

# 腘动脉支架断裂伴支架内完全闭塞开放手术取出1例

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## 摘要

支架内再狭窄(in-stent restenosis, ISR)是血管外科介入治疗术后常见的并发症, 支架断裂是引起支架内再狭窄的危险因素之一, 然而支架内完全闭塞在临床上较为罕见。本文报告了一例69岁男性腘动脉支架内完全闭塞, 行动脉血栓抽吸与球囊扩张均未成功, 最终行开放手术取出完全闭塞支架。患者动脉支架位置跨膝关节, 是支架断裂的危险因素, 在临床工作中应注意支架植入术后病人的随访及复查, 避免因支架断裂造成的狭窄等不良后果, 提高远期通畅率。

## 关键词

腘动脉, 支架断裂, 支架内再狭窄

# Open Surgery for Popliteal Artery Stent Fracture with Total Occlusion in the Stent: A Case Report

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## Abstract

**In-stent restenosis (ISR) is a common complication after vascular surgical intervention. Stent fracture is one of the risk factors for in stent restenosis. However, complete stent occlusion is rare in clinical practice. This paper reported a 69-year-old man with popliteal artery completely occluded in the stent, but the arterial thrombus aspiration and balloon dilation were unsuccessful, and the stent was finally removed by open surgery. The patient's artery stent position crosses the knee joint, which is a risk factor of stent rupture. In clinical work, attention should be paid to the follow-up and reexamination of patients after stent implantation to avoid adverse consequences such as stenosis caused by stent rupture and improve long-term patency rate.**

## Keywords

**Popliteal Artery, Stent Fracture, In-Stent Restenosis**

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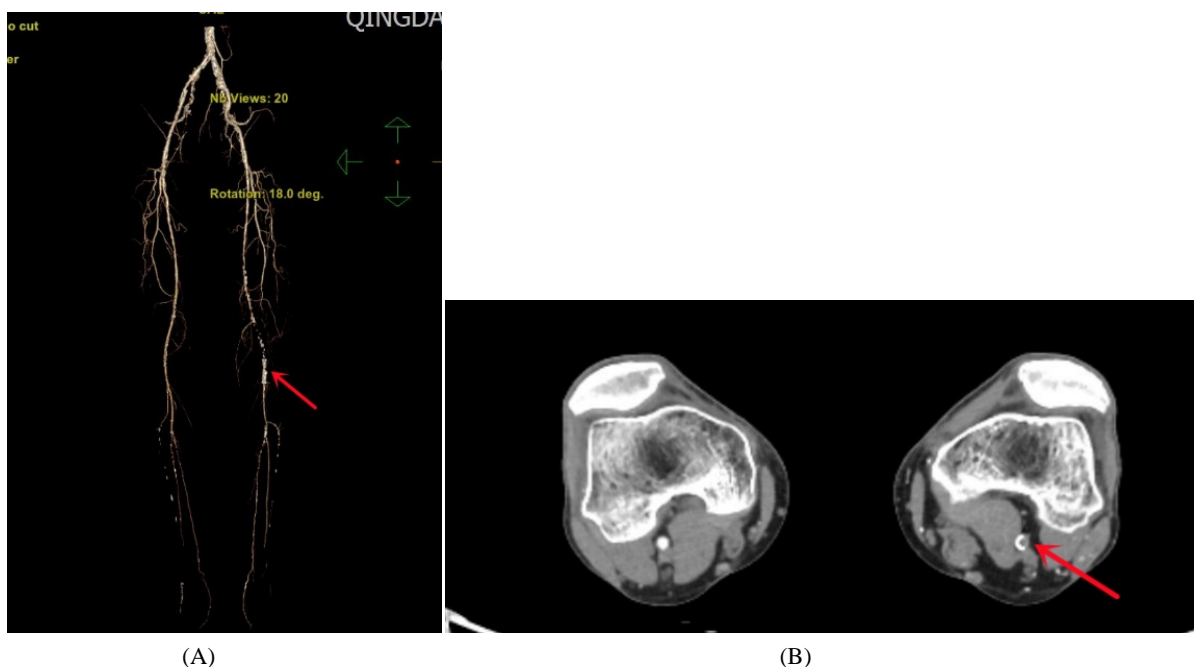
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## 1. 引言

