

Occlusion of the Internal Carotid Artery in the Neck Secondary to Closed Trauma to the Head and Neck: *

A Report of Two Cases

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NUMEROUS reports concerning the management of arteriosclerotic disease of the internal carotid vessels in the neck have appeared in the literature in recent years.^{1, 2, 5, 8} During this same period, there has been little mention of nonpenetrating injuries to the internal carotid vessels in this same region.

Since 1872, when the first case of a nonpenetrating injury to the internal carotid artery in the neck was noted, there have been fifteen cases reported in the available English literature.^{3, 4, 7} All resulted from severe injuries to the head and neck, or upper trunk. Fourteen of the 15 patients were men and 53 per cent were in the third decade of life. The age range was from 16 to 45 years. The management of these patients varied. A few were treated with anticoagulants, superior cervical sympathectomy, or cervical sympathetic blocks;⁷ none were treated by direct surgical operation on the carotid artery. The outcome has been very poor. Only seven patients survived the insult, and all survivors had residual paralyses of some type. We have recently had two cases in our clinic treated by direct operation.

Case Reports

Case 1 (C. M. W.). A 47-year-old Negro was seen in the emergency room on December 25,

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1961. He had been rendered unconscious three hours previously in an automobile accident. When he regained consciousness, he had right hemiparesis.

Physical examination revealed a blood pressure of 240/120; pulse 120. There was a deep submental laceration and the patient was in severe respiratory distress. He was irrational and semicomatose. Skull x-rays and lumbar puncture findings were normal. Retinal artery pressures were not obtained. No other injuries were noted.

Shortly after admission a tracheostomy was performed followed by bilateral carotid arteriography. An occlusion of the left internal carotid artery was demonstrated one centimeter beyond the bifurcation of the common carotid artery (Fig. 1). The occlusion was 2 cm. below a chipped fracture of the anterior portion of the body of C2. The left internal carotid artery was explored under general anesthesia. A fresh thrombus was found at the bifurcation of the common carotid artery and was evacuated. Adequate back-flow

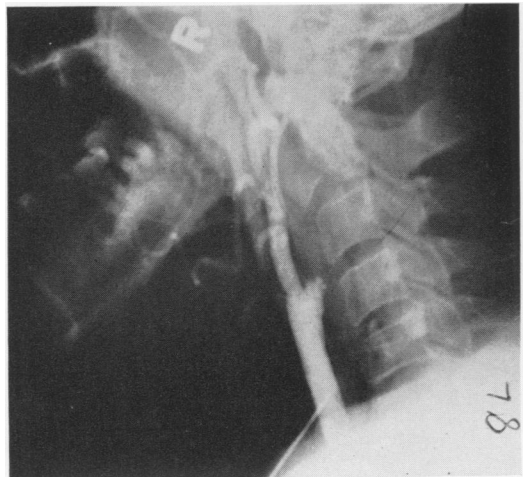


FIG. 1. Left carotid arteriogram showing occlusion of internal carotid at bifurcation. Note anterior fracture of C2.



FIG. 2. Left carotid arteriogram showing internal and external carotid artery occlusion distal to bifurcation.

could not be obtained. There was no disruption of the intima and no gross evidence of injury to the internal carotid artery.

The patient improved very slowly. His sensorium cleared and he was able to care for himself moderately well. He walked alone, but with persistent right hemiparesis. He was discharged on 19 February 1962 to a nursing home.

Case 2 (E. L. A.). A 49-year-old man was admitted to the hospital on 10 June 1962, eight hours following an automobile accident in which

he was rendered temporarily unconscious. When he regained consciousness, right hemiparesis was noted.

Physical examination disclosed a blood pressure of 140/90; pulse 72. There were fresh sutured lacerations of the left mandibular area and the right forehead, and an intrathochantric fracture of the left femur. The patient was alert and had an expressive dysphasia. A right brachial monoparesis and a left Horner's syndrome were present. There were pulsations in the common carotid arteries bilaterally; however, no pulsation was felt in the left temporal artery. No bruits over the neck vessels were noted. The retinal artery pressures were 115/65 on the right and 70/50 on the left. Skull films were normal. A questionable fresh fracture of C3 was noted.

Bilateral carotid arteriography was carried out shortly after admission and the left internal and external carotid arteries were obstructed just distal to the bifurcation of the common carotid artery (Fig. 2). These vessels were explored under local anesthesia. Except for lack of pulsations in the internal and external carotid arteries, there were no gross abnormalities. From each of these vessels a large thrombus was evacuated and excellent back-bleeding was obtained (Fig. 3).

Postoperatively the right brachial monoparesis and dysphasia persisted. Pulsation was now present in the left temporal artery. Gradual improvement in the general condition of the patient ensued, and on June 21, 1962 the left intratrochanteric femoral fracture was stabilized. He tolerated this procedure well.

A left postoperative carotid arteriogram revealed patent carotid vessels in the neck (Fig. 4). The left middle cerebral artery was occluded. Retinal artery pressures obtained at this time were 115/60 on the left and 115/70 on the right. He was discharged on July 6, 1962 with a right brachial monoparesis and expressive dysphasia, both of which have improved slightly since his discharge.

