

## Shotgun Pellet Embolus of the Middle Cerebral Artery\*

### Case Report

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CASES of middle cerebral artery endarterectomy or embolectomy for arterial occlusion secondary to a plaque or thrombotic emboli have been documented.<sup>1,2,4,8,9,11-13</sup> However, reports of intracerebral emboli by foreign bodies incident to extracranial penetrating wounds are rare.<sup>3,7,10</sup> We report a case of successful embolectomy of a metallic pellet to the middle cerebral artery following a shotgun wound to the head and neck.

### Case Report

On January 6, 1968, this 21-year-old right-handed man was shot at close range in the left side of the head and neck with a shotgun. When examined by his family doctor 30 minutes later, he was comatose with a right hemiplegia.

*Examination.* On admission to the John J. Cochran Veterans' Hospital 7 hours after injury, the patient's blood pressure was 120/70, pulse 72, and respirations 22. There were multiple pellet entry sites about the left side of the face, scalp, and neck; a large laceration of the nose; and an anterior hyphema of the left eye. Both carotid arteries had good pulsations, and no bruits were audible.

The patient had a global aphasia. The pupils were equal and reacted to light, the left more sluggishly. A severe right hemiplegia was evident, the only movement being internal rotation of the arm in response to painful stimuli. The right side was areflexic except for a minimal brachioradialis reflex. There was a right Babinski sign. He moved the left side purposefully and with good strength.

Skull films showed multiple No. 2 buckshot subcutaneously in the face, scalp, and neck. Stereoscopic views suggested that one pellet was intracranial, but no bone defect

could be seen to account for direct penetration. A left percutaneous common carotid angiogram disclosed occlusion of the left middle cerebral artery by a pellet lodged approximately 1.5 cm distal to the bifurcation of the internal carotid artery (Fig. 1). There was delayed filling of the Sylvian triangle through collateral arterial anastomosis from the anterior cerebral artery, with retrograde flow to the site of obstruction (Fig. 2).

*Operation.* Following the angiogram, a left frontotemporal craniotomy was performed. The brain did not appear discolored or hemorrhagic, and no evidence of cranial penetration by the shot was found. The middle cerebral artery was exposed by splitting the Sylvian fissure, and the pellet identified. The vessel appeared dilated and red proximal to the occlusion, but narrow and blue distally. The vessel wall was distended and thinned at the metallic fragment locus. Mayfield temporary clips were applied to either side of the occlusion; a 6 mm longitudinal arteriotomy was necessary for extraction of the metallic fragment. Following removal there was good backflow from the distal segment, and the opening was closed with a 7-0 continuous silk suture. Upon release of the clamps, the vessel appeared bright red distal to the previous obstruction. A slight constriction observed at the site of arteriotomy was not altered by topical application of phentolamine (Regitine). Surgery was concluded 11 hours after the injury.

*Postoperative Course.* After awakening from anesthesia, the patient had minimal right leg movement but no change in the flaccid paralysis of the right arm. By the 5th postoperative day, he was alert and walking with aid. A left percutaneous arteriogram, 8 days after surgery, showed patency of the left middle cerebral artery with slight constriction at the arteriotomy site (Fig. 3). The right hemiparesis gradually improved, and he walked unassisted with a hemiparetic gait. At discharge on February 29, 1968, the

