Case report

Calcification of the left internal carotid artery and its implications: a case report in human

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Abstract

During routine activities in the laboratory, a calcified segment of the left internal carotid artery was observed in a caucasian cadaver skull. The calcification extends from the cerebral segment to the cavernous segment of the internal carotid artery. Some important diseases seems to be related with calcification of the internal carotid artery, thus, the present study shall be important for health sciences and those who keep some interest in pathologies associated with calcifications.

Keywords: calcification, internal carotid artery, carotid artery diseases.

1 Introduction

The internal carotid artery is the main artery of head and neck that ensure the blood supply to the encephalon. The internal carotid artery is a terminal branch of common carotid artery, which rises near of the third cervical vertebrae when the common carotid furcates into internal carotid artery and external carotid artery, the superficial correspondent. The internal carotid artery irrigates the major part of ipsilateral hemisphere of the brain, eye and accessory organs, front and, partly, the nose. From the carotid bifurcation, where it lightly hold a carotic sinus, it ascend to the brain basis, penetrates in the skull cavity by the carotid canal and curves frontally over the cavernous sinus at the carotic furrow beside the sphenoid body, ending below the anterior perforated matter by means of division into anterior and medial arteries of brain (WILLIAMS, WARWICK, DYSON et al., 1995).

The anatomical terminology currently divides the internal carotid artery in four segments: cervical, petrous, cavernous and cerebral. However, a more recent classification system of the internal carotid artery proposed by Bouthillier, van Loveren and Keller (1996) describes seven anatomical segments of the internal carotid artery. At the present work, we decided to adopt the division into four segments as being the most usual in bibliographic descriptions.

The cervical portion of the internal carotid begins at the bifurcation of the common carotid, opposite the upper border of the thyroid cartilage, and runs perpendicularly upward, in front of the transverse processes of the upper three cervical vertebrae, to the carotid canal in the petrous portion of the temporal bone. The petrous portion ascends into the carotid canal then curves forward and medialward, and again ascends as it leaves the canal to enter the cavity of the skull between the lingula and petrosal process of the sphenoid. On the cavernous portion the artery is covered by lining endothelium, it first ascends toward the posterior clinoid process, then passes forward by the side of the body of the sphenoid bone, and again curves upward on the medial side of the anterior clinoid process, and perforates the dura mater forming the roof of the sinus. On the cerebral portion the artery perforates the dura mater and then curves backwards below the optic nerve, breaking posteriorly into anterior and medial arteries of the brain (WILLIAMS, WARWICK, DYSON et al., 1995).

2 Case Report

In a caucasian cadaver skull, with approximately 30 years old, belonging to the didactical collection of the Laboratory of Human Anatomy from University of Santa Cruz do Sul, was observed a calcified segment of the left internal carotid artery during routine activities (Figure 1). The calcification extends from the cerebral part of the internal carotid artery (Figure 1a), passing by anterior clinoid process (Figure 1e), until the posterior portion of cavernous segment of internal carotid artery (Figure 1b).

The only evidence of calcification found on the skull of this individual was this calcified segment of the left internal carotid artery. The measurement of width, thickness and length was taken with a digital pachymeter from Digimess. The total length of the calcified segment is 28.12 mm, the cerebral part has 3.92 mm width, and the cavernous part has 5.92 mm width (Figure 1a and b).

3 Discussion

Vascular calcium deposits have recently become a major research and public interest secondary to increasing evidence of the relationship of calcium scores with atherosclerotic burden and clinical outcome (NANDALUR, BASKURT, HAGSPIEL et al., 2006).

