CASE REPORT

Stenting of a cerebral venous thrombosis

Traitement endovasculaire par stents d’une thrombophlébite cérébrale

M. Formaglio\textsuperscript{a,b,c}, H. Catenoix\textsuperscript{a,*},\textsuperscript{b,c}, F. Tahon\textsuperscript{b,c,d}, F. Mauguière\textsuperscript{a,b,c}, A. Vighetto\textsuperscript{b,c,e}, F. Turjman\textsuperscript{b,c,d}

\textsuperscript{a} Service de neurologie fonctionnelle et d’épileptologie, hôpital neurologique Pierre-Wertheimer, hospices civils de Lyon, 59, boulevard Pinel, 69677 Bron, France
\textsuperscript{b} Université de Lyon-1, 69003 Lyon, France
\textsuperscript{c} Institut fédératif des neurosciences de Lyon, 69003 Lyon, France
\textsuperscript{d} Service de radiologie, hôpital neurologique Pierre-Wertheimer, hospices civils de Lyon, 69677 Bron, France
\textsuperscript{e} Service de neurologie D, hôpital neurologique Pierre-Wertheimer, hospices civils de Lyon, 69677 Bron, France

Available online 25 September 2009

KEYWORDS
Cerebral venous thrombosis; Endovascular treatment; Stent; Jugular vein; Heparinotherapy

Summary  Cerebral venous and sinus thrombosis (CVT) is a rare but potentially alarming condition, which remains a diagnostic and therapeutic challenge. Endovascular procedure may be a therapeutic option when evolution is unfavourable despite medical treatment, but the use of stenting is rarely reported in CVT treatment. We report the case of a man who presented a jugular vein thrombosis responsible for severe intracranial hypertension. Because of clinical worsening despite intravenous heparin and symptomatic treatment, endovascular procedure including the placement of five venous stents, thrombolysis and balloon angioplasty, was performed and led to venous recanalization with successful clinical outcome. The patient is still asymptomatic 3 years later. Our report shows that venous stenting could represent an efficient alternative in the management of decoagulation refractory CVT.

© 2009 Elsevier Masson SAS. All rights reserved.

Introduction

Cerebral venous and sinus thrombosis (CVT) is a rare but potentially alarming condition, which accounts for 0.5% of all strokes and remains a diagnostic and therapeutic challenge [1]. Clinical symptoms and severity depend on thrombus extent and location, collateral venous circulation, and rate of thrombus progression [2]. When clinical evolution is unfavourable despite adequate anticoagulation, endovascular procedure may be a therapeutic option for active reestablishment of venous drainage [3]. Successful outcomes following thrombolysis in situ or mechanical thrombectomy using most often balloon angioplasty or rheolytic thrombectomy devices have been reported [4], whereas the use of stenting is rarely reported in treatment of vein thrombosis [5]. We report the case of a patient with a refractory left jugular thrombosis successfully treated by endovascular procedure with placement of five stents in the jugular vein in addition with in situ thrombolysis and mechanical angioplasty.
Figure 1  MRI and cerebral angiography before endovascular treatment.  
MRI T2-weighted axial (A) and T1-weighted gadolinium-enhanced sagittal (B) sections show a left sigmoid sinus and jugular vein thrombosis (arrows). On the face view of digital subtraction cerebral angiography, venous time of the left internal carotid injection (C) emphasizes a total obstruction of the sigmoid sinus and the internal jugular vein (arrow).

Case report

A 31-year-old man of Mediterranean origin, with personal and familial history of severe mucous buccal ulcerations, was transferred to our department for intracranial hypertension with headache, nausea, vomiting and diplopia that had progressively worsened for 1 month. General and neurological examination was normal except a bilateral external ophthalmoplegia. MRI revealed thrombosis of the left jugular vein without parenchymal abnormalities.

Despite intravenous heparin and symptomatic treatment (osmotic therapy and lumbar punctures), hypertension persisted and the ophthalmologic examination was normal except a bilateral external ophthalmoplegia. MRI revealed thrombosis of the left jugular vein without parenchymal abnormalities.

Despite intravenous heparin and symptomatic treatment (osmotic therapy and lumbar punctures), hypertension persisted and the ophthalmologic examination was normal except a bilateral external ophthalmoplegia. MRI revealed thrombosis of the left jugular vein without parenchymal abnormalities.

