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Original article

Multidisciplinary management of intracranial aneurysms: The experience of Lille university hospital center

Prise en charge multidisciplinaire des anévrismes intracrâniens : l'expérience du CHU de Lille

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ABSTRACT

Background. – In recent years, the multidisciplinary approach has become an important concern for the management of intracranial aneurysms.
Objective. – This study aims to evaluate the functional outcomes of patients treated for an intracranial aneurysm (ruptured or unruptured), when the treatment modality was defined in a multidisciplinary fashion.
Materials and methods. – In this retrospective study, we included all patients (n = 209) treated for an intracranial saccular aneurysm at Lille university hospital between January 2009 and December 2009. There were 70 men and 139 women with a mean age of 50.5 years (range 24 to 73 years). The clinical data were recorded before treatment including the American Society of Anesthesiology (ASA) and the World Federation of Neurosurgical Societies (WFNS) scores. Microsurgical approach was performed in 110 patients whereas 99 patients underwent an endovascular procedure. A modified Rankin Scale (mRS) was reported at 3 months after treatment. Intracranial vascular imaging was performed before and immediately after the treatment and then renewed at 3 years in all patients to detect any recurrence.
Results. – Among the 121 patients with ruptured aneurysm, the functional outcomes were similar between patients who underwent microsurgery and patients who had an endovascular treatment. In the 88 patients with an unruptured aneurysm, functional outcomes were also similar between the two treatment modalities. Among the 99 patients treated by the endovascular approach, 4 had a significant aneurysm reopening on follow-up imaging leading to additional treatment (3 clipping, 1 coiling). No aneurysm recurrence was reported among the 110 patients who underwent microsurgical treatment.
Conclusion. – In a trained team, the multidisciplinary approach appears to be a valuable strategy in the management of intracranial aneurysms, to achieve good functional outcomes.

Mots clés :
Anévrisme
Microchirurgie
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RÉSUMÉ

Contexte. – Au cours des dernières années, l'approche multidisciplinaire est devenue une préoccupation importante pour la gestion des anévrismes intracrâniens.
Objectif. – Cette étude vise à évaluer les résultats fonctionnels des patients traités pour un anévrisme intracrânien (rompu ou non rompu), lorsque la modalité de traitement a été définie de façon multidisciplinaire.
Patients et méthodes. – Dans cette étude rétrospective, nous avons inclus tous les patients (n = 209) traités pour un anévrisme sacculaire intracrânien au CHU de Lille de janvier 2009 à décembre 2009. Il y avait 70 hommes et 139 femmes avec un âge moyen de 50,5 ans (extrêmes : 24–73 ans). Les données cliniques ont été recueillies avant le traitement, dont les scores ASA (American Society of Anesthesiology) et de

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la WFNS (World Federation of Neurosurgical Societies). Une exclusion microchirurgicale a été réalisée chez 110 patients alors que 99 patients ont bénéficié d'une procédure endovasculaire. L'échelle de Rankin modifiée (mRS) a été utilisée pour évaluer le statut fonctionnel à 3 mois après le traitement. Une imagerie vasculaire intracrânienne a été réalisée avant et immédiatement après le traitement, puis renouvelée à 3 ans chez tous les patients pour détecter toute récurrence.
Résultats. – Parmi les 121 patients avec un anévrisme rompu, les résultats fonctionnels étaient similaires entre les patients qui ont eu un traitement microchirurgical et ceux qui ont eu un traitement endovasculaire. Parmi les 88 patients présentant un anévrisme non rompu, les résultats fonctionnels étaient également similaires pour les deux modalités de traitement. Au total, parmi les 99 patients traités par voie endovasculaire, 4 patients ont présenté une recanalisation sur l'imagerie de suivi conduisant à un traitement complémentaire (3 par microchirurgie, 1 par embolisation). Il n'a pas été noté de recanalisation parmi les 110 patients qui ont bénéficié d'un traitement par microchirurgie.
Conclusion. – Dans une équipe entraînée, l'approche multidisciplinaire semble être une stratégie utile dans la gestion des anévrismes intracrâniens, pour optimiser le résultat fonctionnel.

