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Clinical case

Superior sagittal sinus reconstruction using a femoral venous graft after total removal of a meningioma. Case report

Reconstruction du sinus sagittal supérieur par un greffon veineux fémoral après exérèse complète d'un méningiome. Cas clinique

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ABSTRACT

Objective. – Resection of a parasagittal meningioma invading the superior sagittal sinus (SSS) needs the reconstruction of the sinus by a patch or a venous graft depending of sinus invasion degree.
Method. – We present here a case of a 21-year-old man who underwent radical removal of a radio-induced parasagittal meningioma totally invading the posterior third of the sinus. For its reconstruction, we used the patient's left superficial femoral vein without valves as an autograft, by realizing two end-to-end anastomoses between the sinus and the graft after an en-bloc removal of the meningioma and the invaded sinus.
Results. – Two years after surgery, clinical examination of the patient was strictly normal and the femoral venous graft was still patent on CT angiograms.
Conclusion. – The superficial femoral vein without valves seems to be convenient for SSS reconstruction.

Mots clés :
Sinus sagittal supérieur
Pontage
Greffon veineux
Méningiome

RÉSUMÉ

Objectif. – L'exérèse d'un méningiome envahissant le sinus sagittal supérieur implique, selon le degré d'envahissement, la reconstruction dudit sinus par un patch ou par un greffon synthétique ou veineux.
Patient et méthode. – Nous présentons le cas d'un homme de 21 ans ayant présenté un méningiome parasagittal radio-induit envahissant le tiers postérieur du sinus sagittal supérieur. Après exérèse totale du méningiome, nous avons reconstruit le sinus en utilisant un morceau de la veine fémorale superficielle gauche du patient, dépourvu de valves et greffé de façon termino-terminale.
Résultats. – Deux ans après la chirurgie, l'examen clinique du patient est strictement normal et le greffon veineux fémoral est toujours perméable sur les différents angioscanners.
Conclusion. – La veine fémorale superficielle, sans valves, semble être un greffon intéressant lorsque l'on envisage la reconstruction du sinus sagittal supérieur.

Radical resection of meningiomas invading the superior sagittal sinus (SSS) presents several hazards. Some surgeons consider sagittal sinus invasion as a contra-indication for complete resection (Kondziolka et al., 1998), while others advocate total resection with venous reconstruction (Bonnal and Brotchi, 1978; Hakuba, 1999).

It is admitted nowadays that complete resection of a meningioma invading venous sinus with sinus reconstruction by patch or graft is the best treatment option to ensure a good long-term cure.

We present here the case of a young man affected with a radio-induced atypical meningioma who was surgically treated by a complete resection followed by a sagittal sinus reconstruction using a femoral vein autograft.

1. Case report

Mr L., 21-year-old, was admitted in our department in January 2009 for the surgical management of a radio-induced meningioma invading the posterior third of the sagittal sinus.

In his past history, he presented in 1996 a lymphoblastic acute leukemia treated by chemotherapy and an adjunctive 18 Grays whole-brain radiotherapy. During a systematic ophthalmologic

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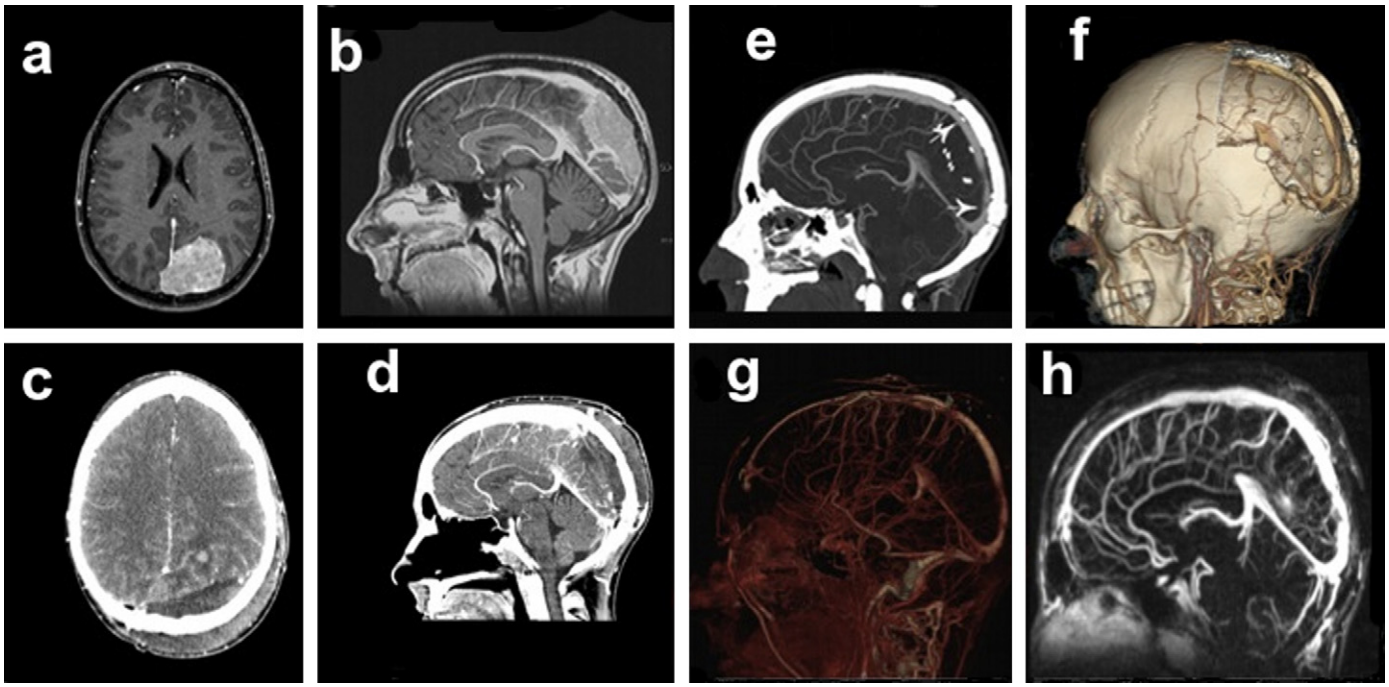

