Case Report

GIANT INTRACRANIAL ANEURYSM RUPTURE IN PREGNANT WOMAN TREATED BY ENDOVASCULAR EMBOLIZATION: A CASE REPORT*

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Abstract

Intracranial aneurysm rupture is a rare cause of morbidity and mortality in pregnancy, with few endovascular treatment cases reported in the literature. In this study, we report a case of a 37-year-old woman in the eighth gestational month, presenting tomographic findings and clinical manifestations compatible with subarachnoid hemorrhage (Hunt Hess III) due to rupture of an ophthalmic segment aneurysm in the internal carotid artery.

Keywords: Cerebral aneurysm; Subarachnoid hemorrhage; Pregnancy; Endovascular embolization.

INTRODUCTION

Giant cerebral aneurysms are uncommon and may manifest as a result of subarachnoid hemorrhage or acute compression syndrome[(1)]. The prevalence of intracranial hemorrhage during gestation ranges from 0.01% to 0.05%[(1,2)], with an incidence between 1/10,000 to 1/2,000[(2–6)], similar to the incidence in the rest of the population[(6)]. This disease causes a high maternal mortality

(40%–83%), corresponding to 5% to 12% of all deaths[1,2,7,8], and is the third major cause of indirect death (non-obstetric)[1,2,5,6]. The endovascular treatment with platinum coils is one of the methods utilized, is minimally invasive and quite effective for the aneurysm occlusion, although there are few cases reported in the literature[1,2,3,9]. This study reports a case of endovascular embolization of a giant cerebral aneurysm in a pregnant woman.

CASE REPORT

A female, 37 years old patient at the 32nd. gestational week, has presented left amaurosis, about three months ago, evolving to a scenario of sudden somnolence, nuchal rigidity, expression aphasia and right hemiparesis.

The patient was referred to the obstetrics service, where the hypothesis of a pregnancy-specific disease was discarded. So, the patient was transferred to an intensive therapy unit. At admission, her arterial pressure was 130/90 mmHg and the heart rate 85 bpm. Palpable uterine contractions were not observed and the uterine cervix was found bulky and closed. Clinical and ultrasound evaluations demonstrated an active fetus, gestational age compatible with the date of amenorrhea, dorsum at left, high cephalic presentation and fetal heartbeats of 140 bpm. Neurological examination demonstrated a picture corresponding to grade III in the Hunt Hess scale, while eye-ground examination detected left papilla atrophy. The patient was submitted to computed tomography (CT) of the brain that detected signs of meningeal hemorrhage (Fisher III). Initial laboratory tests showed 35% hematocrit; 136 mEq/1 seric sodium; 4 mEq/1 seric potassium, 1 mg% creatinine; 40 mg% urea. The patient was maintained under slight sedation, in spontaneous ventilation and under rigorous blood pressure and hydroelectrolytic control. Two days after admission, the patient was submitted to a cesarean section, under general anesthesia. There was no complication both for the mother and the newborn whose discharge occurred 48 hour later. The parturient woman remained under sedation and mechanical ventilation for 12 hours after delivery and, 15 days later, she underwent cerebral arteriography that showed ophthalmic segment giant aneurysm in the left internal carotid measuring 19.6 x 18.4 mm in its greatest dimensions, with a 4.3 mm neck (Figures 1A and 1B).

Five days later, the patient underwent percutaneous embolization of the aneurysm with platinum microcoils (Figures 1C and 1D). The patient remained in the intensive care unit for three days where she recovered the consciousness and orientation although still presenting loss of strength on right hemibody and left amaurosis. In the ambulatory, the patient started presenting fever episodes. Endometritis was diagnosed and curettage was performed, with post-surgery antibiotherapy (amicacin and ampicillin) prescription. Hospital discharge occurred at the tenth day after the curettage with the patient presenting the previously described neurological condition.

