



Outcomes of carotid endarterectomy with primary closure

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Significance:

Cerebrovascular ischemic cases are 3rd leading cause of fatality and neurologic dysfunction in adults. Atherosclerotic lesions outside the carotid cranial circulation are main cause of cerebral ischemia in almost 10-20 percent cases and carotid endarterectomy (CEA) has been proved beneficial for patients with severe carotid artery stenosis to prevent acute cerebrovascular events.

Abstract

Background: Cerebrovascular ischemic cases are 3rd leading cause of fatality and neurologic dysfunction in adults. Atherosclerotic lesions outside the carotid cranial circulation are main cause of cerebral ischemia in almost 10-20 percent cases and carotid endarterectomy (CEA) has been proved beneficial for patients with severe carotid artery stenosis to prevent acute cerebrovascular events. Current study is conducted to assess the short-term outcomes of carotid endarterectomy among patients in terms of morbidities and mortalities at our institution during the study period.

Material and Methods: This cross-sectional analytical study was carried out at Combined Military Hospital, Rawalpindi during August 2019 to July 2021 to analyze the short-term outcomes of carotid endarterectomy (CEA) with primary closure. All the patients who underwent carotid endarterectomy (CEA) with primary closure during study duration were included in the study. Patients who received selective shunting if Electro Encephalogram (EEG) changes noted were excluded from study. Data was collected after taking verbal consent by using preformed questionnaire. Frequency of morbidities like bleeding, infection, stroke, transient ischemic attacks (TIA), myocardial infarction, repeat operation and revision with stent were noted within postoperative period of one month. Frequency of mortalities in one-month postoperative period among patients undergoing carotid endarterectomy was also calculated. Data was entered and analyzed by using SPSS version 22.

Results: Total 198 patients who underwent carotid endarterectomy with primary closure during study duration were included in the study. Age range of the study participants was between 35 to 80 years. Male patients were 107 (54.04%). The comorbidities evaluated in the study participants showed that 172 (86.87%) patients were hypertensive and 73 (36.87%)

has diabetes mellitus. The most frequent postoperative morbidities among patients were bleeding and repeat operation.

Conclusion: It is concluded that carotid endarterectomy with primary closure is a safe and effective surgical means of stroke prevention.

Introduction

Worldwide Cerebrovascular ischemic cases are third largest cause of fatality in adults and primary cause for neurologic dysfunction. Atherosclerotic lesions in the extracranial carotid circulation are responsible for 10-20% of cerebral ischemia cases (1). Although carotid endarterectomy (CEA) has been shown to reduce the risk of acute cerebrovascular episodes in individuals with severe carotid artery stenosis, it is still debated which surgical method is the most effective (2,3). Stenosis of internal carotid artery also increases the stroke risk in symptomatic as well as asymptomatic patients. Carotid endarterectomy (CEA) is a surgical procedure that has been beneficial to reduce the risk of stroke in patients with internal carotid artery stenosis, both symptomatic and asymptomatic. Different surgical procedures, on the other hand, may have an impact on short-term outcomes. Despite of CEA's effectiveness and acceptance there is still discussion regarding the best method for closure. Patch angioplasty is supported by surgeons for reduction in risk of thrombosis of internal carotid artery by increasing size of lumen and ultimately the risk of perioperative stroke is reduced (4).

Comorbidities like diabetes mellitus, dyslipidemia, hypertension and tobacco abuse and percutaneous coronary intervention (PCI) enhance the complex coronary artery disease or diffusely diseased carotid artery among patients presenting for surgical revascularization. In patients with diffusely diseased carotid artery, a distal anastomosis to a non-diseased segment is frequently difficult to perform rather in these cases, carotid endarterectomy (CE) may be an effective surgical option. Carotid endarterectomy (CE) was first introduced by Bailey and colleagues in 1957. Initially it was observed that there is increased operative morbidity and death during the procedure. Even in the recently published meta-analysis of 63,730 patients, Wang and colleagues reported that CE-CABG not only increased 30-day mortality from 2.8% to 5.4%. Perioperative management outcomes of CE have been

reported to be improved with advancement in surgical techniques (5, 6, 7, 8).

This study aimed to evaluate the short-term outcomes of carotid endarterectomy among patients in terms of morbidities and mortalities performed at our institution during the study period.