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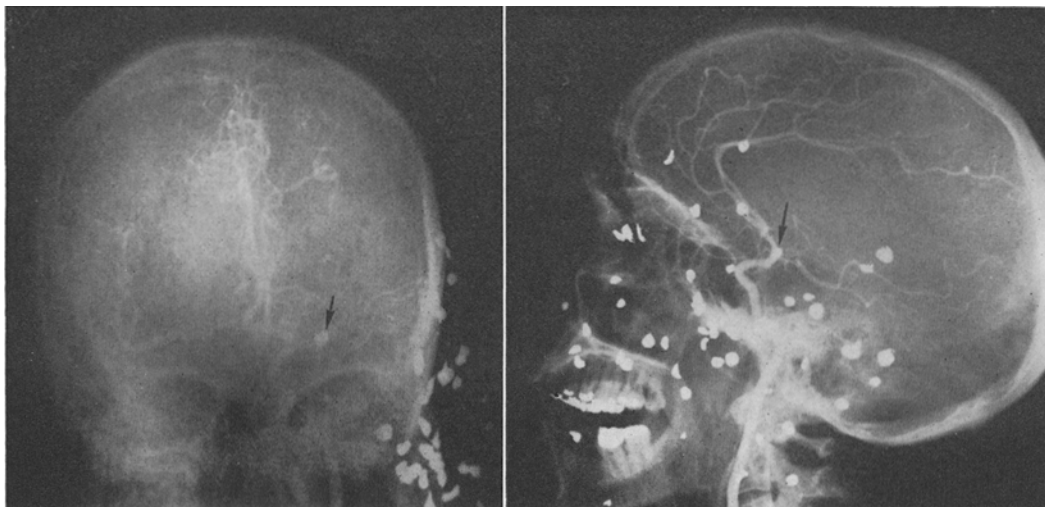


FIG. 1. Preoperative left carotid angiograms, arterial phase. The left middle cerebral artery is completely occluded by a metallic fragment (arrows) distal to the anterior temporal branch. Multiple buckshot are present in the soft tissue of the scalp and face. *Left:* Anteroposterior view following cross compression with filling of the right middle cerebral artery. *Right:* Lateral view.

patient was able to say a few monosyllabic words. His verbal reception and intellect were good. A severe paresis of the right arm continued, with only minimal shoulder and elbow movement.

When examined on March 16, 1969, the patient could enunciate multisyllabic words and three- to four-word phrases clearly. Speech reception, visual interpretation, and reading were normal, and he was totally independent for self-care. His gait had a slight

steppage quality. There was good voluntary shoulder and elbow motion, but only minimal finger and wrist movement.

#### Discussion

It was disappointing but not surprising that more dramatic neurological improvement did not ensue postoperatively. The time required and the quality of recovery were comparable to that which might have happened spontaneously.<sup>6</sup> However, with

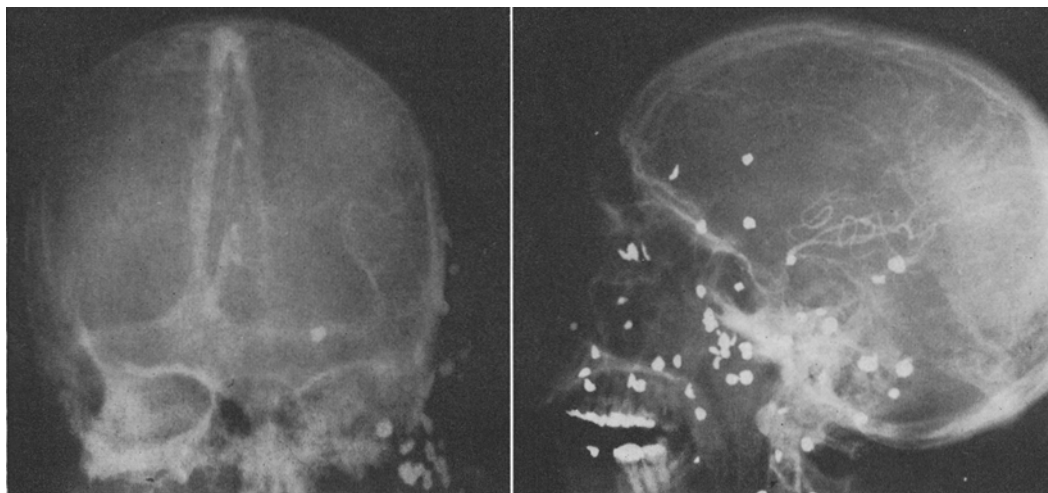


FIG. 2. Preoperative left carotid angiograms, late venous phase, demonstrating retrograde filling of the left middle cerebral artery to the point of obstruction. *Left:* Anteroposterior view. *Right:* Lateral view.

