CEREBRAL EMBOLISM DURING REVISION ARTHROPLASTY OF THE HIP

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Cerebral embolism poses one of the most perplexing problems in cerebrovascular disease ; fat emboli and marantic air emboli occur occasionally. However, the most common cause for a cerebral embolism is degenerative changes in the central arteries. The authors report the case of a 75-year-old female suffering from ischemic cerebrovascular disease of the left dominant hemisphere during a revision arthroplasty of the right hip (cementless Austin Moore hemiarthroplasty to a cemented Charnley total hip replacement) ; a cement gun was used to introduce the cement ; both the induction of anesthesia and the surgical procedure were uneventful. The patient awoke slowly, and when awake she showed a combination of contralateral hemiplegia, and right hemianesthesia with global aphasia ; the CT scan showed an ischemic lesion in the territory of the middle cerebral artery ; during the following two weeks the patient showed complete recovery from the clinical syndrome. This complication must be recognized by every orthopedic surgeon, and a high clinical index of suspicion remains essential to early diagnosis.

Keywords : cerebral embolism ; revision arthroplasty ; hip.
Mots-clés : embolie cérébrale ; reprise d'arthroplastie ; hanche.

INTRODUCTION

Advances in anesthesia during the past 20 years have enabled physicians to perform increasingly complex operations, sometimes in very ill patients. The advances in drugs and monitoring techniques have contributed to this success. Although the success rates have increased, complications continue to occur. The orthopedic surgeon should be aware of anesthetic complications and concerns (3). We present the case of a female suffering from a left hemisphere ischemic cerebral lesion during a revision arthroplasty of the right hip ; the neurological syndrome resulted from arterial occlusion by an embolus in the middle cerebral artery territory.

CASE REPORT

A 75-year-old female was treated for chronic arterial hypertension ; 15 years earlier she suffered a right femoral neck fracture treated in another center with an uncemented Austin Moore hip hemiarthroplasty. For the last 3 years she complained of progressive right groin pain ; the roentgenographic examination showed a severe acetabular erosion (fig. 1). A revision arthroplasty of the right hip was indicated. A cemented Charnley prosthesis was implanted through a lateral approach with the patient in the supine position ; osteotomy of the greater trochanter was carried out ; a cement gun was used to introduce the cement into the femur (fig. 2).

Anesthetic technique : Induction of anesthesia was carried out with Phentanil (3.5 mgr/kg body weight), Propophol (1.8 mgr/kg body weight), and Vecuronio (0.1 mgr/kg body weight). Blood

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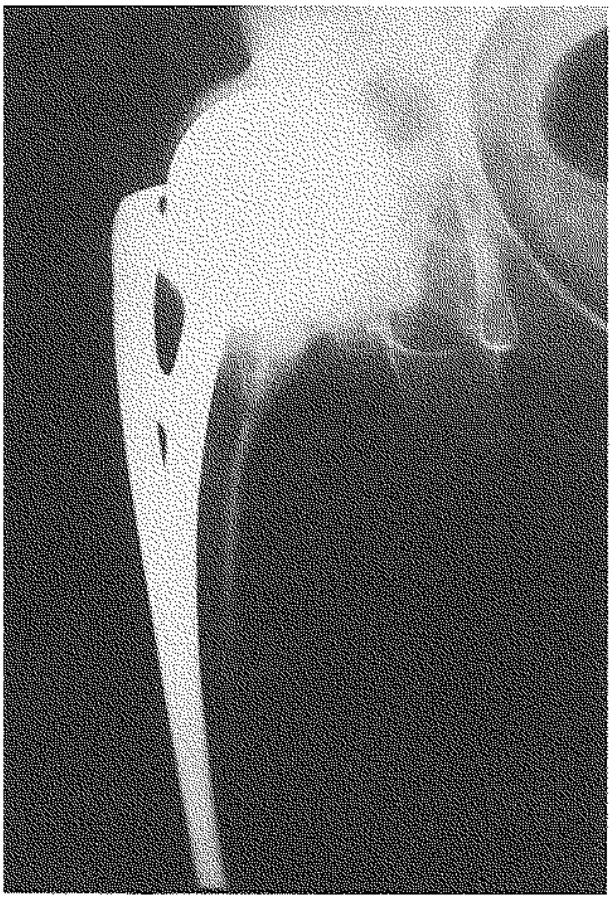

