

GRANULOMA FORMATION AND ARTERIAL THROMBOSIS FOLLOWING COTTON WRAPPING OF AN INTRACRANIAL ANEURYSM

A CASE REPORT

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SUMMARY — The authors report the case of a patient whose left middle cerebral artery aneurysm was wrapped with cotton. Occlusion of the middle cerebral artery, probably secondary to a foreign-body inflammatory reaction, developed late in the postoperative course. A computerized tomography scan revealed cerebral infarct, and an enhancing expansive lesion at the site of the aneurysm suggesting the formation of a granuloma. These findings are discussed and the literature is reviewed.

KEY WORDS: intracranial aneurysm wrapping (cotton), foreign-body granuloma, arterial thrombosis.

Formação de granuloma e trombose arterial após envolvimento de aneurisma intracraniano com algodão: relato de caso.

RESUMO — Os autores descrevem o caso de um paciente cujo aneurisma da artéria cerebral média esquerda foi envolvido com algodão. Oclusão da artéria cerebral média, provavelmente devida a reação inflamatória de tipo corpo estranho, desenvolveu-se tardiamente no curso pós-operatório. Tomografia computadorizada revelou infarto cerebral e uma lesão expansiva, que aumentava de densidade após injeção de contraste, no local do aneurisma, sugerindo formação de granuloma. Estes achados são discutidos e a literatura é revista.

PALAVRAS-CHAVE: envolvimento de aneurisma intracraniano (algodão), granuloma tipo corpo-estranho, trombose arterial.

Clipping of the aneurysmal neck is generally regarded as the best procedure for treating intracranial aneurysms. However, surgeons are often confronted with aneurysms that cannot be clipped, either because of a broad base or arteriosclerotic plaques, or because they are fusiform or important vessels originate from them. In these cases, wrapping of the aneurysm is the method usually resorted to. Various types of materials have been used for wrapping, including acrylic^{2,3,4,6}, muscle⁷⁻⁹, fascia^{1,4}, cotton⁹, gauze^{1,4,13}, muslin^{5,7,8} and biological glue¹².

This report concerns a patient that developed a granulomatous foreign-body reaction and thrombosis of the middle cerebral artery after an aneurysm of this artery was wrapped with cotton. This is a rare complication, of which very few examples are found in the literature.

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CASE REPORT

GMD, a 40-year-old male with a history of mild hypertension and asthma awoke on November 30, 1989 with headache, photophobia and vomiting. On admission to the hospital on December 3, 1989, these symptoms persisted, and only nuchal rigidity was observed on physical examination. The results of laboratory examinations (blood cell count, coagulogram, quantitative analyses of blood glucose, ions, urea, creatinine, uric acid, calcium, bilirubin, alkaline phosphatase) were normal. There was a slight increase in transaminases (SGOT 90 UI/D, SGTP 79 UI/L). A computerized tomography (CT) scan performed on December 6, 1989 revealed blood in the left sylvian fissure. Bilateral carotid and left vertebral angiography showed dilation of the left middle cerebral artery trifurcation (Fig. 1). A left frontotemporal craniotomy was performed on December 19, 1989. During dissection of the middle cerebral artery and its trifurcation, transient local vasospasm was noted and reverted with the use of topical papaverine. The trifurcation of the middle cerebral artery was seen to be dilated, with a small, reddish weakened area, yet no true saccular aneurysm was identifiable. The adjacent brain tissue was xanthochromic. The trifurcation was wrapped with papaverine-soaked cotton. The patient had an uneventful postoperative course and was discharged on December 22, 1989. Fifteen days later, he experienced repeated episodes of right-sided weakness associated with dysphasia, which resolved completely. On March 11, 1990 he developed progressive loss of motor power on the right side and difficulty in talking, but there was no headache. Upon readmission, he was alert and showed nonfluent dysphasia, right-sided hemiparesis involving predominantly the face and arm, hyperreflexia, and a right Babinski sign. Nuchal rigidity was not observed. A CT scan revealed a low-density area in the left basal ganglia region causing compression of ipsilateral lateral ventricle, in addition to a high-density, homogeneously-enhanced mass in the anterior part of the left sylvian fissure (Fig. 2). Left carotid angiography showed occlusion of the trunk of the left middle cerebral artery (Fig. 3). Retrograde filling of the branches of the middle cerebral artery was evident on the late phase of the injection. The bifurcation of the left common carotid artery was also studied, but no changes were found. Treatment with physiological Rheomacrodex was