DISCUSSION

The spontaneous subarachnoid hemorrhage may be caused by vasculitis, tumors, coagulation disorders, arteriovenous malformations or aneurysms, the latest ones accounting for about 50% of cases[4,6,7]. In pregnant women, arteriovenous malformations are more frequent in the age range

between 20 and 25 year and usually bleed between the 15th and 20th gestational weeks. On the other hand, aneurysms occur at more advanced ages (30–40 years) and most frequently suffer rupture in the third trimester[2,4–6]. Incidences of intracranial aneurysm in the first, second or third trimesters are respectively of 6%, 31% and 55%, while in the post-delivery period, the incidence is of 8%[2,5,6], and aneurysms may be multiple in 20% of cases[1,2].

During the pregnancy, hemodynamic stress and hormonal changes contribute for development and rupture of aneurysms[1,3]. Such changes reach their peak in the third trimester and during the labor[3]. Among the changes, one can mention hydric retention, increase in the cardiac output and in blood volume (both in plasmatic volume and in the number of blood cells), alterations of prostaglandin metabolism and consequent vascular intima hyperplasia[3] associated with media alterations[2].

The differential diagnosis should exclude eclampsia and severe preeclampsia, which might occur concomitantly[3,5,7]. The arteriography of the four main cerebral vessels is essential in cases where cranial CT scan suggests meningeal hemorrhage[3,5].

In non-treated patients, rebleeding occurs in 33-50% of cases, with maternal mortality rates of approximately 50% to 68%[1,2,8]. The fetal mortality rate is 27% in cases receiving only pharmacological therapy and 5% in surgical cases[1,2,6–8]. For this reason, option for the subarachnoid hemorrhage surgical treatment usually should be made the earliest possible[5,6], except for extremely severe cases (Hunt Hess > III[5] and cases of intracranial bacterial aneurysms[10]), when the most prudent attitude is firstly to stabilize the patient's clinical condition.

One of the greatest concerns about the use of angiography and embolization during pregnancy is the risk of fetal abnormalities resulting from radiation exposure[1]. In the first two weeks of gestation (embryogenesis period) radiation may kill the embryo. During the organogenesis period (second to seventh weeks), radiation may cause abnormalities and deformities in surviving fetuses. In the fetal period (after the eighth week), growth retardation with microcephaly may occur, besides mental retardation due to neuronal depletion, or development of cancer. The damage probability is directly proportional to the quantity of radiation utilized. The risk of neuronal depletion is higher between the 8th and 15th gestational weeks — a period corresponding to the proliferation of neuroblasts and their migration into the cerebral cortex[1].

Estimates on the radiation dose absorbed by patients submitted to digital subtraction arteriography have demonstrated an effective dose between 3.6 mSv and 10 mSv (1 Sv = 100 rem), equivalent to the total dose of seven or eight cranial CT scans[1]. It is difficult to extrapolate the rate of radiation absorbed by the fetus, however, the radiation diffusion to the pelvis and abdomen during the direct exposure of the skull is minimal and normally does not exceed 0.1 mrad[1]. According to the National Council on Radiation Protection and Measurement, the exposure to doses < 1 rad has a low statistical probability of causing deformities[1]. Such risks tend to decrease even more with the evolution of devices utilized, with the use of an abdominal shield during the procedure and with limitation of the fluoroscope to areas distant from the uterus[1,2]. The iodine contrast has no effect on the fetus, although there is some reports about cases of transient

hypothyroidism[9]. In the present case, the performance of a cesarean before the aneurysm treatment excludes the conceptus exposure to radiation.

The treatment of ruptured intracerebral aneurysms demands intensive care and neurosurgical follow-up, and may be performed either by means of microsurgical clipping or endovascular embolization, depending on the type, size and site of the aneurysm[1,9]. The surgical clipping is still the most utilized technique[5], obtaining excellent aneurysm occlusion and allowing the removal of blood and clots from the brain cisterns, although with high post-surgery mortality and difficult dilatation of the vertebrobasilar system. In spite of few cases reported in the literature, embolization has been currently gaining more and more adepts. In both techniques general anesthesia is utilized and the correlate risk between both techniques is similar[3]. In the case presently reported, one has chosen to perform the endovascular intervention, considering the technique less invasiveness, the difficulty to clip the aneurysm due to its diameter (> 15 mm) and neck (> 4 mm), so avoiding to submit the patient to an additional surgical intervention and to cerebral tissue manipulation.

