

瘤腔内支架血流重建术治疗从瘤体发出分支血管的颅内动脉瘤:附 2 例报道并文献复习

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【摘要】目的 探讨瘤腔内支架血流重建术治疗从瘤体发出分支血管的颅内动脉瘤的可行性及有效性。方法 回顾性分析 2014 年 1 月至 2015 年 12 月收治的 2 例颅内动脉瘤的临床资料。结果 1 例未破裂动脉瘤,1 例破裂动脉瘤;2 例动脉瘤有重要功能的分支血管从瘤体发出,瘤腔内应用支架重建血流辅助弹簧圈栓塞动脉瘤。术后造影显示 2 例动脉瘤均致密栓塞,分支血管通畅。术后随访 9、10 年,动脉瘤无复发,神经功能完全正常。结论 瘤腔内支架血流重建辅助弹簧圈栓塞治疗从瘤体发出功能血管分支的动脉瘤是可行的、有效的,不仅可以治疗动脉瘤、防止动脉瘤再次破裂出血,还可以重建从瘤体发出功能分支血管的血流,确保脑功能正常。

【关键词】颅内动脉瘤;介入治疗;支架;弹簧圈;瘤腔内血流重建术

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Clinical efficacy of stents in the aneurysmal cavity for flow reconstruction in the treatment of intracranial aneurysms with branch vessels emanating from the aneurysm sac: two case reports and literature review

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【Abstract】Objective To investigate the feasibility and efficacy of stents in the aneurysmal cavity for flow reconstruction in the treatment of intracranial aneurysms with branch vessels emanating from the aneurysm sac. Methods The clinical data of 2 patients with intracranial aneurysms admitted from January 2014 to December 2015 were retrospectively analyzed. Results One was an unruptured aneurysm and the other was a ruptured aneurysm; for both cases, important functional branch vessels emanated from the aneurysm sac, and stents were applied in the aneurysmal cavity to reconstruct the blood flow and assist in coil embolization of the aneurysms. Postoperative angiography revealed that both aneurysms were densely embolized and the branch vessels were patent. The postoperative follow-up lasted for 9 and 10 years, respectively, and no recurrence of aneurysms was observed, with completely normal neurological functions. Conclusion Stents in the aneurysmal cavity for flow reconstruction combined with coil embolization for the treatment of aneurysms with functional vascular branches emanating from the aneurysm sac is feasible and effective. It not only treats the aneurysms and prevents re-rupture and hemorrhage but also reconstructs the blood flow of the functional branch vessels emanating from the aneurysm sac, ensuring normal brain function.

【Key words】Intracranial aneurysm; Interventional treatment; Stents; Coils; Aneurysmal cavity flow reconstruction

随着近年来随着医疗技术水平的提高以及介入神经放射材料的更新换代,神经介入治疗已经成为颅内动脉瘤的首选手术方案^[1]。然而,对于从动脉瘤体发出分支血管的颅内动脉瘤,一直是治疗的难题。开颅手术需行血管分流术进行重建血流后再孤立动脉瘤^[2];介入治疗需支架辅助弹簧圈栓塞动脉

瘤。无论是开颅夹闭,还是介入栓塞,治疗起来都比较棘手,术后并发症发生率相对较高。我们采用瘤腔内支架血流重建辅助弹簧圈栓塞治疗此类动脉瘤 2 例,取得良好的疗效,现结合文献总结如下。

1 病例资料

病例 1:56 岁男性,因体检发现颅内多发动脉瘤 1 周于 2014 年 11 月 17 日入院。外院头颅 MRA 检查发现右侧颈内动脉后交通段动脉瘤、右侧大脑中动脉分叉部动脉瘤、右侧大脑后动脉 P2 段动脉瘤。入院后体格检查:神志清楚,GCS 评分 15 分;颈软,四肢肌力、肌张力正常,双侧巴氏征阴性。完善术前准备后,经双侧股动脉置入 Cordis 6F 导管鞘并固定,脑

