

Reviewing Endovascular and Conventional Angioplasty: Challenges in Modern Patient-Centered Care

Ahmed Algharib and Giel G. Koning

Department of Vascular and Endovascular Surgery, Euregio Hospital, Nordhorn, Germany

Dear Editor:

We have read the paper of Park et al. [1] entitled: “Outcomes of Isolated Endarterectomy and Patch Angioplasty of the Common Femoral Artery According to Current Inclusion Criteria for Endovascular Treatment” with great interest.

In our opinion, the important topic highlighted and investigated in this interesting paper [1] may be interpreted from a broader perspective. Therefore, we would like to add our comment on this important topic as addressed by our highly respected colleagues.

Endovascular angioplasty has emerged as a pivotal technique for addressing various vascular conditions, including angina pectoris, myocardial infarction, stroke, and peripheral artery disease [2,3]. This method lies in contrast to conventional angioplasty, the open method for thrombendarterectomy with patch closure of the arterial wall. The minimally invasive nature of the endovascular technique, facilitated by inserting a catheter and inflating a balloon, has revolutionized vascular interventions globally. This paper endeavors to analyze the multifaceted landscape of angioplasty techniques, considering diverse aspects ranging from customized anesthesiology, as well as some potential closure methods, from the patient's perspective.

The field of endovascular and conventional angioplasty is marked by dynamic challenges and promising opportunities [2,3]. Addressing these challenges requires a multidisciplinary approach, bridging clinical expertise with innovative technologies [2,3]. Concurrently, the ongoing advancements in techniques and materials present exciting prospects for optimizing patient outcomes and minimizing

both procedural and anesthesiological risks.

A central focus is the comparison between endovascular angioplasty and conventional open surgery, specifically employing patch angioplasty, as in carotid or femoral operation techniques. The minimally invasive approach of endovascular angioplasty, coupled with techniques like stents and drug-coated balloons, offers potential benefits in terms of reduced recovery time, improving patency, lowered complication risk, and enhanced patient outcomes [3].

Selecting the most appropriate postoperative antiplatelet, whether that is a daily oral anticoagulation, aspirin, acenocoumarol, clopidogrel, or combinations of these, necessitates a comprehensive understanding of each patient's unique medical profile and potential medication interactions according to up-to-date guidelines. Tailoring the treatment strategy to patients' specific circumstances is paramount for achieving optimal postoperative outcomes and patency [4].

Integral to this discussion is the concept of verified patient-reported outcome measures (v-PROMs), which serves as a vital tool in assessing treatment effectiveness and patient experiences [5]. In this context, PROMs should be validated or verified through direct engagement with patients, employing techniques like focus group discussions [5]. Namely, quite often, the patient-reported outcomes have been developed and thought-out by doctors instead of the target group itself, or, at least, have been confirmed or rejected by them. This participatory approach ensures that the patient's true voice is actively integrated into the evaluation of treatment outcomes, contributing to patient-

Received January 4, 2024, Revised February 22, 2024, Accepted April 25, 2024, Published on May 21, 2024

Corresponding author: Ahmed Algharib, Department of Vascular and Endovascular Surgery, Euregio Hospital, 10 Albert-Schweitzer-Street, Nordhorn 48527, Germany

Tel: 49-5921-841641, Fax: 49-5921-841645, E-mail: Ahmed.algharib@euregio-klinik.de, <https://orcid.org/0009-0002-2745-0944>

Copyright © 2024 The Korean Society for Vascular Surgery

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

Cite this article; Vasc Specialist Int 2024. <https://doi.org/10.5758/vsi.240004>

centered care and holistic assessment.