1. Introduction

In France, the incidence of aneurysmal subarachnoid hemorrhage (aSAH) is estimated to be 7/100,000 a year [1]. Many studies have shown that endovascular coiling and microsurgical clipping are 2 valuable treatment options [2–4]. The ISAT study, which was a prospective randomized trial, demonstrated that endovascular treatment should be preferred when the 2 options were feasible [5–7]. However, each treatment option has its own limitations [5–7]. Therefore, many clinical and anatomical criteria must be considered in order to define the optimal treatment for each patient. This multimodal evaluation requires a truly multidisciplinary approach, for best patient care. For this reason, many teams have defended the importance of the multidisciplinary management of intracranial aneurysms [8–14]. This multidisciplinary management is also valuable for unruptured intracranial aneurysms [15–17], with a prevalence estimated at 3.2% [18]. The aim of this study was to evaluate the functional outcomes of patients treated for an intracranial aneurysm (ruptured or unruptured), whatever the treatment modality when defined in a multidisciplinary fashion..

2. Materials and methods

2.1. Data collection/inclusion criteria

Using the hospital database, we studied the medical records of all patients admitted to our institution for the management of ruptured or unruptured intracranial aneurysm between January 2009 and December 2009 ($n = 219$). We excluded all patients who died before the treatment of their aneurysm ($n = 5$). All patients who harbored a fusiform, large (> 20 mm) or giant aneurysm ($n = 5$) were also excluded.

2.2. Clinical and radiological follow-up

Among clinical data, the American Society of Anesthesiologists score [19] (ASA) and the World Federation of Neurosurgical Societies score [20] (WFNS) were recorded before treatment and all patients were re-evaluated 3 months after treatment using a modified Rankin Scale [21] (mRS). All patients who underwent endovascular treatment had a conventional cerebral angiography before treatment, and at the end of the procedure. Then, magnetic resonance angiography (MRA) was performed at 6 months, 18 months and 3 years after treatment. In surgically treated patients with an unruptured aneurysm, a conventional cerebral angiography was performed before treatment. In case of simple exclusion of the aneurysm using a single clip, cerebral computed tomography angiography (CT angiography) was performed immediately after treatment and at 3 years. A conventional cerebral angiography after treatment was preferred in cases of complex aneurysm requiring multiple clips.

The operated patients with a ruptured aneurysm underwent a CT angiography before treatment and a conventional angiography immediately after treatment to detect other aneurysms not observed on the CT angiography. A CT angiography was performed at 3 years. Radiological data were collected by studying the medical records. Radiological records were reviewed by the neuroradiologist for all patients who presented a recanalization. They were classified using the classification of Raymond et al. [22].

2.3. Data analysis

For statistical data analysis, the "paired samples *t*-test" was used for normally distributed data. For non-numerical data, the Chi^2 test was used to compare the group of the operated patients to the group of the patients who had endovascular treatment. A P value < 0.05 was considered statistically significant. The analyses were performed using the SPSS statistical software, version 17 (SPSS Inc.).

3. Results

3.1. Population

A total of 209 patients were included in this study and no patient was lost to follow-up. There were 70 men and 139 women with a mean age of 50.5 years (range 24 to 73 years; SD = 7.7). The treatment was an endovascular procedure for 99 patients and microsurgical approach for 110 patients. Fifty-six patients (27%) had multiple intracranial aneurysms. The patients with middle cerebral artery (MCA) aneurysms underwent, in most cases, microsurgery, whereas the patients with vertebro-basilar aneurysms had endovascular treatment (Tables 1A and 1B).

3.2. Patients with unruptured aneurysms

There were 62 women and 26 men (sex ratio = 2.4). The mean age at diagnosis was 51 years for both the operated patients ($n = 52$) and patients who underwent endovascular treatment ($n = 36$). The ASA score was statistically comparable between the two groups. The mRS score, 3 months after the treatment, was also comparable between both groups. There were no deaths or no neurological impairments at 3 months. All patients were mRS 0–2. Only 13% of patients reported minor disorders such as memory loss and concentration problems, which have not required further investigations and treatments. After 3 years, 9 reopened aneurysms (25%) after

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