Asymptomatic looping of the internal carotid artery: a case report

Internal karotis arterde asemptomatik sifon yapısı: Olgu sunumu

Oğuz ÖĞRETMENOĞLU, M.D.

Variations and anomalies of the internal carotid artery in the neck are not rare. Although the possibility of these variations is well known, it may mislead surgeon in certain circumstances as in the following case. A 68-year-old female patient had an asymptomatic looping of her internal carotid artery, which was recognized during neck dissection. This small, non-pulsatile and sigmoid looping resembled a lymph node rather than carotid artery itself. The purpose of this report is to alert the surgeons to the potential risk of hazardous complications. The knowledge of such unexpected conditions and the application of proper surgical techniques will prevent those complications.

Key Words: Carotid artery; internal/anatomy & histology/embryology/pathology; diagnosis; differential.

Expected course of the cervical internal carotid artery is straight without any branching. Major congenital anomalies of the internal carotid artery such as agenesis, aplasia and hypoplasia are rare, but angulations are more common. In the literature, angulations of the carotid artery are defined as tortuous, coiling, curving, looping or kinking according to its shape.\[1-3\] Although the true incidence of angulated carotid arteries is not known, it can be as high as 40%.\[1\] Some of patients may have symptoms such as cerebral vascular insufficiency, tinnitus and neurological deficits, but most of them are asymptomatic for along time. Etiology is multi-factorial. Both congenital and developmental aberrations and degenerative processes together with arteriosclerosis take part in the etiology.\[4\] Those variations and anomalies can cause dangerous complications in head and neck surgery. Recognition of variations of the internal carotid artery that can be hazardous was reported several times during pharyngeal or middle ear surgery, but during neck dissection. In contrast to pharyngeal or middle ear surgery, perfect exposure of neck dissection...
Asymptomatic looping of the internal carotid artery makes the identification of carotid artery and its variations easy. Although, possibility of such variations is well known and neck dissection provides good exposure, it may mislead surgeons in certain conditions as in the current case. The aim of this report is to warn the head and neck surgeons for such incidents.

CASE REPORT

A 68-year-old female patient presented with a lump under her mandible for 6 months. On the examination, a fixed mass 3 cm in diameter was palpated in the left submandibular region. Any other primary tumor or related disease was excluded by physical examination and CT scan evaluation. Fine needle aspiration biopsy revealed high grade epithelial malignancy. She underwent a neck dissection by preserving 11th cranial nerve, sternocleidomastoid muscle and internal jugular vein. Neck dissection was performed caudal to cephalic and latero-medial in an ordinary fashion. At the cephalic border of the dissection field, just below the digastric muscle an ovoid shaped mass was recognized. It was lateral to the internal carotid artery, and 1x0.5 cm in diameter. There was no pulsation on the mass. It spontaneously separated from the dissection material during sharp dissection. Although, it mimicked a lymph node, easy separation from the dissected material was unusual. Because of this, further identification of the internal carotid artery to the skull base was done, before the attempt of removal. It revealed that it was carotid artery itself. The artery had two 180° loops that made a small siphon (Fig. 1 and 2). Sternocleidomastoid muscle and internal jugular vein were retracted anteriorly, and the looping segment was forced upwards by a retractor tip to provide visibility in figure 2.

DISCUSSION

In the literature, nomenclature for angulations of the internal carotid artery is confusing. In the classification of Weibel and Fields there are four types of variation: 1. Straight, 2. S or C shaped elongation, 3. Kinking of one or more segments, and 4. Coiling. Tortuous, curving, looping and sigmoid looping are some of the other terms describing those variations. The variation in the current patient is formed by two 180° loops, which can be named as looping, sigmoid looping or kinking of the internal carotid artery. Although true incidences of those variations are not known, postmortem studies and angiographic results suggest a 10 to 43 per cent incidence. The frequency is 25-28 per cent for curved, and 5-7 per cent for kinked (90°-145°) or coiled internal carotid artery according to Paulsen and et al. Those variations are generally asymptomatic. Even major anomalies of the internal carotid artery such as agenesis, aplasia and hypoplasia may be asymptomatic for a long time. In obvious pathologies related to the carotid artery such as pulsatile oropharyngeal and middle ear mass or a glomus tumor, the surgeon has angiographic scans and prepares himself and the patient for the very well planned procedure. On the other hand, unknown preoperative abnormal course of the artery carries a potential risk for complications. In unexpected situations, rupture of the artery is possible during surgery. Parasentesis may result in profuse bleeding and fatality in the case of middle ear aberrant carotid artery. Tortuous carotid artery can make contact to tonsillar capsule, pharyngeal walls. Surgery of the palatine tonsils, oropharynx, and adenoids carries risk to damage the internal carotid artery in such patients. In con-

![Fig. 1 - Schematic representation of two 180° loops making a siphon of the internal carotid artery.](image1)

![Fig. 2 - Looping of the internal carotid artery of the patient. One arrow: Hypoglossal nerve, two arrows: Looping segment and three arrows: Carotid artery and vagus nerve.](image2)
Asymptomatic looping of the internal carotid artery

Asymptomatic looping of the internal carotid artery during neck dissection. Exposure is good enough to identify whole course of the artery. On the other hand, the fact was amazingly hidden in our patient. The small sigmoid looping segment was at the cephalic end of the dissection field and was partially hidden under the posterior belly of the digastric muscle. This visible part of sigmoid segment perfectly mimicked a small mass, a lymphadenopathy, since lacking of pulsation. Easy separation from the dissected soft tissue was the only clue.

During surgery in the head and neck area, pulsation is the most important sign to identify the carotid artery. Observation of pulsation is helpful in the presence of scarring or fixed mass. On the other hand it does not provide absolute safety in every occasion. Pulsation can disappear in hypotension and become weaker in the loss of arterial wall elasticity, as occurs in old ages with arteriosclerosis. Even with perfect exposure of neck dissection, lack of pulsation can mislead the surgeon. Because of this, the anesthetists must warn the surgeon when hypotension is present, and the surgeon must always keep in mind that pulsation may be weaker than expected.

As a conclusion, changes in the course of the carotid artery in the neck may become dangerous in head and neck surgery. Of course any mass around the carotid artery must be evaluated by angiographic studies before any surgical procedure. In an unexpected situation, as in our patient, one must certainly identify whole arterial shaft before trying to remove any mass around the carotid. Surgeons must keep in mind that pulsation of the artery is not always clear. It is also important to avoid sharp dissection before identification. Knowledge of the possible variations and anomalies of the internal carotid artery, and application of proper surgical techniques is very important for head and neck surgeons to prevent hazardous complications.

REFERENCES