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血管造影显示右侧大脑中动脉分叉部动脉瘤,呈梭状隆起,大小约 12.0 mm×12.9 mm,瘤径宽约 14 mm,可见右侧大脑中动脉 M2 段上干、下干经瘤体发出(图 1A)。我们设计瘤腔内支架血流重建辅助弹簧圈栓塞动脉瘤方案(图 1C)。选择最佳工作位,通过 2 根 6F 导引管在路图引导下分别将支架导管超选择进入从大脑中动脉分叉部动脉瘤体发出的 M2 段上干、下干分支,路图下在微导丝引导下分别经 2 根 6F 导引管置入 echelon-10 微导管于动脉瘤腔内(图 1D);从大脑中动脉 M1 段并列植入两个支架,经瘤腔送入 M2 段上干 Enterprise 支架(4.5 mm×28 mm);送入 M2 段下干 Enterprise 支架(4.5 mm×37 mm);在未释放前,先将弹簧圈基本填满动脉瘤腔且有足够支撑力后,再分别释放两个支架,最后经微导管致密填塞瘤腔,共置入 10 枚弹簧圈,总长度 260 cm,形成瘤腔内支架血流重建。右侧颈内动脉后交通段动脉瘤大小约 11.0 mm×10.3 mm,瘤颈宽 6.95 mm(图 1A);右侧大脑后动脉 P2 段动脉瘤大小约 11.5 mm×8.2 mm,瘤颈宽 7.2 mm(图 1B),均使用支架辅助弹簧圈栓塞治疗。术后即刻造影显示 3 个动脉瘤栓塞效果达到 Raymond 分级 I 级,重建血管与载瘤动脉通畅(图 1E、1F)。术后左上肢肌力 II 级,复查头颅 CT 示右侧额颞叶片状低密度影,考虑局限性脑梗塞可能,予以抗凝、扩容、抗血小板聚集、营养神经及康复治疗,出院时左上肢肌力恢复至 V 级。术后半年复查,左上肢肌力恢复正常;脑血管造影显示右侧大脑中动脉分叉部动脉瘤栓塞致密,重建血管与载瘤动脉通畅(图 1G);右侧颈内动脉后交通段动脉瘤和右侧大脑后动脉 P2 段动脉瘤(图 1G、1H)。对复发动脉瘤给予再次栓塞治疗。再次栓塞术后半年复查脑血管造影显示 3 个动脉瘤均栓塞致密(图 1I、1J)。再次栓塞术后 2 年复查脑血管造影未见动脉瘤复发(图 1K、1L)。术后 10 年随访,病人未诉不适。

病例 2:33 岁男性,因突发头痛 15 h 于 2015 年 6 月 1 日入院。入院后体格检查:神志嗜睡,GCS 评分 14 分;颈抵抗阳性,四肢肌力、肌张力正常,双侧巴氏征阴性。头颅 CT 检查示蛛网膜下腔出血,Hunt-Hess 分级 2 级。在我院行急诊介入手术治疗。经双侧股动脉置入 Cordis 6F 导管鞘并固定,脑血管造影显示基底动脉顶端大动脉瘤,大小约 19.0 mm×16.1 mm,瘤颈宽约 16.7 mm,瘤体朝向后发;两侧大脑后动脉与小脑上动脉从瘤体下部发出(图 2A、2B)。我们设计并列支架从基底动脉到两侧大脑后动脉搭桥-血流重建辅助弹簧圈栓塞动脉瘤方案(图 2C)。

