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Our early results of carotis endarterectomy with no shunt and primary closure method

Burak Tamtekin[1], Güler Gülşen Ersoy[1], İsmail Dal[2]

[1]Department of Cardiovascular Surgery, Kastamonu University, Kastamonu, Turkey
[2]Department of Thoracic Surgery, Kastamonu Training and Research Hospital, Kastamonu, Turkey

ABSTRACT

Aims: Carotid artery disease is one of the most important causes of stroke. If left untreated, it causes serious mortality and morbidity. The gold standard treatment for carotid artery stenosis is carotid endarterectomy. The use of shunt, primary or patch closure of the arteriotomy varies according to clinical experience. In this article, we present the results of carotid endarterectomy performed with no shunt and primary closure method.

Methods: Thirty cases who underwent carotid endarterectomy in our clinic between April 2021 and April 2022 were analyzed retrospectively. All patients underwent selective carotid surgery. All surgeries were performed with the same technique and under general anesthesia. The patients were evaluated in terms of demographic characteristics, operation time, cross-clamp time, mortality, morbidity, and hospital stay.

Results: The clinical data of the early follow-up in the first month postoperatively were evaluated. Six (20%) of the patients were female and 24 (80%) were male. All of the males were active smokers. The mean age was 71.1 (min:65-max:82). Twenty five patients had a history of coronary artery disease. The mean cross-clamp time was 9.1 (±0.8) minutes. All surgeries were performed without using shunts. In all patients, primary closure was performed without the use of arterotomy grafts.

Conclusion: As an early morbidity, dysphagia was detected in 1 patient. This symptom disappeared at follow-up at 1 month. No early mortality was observed in any patient at 1-month follow-up. With increasing experience, carotid endarterectomy operations can be performed safely with no shunt and primary closure method. Our early surgical results are consistent with the literature.

Keywords: Carotid endarterectomy, primary closure, shunt

INTRODUCTION

Stroke is a very tiring and socioeconomic burden for patients and their relatives all over the world. Carotid artery occlusion is one of the most important causes of stroke.[1] These occlusions are the second cause of cardiovascular death after coronary artery diseases. Despite advancing technology and interventional techniques, open carotid endarterectomy still remains the gold standard in the treatment of this disease.[2]

In this study, we aimed to present the characteristics, surgical technique and early results of the patients we operated for carotid artery stenosis.

METHODS

Thirty cases who underwent carotid endarterectomy in our clinic between April 2021 and April 2022 were analyzed retrospectively. Demographic data, morbidity and mortality data of the patients were obtained from the hospital database. Patients over the age of 85, pregnant women and patients with covid infection were excluded from the study.

Before the start of the study, permission was obtained from the Ethics Committee of Kastamonu University with the approval number 2022-KAEK-42.

Diagnosis was often made by Doppler USG in neurology clinics or outpatient clinics. Consultation was requested by us for patients with a stenosis of more than 70% in Doppler USG. A definitive diagnosis was made with Computed Tomography (CT) angiography and the location of the lesions was determined in detail.

Surgical indication decision was made in patients with stenosis of 70% or more in CT angio. The surgical procedure was performed in the standard way and under general anesthesia in all patients. The carotid artery was reached with the classical carotid approach. Common, external and internal carotid arteries were found and turned with nylon tapes. Clamps were placed after 5000 units of heparinization. Endarterectomy was performed by longitudinal arterotomy from the common carotid artery to the internal carotid artery (**Figure 1**).

Corresponding Author: Ismail Dal, drismaildal@gmail.com

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No shunt was used in any patient. All arterotomies were closed primary with 6/0 polyprolene. Low molecular weight heparin was given postoperatively. After oral intake was started, oral antiaggregant treatment was started.

Figure 1. Completely removed plaque.