Endovascular treatment was attempted. The initial angiogram confirmed the left jugular thrombosis associated with a hypoplasia of right jugular vein and lateral sinus (Fig. 1). A no. 8 French venous catheter was easily advanced from a cervical puncture site in the left internal jugular vein into the thrombus up to the lateral sinus in order to avoid its trapping in the cardiac right atrium. A 6 × 40-mm Cordis Ammia angioplasty balloon (Cordis, Miami lakes, FL, United States) was placed through the thrombosed vessel and mechanical angioplasty was performed. Two 8 × 40-mm and two 7 × 40-mm Cordis Precise endovascular stents (Cordis, Miami lakes, FL, United States) were then placed coaxially in the jugular vein to overlap each other and to cover the total length of the thrombus and enabled recanalisation (Fig. 2). The patient improved and anticoagulation with heparin was relayed by antivitamin K therapy because of venous placement of stents and because

Figure 2  Cerebral angiography after endovascular treatment.  
Native image (A) shows stents in left sigmoid sinus and internal jugular vein (arrow). The venous time of the left internal carotid injection (B) confirms complete recanalization and shows a defect opacification that could correspond to either a persistent clot or a Pacchioni granulation (arrow).
it represents the reference treatment of venous thrombosis [6].

Two weeks later, the patient developed again cephalgia and vomiting as well as buccal ulcerations. MRI confirmed the spreading of the thrombosis to the left transverse sinus and to the sagittal superior sinus. A second endovascular treatment was performed in the left internal jugular vein. A no. 6 French diagnostic catheter and a Vasco microcatheter (Balt, Montmorency, France) were positioned through a no. 8 French guiding catheter. Using this three-catheter coaxial technique, it was possible to place a 0.35-mm guiding catheter in the thrombosed stent where 30 mg of rtPA were infused in addition with 10 mg administered in the lateral sinus. A mechanical angioplasty was performed again with a Maverick balloon angioplasty (Boston scientific, Natick, MA, United States) and a fifth 9 × 30-mm Cordis Precise stent was placed in the thrombosed transverse sinus. Aspirin was associated to AVK drugs because of lack of efficacy of the previous oral anticoagulation on stent restenosis. Furthermore the patient was treated by oral low dosages of oral corticosteroids in the hypothesis of a Behcet’s disease.

The outcome was finally favourable with progressive resolution of cephalgia and diplopia. The patient is asymptomatic 3 years later and ophthalmologic examination is normalized without papilloedema nor visual fields abnormalities. A control MRI angiography performed 3 years after stenting showed a flow in the left lateral sinus and the left jugular vein above and below the stents, at the level of which flow could not be directly visualized because of image artefacts. A left dilated occipitotemporal vein of Labbe was shown to drain in the origin of the jugular vein.

**Discussion**

Since the study by Einhäupl et al. [6] anticoagulant therapy has proved to be the first line treatment of CVT. In case of anticoagulant treatment failure, endovascular procedures could be a therapeutic option to provide active reestablishment of venous drainage and prevent cerebral oedema and mass effect. Combination of in situ infusion of pharmacologic thrombolytic drugs and mechanical thrombectomy is usually used. Indeed, local thrombolysis with rtPA appears to restore flow with a low incidence of haemorrhage more frequently and rapidly than heparin alone or intravenous thrombolysis [3]. Endovascular therapy with mechanic thrombectomy may be indicated for patients who deteriorate despite adequate anticoagulation [1]. There are also many reports of mechanical thrombectomy in CVT with successful outcome, especially with AngioJet rheolytic catheter thrombectomy and balloon angioplasty associated with in situ or intravenous rtPA administration [4].

Venous stenting is a more rarely used technique in CVT treatment but has been efficiently performed in several cases of refractory idiopathic intracranial hypertension [7]. There are also reports of endovascular stent placement in the treatment of stenotic or occluded sinuses associated with dural arteriovenous fistulae [8]. This therapeutic remains nevertheless rarely used in the management of CVT [5].

Our case shows that venous stenting could be a useful procedure in the treatment of CVT. It highlights the benefits that the association of anti-aggragtant drugs could yield as already observed after arterial stenting [9]. Indeed, our patient was first improved by jugular vein stenting but secondarily relapsed because of a rethrombosis under effective anticoagulation therapy. After a second endovascular procedure and introduction of antiplatelet aggregation therapy, he presented no relapse. Steroids are not considered useful in the acute phase of CVT and can even be detrimental in patients without parenchymal abnormalities [10], there use in our patient was justified by the diagnosis of probable Behcet’s disease and the severe buccal ulcerations.

In conclusion, our case shows that venous stenting could represent an efficient alternative in the management of decomagulation refractory CVT. Our patient had a favourable clinical outcome, which, however, required two endovascular procedures and the association of thrombolysis, balloon angioplasty, stenting and anti-aggregant treatment, showing the variety of management strategies that can be needed in order to obtain restoration of venous circulation. Further comparative studies may help to clarify the optimal treatment for CVT, the place of the stenting procedure and the role of anti-aggregant drugs.

**Conflicts of interests**

No potential conflict of interest relevant to this article was reported.

**References**