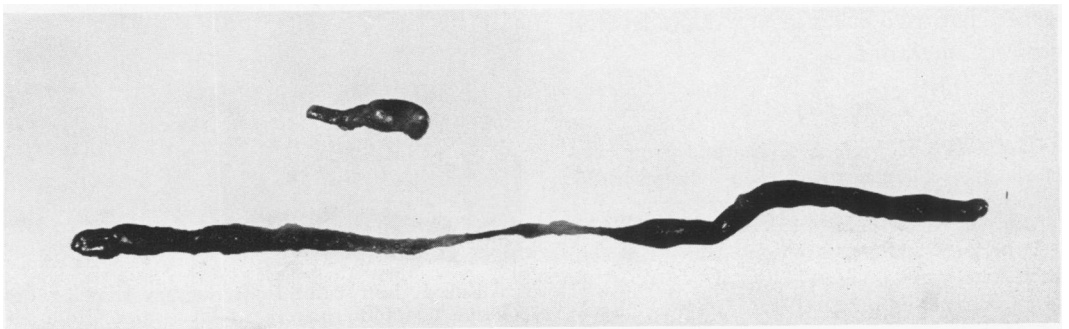


FIG. 3. 15 centimeter thrombus from internal carotid and 3 centimeter thrombus from external carotid arteries.

Comment

Occlusion of the internal carotid artery may commence in the intracranial portion, or the proximal portion in the neck. It is often difficult to differentiate the primary site of origin because of the extension of the thrombus retrograde and antegrade, respectively.⁶ The intracranial occlusion is very often associated with a basilar skull fracture.

Injury to the internal carotid artery in the neck may be due to direct contusion or from a stretching or shearing effect to the artery. As a result of such injury, there may be actual disruption of the arterial wall. There need not be any gross evidence of injury, however, as in our two cases. In this instance there is probably spasm due to the injury with subsequent thrombosis. It is conceivable that this injury may be similar to the deaccelerating injury of the aortic arch, that is, the stretch effect upon a vessel fixed between two points.

Symptoms of internal carotid artery occlusion secondary to closed trauma are variable in onset; they usually occur immediately following an injury, but need not for several hours. Cairn reported a patient who did not manifest neurological symptoms until 30 hours after injury.³ Because of the protean nature of this syndrome and its variability, the diagnosis will depend upon demonstration of a lesion by carotid arteriography. Ophthalmodynamometry may afford some help in screening these patients.

Treatment should be surgical exploration and repair of the involved artery as soon as the lesion is recognized. This is generally performed using local anesthesia, although general anesthesia may be necessary in some instances. Anticoagulants and fibrinolytics are not contra-indicated, but should be used as adjuncts to direct operation.

Prognosis in these patients is poor. Awareness of this entity and prompt institution of arteriography and operation may result in a more favorable prognosis.

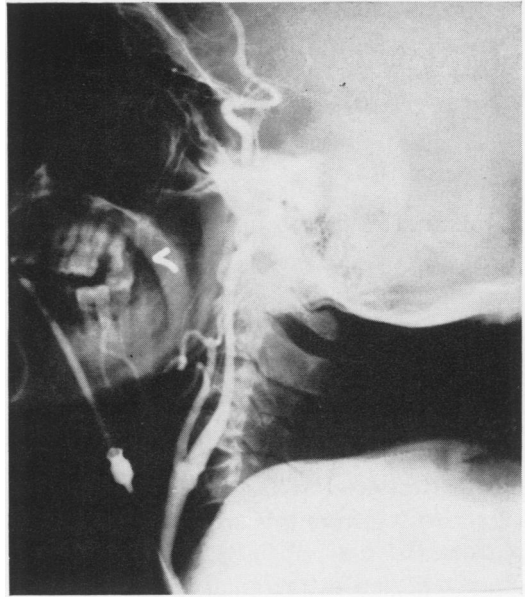


FIG. 4. Postoperative left carotid arteriogram showing patent carotid vessels in neck. Note middle cerebral artery not visualized.

References

1. Crawford, E. S., M. E. DeBakey, W. S. Fields, D. A. Cooley and G. C. Morris: Surgical Treatment of Arteriosclerotic Occlusive Lesions in Patients with Cerebral Arterial Insufficiency. *Circulation*, 20:168, 1959.
2. Gurdjian, E. S., W. G. Hardy and D. W. Linder: The Surgical Considerations of 258 Patients with Carotid Artery Occlusion. *Surg., Gynec. & Obst.*, 110:327, 1960.
3. Hockaday, T. D. R.: Traumatic Thrombosis of the Internal Carotid Artery. *J. Neurology, Neurosurg. & Psychiatry*, 22:229, 1959.
4. Murray, D. S.: Post-traumatic Thrombosis of the Internal Carotid and Vertebral Arteries after Non-penetrating Injuries of the Neck. *British J. Surg.*, 44:556, 1957.
5. Rob, C. and E. B. Wheeler: Thrombosis of Internal Carotid Artery Treated by Arterial Surgery. *British Med. J.*, 2:264, 1957.
6. Sedzimir, C. B.: Head Injury as a Cause of Internal Carotid Thrombosis. *J. Neurology, Neurosurg. & Psychiatry*, 18:293, 1955.
7. Schneider, R. C. and L. J. Lemmen: Traumatic Internal Carotid Artery Thrombosis Secondary to Non-penetrating Injuries to the Neck. *J. Neurosurg.*, 9:495, 1952.
8. Strully, K. J., E. S. Hurwitt and H. W. Blankenberg: Thrombo-endarterectomy for Thrombosis of the Internal Carotid Artery in the Neck. *J. Neurosurg.* 10:474, 1953.