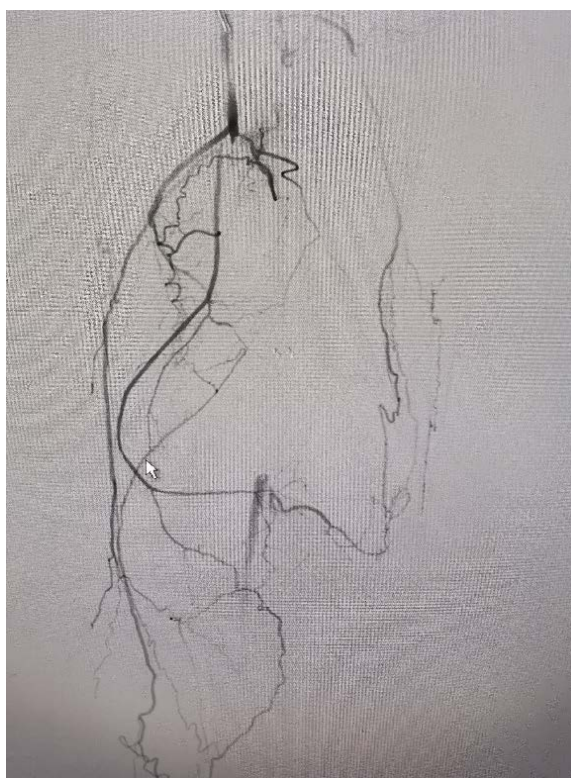
支架内再狭窄是血管外科介入治疗术后常见的并发症，有研究表明，腔内介入治疗后患者 1 年支架内再狭窄的发生率可高达 15%~40% [1] [2]。支架断裂与支架内再狭窄密切相关，并影响一期支架通畅率 [3]。青岛大学附属青岛市市立医院血管外科收治 1 例腘动脉支架断裂伴支架内完全闭塞的患者，采用开放手术取出支架，现报道如下。

## 2. 临床资料

患者，男，69 岁，于 2022 年 6 月 7 日因“左腘动脉支架植入术后 10 余年，间歇 2 年”入院，左下肢卢瑟福分级 3 级，跛行距离 50 m。既往有高血压病史 40 余年，血压最高达 200/110 mmHg，规律口服“缬沙坦、倍他乐克”治疗，血压控制在 160/80 mmHg 左右。10 余年前在我院行“左腘动脉支架植入术”，术后不规律服用“阿司匹林”。吸烟史 50 年，约 10 支/天，未戒烟。入院 CTA 示：左腘动脉支架术后，支架出现部分缺损(图 1(A)、图 1(B))。我科定于 2022-06-10 在局麻下试行“左下肢动脉血栓抽吸 + 左下肢动脉球囊扩张成型术”，术中造影见：左侧髂动脉；股总、股浅动脉近端及股深动脉显影，但可见多处狭窄，股浅动脉中段以下影像截断，周围可见侧支循环建立(图 2)。DSA 下可见腘动脉支架不连续，出现部分断裂(图 3)。DSA 监视下反复尝试导丝通过支架均告失败，使用不同规格的球囊对股动脉近端狭窄部位予以扩张后暂时结束手术，决定改日行开放手术取出支架。于 2022-06-14 在全麻下行“左下肢动脉成型术 + 腘动脉支架取出术”，术中在左侧腘窝处做“S”型纵切口，暴露股浅动脉远端至腘动脉，分别穿过吊带备阻断血流用。以手指探查，股浅动脉未触及搏动，分别阻断股浅动脉及腘动脉，在股浅动脉后壁做一纵行切口，可见血管内支架(图 4)，延伸切口直至完全取出支架。可见支架内被增生的内膜完全堵塞，支架外围不规则断裂(图 5)。使用血管补片行股浅动脉远端血管成型术，手术顺利。患者术后恢复顺利出院，出院后继续口服阿司匹林、波立维等药物抗血小板聚集，目前随访 3 个月，定期复查下肢动脉彩超及 ABI，无明显下肢疼痛、麻木、肿胀等不适。

