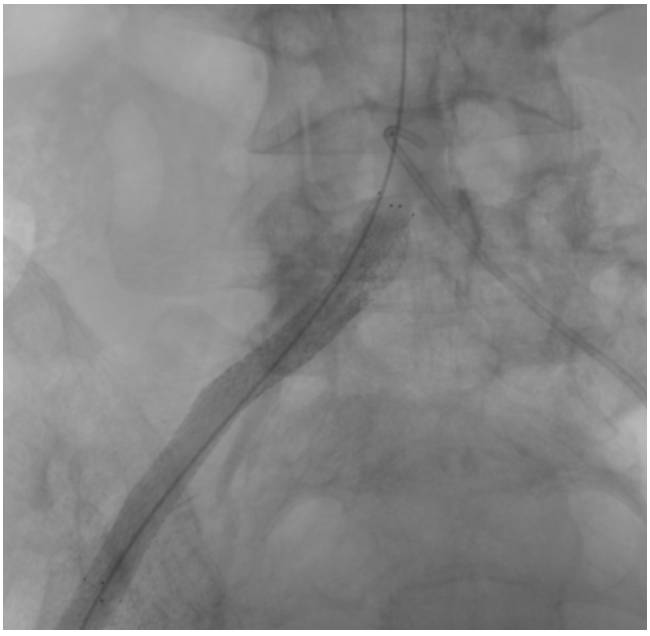

Figure 4. Final angiographic result demonstrating restoration of antegrade flow after self-expanding stent deployment

Once the true lumen position was confirmed by contrast injection, the "through-the-strut" track was sequentially dilated using peripheral balloons of increasing sizes (from 4mm to 7mm). This maneuver served to "crush" the portion of the stent located in the false lumen and create a new channel into the true lumen. To stabilize this re-entry point and ensure long-term patency, a second stent—an 8 x 100 mm Lifestent self-expanding stent (Becton Dickinson, Tempe, AZ)—was deployed in a "telescoping" fashion. This second stent bridged the gap from the true lumen into the distal part of the first stent, effectively creating a new endoluminal flow path.

Post-operative Course and Follow-up The final angiogram demonstrated excellent antegrade flow into the right external and internal iliac arteries with no residual dissection or significant stenosis. The patient's rest pain disappeared immediately post-procedure, and the cyanosis of the first toe resolved within 48 hours. Post-procedural hemodynamic assessment demonstrated marked improvement, with the ABI increasing to 1.1, indicating successful restoration of limb perfusion. He was discharged on a dual antiplatelet regimen (Aspirin 100mg and Clopidogrel 75mg) and optimized statin therapy.

At the 6-month follow-up, the patient remained asymptomatic with an improved walking distance of over 1000 meters. A follow-up CTA confirmed the stability of the "stent-in-stent" complex, with no signs of migration, fracture, or in-stent restenosis. The right common iliac artery remained widely patent.

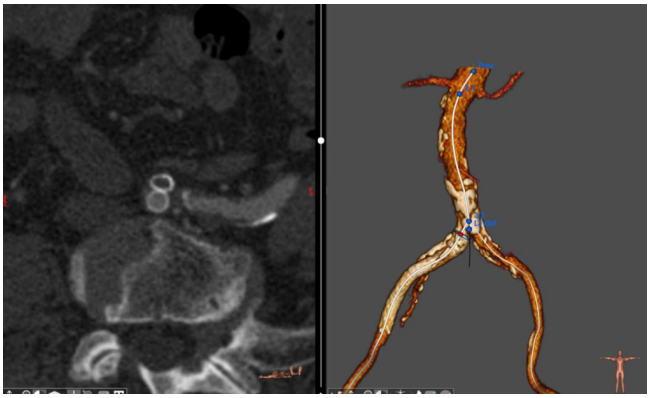

Figure 5. 6-month post-operative CT scan demonstrating patent iliac stents with preserved true lumen flow

4. DISCUSSION

The transition toward endovascular-first strategies for aortoiliac occlusive disease (AIOD) has fundamentally changed the therapeutic landscape, offering patients lower perioperative morbidity compared to open surgical reconstruction. However, as endovascular techniques are increasingly applied to complex TASC II C and D lesions, the risk of iatrogenic complications—specifically arterial dissection and "geographic miss" during stent deployment—remains a critical challenge. The case of this 58-year-old patient, who suffered a subintimal stent placement during a common iliac artery intervention, serves as a significant clinical lesson in complication management and the endovascular learning curve.

4.1. Mechanics of Iatrogenic Failure

Iatrogenic arterial dissection is an inherent risk, particularly when navigating calcified or eccentric lesions. In this case, the use of a 0.035" hydrophilic guidewire provided the necessary trackability but lacked the tactile feedback to alert the operator that the wire tip had entered the subintimal space. When a balloon-expandable stent (Besmooth) is deployed within this false lumen, it does not merely fail to open the vessel; it actively compresses the adjacent true lumen, leading to acute limb-threatening ischemia.

According to the SCAI Expert Consensus Statement, the mastery of aorto-iliac interventions requires not only the ability to cross complex lesions but also the technical maturity to recognize and manage iatrogenic injuries such as dissections using endovascular tools. The consensus emphasizes that the complexity of the patient's clinical condition should dictate the selection of appropriate bailout procedures, moving away from immediate surgical conversion [5].

