Internal Carotid Artery Dissection After Remote Surgery

Iatrogenic Complications of Anesthesia

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Background
Subintimal dissection with acute occlusion of the internal carotid artery resulting in acute cerebral infarction has not been reported as an iatrogenic complication of general anesthesia.

Case Descriptions
An anesthetist stretched the neck of a 44-year-old man by anchoring an anesthesia mask posterior to the angle of the jaw with overlying fingers as the patient struggled during an insufficient inhalational mask anesthetic. A 33-year-old man received an endotracheal anesthetic without struggle, but as he was turned from a supine to a prone position, his head and neck were not immobilized to rotate with his torso during the move. The next day both patients suffered acute cerebral infarctions secondary to ICA dissections and occlusions (angiographically demonstrated).

Conclusions
Stretching the soft neck tissues of anesthetized patients can cause internal carotid artery dissection and acute cerebral infarction. (Stroke. 1994;25:1276-1278.)

Key Words
• anesthesia • carotid arteries • cerebral infarction • dissection

No report in the literature links the position of an anesthetized patient's head and neck or the forcible holding of an anesthesia mask to a struggling (insufficiently anesthetized) patient with the complication of carotid artery intimal tearing, dissection, and occlusion. The complication of carotid artery occlusion and cerebral infarction typically is delayed after the initial carotid artery injury and the beginning of dissection and may therefore divert attention from the physical rendering of a general anesthetic as the cause of such events. The following accounts describe the circumstances preceding these adverse events.

Case Reports

Case 1
A 44-year-old man weighing 185 lb, normotensive and without systemic disease, underwent surgical removal of a cactus thorn from his hand. An initial 5 mg atracurium and 350 mg thiopental followed by 100 mg succinylcholine was administered intravenously. An anesthesia mask was held in place on the patient's face by the anesthetist's left hand. Laryngoscopy, attempted once, could not expose the larynx, although the patient's anatomy was normal. Tracheal intubation was not pursued. Oxygenation was well maintained, as confirmed by pulse oximetry. Nitrous oxide (50%) and inspired enflurane (2%) were administered through the mask, with an oral airway in place. Upon surgical incision the patient moved strenuously. Assisted ventilation through the mask was maintained, while the patient produced high-pitched vocalization, another manifestation of a light plane of anesthesia. The patient's head (ie, occiput) was firmly restrained on the operating table under the anesthesia mask held by the anesthetist's left hand. Sufentanil and more atracurium were given intravenously to deepen the anesthesia.

After surgery the patient awakened and complained of pain on the left side of his neck. No external abnormalities were apparent, and he was released from the hospital. Eleven hours later he suddenly became aphasic and had right hemiparesis and right central facial palsy. On his immediate return to the hospital, carotid angiography was performed that demonstrated an occluded left internal carotid artery. The pattern of a conical, tapering lumen produced by subintimal dissection started at the level of the third cervical vertebra; flow ceased at C-2 (see Figure). No filling of the left carotid siphon was seen from antegrade flow or from collateralized filling retrograde to the ophthalmic artery. The aortic arch and other cervical vessels were normal; computed tomography (CT) of the head also appeared normal.

Heparin therapy was given after transfer to another hospital. Right-sided hemiparesis resolved in 2 days; intellectual function and fluent speech did not recover. CT of the brain then revealed acute infarction of the left temporal and parietal lobes in the territory supplied by the middle cerebral artery. Repeat carotid arteriography 6 days after the acute event demonstrated persistent occlusion of the left internal carotid artery and collateral blood supply to the left cerebral hemisphere from the anterior and posterior communicator branches. The patient requires continuous custodial care.

Case 2
A 33-year-old normotensive man, 6' 6" tall, with unconfirmed suspicion of Klinefelter syndrome (XXY chromosome and variants) and symptomatic lumbar disc herniation, was anesthetized for lumbar laminectomy in the prone position. Laryngoscopy and tracheal intuba-
...enhanced for anesthetized patients unprotected by nor-

gage. The potential for injury to the carotid artery exists
from "cervical rotation and hyperextension," perhaps

vertebra with preservation of the more elastic adventi-
and second cervical vertebrae. This results in rupture of
the intima and media at the level of the third cervical
vertebra or the bony mass of the first

intimal dissection of the left internal carotid artery manifested by
an elongated, conical, tapered stenosis beginning at the level of
the third cervical vertebra and cessation of flow at the petrous
portion of that vessel.

Selective left carotid arteriogram (patient 1) demonstrating sub-
timal dissection of the left internal carotid artery by
axial rotation of the head and neck is the proposed
mechanism of injury to the carotid artery that causes
the dissections described above. In case 1 the forceful
restraint of the patient's head as his torso strained
against the operating table may well have stretched the
internal carotid artery "across the transverse process of
the third cervical vertebra or the bony mass of the first
and second cervical vertebrae. This results in rupture of
the intima and media at the level of the third cervical
vertebra with preservation of the more elastic adventi-
tia." The fourth and fifth fingers of the left hand
holding the anesthesia mask might also directly trauma-
tize the artery, as they anchor the mask by extending
over the mandible and encroaching on the carotid
bifurcation.

In case 2 the tracheal intubation entailed no apparent
difficulties, and an adequate depth of anesthesia was
maintained. Unrecognized movement of the neck when
the patient was turned to the prone position or when the
head and neck were positioned with the patient prone
(such as 90° axial rotation or extension instead of
flexion) may have caused internal carotid artery dam-
age. The potential for injury to the carotid artery exists
from "cervical rotation and hyperextension," perhaps
enhanced for anesthetized patients unprotected by nor-

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