A 64-year-old male patient was admitted to Clinic for supra-aortic branches evaluation and multi-detector computerized tomography (MDCT) angiography. Five years earlier he had stroke with right-sided weakness while nineteen years ago he was operated for laryngeal cancer followed by radiation therapy. Ultrasound of carotid arteries revealed left ICA occlusion and right ICA aneurysm 18 mm in diameter with parietal thrombosis. MDCT angiography confirmed these findings with fusiform aneurysm of right ICA. Aneurysm resection was performed and Dacron tubular graft 6mm placed between common and internal carotid artery. Postoperative course was uneventful, color duplex scan showed regular findings and graft patency.

Key words: laryngeal cancer, radiation therapy, extra-cranial aneurysm, internal carotid artery

INTRODUCTION

Extra-cranial internal carotid artery (ICA) aneurysm is defined as localized dilatation of more than 50% of lumen as compared to normal dimensions. Fusiform aneurysms usually affect the common carotid artery at its bifurcation with proximal extension to ICA while saccular form affects the middle and distal portions of the ICA. Aneurysms affecting extra-cranial ICA represent 0.4%–1% of all arterial aneurysms. ICA aneurysm are usually triggered by atherosclerosis, still previous carotid surgery, trauma, fibro-muscular dysplasia, infection and spontaneous dissection could also be implicated in the pathophysiology. On the other hand, radiation-associated carotid artery stenosis is well known and described phenomenon that could occur after external irradiation for head and neck cancer. Carotid aneurysm induced by irradiation has not been described yet.

CASE REPORT

A 64-year-old male patient was admitted to Clinic for supra-aortic branches evaluation and multi-detector computerized tomography (MDCT) angiography, because of transition ischemic attack. Five years ago he suffered stroke with right-sided weakness. Magnetic resonance of the brain was performed that showed old ischemic lesions of the left temporal lobe. His past medical history also included hypertension, hypothyroidism and diabetes mellitus. Nineteen years ago he was operated for laryngeal cancer followed by radiation therapy.

During the physical examination large scar was visible on the right side of the neck after previous laryngeal cancer surgery. All laboratory findings were within the within normal range including inflammatory markers (C-reactive protein, white blood cell count, sedimentation rate). Routine control ultrasound examination revealed left ICA occlusion and asymptomatic fusiform aneurysm of the right ICA. MDCT angiography was performed and showed right ICA aneurysm 18 mm in diameter with parietal thrombosis, localized on the carotid bifurcation with proximal extension to proximal ICA part and distal insignificant ICA stenosis in the petrous canal (Figure 1) and surgical treatment was indicated. Under general anesthesia carotid arteries were dissected and heparin was administrated. Intra-operatively, extensive fibrous connective tissue was seen in the region of the carotid bifurcation with adhesions with surrounding structures (Figure 2). Proximal and distal control was obtained and carotid arteries were clamped. Aneurysm was resected and Dacron tubular graft inserted between proximal common carotid artery and distal ICA, both anastomosis end-to-end type with 6.0 polypropylene suture for distal anastomosis and 5.0 for proximal (Figure 3). Clamping time was 12 min. Patho-histology (hematoxillin-eosin stains) findings revealed three-layered aneurysm with the fields of old fibrous connective tissue involving tunica adventitia and without any significant
atherosclerotic changes. Significant loss of elastic tissue was observed as well as muscle fibers that are replaced by fibrous tissue in media and adventitia. There were no perioperative complications and the patient was discharged on the third postoperative day. Color duplexes scan of carotid arteries showed regular findings and graft patency after one month, three months and six months postoperatively.

DISCUSSION

Extra-cranial ICA aneurysms are rare with rate of 0.4%–1% of all arterial aneurysms. The most frequent cause is atherosclerosis (46%–70%), followed by fibromuscular dysplasia, iatrogenic lesions, trauma, congenital defects or infection of the para-pharyngeal space extending to the vessel wall. Carotid aneurysms could be unilateral or bilateral and true or false aneurysms. The male to female ratio for true atherosclerotic aneurysms is approximately 2:1 with an increasing prevalence in patients over 50 years of age. False aneurysms usually occur secondary to trauma or following rupture or dilatation of a patch angioplasty in a patient with previous carotid endarterectomy. Aneurysms could be asymptomatic or presented as a cervical pulsatile mass and provoke symptoms of neighboring neurovascular structure compression, horsen’s syndrome or cranial nerve paralysis.

