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During Endovascular Aortic Repair in Difficult Iliac Artery Anatomy, Contralateral Snare Cannulation *vs*. Retrograde Gate Cannulation

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Abstract

Endovascular Aortic Repair (EVAR) is a minimally invasive procedure employed to treat Abdominal Aortic Aneurysms (AAA). However, the presence of challenging iliac artery anatomy can complicate the procedure, making effective cannulation crucial. This paper compares two cannulation techniques: Contralateral Snare Cannulation (CSC) and Retrograde Gate Cannulation (RGC), in the context of EVAR performed on patients with difficult iliac artery anatomy. The study evaluates the technical success, procedural time, fluoroscopy time, and complication rates associated with each technique. Through a comprehensive review of clinical cases and literature, the findings suggest that while both techniques have distinct advantages and limitations, the choice of method should be tailored to the patient's specific anatomical challenges and the surgeon's expertise.

Keywords: Endovascular aortic repair • EVAR • Contralateral snare cannulation • Retrograde gate cannulation

Introduction

Endovascular Aortic Repair (EVAR) has revolutionized the treatment of Abdominal Aortic Aneurysms (AAA) by offering a less invasive alternative to open surgery. Despite its advantages, EVAR can be challenging in the presence of complex iliac artery anatomy, which includes tortuosity, calcification, and narrow diameters. Efficient cannulation of the contralateral limb is critical to the success of the procedure. Two prominent techniques for cannulation in these difficult scenarios are Contralateral Snare Cannulation (CSC) and Retrograde Gate Cannulation (RGC). This paper aims to provide a detailed comparison of these two methods, highlighting their efficacy, safety, and applicability in complex anatomical conditions [1].

Literature Review

Contralateral Snare Cannulation involves the insertion of a snare device through the contralateral iliac artery to capture and guide the wire from the ipsilateral side. This technique is particularly beneficial in cases of severe iliac artery tortuosity, where conventional methods might fail. The CSC technique begins with the deployment of the main body of the endograft through the ipsilateral femoral artery. A guidewire is then advanced from the ipsilateral to the contralateral side. A snare device, introduced through the contralateral femoral artery, is used to capture the guidewire and externalize it, facilitating the placement of the contralateral limb. CSC is advantageous in highly tortuous iliac arteries as it allows for precise control of the guidewire and minimizes the risk of vessel injury. It also provides a stable platform for the advancement of the contralateral limb. The technique requires additional procedural steps and fluoroscopy time. Moreover, the use of a snare can be technically demanding and requires considerable expertise [2].

Retrograde gate cannulation involves the introduction of the guidewire directly into the contralateral gate of the main body from a retrograde approach, usually through the contralateral femoral artery. In RGC, after deploying the main body of the endograft, a guidewire is introduced retrogradely through the contralateral femoral artery and navigated into the contralateral gate. The wire is then advanced into the ipsilateral side, enabling the placement of the contralateral limb. RGC is generally quicker as it involves fewer steps compared to CSC. It can also reduce the overall procedural and fluoroscopy times, which is beneficial in minimizing radiation exposure to both the patient and the surgical team. This technique can be challenging in the presence of severe iliac artery tortuosity or significant calcification. The success of RGC is highly dependent on the operator's skill and the anatomical configuration of the iliac arteries [3].

RGC tends to have shorter procedural times compared to CSC, primarily due to its simpler and more direct approach. However, in cases of challenging anatomy, the time difference might be negligible as CSC can avoid complications that would otherwise prolong the procedure. RGC generally results in shorter fluoroscopy times, which is a significant advantage in reducing radiation exposure. CSC, while potentially longer in fluoroscopy time, provides a higher degree of precision, which can mitigate complications and the need for additional imaging. Both techniques are associated with low complication rates when performed by experienced operators. However, the complexity of CSC might lead to a higher incidence of procedural complications if not executed properly. Conversely, RGC may pose a higher risk of failure in severely tortuous iliac arteries, potentially leading to increased procedure time and complications [4,5].

Discussion

The choice between CSC and RGC in EVAR for difficult iliac artery anatomy should be guided by the specific anatomical challenges and the surgeon's expertise. While CSC provides superior control and is beneficial in highly tortuous or calcified arteries, it is more complex and requires additional procedural time and expertise. RGC offers a quicker, more straightforward approach, but its success is highly dependent on the operator's skill and the anatomical configuration of the iliac arteries. The decision-making process should also consider the patient's overall health, the potential for complications, and the resources available. In facilities where advanced imaging and highly

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skilled interventional radiologists are available, CSC might be the preferred choice. Conversely, in settings where minimizing procedural time and radiation exposure is critical, RGC could be more advantageous [6].

Conclusion

Both Contralateral snare cannulation and Retrograde gate cannulation are viable techniques for EVAR in patients with difficult iliac artery anatomy. Each method has its own set of advantages and limitations, and the choice between them should be tailored to the patient's specific anatomical challenges and the surgeon's expertise. Further research and advancements in imaging technology and endovascular devices are likely to enhance the efficacy and safety of these techniques, ultimately improving outcomes for patients undergoing EVAR. Future studies should focus on developing standardized protocols for the selection of cannulation techniques based on specific anatomical parameters. Additionally, advancements in imaging technologies and the development of more flexible and precise endovascular tools could further enhance the success rates of both CSC and RGC. Multicenter trials with larger patient populations and long-term follow-up are also necessary to better understand the implications of these techniques on patient outcomes.

Acknowledgement

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Conflict of Interest

None.

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