Neurochirurgie xxx (2016) xxx–xxx

Disponible en ligne sur
ScienceDirect
www.sciencedirect.com

Elsevier Masson France
EM|consulte
www.em-consulte.com

Original article

Role of preoperative embolization of intramedullary hemangioblastoma

G. Saliou [a], L. Giammattei [b,*], A. Ozanne [a], M. Messerer [a,b]

[a] Service de neuroradiologie interventionnelle, AP–HP, Hôpital Bicêtre, Le Kremlin-Bicêtre, 78, rue du General-Leclerc, 94275 Kremlin-Bicêtre cedex, France
[b] Service de neurochirurgie, AP–HP, hôpital Bicêtre, Le Kremlin-Bicêtre, 78, rue du General-Leclerc, 94275 Kremlin-Bicêtre cedex, France

ARTICLE INFO

Article history:
Received 28 September 2015
Received in revised form 10 January 2016
Accepted 26 January 2016
Available online xxx

Keywords:
Hemangioblastomas
Spinal cord tumor
Embolization

ABSTRACT

Object. – Hemangiobastomas (HB) are rare lesions accounting for 1 to 5% of all spinal cord tumors. Due to their hypervascular nature, an angiography may be proposed preoperatively in order to identify tumoral vascular anatomy. Preoperative embolization may be indicated to reduce intraoperative bleeding, thus facilitating tumor resection and minimizing surgical risk. The aim of this paper is to report our experience of preoperative embolization in intramedullary hemangioblastomas.
Methods. – We performed a retrospective analysis of all patients operated on for intramedullary hemangioblastomas between 1995 and 2014 who had undergone embolization before surgery.
Results. – Seven patients were analyzed: there were 6 females and 1 male, mean age 43 years, 6 patients had Von Hippel-Lindau disease. Four tumors were located in the cervical spine and three in the dorsal spine. The average maximum sagittal diameter was 19 mm (range 8–32 mm), while the average maximum axial diameter was 11.5 mm (range 6–21 mm). The embolic agent used was Histoacryl (NBCA). Endovascular embolization was routinely performed the day before surgery. One patient experienced a major preoperative complication with a vertebrobasilar infarctus with consequent unilateral cerebellar syndrome and gait instability. Minor extravasation of embolic agent was observed in two cases. In one of these two cases, there was also the penetration of the embolic agent in the tumor; the resection was impossible due to the hard consistency of the tumor. In the other 6 patients, the resection was total. Six patients had identical preoperative and postoperative McCormick score and one patient shifted to a better score at follow-up.
Conclusion. – Preoperative endovascular embolization is an effective adjunct treatment. It is useful in reducing the surgical bleeding and thus the operative risks. The procedure is not always safe and complications could occur. We recommend preoperative embolization in selected cases.

1. Introduction

Hemangioblastomas (HB) are benign and highly vascularized tumors accounting for 1 to 5% of intramedullary tumors [1,3]. In one third of cases, they are purely intramedullary, and in two third the localization is intra- and extramedullary [2]. The majority of spinal HB occurs in the posterolateral segment of the spinal cord. The vascularization of the spinal cord is supplied by the anterior and the posterior spinal arteries which arise rostrally from the vertebral arteries and that are fed along their course by multiple radicular arteries. The intercostal arteries, originating from the aorta, give rise to the radiculomedullary arteries which divide into the anterior and posterior radicular arteries. One anterior radicular artery is always dominant in caliber and is called Artery of Adamkiewicz, in 80% of cases the origin is in left posterior intercostal artery between T8 and L1.

The spinal cord is supplied by a centrifugal system fed by the sulcal arteries and by a centripetal system, the pial network, which give rise to perforating branches.

It is important to remember that spinal cord anterior circulation has a segmental supply and is therefore more susceptible to ischemia, while the posterior spinal arteries constitute a well-anastomosed circuit.

Excessive intraoperative bleeding is one of the main reasons why complete resection of intramedullary HB is prevented. A preoperative embolization could minimize the intraoperative bleeding facilitating the achievement of a total resection and reducing the surgical risks [1,4–7]. Our experience with preoperative embolization is presented in this study.

* Corresponding author.
E-mail address: lore1985nch@gmail.com (L. Giammattei).

http://dx.doi.org/10.1016/j.neuchi.2016.01.004
0028-3770/

2. Methods

2.1. Patient evaluation

The clinical records, radiologic studies and operative reports of these patients were analyzed retrospectively. We reported each complication related to the HB embolization and neurosurgical procedure. All patients had magnetic resonance imaging pre- and postoperatively and were routinely examined after the operation both clinically and by MRI to detect tumor recurrence at least once a year. First postoperative MRI was usually performed one year after the surgical procedure, unless there was any clinical worsening. Follow-up examinations were performed at two months, twelve months and twenty-four months, and then every 2 years, unless relevant clinical changes occurred. The patients were scored based on a McCormick score at the moment of admission and during the last follow-up.

2.2. Endovascular embolization

Preoperative angiography is useful to define tumor vascularization and, in particular, the relationship between tumor vessels and normal spinal cord vessels. Once having precisely defined the tumoral and medullary angioarchitecture, it is possible to assess the risk and potential benefit of a preoperative embolization.

Endovascular embolization is performed with tracheal intubation under general anesthesia. The femoral artery is punctured using the Seldinger technique and a 5 French or 6 French catheter is inserted. Selectivity can be improved using coaxial microtubules which are introduced as deeply as possible, ideally into the tumor arteries. The use of microtubules guarantees super selective endovascular embolization and reduces the risk of ischemic spinal cord lesions.