In stable patients with near-term fetus, the vaginal delivery is preferred, while the cesarean section is more frequently used in cases of unruptured aneurysm, meningeal hemorrhage during labor or when the patients's clinical and neurological pictures are unfavorable[6]. If the intracranial aneurysm occlusion is performed before the delivery, this may occur by vaginal way without risk of rebleeding. On the other hand, in cases where delivery occurs first, this may occur either by vaginal way or by cesarean section; in this case the choice is guided by the obstetric state of the patient. There is no evidence that the cesarean section is safer for the mother or for the fetus[3,6,8], and frequently this procedure is chosen due its quickness and easy monitoring[3]. Additionally, there is the possibility that the aneurysmal clipping is performed immediately after the cesarean section and conversion of anesthesia[5].

Similarly to the cases reported in the researched literature, the endovascular management in this rare case has obtained excellent therapeutic result and prognosis, so the continuous progress of diagnosis/therapeutic techniques and equipment tends to gradually reduce the morbimortality rates of this disease, provided maximum attention is paid to simple manifestations like headaches or ocular alterations in pregnant women.

REFERENCES

1. Meyers PM, Halbach VV, Malek AM, *et al.* Endovascular treatment of cerebral artery aneurysms during pregnancy: report of three cases. Am J Neuroradiol 2000;21:1306–1311.

2. Kizilkilic O, Albayran S, Adaletli I, *et al*. Endovascular treatment of ruptured intracranial aneurysm during pregnancy: report of three cases. Arch Gynecol Obstet 2003;268:325–328.

3. Shahabi S, Tecco L, Jani J, *et al.* Management of a ruptured basilar artery aneurysm during pregnancy. Acta Chir Belg 2001;101:193–195.

4. Rivero MI, Gonzalez E, Alfonso F. Trabajo de parto y rotura de aneurisma cerebral. Unne Corrientes Argentina on line: 2002 nov cited 2003 nov 23; 1(2): Available from: URL: http://www.unne.edu.ar/cyt/2002/03-Medicas/M-007.pdf.

5. Reichman OH, Karlman RL. Berry aneurysm. Surg Clin Am 1995;75:115–121.

6. Stoodley MA, Macdonald RL, Weir BK. Pregnancy and intracranial aneurysms. Neurosurg Clin N Am 1998;9:549–556.

7. Lynch JC, Andrade R, Pereira C. Hemorragia intracraniana na gravidez e puerpério. Arq Neuropsiqiatr 2002;60:264–268.

8. Dias MS, Sekhar LN. Intracranial hemorrhage from aneurysm and arteriovenous malformations during pregnancy and puerperium. Neurosurgery 1990;27:855–866.

9. Piotin M, de Souza Filho CB, Kothibakan R, Moret J. Endovascular treatment of acutely ruptured intracranial aneurysms in pregnancy. Am J Obstet Gynecol 2001;185:1261–1262.

10. Powell S, Rijhsighani A. Ruptured bacterial intracranial aneurysm in pregnancy. A case report. J Reprod Med 1997;42:455–458.