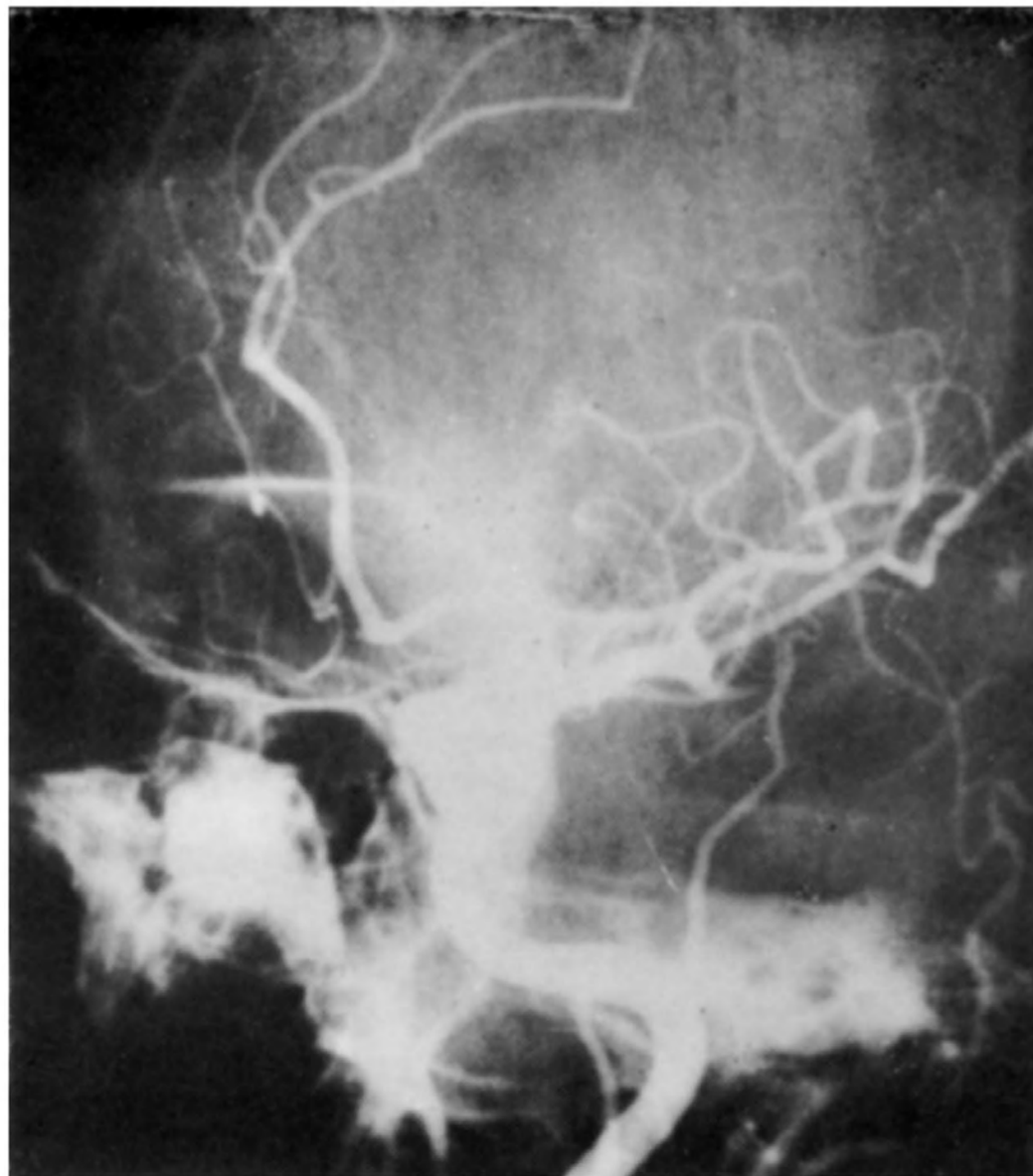


Fig. 1. Case GMD. Preoperative left carotid angiogram in oblique view showing dilation of the left middle cerebral artery trifurcation.

