

(CASE REPORT)



Improvement of rest pain in a patient with symptomatic peripheral artery disease as an unexpected outcome of carotid endarterectomy: A case report

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Abstract

Background: Carotid endarterectomy (CEA) has proven efficacy in reducing the long-term risk of disabling strokes. However, it can also lead to unexpected benefits, such as improvement of neurological symptoms or arterial hypertension. In this case report we present a patient with peripheral arterial disease (PAD) who reported sudden relief of rest pain after bilateral CEA.

Case presentation: A 65-year-old Ukrainian male presented with 2 2-year history of intermittent claudication and rest pain in the left lower limb. On ultrasound asymptomatic critical stenosis of the left and right internal carotid arteries, and critical stenosis of the left iliac segment were revealed. After the first right-sided CEA on the first postoperative day, the patient suddenly reported relief of rest pain in the left lower limb. After the second left-sided CEA, the patient reported relief of a "burning sensation" and paresthesia of the left foot. The patient's ankle-brachial index was the same before and after the operation.

Conclusion: Despite the well-known purpose of CEA rarely it can lead to unexpected satisfactory outcomes and improvement of patient quality of life. Improvement of lower extremity rest pain after CEA is rare but yet possible, although the explanation of this phenomenon needs further investigation.

Keywords: Carotid endarterectomy; Peripheral artery disease; Rest pain; Carotid artery disease

1. Introduction

Atherosclerotic lesions of the extracranial sections of the internal carotid artery (ICA) contribute to more than 50% of strokes [1,2]. Carotid endarterectomy (CEA) is a relatively safe procedure that has proven efficacy in reducing the long-term risk of disabling strokes in asymptomatic patients with stenosis of 70% or more [1,2]. Despite routine screening for carotid artery disease (CAD) is not recommended, patients with peripheral artery disease (PAD) still can benefit because of the increased prevalence of carotid stenosis among this patient population [3,4]. Although mainly the main purpose of CEA is reducing the risk of stroke, it also can lead to unexpected benefits like improvement of atypical neurological symptoms or arterial hypertension [5,6]. In this case report we present a patient with symptomatic PAD, who reported sudden relief of rest pain after bilateral CEA.

2. Case presentation

A 65-year-old Ukrainian male presented with 2 2-year history of intermittent claudication and rest pain of the left lower limb. On ultrasound critical stenosis of the left and right internal carotid arteries, and critical stenosis of the left iliac

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segment were revealed. Besides that patient had arterial hypertension and denied any harmful habits (like smoking), and 6 months prior was prescribed cilostazol and atorvastatin. It was decided to do CEA before the iliac segment reconstruction. There were no significant comorbidities or laboratory analysis derangements. After the first right-sided CEA patient suddenly reported relief of rest pain in the left lower limb, especially in the night. After the second left-sided CEA, the patient reported relief of a "burning sensation" and paresthesia of the left foot. Patients' ankle-brachial index after CEAs increased from 0,4 to 0,6. As the best medical treatment patient was prescribed cilostazol and triflusal postoperatively.

3. Discussion

It is well known that atherosclerosis leads to vessel wall thickening with further stenosis and obstruction if not treated. The main purpose of CEA is to remove atherosclerotic plaque from ICA and CCA bifurcation to improve blood flow and reduce stroke incidence in asymptomatic and symptomatic patients [1,2]. Despite routine screening for carotid artery disease (CAD) is not recommended, patients with peripheral artery disease (PAD) still can benefit because of the increased prevalence of carotid stenosis among these patients [3,4]. However, it has been generally accepted that intervention for critical limb ischemia can proceed before consideration of carotid revascularization, preemptive CEA may be performed to reduce the risk of perioperative stroke [7]. Rarely CEA leads to unexpected benefits like improvement of arterial hypertension and reduction of the amount of antihypertensive drugs needed for hypertension control [5]. There are also described cases when it led to improvement of atypical neurologic symptoms [6].

One possible hypothetical mechanism of sudden improvement of rest pain after carotid endarterectomy may involve greater baroreceptor sensitivity and its influence on pain perception and vessel motility. During CEA the atherosclerotic plaque is removed which makes the arterial wall thinner. Therefore carotid baroreceptors perceive more stimuli from pulsatile flow. One study demonstrated increasing of baroreceptor sensitivity after carotid endarterectomy [8]. The carotid baroreceptor reflex activates the parasympathetic nervous system which leads to systemic vasodilatation by depressing of sympathetic nervous system [9]. We assume, that because of the calcification of main vessels they have reduced motility therefore this vasodilatation possibly mostly influences collateral vessels. Although not quite understood how, studies also demonstrate that baroreceptor stimulation also influences nociceptive perception and may increase pain threshold [10,11]. In addition to that, cilostazol has a positive effect on rest pain and intermittent claudication [12]. For the last decade in our department, we noticed several patients with such unexpected benefits of CEA. Among them, the duration of pain relief varied from one week to half a year, but because of the rarity of this entity factors that contribute to pain relief duration were not established. Although this theme requires further investigation, described physiologic mechanisms can be a possible explanation for rest pain relief after CEA.