4.2. Through-the-Strut re-entry

The decision to salvage the procedure endovascularly is supported by evidence that endovascular-first approaches for AIOD are safe and do not compromise future surgical options [4]. The "through-the-strut" re-entry maneuver performed in this case—navigating a 5F JR catheter through the cells of the misplaced Besmooth stent to reach the true lumen—is an advanced bailout strategy.

This maneuver mirrors the principles found in the MIMIC trial and studies by Kokkinidis et al. (2018), which demonstrate that even in calcified, thrombotic, and complex lesions (including CTOs), endovascular techniques can achieve high technical success. Kokkinidis reported that for such challenging lesions, 1-year primary patency can reach 78% and secondary patency as high as 92% [6]. The subsequent use of a self-expanding Lifestent to "re-line" the artery after crushing the initial stent aligns with evidence that self-expanding stents (SES) offer superior conformability and flexibility in disrupted vascular anatomy compared to balloon-expandable stents [6].

4.3. Learning Curve and Complication Readiness

Complex endovascular interventions inherently carry a risk of iatrogenic complications,

particularly in heavily calcified and anatomically challenging lesions. Early recognition of procedural failure, prompt reassessment of guidewire position, and availability of bailout strategies are critical determinants of procedural success.

In the present case, rapid identification of flow loss and immediate transition to a re-entry strategy enabled restoration of true lumen perfusion without conversion to open surgery. The involvement of an experienced interventionalist highlights the importance of procedural preparedness and multidisciplinary support in managing limb-threatening complications during complex aortoiliac interventions.

As emphasized in contemporary SCAI recommendations, successful outcomes in complex AIOD depend not only on lesion crossing but also on the ability to manage procedural complications and optimize the final hemodynamic result [7].

4.4. Endovascular Salvage vs. Open Surgical Bypass

Traditionally, an iatrogenic iliac occlusion would lead to an emergency aortofemoral bypass. However, open surgery in an acute, heparinized setting carries significant risks of hematoma, wound complications, and infection, especially in a diabetic smoker with a long history of tobacco use (40 pack-years). Evidence from the ACR Appropriateness Criteria suggests that endovascular approaches offer comparable mid-term outcomes to open surgery while significantly reducing the initial procedural burden on the patient [8].

The successful salvage prevented the systemic stress of major surgery, which was crucial given the patient's comorbidities. The 6-month follow-up confirming patency validates the "through-the-strut" technique as a smart, effective choice.

Several limitations should be acknowledged. First, this report describes a single-case experience and therefore has limited generalizability. Second, intravascular ultrasound (IVUS), which may provide superior confirmation of guidewire position and true lumen re-entry during complex iliac interventions, was not available in our hospital. Wire position confirmation relied on angiographic visualization, roadmap guidance, and contrast injection. Finally, longer follow-up is required to assess the long-term durability of the through-the-strut reconstruction.

5. CONCLUSION

Iatrogenic subintimal stent deployment during iliac artery intervention is a rare but potentially limb-threatening complication. The through-the-strut re-entry technique may provide an effective endovascular bailout strategy for restoring true lumen perfusion and avoiding emergency surgical conversion in selected patients.

This case demonstrates that careful procedural reassessment, timely recognition of wire malposition, and preparedness with rescue techniques are essential to achieving favorable outcomes during complex aortoiliac interventions.

REFERENCES

1. Norgren L, Hiatt WR, Dormandy JA, et al. Inter-Society Consensus for the Management of Peripheral Arterial Disease (TASC II). J Vasc Surg. 2007;45 Suppl S:S5-67. doi: 10.1016/j.jvs.2006.12.037

2. Klein AJ, Jaff MR, Gray BH, et al. SCAI expert consensus statement for aorto-iliac arterial intervention appropriate use. Catheter Cardiovasc Interv. 2014;84(4):520-528. doi: 10.1002/ccd.25505

3. Björck M, Koelemay M, Acosta S, et al. Editor's Choice - European Society for Vascular

Surgery (ESVS) 2020 Clinical Practice Guidelines on the Management of Acute Limb Ischaemia. Eur J Vasc Endovasc Surg. 2020;59(2):173-218. doi: 10.1016/j.ejvs.2019.09.006

4. Carlo C, Latz CA, Boitano LT, et al. An Endovascular-First Approach for Aortoiliac Occlusive Disease is Safe. Ann Vasc Surg. 2021;70:62-69. (Ref #41 in ACR document).

5. Klein AJ, Jaff MR, Gray BH, et al. SCAI expert consensus statement for aorto-iliac arterial intervention appropriate use. Catheter Cardiovasc Interv. 2014;84(4):520-528. (Standard reference in SCAI Evidence Tables).

6. Kokkinidis et al. Primary and secondary patency in EIA, CTO, and calcified lesions using SES and BES. Journal of Endovascular Therapy. 2018;25(2):183–191. (SCAI Evidence Table, Page 1).

7. Zander et al. Bifurcated endograft as a minimally invasive alternative to open surgery in high surgical risk patients. J Vasc Interv Radiol. 2011;22:1124–1130. (SCAI Evidence Table, Page 197).

8. Rocha-Neves J, Ferreira A, Sousa J, et al. Endovascular Approach Versus Aortobifemoral Bypass Grafting: Outcomes in Extensive Aortoiliac Occlusive Disease. Vasc Endovascular Surg. 2020;54(2):102-110. (Ref #44 in ACR document).