选择最佳工作位,经 2 根 6F 导引管在路图引导下将支架导管超选择进入左、右大脑后动脉 P1 段,分别经支架导管从基底动脉植入 Enterprise 支架(4.5 mm×37 mm),经过瘤腔分别送入两侧大脑后动脉 P1 段,路图下在微导丝引导下分别经 2 根 6F 导引管置入 echelon-10 微导管于动脉瘤腔内,以挽救病人生命为主,弹簧圈致密填塞动脉瘤上部,待动脉瘤大部分栓塞且有足够支撑力后,再分别释放两个支架,继续经微导管疏松填塞发出两侧小脑上动脉的瘤体下部,共置入 13 枚弹簧圈,总长度 266 cm,形成瘤腔内支架血流重建。术后即刻造影显示动脉瘤上部栓塞致密,下部小脑上动脉开口处疏松,两侧小脑上动脉显影良好,重建血管与载瘤动脉通畅(图 2D、2E)。术后左侧面神经不全麻痹,左上肢肌力 V 级;予以抗血小板聚集、抗血管痉挛、营养神经及康复治疗。术后半年复查,左上肢肌力恢复正常,左侧面神经不全麻痹恢复正常,脑血管造影可见动脉瘤下部疏松填塞,动脉瘤下部有残留,重建血管与载瘤动脉通畅(图 2F、2G)。术后 4 年脑血管造影见动脉瘤无明显,无破裂出血(图 2H、2I)。术后 9 年随访,可扶代步器行走,但行走不稳,未再发生出血。

2 讨论

2.1 可行性及有效性 血管分叉处又从瘤体发出重要分支血管的颅内动脉瘤一直是治疗的难题^[3]。除了开颅行血管重建后孤立动脉瘤以外^[2],目前尚无新的治疗方案被认为是安全、有效的。近年来,随着介入神经放射设备、栓塞材料的更新、操作技术的进步以及临床经验的积累,介入治疗为这类复杂、难治性动脉瘤的开创了新思路 and 前景^[4、5]。我们采用瘤腔内支架血流重建辅助弹簧圈栓塞治疗从瘤体发出重要功能分支的复杂、难治性动脉瘤,长期(9~10 年)随访证实其可行性及有效性。这种方法不仅可以治愈动脉瘤、防止再破裂出血,而且重建血管长期通畅,保证脑区血供与神经功能正常。因此,这种方法可以成为这类难治、复杂动脉瘤的治疗方法之一。

2.2 适应证、优缺点及注意事项 瘤腔内支架血流重建辅助弹簧圈栓塞主要适用于从瘤体发出两支及以上分支血管的颅内动脉瘤。既要使动脉瘤栓塞致密,避免动脉瘤破裂出血、复发,又要保证动脉瘤远端分支血管的正常血流供应^[6],瘤腔内支架血流重建辅助弹簧圈栓塞可以在栓塞动脉瘤的同时重建载瘤动脉血流,使动脉瘤颈处的血流动力学发现改变^[7]。这对于破裂及未破裂动脉瘤均适用,且无明显手术