4. Conclusions

Despite the well-known purpose of CEA rarely it leads to unexpected satisfactory outcomes and improvement of patient quality of life. Improvement of lower extremity rest pain after CEA is possible but an explanation of this phenomenon needs further investigation.

Compliance with ethical standards

Disclosure of conflict of interest

The author declares no conflict of interest.

Statement of ethical approval

The present research work does not contain any studies performed on animals/humans subjects by any of the authors'.

Statement of informed consent

The authors declare that there is no conflict of interest in conducting scientific research and preparing this article. Informed consent was obtained from all individual participants included in the study

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References

- [1] Naylor A.R, Rantner B, Ancetti S, de Borst G.J, de Carlo M, Halliday A, et al. European Society for Vascular Surgery (ESVS) 2023 Clinical Practice Guidelines on the Management of Atherosclerotic Carotid and Vertebral Artery Disease. *Eur J Vasc Endovasc Surg*. 2023;
- [2] AbuRahma A.F., Avgerinos E.D., Chang R.W. et al.. Society for Vascular Surgery clinical practice guidelines for management of extracranial cerebrovascular disease. *J Vasc Surg*. 2022 Jan;75(1S):4S-22S. doi: 10.1016/j.jvs.2021.04.073. Epub 2021 Jun 19. PMID: 34153348
- [3] Marek J, Mills JL, Harvich J, Cui H, Fujitani RM. Utility of routine carotid duplex screening in patients who have claudication. *J Vasc Surg* 1996; 24:572-7; discussion: 577-9.
- [4] Ramos MJ, Gonzalez-Fajardo JA, Vaquero-Puerta C, VallinaVictorero M, Vicente-Santiago M, Vaquero-Lorenzo F, et al. Asymptomatic carotid stenosis in patients with intermittent claudication: epidemiological study. *J Cardiovasc Surg (Torino)* 2011; 52:761-8
- [5] Noteroglu, E., & Kuchel, G. A. (2007). A PHYSIOLOGICAL EXPLANATION FOR AN UNEXPECTED BENEFIT OF CAROTID ENDARTERECTOMY. *Journal of the American Geriatrics Society*, 55(8), 1310–1311. <https://doi.org/10.1111/j.1532-5415.2007.01262.x>
- [6] Strautmane S, Priede Z, Millers A. The Impact of Revascularization in a Patient with Atypical Manifestations of Hypoperfusion. *Medicina (Kaunas)*. 2022 Sep 22;58(10):1328. doi: 10.3390/medicina58101328. PMID: 36295488; PMCID: PMC9607088.
- [7] Yamamoto K, Miyata T, Nagayoshi M, Akagi D, Hosaka A, Miyahara T, et al. Carotid endarterectomy may reduce the high stroke rate for patients with the disease of abdominal aorta and peripheral arteries. *Int Angiol* 2006;25:35-9.
- [8] Landesberg G, Adam D, Berlatzky Y, Akselrod S. Step baroreflex response in awake patients undergoing carotid surgery: time- and frequency-domain analysis. *Am J Physiol*. 1998 May;274(5):H1590-7. doi: 10.1152/ajpheart.1998.274.5.H1590. PMID: 9612368.
- [9] Biaggioni, I., Shibao, C. A., Diedrich, A., Muldowney, J. A. S., Laffer, C. L., & Jordan, J. (2019). Blood Pressure Management in Afferent Baroreflex Failure. *Journal of the American College of Cardiology*, 74(23), 2939–2947. <https://doi.org/10.1016/j.jacc.2019.10.027>
- [10] Reyes del Paso, G. A., Montoro, C., Muñoz Ladrón de Guevara, C., Duschek, S., & Jennings, J. R. (2014). The effect of baroreceptor stimulation on pain perception depends on the elicitation of the reflex cardiovascular response: Evidence of the interplay between the two branches of the baroreceptor system. *Biological Psychology*, 101, 82–90. <https://doi.org/10.1016/j.biopsycho.2014.07.004>
- [11] Heberto Suarez-Roca, Rebecca Y. Klinger, Mihai V. Podgoreanu, Ru-Rong Ji, Martin I. Sigurdsson, Nathan Waldron, Joseph P. Mathew, William Maixner; Contribution of Baroreceptor Function to Pain Perception and Perioperative Outcomes. *Anesthesiology* 2019; 130:634–650 doi: <https://doi.org/10.1097/ALN.0000000000002510>
- [12] Martini, R., Ageno, W., Amato, C., Favaretto, E., Porfidia, A., & Visonà, A. (2024). Cilostazol for peripheral arterial disease – a position paper from the Italian Society for Angiology and Vascular Medicine. *Vasa*, 53(2), 109–119. <https://doi.org/10.1024/0301-1526/a001114>