Two embolic agents are normally used. The first corresponding to calibrated non absorbable microspheres, available in ranges which vary from 50 to 900 μm (*Embosphere*®: trisacryl gelatin microspheres, Biosphere Medical, Roissy, France; *Contour Particules*®: Boston Scientific, Fremont, CA) [1,4,6]. The second corresponding to the N-butyl cyanoacrylate (NBCA) (*Histoacryl*®: Braun Aesculap, Tuttlingen, Germany; *Glubran*®: GEM Srl, Viareggia, Italy) [8]. The choice of the embolic agent primarily depends on the radiologist's experience. The microspheres are usually preferred in cases of multiple, tortuous and small feeding arteries, while NBCA is normally utilized in cases of reduced number of feeding vessels, non-tortuous and with a diameter permitting a peritumoral or ideally an intratumoral catheterization. We normally use N-butyl cyanoacrylate (NBCA) to obtain a selective devascularization reducing the risk of unintended medullary ischemia (Fig. 1).

In order to allow the embospheres to reach the desired vascular target, a sufficient flow must be maintained within the feeding pedicle. In case of inadequate vascular flow, there is a risk of tumor volume augmentation leading to rupture. The injection site should be as deep as possible, ideally intra-tumoral. To start with smaller and continue with a gradually increased particle size is the proper technique to obtain an optimal devascularization, thus avoiding a proximal occlusion of feeding arteries responsible for a collateral revascularization of the lesion. If it is not possible to push the microcatheter into the tumor, the radiologist should choose embospheres with a diameter superior to spinal cord normal arteries to avoid ischemic damage. The injection should be made cautiously and stopped when the desired local hemodynamic change is obtained. At the end of the procedure, an angiography is performed to examine the results of embolization and the decrease or disappearing of tumoral blush [1,6,8]. In the case of persistent arterial afferences, a superselective catheterization could be performed [6].

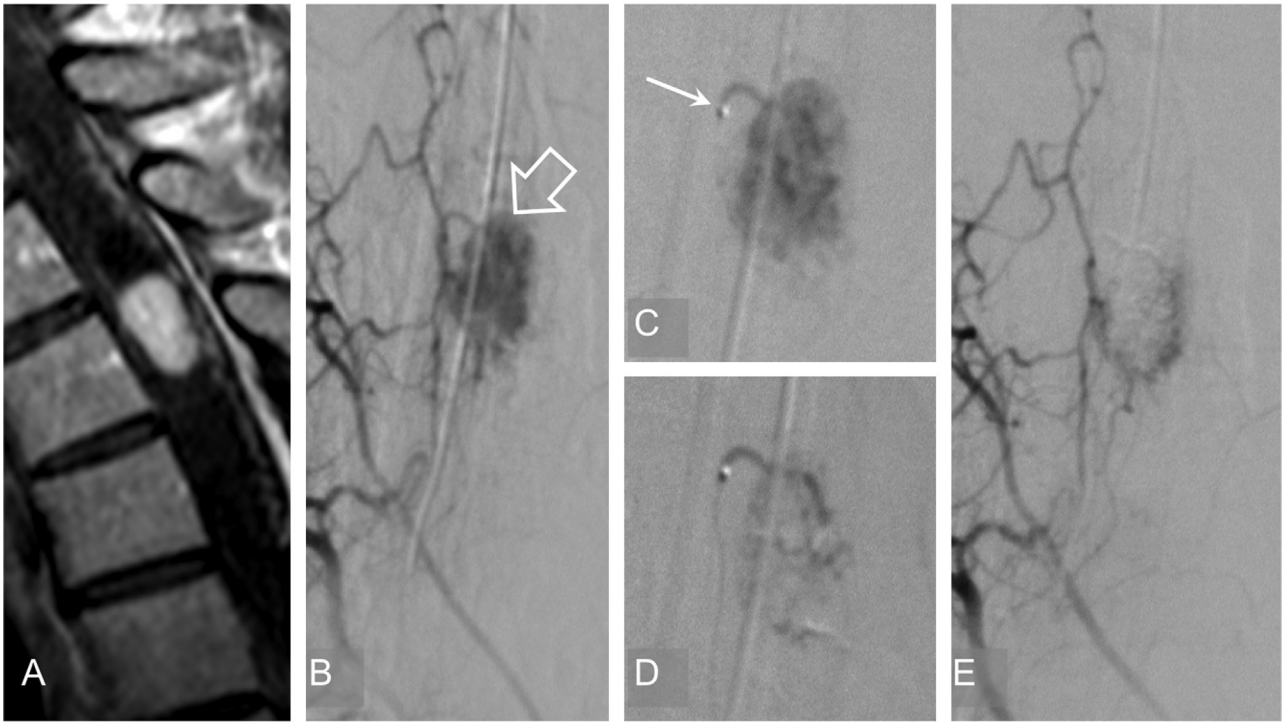

Fig. 1. MRI and angiography performed in a 43-year-old female. A. Spinal MRI in T1 sequence after gadolinium injection demonstrates an intramedullary hemangioblastoma located at T3 level. B: Spinal angiography demonstrates a radiculopial supply and the blush corresponding to the lesion (arrow). C. A microcatheter is advanced distally close to the upper part of the tumor, and a selective angiogram is performed to check its position before injection of NBCA (arrow). D. The injection of NBCA allows selective tumoral embolization. E. Postembolization angiography shows the decrease of the tumoral blush estimated at about 80% (persistence of limited peritumoral blush in the inferior part of the tumor).

Please cite this article in press as: Saliou G, et al. Role of preoperative embolization of intramedullary hemangioblastoma. Neurochirurgie (2016), http://dx.doi.org/10.1016/j.neuchi.2016.01.004