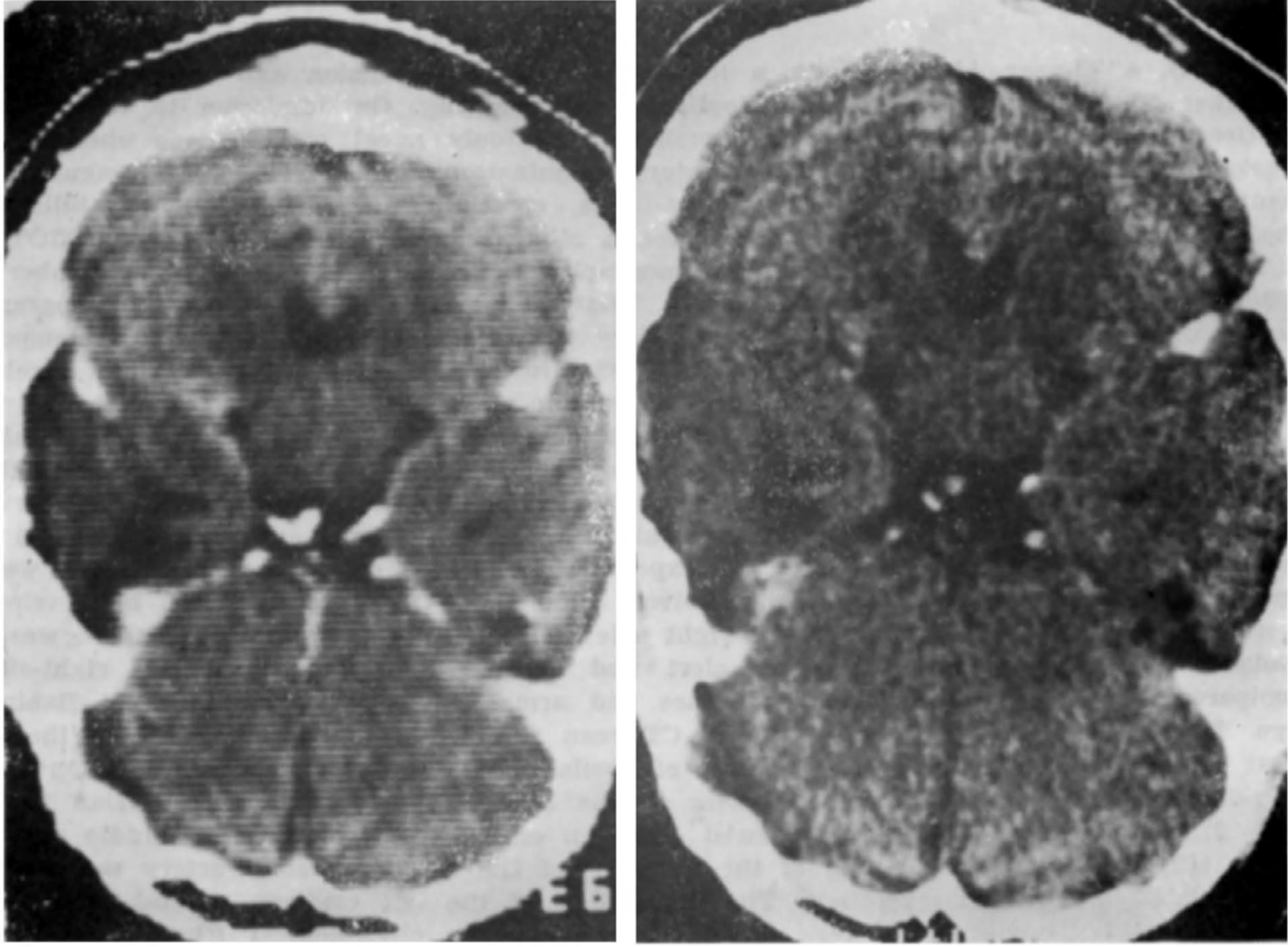


Fig. 2. Case GMD. Computerized tomography scan before (left) and after contrast injection (right) showing a high density contrast enhancing mass in the anterior part of the left sylvian fissure.



Fig. 3. Case GMD. Postoperative left carotid angiogram in oblique view showing occlusion of the trunk of the left middle cerebral artery.

started. Although the patient remained alert and had no nuchal rigidity, the motor deficit increased. Under treatment with heparin (4000 U IV at 4-hour intervals), started on March 3, 1990, he began improving. Héparine was administered during a 14-day period. At the time of discharge, the patient showed discrete dysnomia and the hemiparesis was less severe than on admission. A follow-up CT scan performed one month after readmission showed that the enhancing expansive lesion in the sylvian fissure had not changed in size or shape.

COMMENT'S

Various biological and/or synthetic materials, among which muscle^{7,9}, fascia^{2,4}, cotton⁹, gauze^{1,4,13}, muslin^{5,7,8}, biological glue¹² and acrylic^{2-4,6}, have been used for the wrapping or wall reinforcement of unclippable aneurysms. None of these materials, however, offers the ideal properties of immediate adherence, long term effectiveness, and no toxicity. Laboratory and clinicopathological studies conducted by Sachs⁷ showed that a marked fibrotic reaction is induced when cotton is wrapped around intracranial vessels in dogs and humans. Sturdy et al.⁸ also demonstrated that various substances, including cotton, talcum powder, and suture material, are capable of eliciting a granulomatous reaction. What appears to have occurred in the case reported here was an exaggerated tissue reaction to the foreign body (cotton), leading to the formation of a giant granuloma and to arterial occlusion.