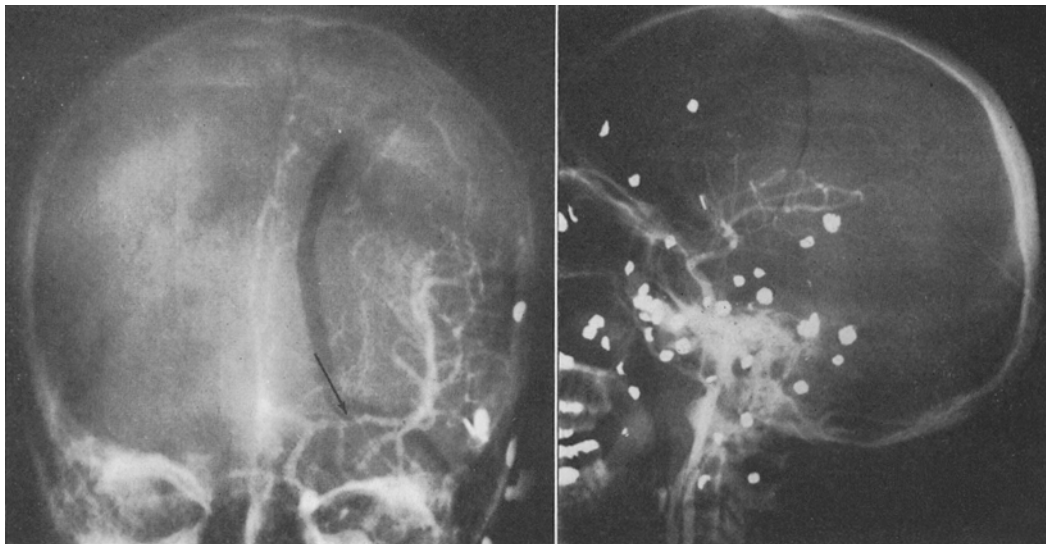


FIG. 3. Postoperative left carotid angiograms, arterial phase. *Left:* Anteroposterior view showing constriction of the middle cerebral artery (*arrow*) immediately distal to the anterior temporal branch at the site of arteriotomy. The pericallosal artery is shifted to the right secondary to postoperative edema. *Right:* Lateral view.

restoration of normal circulation, areas of marginal ischemia may have been saved and neurological improvement enhanced.

There are other indications for removal of this type of vascular obstruction. If the pellet remains, it could conceivably erode the thinned out and stretched arterial wall so as to produce intracranial hemorrhage; however, previously reported instances of hemorrhage secondary to vessel erosion and rupture by a foreign body have been limited to larger and extracranial vessels.<sup>5</sup> Another consideration is the possible failure of collateral circulation at a later time, thus producing additional neurological deficit.

In a similar case, Piazza and Gaist<sup>10</sup> milked the pellet back downstream into the distal internal carotid artery, and occluded that vessel distal to the foreign object. Circulation through the middle cerebral artery was reestablished via collaterals from the opposite side. It appears to us that embolectomy is preferable since additional ischemia might occur from internal carotid ligation.

In our case, the pellet did not enter the skull, and the site of penetration into the extracranial vasculature is unknown. There was no hematoma in the neck and no evidence of irregularity of the distal common or internal carotid arteries by angiography. The

location of much of the buckshot suggests that the penetration may have occurred proximal to the location of the needle in the common carotid artery.

### Summary

The unusual occurrence of a metallic embolus in the middle cerebral artery following a gunshot wound to the head and neck has been reported. The patient had a severe right hemiplegia and aphasia. Embolectomy resulted in postoperative patency of the artery and clinical improvement.

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