Fig. 1. — AP roentgenogram of the right hip showing severe acetabular erosion related to an uncemented Austin Moore hemiarthroplasty performed 15 years before. A revision hip arthroplasty was then indicated.

pressure (Dinamap-Critikon), ECG (lead II), pCO_2 and spO_2 were monitored. The anesthesia was maintained with O_2 : N_2O (FIO_2 35%), ventilation with intermittent positive pressure, continuous inspiratory isofluorane (0.5-0.75%), and intermittent doses of Phentanil (total dose 300 mcgr). There were no intraoperative hemodynamic problems ; when the prosthetic components were cemented the pCO_2 decreased from 28 to 22 mmHg, although no evidence of decreased O_2 arterial saturation was encountered ; 2,500 ml of crystalloids and 500 ml of colloids were administered ; the estimated blood loss was 700 ml. At the end of the surgical procedure the patient awoke slowly, and when awake she showed the classic picture of arterial embolies in the middle cerebral artery territory in the left dominant hemisphere, (right-sided hemiplegia and hemianesthesia, and global aphasia). This particular neurological syndrome was not related to the anesthetic drugs utilized or to cerebral hypoxia. The patient was admitted to the intensive care unit. On the CT scan performed 12 hours later an ischemic lesion in the territory of the middle cerebral artery was found in the left dominant hemisphere (fig. 3). No anticoagulant therapy was indicated because of the early spontaneous recovery from the clinical syndrome. During the following two weeks the patient showed complete spontaneous recovery from the ischemic defect ; 12 days later she was discharged ; 18 months later she had undergone complete recovery from the condition.

Fig. 2. — Postoperative AP roentgenogram showing the cemented Charnley total hip arthroplasty.

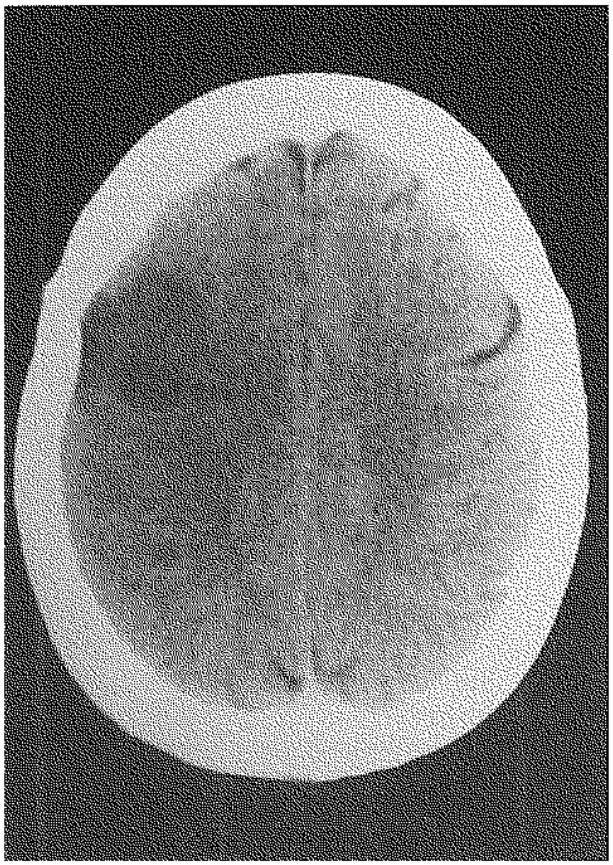

Fig. 3. — CT scan showing a hypodense left frontoparietal lesion, suggesting an embolic occlusion in the middle cerebral artery territory.

DISCUSSION

Cerebral embolism poses one of the most perplexing problems in cerebrovascular disease. The size, site, and to some extent the pathologic nature of the embolus determines the size, location, and character of the ensuing infarct. Emboli large enough to occlude the stem of the middle cerebral artery result in a large stroke, involving both deep grey and white matter as well as the cortical surface and its underlying white matter. A smaller stroke ensues if the embolus is small enough to occlude only a small cortical surface branch or a small penetrating branch from the middle cerebral artery stem or the basilar artery. Furthermore, embolic material composed of platelet fibrin clot characteristically has a tendency to migrate, undergo lysis and disperse, accounting for fluctuations in symptoms and, in some cases, complete recovery from the ischemic deficit.