Vascular thrombosis resulting from the coating of an aneurysm with fascia and cyanoacrylate was demonstrated by Coe and Bondurant². These authors suggested that shrinking of the fascia and acrylic coating could, in that case, have been responsible for occlusion of the vessel.

A few reports concerning giant granulomas are available in the literature. Shinosaka and Wagaio described the development of a granulomatous lesion after the resection of a meningioma. Haisa et al.⁵ reported granuloma formation after muslin wrapping and cyanoacrylate coating of an aneurysm. In a recent report, Chambi et al.¹ described six female patients with gauze-induced lesions (termed «gauzomas»), 'adding to three other cases, also all female, already identified in the literature. All underwent aneurysm reinforcement with gauze and developed enhancing expansive lesions in correspondence with CT-demonstrated sites of aneurysm. In this series of patients, signs and symptoms developed progressively within 17 months of the surgery. They included headache, low grade fever, epilepsy, endocrinopathy, cerebrospinal fluid pleocytosis, and cranial nerve deficit. In none of these cases, however, were ischemic infarcts or arterial occlusion reported. The reaction was self-limiting in all cases, and some patients even made a partial recovery. Anatomopathological examination was made in only one patient and revealed an area of fibrotic granulomatous foreign-body reaction containing biréfringent material.

The presence of fever and cerebrospinal fluid pleocytosis in some patients, plus a contrast-enhancing mass on CT, suggests an inflammatory process. It is also suspected that vascular changes are produced that could explain the appearance of seizures and cranial nerves damage. In the case reported here, the inflammatory reaction is believed to have extended throughout the wall of the left middle cerebral artery producing its occlusion.

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