Management of carotid aneurysms is required in most of the cases to prevent complications. Conservative management of extracranial ICA aneurysms resulted in a high rate of complications and mortality, with stroke rate up to 50% in untreated cases. Treatment is either surgical or endovascular, depending on the size, location, and anatomic relation to surrounding structures. Various surgical procedures have been reported: aneurysmectomy with end-to-end anastomosis, vein graft or Dacron interposition, anastomosis between the external and internal carotid artery, or even arterial ligation in emergency cases of aneurysm rupture. Endovascular approaches have also been used successfully in cases where the risk of nerve damage is high or if the aneurysm extends into the skull base.

On the other hand, radiation-associated carotid artery stenosis has been well described as a life-threatening complication that occurs after radiation for neck and head cancers. Carotid stenosis induced by radiation is reported to be present in 30% to 50% of patients treated with irradiation for head and neck cancer, mostly nasopharynx and larynx cancer. Although the relationship of irradiation and later of carotid stenosis occurrence is clear and already published, correlation of irradiation and occurrence of carotid aneurysm, as seen in our case, has not yet been reported.

In our case, we believe that ICA aneurysm occurred due to previous irradiation, based on patho-histological and intraoperative findings with extensive amount of fibrous connective tissue seen on patho-histological findings and fibrous adhesions of ICA aneurysm to surrounding structures. Also patho-histological findings showed insignificant amount of atherosclerotic changes in the arterial wall and thus excluding it as a possible cause of aneurysm formation. Since irradiation was performed 19 years ago, we believe that the probable mechanism of aneurysm formation is retraction of connective tissue during the years following irradiation inducing continual stretching and thinning of the arterial wall and finally resulting in true fusiform aneurysm formation. All other possible causes of aneurysm were not recognized in the presented case. In the presented case surgical treatment was our choice due to the lack of material for
endovascular procedure in our center and large experience in open carotid surgery. 10-14

CONCLUSION

According to the available literature this is the first case of true, fusiform, extra-cranial aneurysm of ICA as consequence of radiation therapy. Resection of ICA aneurysm and reconstruction with Dacron tubular graft is safe and adequate method of choice for such condition. Apart from carotid stenosis, we believe that irradiation could cause carotid aneurysms as well that should be thought of when approaching patient with radiation therapy history.

SUMMARY

ANEURIZMA KAROTIDNE ATERIJE KAO POSLEDICA ZRAČENJA

Stenoza carotidne arterije, kao posledica zračenja, je dobro poznat entitet. Međutim aneurizma carotidne arterije kao posljedični fenomen nije opisana u dosadašnjoj literaturi. U našem radu predstavljamo vrlo redak slučaj aneurizme carotidne arterije udružene sa prethodno sprovedenom zračenom terapijom.

Pacijent starosti 64 godine, primljen je u našu kliniku zbog evaluacije supra-aortnih grana i sprovedenja Multisdjajne kompjuterizovanog tomografije (MSCT) sa kontrastom. Pre pet godina pacijent je pretrepo moguć da posledičnom desnostranom slabošću. Pre devetnaest godina operisan je zbog karcionoma na laringsu, nakon čega je usledila zračna terapija. Ultrazvukom karotidnih arterija otkrivena je aneurizma desne unutrašnje karotidne arterije, prečnika 18 mm sa parijetalnom trombom. MSCT angiografijom je potvrđeno postojanje aneurizme desne unutrašnje karotidne arterije. Učinjena je resekcija aneurizme sa interpozicijom Dacronskega tubularnog grada prečnika 6 mm između desne zajedničke karotidne arterije i unutrašnje karotidne arterije. Postoperativni tok je protekao bez komplikacija, kontrolni color duplex scan je pokazao uredan nalaz i provodnost grada nakon prvog, trećeg i šestog meseca od operacije. Na osnovu intraoperativnog nalaza, koji je pokazao ekstenzivne athezne vezivog tkiva oko aneurizme, i pahtohistološkog nalaza, koji nije pokazao značajnije aterosklerotike promjene u zidu aneurizme, verujemo da je aneurizma unutrašnje karotidne arterije, koju smo prezentovali posledica prethodno sprovedene zračne terapije. Uvidom u nama dostupnu literaturu ovo je prvi slučaj prave, fuziformne ekstrakranijalne aneurizme unutrašnje karotidne arterije udružen sa zračnom terapijom.

Ključne reći: karcionom laringsa, zračna terapija, ekstra-kranijalna aneurizma, unutrašnja karotidna arterija

REFERENCES


CONSENT
The patient and his family were informed that data obtained would be submitted for publication and a written consent was obtained from the patient and their relatives.

CONFLICT OF INTEREST STATEMENT
The authors certify that they have NO affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers’ bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.