All patients were brought to the intensive care unit intubated. After about 1 hour, they were stabilized in terms of neurological, respiratory, cardiac and metabolic parameters and were extubated. Hypertension, the most common intensive care problem, was controlled with intravenous antihypertensives. Intensive care follow-up was performed on the 1st postoperative day. Oral anticoagulants and oral antihypertensives were administered during clinical follow-ups. After 2 more days of clinical follow-up, the patients were routinely discharged on the 3rd postoperative day.

SSPS v24.0 (SSPS Inc, Chicago, IL) was used to analyze the data. Categorical variables were evaluated as numbers and percentages. Mean and standard deviation values were calculated for continuous variables.

RESULTS

In our study, 30 cases who underwent carotid endarterketomy in our clinic were evaluated. The mean age of the patients was 71.1 (min:65-max:82). Twenty-four of the patients were male (80%), and 6 of them were female (20%). Demographic characteristics of the patients are shown in **Table 1**.

Table 1: Demographic characteristics of the patients

	n	%
Gender		
Male	24	80
Female	6	20
Smoking history	24	80
Diabetes	12	40
Hypertension	27	90
Coronary artery disease	20	66
Cerebrovascular event	30	100

CT angiography revealed unilateral severe stenosis in 17 patients (57%), and bilateral severe stenosis in 13 patients (43%). Unilateral complete occlusion of the internal carotid artery was detected in 2 patients (7%) (**Table 2**).

Table 2: Carotid lesions on CT angiography

	n	%
Unilateral severe stenosis	17	57
Bilateral severe stenosis	13	43
Unilateral complete occlusion	2	7

Isolated carotid endarterectomy was performed in all cases. The mean cross-clamp time was 9.1 (±0.8) minutes. First, carotid endarterectomy was performed in a patient with coronary artery disease. 15 days later, coronary artery bypass surgery was performed on the same patient. Dysphagia was detected in 1 patient. In this patient's follow-up one month later, there was a decrease in his complaint. Postoperative complications are shown in **Table 3**. All patients were discharged on the 3rd postoperative day. No mortality was observed in any patient.

Table 3. Postoperative complications

	n	%
Early mortality	0	0
Hypertension	20	66
Bleeding, hematoma	0	0
Reoperation	0	0
Minor neurological deficit (difficulty swallowing)	1	3.3
Major neurological deficit	0	0

DISCUSSION

Carotid artery disease can cause stroke and death.[3] Since the carotid endarterectomy surgery performed for the first time by De Bakey in 1953, this technique still maintains its place as the safest surgical method.[4]

Carotid endarterectomy operations can be performed with general, local and regional anesthesia techniques. The superiority of these anesthesia methods to each other has not been determined yet.[5] General anesthesia seems to be a more comfortable method since surgery is performed in a critical area.[6] We preferred to perform all carotid endarterectomy operations under general anesthesia.

There are many articles about the use of shunts during surgery. Shunt use has possible side effects such as stroke and carotid wall damage. Some authors reported that shunt use carries a 3% risk of embolism and dissection. In addition, shunt placement prolongs the operation time.[7,8] For these reasons, we did not use shunts in carotid endarterectomy operations. The operations were completed with the shortest cross-clamp time with the least manipulation possible.

Primary closure of the arterotomy causes less endothelial damage because it is a native vessel repair. There are articles in the literature reporting that there is no statistically significant difference between closure of the artery with a patch or primary closure.[9,10] In this study, all cases were closed primarily. Thrombosis was not observed in any of the patients, thanks to the low molecular weight heparin used in the early period and the oral antiaggregant used afterwards.

In our clinic, 30 cases of carotid stenosis were operated and discharged within 1 year without any problems. No early mortality was observed in any patient. In the follow-ups 1 month later, 100% survival was detected. It was thought that the transient dysphagia seen in 1 patient was due to traction of the hypogloss nerve. Our early surgical results are consistent with the current literature. Performing these surgeries with the least manipulation and the shortest cross-clamp time yields the best clinical results.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Kastamonu University Clinical Researches Ethics Committee (Date: 11.05.2022, Decision No: 2022-KAEK-42).

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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