Integration of evidence-based practices is paramount in the pursuit of optimizing PROMs and procedural efficiency. An effective approach to comprehensively evaluate available evidence is the “error matrix” method (introduced by Keus et al. [6]), which offers a concise yet informative summary of the existing research landscape. This method enables a quick assessment of study quality, risk of bias, and the overall impact of each piece of evidence, aiding clinicians and researchers in making informed decisions at different levels of importance, namely “critical for (pre-operative) decision making,” “important but not critical for decision making,” and “of lower importance to patients” [6]. Moreover, recent developments in medical practice have been spurred by the emergence of the hybrid operating room, where conventional and endovascular procedures, such as angioplasty, can be seamlessly combined in a single session. This groundbreaking approach holds transformative potential in optimizing patient care and procedural efficiency. Furthermore, it requires a new generation of medical professionals proficient in the disciplines of angiology, interventional radiology, and endovascular surgery.

Another crucial consideration for patient-centered care is the implementation of customized anesthesiology practices. In our regional teaching hospital, we recognize the significance of tailoring anesthesiological approaches to individual patients. For instance, in carotid endarterectomies, we introduced plexus (loco-regional) anesthesia [7]. Along with minimizing operational and anesthesiological risks, this technique enables patients to be awake during critical phases, allowing the vascular surgeon and neurologist to conduct real-time evaluations [7]. For both endovascular and conventional vascular angioplasties, optimizing pulmonary and cardiac stability through general anesthesia contributes to favorable outcomes [8-10]. To date, the hypothesis that patients experience anxiety during plexus anesthesia has not been investigated. We aim to confirm or reject this hypothesis through research in our center and our research network. Notably, two carotid reconstruction approaches have gained attention: direct suturing and patch angioplasty of the arterial wall [9]. However, primary suturing of the arterial wall after removing the problematic and symptomatic plaque (e.g. in carotid or femoral endarterectomy) may be practiced only when the surgeon is certain that the diameter is sufficiently large and aware that a patch may or may not contribute to better outcomes. If a patch causes the diameter to change significantly compared to the anatomical diameters, thrombus formation and flow may be more seriously impacted [9].

Several reports have indicated favorable postoperative patency rates after peripheral procedures with polytetra-

fluoroethylene-patch, with 5-year patency rates exceeding 90% in some cases [10]. However, the evidence within these reports may be deemed fragmentary due to the dearth of comprehensive large-scale cohort studies concerning patch device selection. In light of this limitation, medical practitioners have considered alternative options based on individual patient backgrounds when choosing the technique to be used. For instance, patients slated for impending artery bypass grafting or those deemed at high risk of severe infection might be more suited to one technique over the other [10]. Wound complications have been a focal point of investigation in clinical studies assessing various patch devices, including arterial patches, vein patches, and vascular prosthesis [9,10]. The rates of wound infections, hematomas, and lymph leaks have been reported at varying ranges, underscoring the importance of understanding and managing these complications [8,9].

Recent research involving biopatches as a closure material has aided in mitigating these complications to some extent. In particular, reduced rates of wound infection and lymph leaks (7.7% and 1.5%, respectively) were observed, suggesting a potential improvement in freedom from wound-related issues [10]. Comparatively, the use of bovine pericardium for patch angioplasty following carotid endarterectomy has been shown to have benefits such as enhanced bleeding management, decreased postoperative aneurysm morbidity, and several practical advantages. These advantages include avoidance of additional skin incisions for patch acquisition, resistance to infection, minimal oozing from the device, reduced bleeding at the suture site, and simplified hemostasis during subsequent endovascular interventions [10]. However, the long-term outcomes of bovine pericardium usage for patch angioplasty in patients with severe common femoral artery stenosis remain largely unexplored [10].

While the current literature lacks extensive research on the extended surgical outcomes of bovine pericardium, the aforementioned advantages suggest its potential utility, particularly in complex patient scenarios. As a comprehensive understanding of the pros and cons associated with different devices is required to make medical decisions, the insights presented in this discussion underscore the necessity for further investigation and comprehensive long-term outcome studies to guide informed choices in peripheral arterial repair strategies. In addition, patient cooperation and minimal movement are essential during endovascular procedures under local anesthesia. Achieving this balance requires meticulous coordination among all medical professionals, with focus on the anesthesiologists, the vascular surgeon, and, most importantly, the patient.