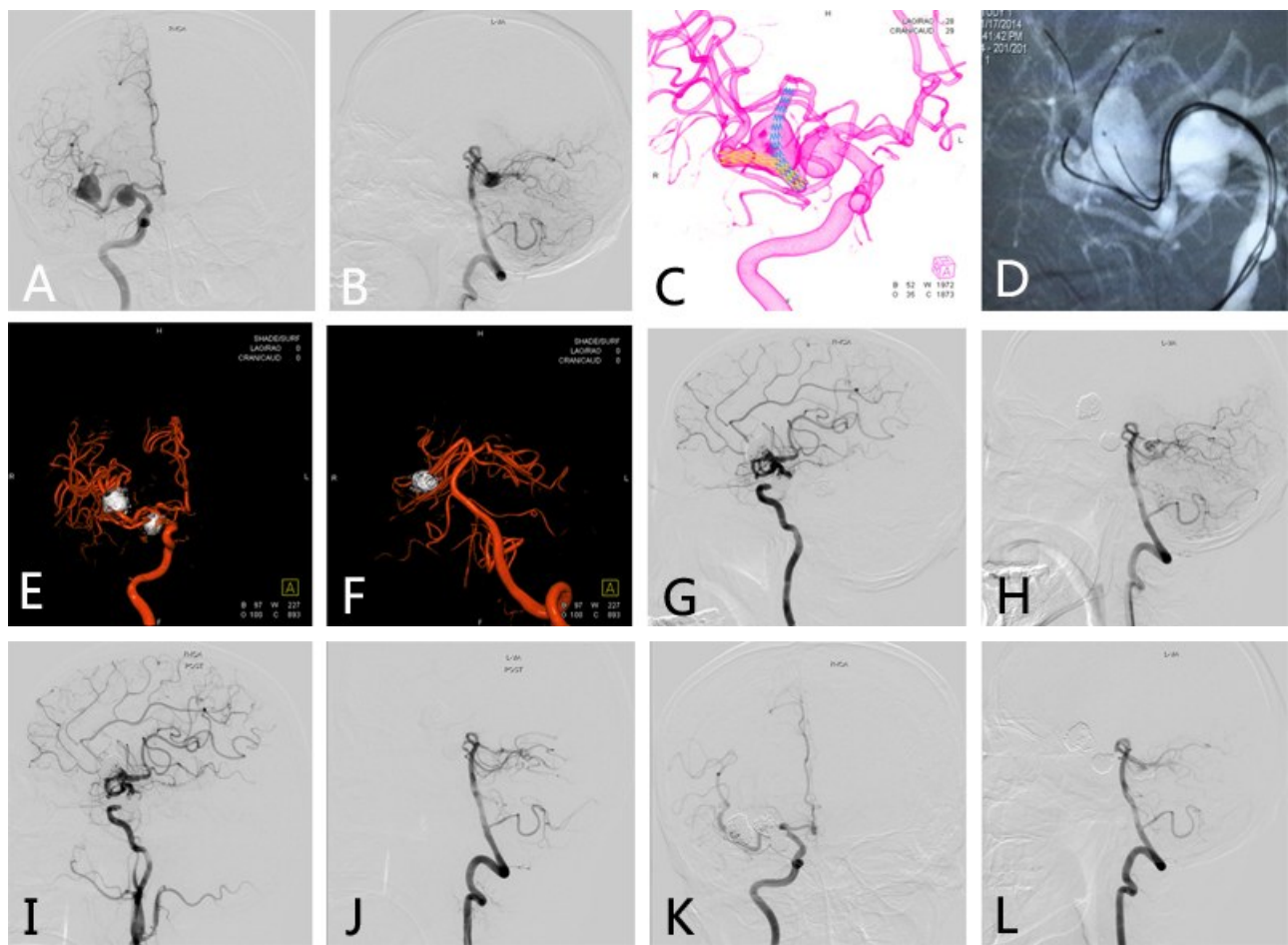


图 1 颅内动脉瘤采用瘤腔内支架血流重建辅助弹簧圈栓塞治疗前后影像

A、B. 术前 DSA 显示右侧大脑中动脉分叉部动脉瘤(大小约 12.0 mm×12.9 mm,瘤颈宽,M2 段上下干从瘤体发出)、右侧颈内动脉后交通段动脉瘤(大小约 10.3 mm×11.0 mm)、右侧大脑后动脉 P2 段动脉瘤(大小约 11.5 mm×8.2 mm);C. 瘤腔内支架血流重建辅助弹簧圈栓塞右侧大脑中动脉分叉部动脉瘤的设计图;D. 术中 DSA 显示支架导管超选进入 M2 段上、下干,微导管超选进入动脉瘤;E、F. 术后 DSA 显示三个动脉瘤均栓塞致密,血流通畅;G、H. 术后半年复查 DSA 显示右侧大脑中动脉分叉部动脉瘤栓塞致密,右侧颈内动脉后交通段动脉瘤和右侧大脑后动脉 P2 段动脉瘤复发;I、J. 再次栓塞后半年复查 DSA 显示三个动脉瘤栓塞致密;K、L. 再次栓塞术后 2 年复查 DSA 未见动脉瘤复发

Figure 1 Images of a patient with intracranial aneurysms before and after treatment with endovascular stent flow reconstruction-assisted coil embolization