Therapy of patients with embolic cerebral infarction consists of managing the stroke itself, in both the acute and chronic phases, and in prevention of further embolic strokes. The suspicion that fragments of clot from an unknown source constitute the embolic material raises consideration of anticoagulation. Before beginning anticoagulation therapy, a CT scan should be obtained to rule out the possibility of a small lobar hemorrhage masquerading as an embolic stroke. When chronic anticoagulation is prescribed in any type of cerebral embolism of unknown source, low-dose warfarin therapy is usually recommended. The prothrombin time should not be greater than 1.5 times the control. Finally, there are no reliable guidelines for the duration of anticoagulation therapy for patients with cerebral embolus of unknown source. But if the patient is under 50 years of age, anticoagulation for 6 months to 1 year seems appropriate. In our patient, no anticoagulation therapy was prescribed because an early, nearly complete spontaneous recovery from the ischemic defect was observed. Marshall *et al.* have reported a fatal pulmonary embolism during a total hip replacement resulting from high-pressure cementing techniques in an osteoporotic femur (2). On the other hand, Evans *et al.* have reported that venous air embolism occurs commonly throughout hip surgery, especially during prosthesis insertion into the femoral shaft. However, these authors concluded that the incidence of air embolism and associated cardiovascular changes during total hip arthroplasty may be reduced in those patients in whom a cement gun is used to inject the cement (1). Unfortunately, our case did not show evidence of a fat embolus etiology. Cerebral embolism is a rare but potentially dangerous complication during total hip replacement. The authors believe that the most common cause of this condition is degenerative changes in the central arteries. This article emphasizes that the recognition of this condition must be familiar to every orthopedic surgeon and that a high clinical index of suspicion remains essential to early diagnosis. The authors did not find any similar cases in the review of the literature.

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SAMENVATTING

E. C. RODRIGUEZ-MERCHAN, J. A. COMIN-GOMEZ, J. L. MARTINEZ-CHACON. Cerebrale embolie tijdens een revisie arthroplastiek van de heup.

Cerebale embolie is een complex probleem : nu en dan kunnen vet- of gasembolen hersenlaesies veroorzaken maar de meest voorkomende oorzaak van een cerebrale embolie zijn degeneratieve letsels van de centrale arteriën. De auteurs beschrijven het geval van een 75-jarige patiënte die een cerebrale ischemie in het linker hemisfeer kreeg tijdens een revisie van een totaal prothese van de heup (cementloze femurprothese volgens Moore vervangen door een gecementeerde totaal prothese volgens Charnley).
Het cement werd met een spuit retrograad ingebracht. Er deden zich noch anesthesiologische noch chirurgische problemen voor. Patiënte ontwaakte vrij traag ; wanneer wakker werd een rechter hemiplegie en een rechter anesthesie met globale afasie gezien. De CT-scan toonde een ischemisch letsel in het gebied van de arteria cerebralis media.
De klinische recuperatie was volledig na 2 weken. Elke orthopedisch chirurg zou zich van de mogelijkheid van deze complicatie bewust moeten zijn ; een bijzonder scherpe waakzaamheid is aangewezen om een vroegtijdige diagnose te kunnen stellen.

RÉSUMÉ

E. C. RODRIGUEZ-MERCHAN, J. A. COMIN-GOMEZ, J. L. MARTINEZ-CHACON. Embolie cérébrale pendant une reprise d'arthroplastie de la hanche.

L'embolie cérébrale pose des problèmes complexes ; des emboles graisseux ou gazeux se produisent occasionnellement mais la cause la plus habituelle d'une embolie cérébrale est représentée par des altérations dégénératives dans les artères centrales. Les auteurs rapportent le cas d'une patiente de 75 ans qui a présenté une ischémie cérébrale de l'hémisphère gauche dominant à l'occasion d'une reprise de prothèse totale de hanche (prothèse fémorale de Moore sans ciment remplacée par une prothèse totale cimentée de Charnley) ; le ciment avait été introduit de façon rétrograde avec une seringue ; il n'y avait pas eu de problème anesthésiologique ou chirurgical. Le réveil fut très lent ; une fois réveillée, la patiente présentait une hémiplégie et une hémianesthésie du côté droit ainsi qu'une aphasie globale ; le CT Scan montrait une lésion ischémique dans le territoire de l'artère cérébrale moyenne. La récupération clinique a été complète en deux semaines. Cette complication devrait être familière à tout chirurgien orthopédique et une vigilance particulière est essentielle pour poser un diagnostic précoce.