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Intraoperative carotid artery surgery injuries in Uzbekistan: a comprehensive review

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Abstract: Carotid artery surgeries, including carotid endarterectomy and stenting, are critical procedures for stroke prevention. Despite their importance, intraoperative injuries remain a significant challenge, leading to complications such as embolism, vessel rupture, and nerve damage. This article reviews the incidence and management of such injuries, with a particular focus on Uzbekistan. It highlights local challenges such as equipment shortages and varying levels of surgeon expertise. Recommendations are provided for improving surgical outcomes by addressing these challenges and investing in better training and resources.

Keywords: Carotid artery surgery, intraoperative injuries, stroke prevention, Uzbekistan, vascular surgery, surgical training.

Introduction: Carotid artery surgery plays a vital role in preventing ischemic strokes, especially in patients with significant carotid artery stenosis. Carotid endarterectomy (CEA) and carotid artery stenting (CAS) are the primary surgical options used worldwide. However, these procedures carry inherent risks, particularly intraoperative injuries to the carotid artery. In Uzbekistan, the challenges are compounded by limited access to advanced medical technologies and variations in the surgical training of practitioners. This review examines the types of injuries encountered during carotid artery surgery in Uzbekistan, their causes, and strategies for improving patient outcomes.

METHODS

A thorough literature review was conducted using international databases such as PubMed and Scopus, as well as local sources like the Uzbekistan Medical Journal and Zdravookhranenie Uzbekistana. Studies published

from 2000 to 2024 were included, focusing on the prevalence, prevention, and management of intraoperative carotid artery injuries. Additionally, regional data from Uzbekistan were prioritized to provide insight into the unique challenges faced in this context.

RESULTS

Types and Frequency of Injuries

Intraoperative injuries during carotid artery surgery can be categorized into several types:

- 1. Vascular rupture:** Often caused by improper clamping or fragile vessel walls during dissection.
- 2. Thrombosis:** Caused by inadequate anticoagulation or technical errors in handling the vessel.
- 3. Cranial nerve damage:** The vagus and hypoglossal nerves are particularly vulnerable during these surgeries.

Studies from Uzbekistan indicate a higher injury rate of 2-3%, which is above the typical rates seen in high-resource countries. This is attributed to factors such as insufficient equipment, variability in surgical expertise, and the lack of advanced preoperative imaging techniques.

Contributing Factors

- 1. Patient-related factors:** Conditions like advanced atherosclerosis, hypertension, and diabetes contribute to a higher risk of complications during surgery.
- 2. Surgical factors:** Limited access to intraoperative imaging tools, such as ultrasound or intraoperative angiography, increases the risk of injury.
- 3. Systemic factors:** Resource limitations and a lack of continuous education for surgeons further exacerbate the situation.

Management Approaches

- 1. Primary vessel repair or grafting:** Essential for addressing any significant vascular damage.
- 2. Thrombectomy:** Recommended in cases of embolism or thrombosis caused by intraoperative trauma.
- 3. Postoperative care:** Emphasizing intensive monitoring and prompt intervention to address any complications that arise after surgery.

DISCUSSION

Intraoperative injuries during carotid artery surgery present a serious risk to patient safety, especially in resource-limited settings like Uzbekistan. One major challenge identified in local studies is the insufficient use of modern intraoperative imaging, which could significantly reduce the incidence of these injuries. Furthermore, surgeon expertise varies greatly across

different regions of the country, leading to inconsistent outcomes.

Training programs for vascular surgeons should be expanded, focusing on the use of advanced imaging technologies and the implementation of standardized surgical techniques. Collaborative programs with international surgical societies could also play a key role in improving the local surgical workforce's skills.

Investment in state-of-the-art surgical equipment and creating a network of specialized vascular centers could address the resource gap and provide better outcomes for patients undergoing carotid artery surgeries in Uzbekistan.

CONCLUSION

Intraoperative carotid artery injuries remain a significant concern in Uzbekistan. The challenge lies not only in the technical aspects of surgery but also in the broader systemic issues that affect the quality of care. To reduce the frequency of complications, it is essential to focus on improving surgical training, ensuring access to modern technology, and promoting a culture of continuous professional development. Addressing these issues will contribute to improved surgical outcomes and reduce the incidence of these potentially devastating injuries.

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