A–B: Preoperative DSA shows an aneurysm at the bifurcation of the right middle cerebral artery (approximately 12.0 mm×12.9 mm in size, with a wide neck, and the upper and lower branches of the M2 segment emerging from the aneurysm sac), an aneurysm at the posterior communicating segment of the right internal carotid artery (approximately 10.3 mm×11.0 mm in size), and an aneurysm at the P2 segment of the right posterior cerebral artery (approximately 11.5 mm×8.2 mm in size). C: Design diagram for endovascular stent flow reconstruction-assisted coil embolization of the aneurysm at the bifurcation of the right middle cerebral artery. D: Intraoperative DSA shows the stent delivery catheter superselectively entering the upper and lower branches of the M2 segment, and the microcatheter superselectively entering the aneurysm. E–F: Postoperative DSA shows that all three aneurysms are densely embolized with patent blood flow. G–H: DSA at 6 months postoperatively shows that the aneurysm at the bifurcation of the right middle cerebral artery is densely embolized, while the aneurysms at the posterior communicating segment of the right internal carotid artery and the P2 segment of the right posterior cerebral artery have recurred. I–J: DSA at 6 months after re-embolization shows that all three aneurysms are densely embolized. K–L: DSA at 2 years after re-embolization shows no recurrence of aneurysms.