In conclusion, this paper underscores the multifaceted

nature of angioplasty and its impact on vascular interventions of patients and their specialists. By using personalized techniques, discussing postoperative care, and emphasizing the importance of verified PROMs, the Hybrid OR, and customized anesthesiology, we aimed to propel advancements in the domain of vascular and endovascular surgery. Ultimately, the goal is to elevate patient well-being and 'quality of life' or 'health status' while ushering in a new era of cross-disciplinary medical practice that centers around individual needs and minimizes procedural risks.

FUNDING

None.

CONFLICTS OF INTEREST

The authors have nothing to disclose.

ORCID

Ahmed Algharib

<https://orcid.org/0009-0002-2745-0944>

Giel G. Koning

<https://orcid.org/0009-0001-9112-5313>

REFERENCES

- 1) Park S, Ku T, Hwang D, Yun WS, Kim HK, Huh S. Outcomes of isolated endarterectomy and patch angioplasty of the common femoral artery according to current inclusion criteria for endovascular treatment. *Vasc Specialist Int* 2022;38:32. <https://doi.org/10.5758/vsi.220040>
- 2) Doyen B, Soenens G, Maurel B, Hertaault A, Gordon L, Vlerick P, et al. Assessing endovascular team performances in a hybrid room using the Black Box system: a prospective cohort study. *J Cardiovasc Surg (Torino)* 2023;64:82-92. <https://doi.org/10.23736/S0021-9509.22.12226-3>
- 3) Eves J, Sudarsanam A, Shalhoub J, Amiras D. Augmented reality in vascular and endovascular surgery: scoping review. *JMIR Serious Games* 2022;10:e34501. <https://doi.org/10.2196/34501>
- 4) Marsman MS, Özdemir-van Brunschot DMD, Jahrome AK, Veeger NJGM, Schuiling WJ, van Rooij FG, et al. Case series about the changed antiplatelet protocol for carotid endarterectomy in a teaching hospital: more patients with complications? *Surg J (N Y)* 2018;4:e220-e225. <https://doi.org/10.1055/s-0038-1675566>
- 5) Bökkerink WWJV, Koning GGG, Vriens PPWHE, de Vries JJ. Patients' perspective on inguinal hernia repair: a focus group study. *Asian J Surg* 2021;44:1236-1237. <https://doi.org/10.1016/j.asjsur.2021.07.009>
- 6) Keus F, Wetterslev J, Gluud C, van Laarhoven CJ. Evidence at a glance: error matrix approach for overviewing available evidence. *BMC Med Res Methodol* 2010;10:90. <https://doi.org/10.1186/1471-2288-10-90>
- 7) Marsman MS, Wetterslev J, Keus F, van Aalst D, van Rooij FG, Heyligers JMM, et al. Plexus anesthesia versus general anesthesia for carotid endarterectomy: a systematic review with meta-analyses. *Ann Med Surg (Lond)* 2021;65:102327. <https://doi.org/10.1016/j.amsu.2021.102327>
- 8) Bang CY, Jeong C, Lee SH, Sung K, Lee BK, Lee SY. Salvage percutaneous transluminal angioplasty of the superficial femoral artery in the diabetic foot with deteriorating limb ischemia. *Wounds* 2023;35:E261-E264. <https://doi.org/10.25270/wnds/23046>
- 9) Marsman MS, Wetterslev J, Jahrome AK, Gluud C, Moll FL, Keus F, et al. Carotid endarterectomy with patch angioplasty versus primary closure in patients with symptomatic and significant stenosis: a systematic review with meta-analyses and trial sequential analysis of randomized clinical trials. *Syst Rev* 2021;10:139. <https://doi.org/10.1186/s13643-021-01692-8>
- 10) Uehara H, Uchiyama M, Imazuru T, Shimokawa T. A successful case of patch angioplasty with bovine pericardium XenoSure® to the common femoral artery after endarterectomy. *Int J Surg Case Rep* 2023;106:108209. <https://doi.org/10.1016/j.ijscr.2023.108209>