Atherosclerosis at the bifurcation of the carotid artery is a common cause of stroke, and, when such lesions are calcified, they may easily be identified on a panoramic radiograph since the carotid bifurcation lies within the field of a properly performed X-ray. The factors of risk for the formation of

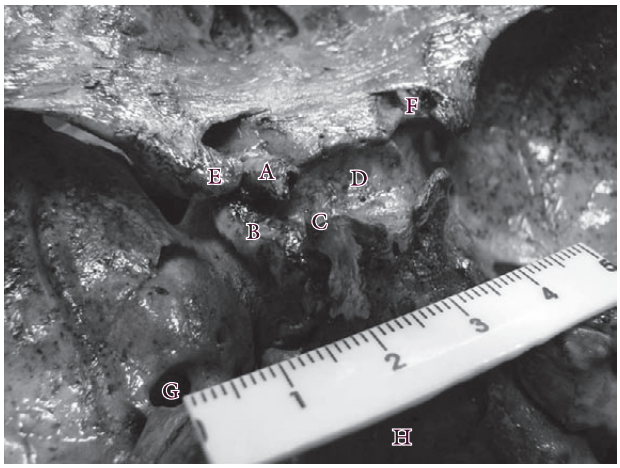

Figure 1. Figure showing medium fossa of skull. a) cerebral portion of internal carotid artery; b) cavernous portion of internal carotid artery; c) sella dorsum; d) sella turcica; e) anterior clinoid process; f) optic canal; g) foramen ovale; h) clivo. Scale in centimeter.

atheroma include obesity, high blood pressure, smoking, diabetes mellitus, high cholesterol tax and triglyceride, sedentarysm, advanced age and masculine sex, amongst others (ALBUQUERQUE, MENEZES, CARLOS et al., 2005).

Some authors tell the accidental discovery of calcifications in the area of bifurcation of the artery carotid in panoramic X-rays (FRIEDLANDER AH. and FRIEDLANDER, IK., 1998). These studies suggest a prevalence of calcifications in the artery carotid that vary from 2 to 5% (OHBA, TAKATA, ANSAI et al., 2003). Those values are larger when in women in the menopause (FRIEDLANDER and ALTMAN, 2001), in individuals with obstructive apnea of the sleep (FRIEDLANDER, AH., FRIEDLANDER, IK., YUEH et al., 1999), in patients that underwent treatment with radiotherapy (FRIEDLANDER and FREYMILLER, 2003), patient with renal diseases (KANSU, ÖZBEK, AVCU et al., 2005), in individuals with advanced age (OHBA, TAKATA, ANSAI et al., 2003) and with diabetes type 2, these last ones could arrive the a prevalence of 20% (FRIEDLANDER, GARRETT and NORMAN, 2002).

In according with Burgener, Kormano and Pudas (2008), arteriosclerotic calcifications of the internal carotid artery are commonly seen as it passes through the cavernous sinus. These calcifications can range from a small flake to complete visualization of carotid siphon. On the lateral view, these calcifications are superimposed on the sella turcica, whereas ring-like calcifications may be seen on either side of the sella in anterior-posterior projection.

Although atherosclerotic calcifications in the intracranial internal carotid arteries are very frequent, to our knowledge, their association with cardiovascular risk factors and their predictive value for ischemic cerebrovascular events have not been studied extensively (DE WEERT, CAKIR, ROZIE et al., 2009).

According to Underhill, Yuan, Terry et al. (2008), people with obstructive disease in the coronary artery generally presents a prevalence of calcification of carotid artery.

Yet, according to De Weert, Cakir, Rozie et al. (2009), atherosclerotic calcifications are present not only in the extracranial carotid bifurcation but also in the intracranial part of the internal carotid artery. Calcifications are associated for the most part with higher age and male gender, however women can also present it. The presence and volume of calcifications are independently associated with cardiovascular risk factors. Calcifications are not related to the presence or type of ischemic cerebrovascular disease.

Intracranial calcifications of internal carotid artery are more common in men than women, and seems to be larger in men. Internal carotid artery calcifications might be an indicator of arterial stenosis, which in the intracranial internal carotid artery carries an increased risk of stroke.

We undertook this study with the aim of providing a more accurate report about the calcifications in arterial segments, because of its interesting relationships with pathologies in adjacent structures. Finally, this study shall be useful for clinicians, surgeons and academics that manipulate and keep particular interest for this anatomical site.

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