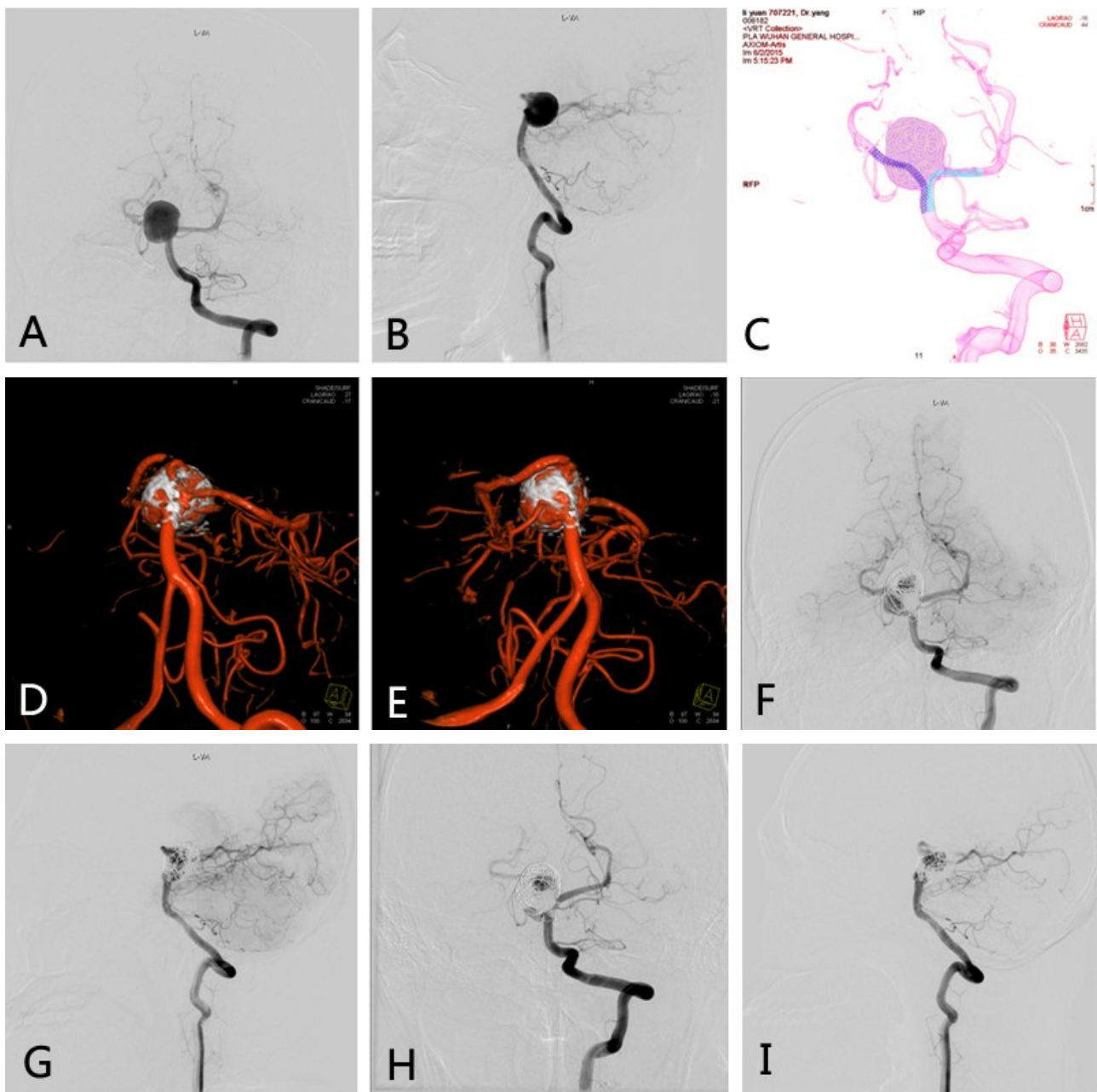


图2 颅内动脉瘤采用瘤腔内支架血流重建辅助弹簧圈栓塞治疗前后影像

A、B. 术前 DSA 显示基底动脉顶端动脉瘤, 大小约 19.0 mm×16.1 mm, 瘤颈宽, 双侧大脑后动脉、双侧小脑上动脉从瘤体发出; C. 瘤腔内支架血流重建辅助弹簧圈栓塞基底动脉顶端动脉瘤的设计图; D、E. 术后即刻 DSA 示致密填塞动脉瘤上部, 疏松填塞发出两侧小脑上动脉的瘤体下部; F、G. 术后半年复查 DSA 发现基底动脉顶端动脉瘤残留; H、I. 术后 4 年复查 DSA 显示动脉瘤无明显变化

Figure 2 Images of a patient with intracranial aneurysms before and after treatment with endovascular stent flow reconstruction–assisted coil embolization

A–B: Preoperative DSA demonstrates a basilar artery tip aneurysm, approximately 19.0 mm×16.1 mm in size, with a wide neck, and the bilateral posterior cerebral arteries and bilateral superior cerebellar arteries emanating from the aneurysm. C: The design diagram of endovascular stent flow reconstruction–assisted coil embolization for the basilar artery tip aneurysm in the aneurysmal sac. D–E: Immediate postoperative DSA indicates dense embolization of the upper part of the aneurysm and loose embolization of the lower part of the aneurysm from which the bilateral superior cerebellar arteries emerged. F–G: DSA re–examination half a year after the operation reveals the residue of the aneurysm at the top of the basilar artery. H–I: DSA re–examination 4 years after the operation shows no obvious change in the aneurysm.

禁忌^[8]。

这种方法具有微创、出血少、并发症少、安全性高,尤其对老年病人更有优势^[9]。本方法操作有一定准度,但其难度较开放手术低且适应证较宽。这种手术具有可行性、成功率高与有效性^[10]。其缺点是费用相对较高,要求设备条件高,对技术团队人员要求较高、配合较好。

操作时特别注意轻柔、稳、准、细,尤其对于较大的宽颈动脉瘤,在释放支架时,如果没有径向支撑,支架在载瘤动脉处会于悬空状态,支架自膨时有可能出现支架移位,有些甚至掉进动脉瘤腔,造成严重后果^[11]。为了避免这种情况,术中要特别注意,在栓塞微导管及支架导管到位,分流支架到位后先不释放,先经动脉瘤腔的微导管送入直径与动脉瘤大小匹配的弹簧圈,待动脉瘤腔被弹簧圈基本填塞,对搭桥支架有支撑力、支架释放后不会塌陷时,再释放支架^[12];在瘤腔内形成稳定重建血流^[13]。动脉瘤腔也不可填塞过于致密,防止支架被压缩变形,导致支架管腔狭窄、血栓形成,影响血流供应。另外,还需注意术后规范抗血小板聚集、抗凝等治疗^[14]。

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