Materials and Methods

This cross-sectional analytical study was carried at Combined Military Hospital, Rawalpindi during August 2019 to July 2021 after taking ethical approval from institutional ethical review committee to analyze the short term outcomes of carotid endarterectomy (CEA) with primary closure. All the patients who underwent carotid endarterectomy (CEA) with primary closure during study duration were included in the study. Patients which received selective shunting if Electro Encephalogram (EEG) changes noted were excluded from study. Data was collected after taking verbal consent by using preformed questionnaire. Demographic characteristics (Age, gender) and comorbidities like hypertension, diabetes mellitus, coronary artery diseases, dyslipidemia and tobacco abuse were evaluated in all the patients undergoing carotid endarterectomy. Frequency of morbidities like bleeding, infection, stroke, transient ischemic attacks (TIA), Myocardial Infarction, repeat operation and revision with stent were noted within postoperative period of one month. Frequency of mortalities in one-month postoperative period among patients undergoing carotid endarterectomy was also calculated. Data was entered and analyzed by using SPSS version 22. Chi square test was applied to see any statistical difference between groups. P value < 0.05 was considered significant.

Table 1: Demographic characteristics and comorbidities among patients undergoing endarterectomy (n=198)

Characteristic	Frequency (Percentage)
Age (Range in years)	35-80 years
Male	107 (54.04%)
Female	91 (45.96%)
Hypertension	172 (86.87%)
Diabetes mellitus	73 (36.87%)
Coronary artery diseases	103 (52.02%)
Dyslipidemia	139 (70.20%)
Tobacco abuse	135 (68.18%)

Results:

Total 198 patients who underwent carotid endarterectomy with primary closure during study duration were included in the study. Age range of the study participants was between 35 to 80 years. Out of total 198, the male patients were 107 (54.04%) while 91 (45.96%) patients were females. The comorbidities evaluated in the study participants showed that 172 (86.87%) patients were hypertensive, 73 (36.87%) has diabetes mellitus, coronary artery diseases, dyslipidemia and tobacco abuse frequency was in 103 (52.02%), 139 (70.20%) and 135 (68.18%) patients respectively (Table 1).

Postoperative frequencies of various comorbidities among patients underwent carotid endarterectomy with primary closure were observed in 22 (11.11%) patients in one month duration. The most frequent postoperative morbidities among patients were bleeding and repeat operation in 2.52% patients each. Myocardial infarction was in 1 (0.50%) patient. Other observed comorbidities were infection 2 (1.01%), stroke 4 (2.02%), transient ischemic attack (2.02%) and revision with stent 2 (1.01%). Out of total 198 patients 6 (3.03%) died within one-month postoperative period (Table 2).

Table 2: Frequency of Postoperative morbidities and mortalities among patients undergoing endarterectomy

Comorbidities and mortalities	Frequency (Percentage)
Bleeding	5 (2.52)
Infection	2 (1.01%)
Stroke	4 (2.02%)
Transient Ischemic attack (TIA)	4 (2.02%)
Myocardial Infarction (MI)	1 (0.50%)
Repeat operation	5 (2.52%)
Revision with stent	2 (1.01%)
Death	6 (3.03%)

Discussion

Carotid Endarterectomy (CEA) is one of the most effective means of stroke prevention. However, literature reveals that it is arguable whether patch angioplasty or primary closure is beneficial technique in lowering the incidences of postoperative restenosis and complications like stroke, transient ischemic attacks (TIA), Myocardial Infarction (MI), and fatality. Some

studies showed that patch angioplasty reduce occurrence of acute thrombosis in the short term due to increase in lumen size that also reduce the risk of perioperative stroke. However, there are also hazards of patch closure including hemorrhage and infection (9,10,11). Our study findings revealed that out of the 198 surgeries 22 were noted to have complications within 30-days postoperative period including bleeding, infection, stroke, TIA and myocardial infarction. The incidence of death in the study population was in 3.03% patients. The rate of short-term complications after endarterectomy is lower than the findings of Oldham J et al. (12) which may be attributed to the advancement of knowledge, surgical techniques and latest technologies used in newly equipped operation theatres. We can suggest that carotid endarterectomy with primary closure is associated with a lower complication rate. Many studies have shown that CEA is effective in preventing stroke; nevertheless, there is still controversy exists about either patch angioplasty or primary closure is the best strategy for reducing postoperative re-stenosis and associated consequences like stroke, TIA, MI, and mortality (13,14).

The main limitations of the study were that it was a cross sectional study with small sample size and there was no follow-up for long duration to identify the accurate frequency of postoperative complications among patients undergoing carotid endarterectomy. Other important limitation of the study is that complication rate with other used techniques is not compared.

Conclusion

Our study findings conclude that carotid endarterectomy along with primary closure for stroke prevention is a safe and effective.

Conflict of interest: Authors do not have any conflict of interest to declare.

Disclosure: None

Human/Animal Rights: No human or animal rights are violated during this study.

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