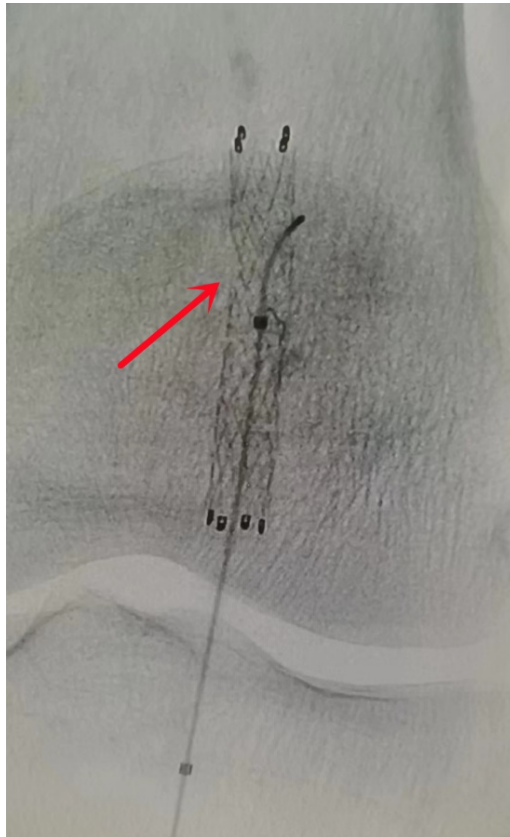


**Figure 1.** CTA of lower limb artery showed that after stenting of left popliteal artery, the stent was partially damaged  
**图 1.** 下肢动脉 CTA 示左腘动脉支架术后，支架出现部分缺损

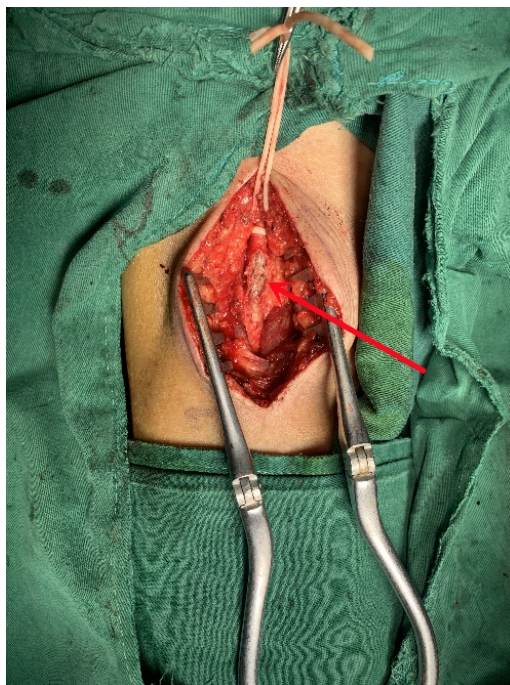


**Figure 2.** Intraoperative angiography showed: left iliac artery; The proximal end of common femoral artery, superficial femoral artery and deep femoral artery are developed, but multiple stenosis can be seen, the image below the middle segment of superficial femoral artery is truncated, and collateral circulation can be seen around

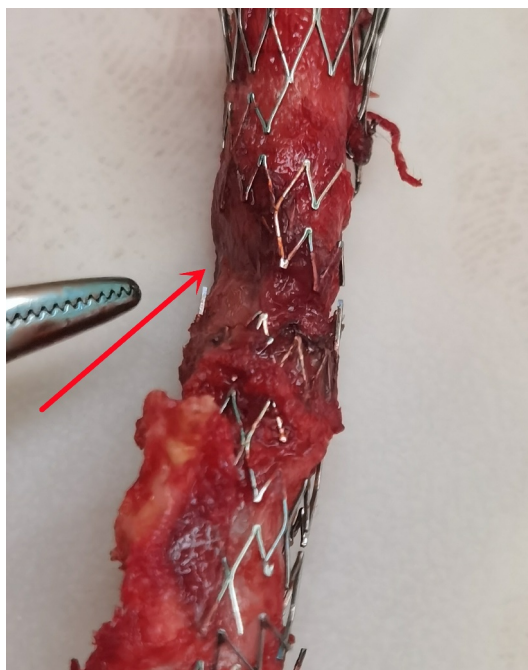
**图 2.** 术中造影见：左侧髂动脉；股总、股浅动脉近端及股深动脉显影，但可见多处狭窄，股浅动脉中段以下影像截断，周围可见侧支循环建立