Fig. 1. Preoperative MRI, axial (a) and sagittal (b) T1-weighted with gadolinium enhancement images showing a large parieto-occipital meningeal tumour invading the posterior one-third of the superior sagittal sinus (SSS). Early postoperative CT scan, axial (c) and sagittal (d), showing an extradural hematoma that occluded the bypass, and required evacuation; at 7th day (e), 3 months (f) (3D reconstruction, g: angiogram) and 2 years after surgery (h): the graft was patent.
IRM préopératoire, en pondération T1 après injection de gadolinium, en coupe axiale (a) et sagittale (b), montrant une volumineuse tumeur pariéto-occipitale envahissant le sinus sagittal supérieur. Imagerie postopératoire à j1, en coupe axiale (c) et sagittale (d) révélant un hématome extradural comprimant le pontage et nécessitant une évacuation chirurgicale ; à sept jours (e), à trois mois (f) (reconstruction 3D, g : angiogramme) et à deux ans (h) de la chirurgie : le greffon est fonctionnel.

examination in November 2008, a bilateral papillary edema was found, without papillary haemorrhage nor venous thrombosis. The patient complained of headache without any neurological deficit. Visual acuity was 10/10 for both eyes. Magnetic Resonance Imaging (MRI) displayed a left occipito-parietal parasagittal meningioma (85 × 67 mm). On the angiographic sequences, the posterior third of the SSS was occluded. The torcular was not involved (Fig. 1a and b).

Considering the patient's age and the fact that the meningioma was a radio-induced, and probably atypical subtype, we decided to perform a radical resection: surgery combined tumour resection with sinus grafting using to a superficial femoral vein autograft. The approach was done on the patient in semi-sitting position via a large skin flap and craniotomy crossing the midline to expose both sides of the sinus. At the end of the resection, the invaded SSS was removed: it was a type VI sinus invasion (Fig. 2) (Merrem, 1970; Bonnal and Brotchi, 1978). SSS proximal and distal lumens were controlled by intraluminal balloons. A 9-cm segment of the left superficial femoral vein without valves was harvested in the thigh. The sinus was reconstructed using two end-to-end anastomoses with 8.0 non-resorbable sutures (Fig. 3). Occlusion time of the sinus lasted about 30 minutes. Intravenous heparinization (at dosage of 50 UI by kilogram, to double the clotting time) was used during surgery and was maintained postoperatively during 3 weeks. The day after surgery, an extradural hematoma that occluded the bypass blood flow, required a reoperation (Fig. 1c and d). The following postoperative course was uneventful. The sinus reconstruction was patent on CT angiogram at 7th days (Fig. 1e) and 3rd month (Fig. 1f and g). The patient was asymptomatic and returned to his job within 2 months.

Histological exam showed a proliferation of meningothelial cells with batches of less differentiated cells. Mitotic activity was increased in some places, with moderated cytonuclear atypia. Proliferation index was 10% and the pathologist concluded to a WHO grade II atypical meningioma.

Last medical control was given in March 2011: the patient was still asymptomatic, with a normal life. His only complain was a heavy leg sensation due to the femoral vein sacrifice. Angiographic brain MRI showed no stenosis of the graft that was still functional 2 years after surgery (Fig. 1h) without recurrence of the disease.

2. Discussion

Surgical treatment of meningioma invading the SSS is well codified today. A grading classification of the invaded sinus and surgical technique has been proposed (Fig. 2) (Merrem, 1970; Bonnal and Brotchi, 1978). When the sinus is totally occluded with documented venous hypertension and without spontaneous venous suppleances, reconstruction of the sinus is mandatory to treat intracranial hypertension (Auque, 1996). Depending on the age of the patient, the growth pattern and the grading of the tumour according to the WHO classification, a radical resection of the tumour is not mandatory in all cases (Chamberlain, 2011). In case of atypical meningioma, a radical resection is required to avoid recurrence: several reports indicate claim that radical resection in grade II meningiomas (atypical) allows a better control than subtotal resection followed by radiation therapy (Durand et al., 2009; Ducray and Honnorat, 2010; Jo et al., 2010; Pasquier and Rezvoy, 2010). In our case of a young patient with a high probability of atypical meningioma (past medical history of whole brain radiotherapy), the radical resection with reconstruction of the SSS was the best therapeutic option to obtain long term tumour control.

In the series of Sindou and Alvernia (2006), three deaths were due to venous infarction following sinus interruption. Numerous techniques of venous reconstruction have been proposed: dura mater, pericranium, fascia lata, prosthetic material for patching; great saphenous vein, external jugular vein, polytetrafluoroethylene (PTFE) for by-passes (DiMeco et al., 2004; Sindou et al., 2005).