RUPTURA DE ANEURISMA INTRACRANIANO GIGANTE

Figuras

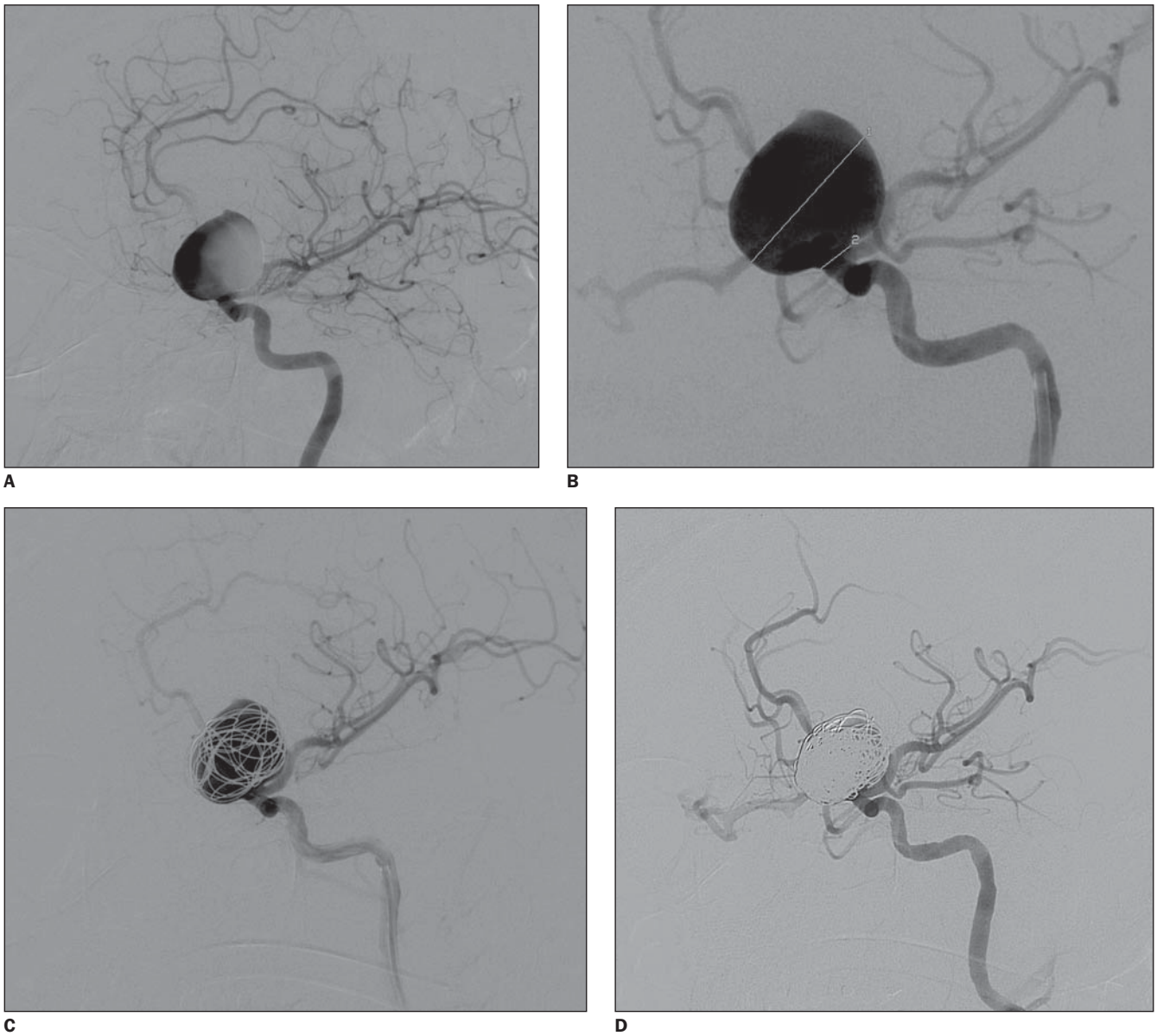

Figure 1. Cranial CT study demonstrating internal carotid artery ophthalmic segment giant aneurysm. **A:** Pre-embolization anteroposterior view. **B:** Anteroposterior incidence demonstrating the aneurysm dimensions (19.6 × 18.4 mm) and the cervix diameter (4.3 mm). **C:** Transembolization anteroposterior incidence. **D:** Anteroposterior incidence after partial embolization.