**Figure 3.** The popliteal artery stent is discontinuous and partially broken under DSA  
**图 3.** DSA 下可见腘动脉支架不连续，出现部分断裂



**Figure 4.** Intravascular stent exposed during operation  
**图 4.** 术中暴露出血管内支架



**Figure 5.** The stent was completely filled with hyperplastic intima, and the periphery of the stent was irregularly fractured  
**图 5.** 支架内被增生的内膜完全填塞，支架外围不规整断裂

### 3. 讨论

下肢动脉硬化闭塞症(lower extremity arteriosclerosis obliterans, LEASO)的发病率在中国明显升高，是导致患者截肢的重要原因之一[4] [5]。随着血管外科技术的不断发展，经皮腔内血管成形术(percutaneous transluminal angioplasty, PTA)联合支架植入术已逐渐成为下肢缺血性动脉疾病首选术式。在血管支架成功植入的同时，支架内再狭窄(in-stent restenosis, ISR)一直被认为是术后最常见的并发症之一[6]。ISR 指支架内管腔直径狭窄 $\geq 50\%$ 或管腔直径较支架植入时减少 $>20\%$  [1] [2]。

很多研究显示支架断裂与支架内再狭窄密切相关，严重影响 LEASO 病人术后一期通畅率[3] [7] [8] [9]。既往有研究表明炎症反应会促进血管内膜增生[10] [11]，支架断裂后刺激血管内膜，引起炎症反应，造成内膜过度增生；当支架发生严重断裂时，血管壁失去支架对其支撑作用，可以引起血流动力学显著改变，这时血流与血管壁间剪切力显著增加，致使内皮炎症反应加重，进一步导致 ISR 发生[6] [12] [13]。

Jaff 等[14]将外周血管支架断裂分为 5 种类型：I 型是指支架断裂只涉及 1 个支架，即单支柱断裂；II 型是指涉及多个不同部位的支架断裂；III 型是指完全的横断断裂，且无移位；IV 型是支架断裂导致支架移位；V 型是指支架螺旋型断裂。本例患者从影像学检查上来看属于 II 型。

Duda 等早在 2002 年曾报道过股浅动脉段支架断裂的发生率为 18% [15]，而后 Rits 等研究发现股腘动脉段支架断裂的发生率为 2%~65% [3]。本例患者支架位置跨越膝关节，是导致支架断裂的危险因素之一。Chang 等人研究证明，跨膝关节腘动脉病变患者支架植入术后 1 个月发生支架断裂的概率为 7.69%，3 个月时为 53.8%，6 个月时为 61.5% [16]。膝关节处支架除了要承受血管壁收缩、舒张的内应力，还要受关节活动造成的血管扭曲、扭转力等影响，所以跨关节支架断裂率高，远期通畅率欠佳。

目前国内对于支架植入后发生断裂还没有通用的诊疗方案，临床医生应首先分析支架断裂的原因，其次根据支架断裂的程度以及可能造成的不良后果采取相应的诊治措施。根据 Jaff 支架断裂分型，I 型断裂且无临床症状时无需特殊处理，定期随访；II 型支架断裂则需要根据支架断端是凸向腔内还是腔外相

应的选择球囊扩张或球囊扩张与覆膜支架植入术治疗；III型、IV型以及V型支架断裂容易导致出血等较为严重的并发症，可以采用球囊扩张与覆膜支架植入术，必要时进行开放手术。

综上所述，随着腔内治疗技术在LEASO中的广泛应用，术后出现支架断裂的并发症发生率也在升高。在临床工作中应注意腔内介入术后病人的随访及复查，做到早发现、早诊断、早治疗，避免因支架断裂造成的狭窄等不良后果，提高远期通畅率。

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