REPEATED DIGITAL SUBTRACTION ANGIOGRAPHY AFTER PERIMESENCEPHALIC SUBARACHNOID HEMORRHAGE?

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SUMMARY

Background and purpose: In patients with perimesencephalic subarachnoid hemorrhage (pSAH) DSA is recommended to exclude aneurysms due to false negative findings in CT-angiography. However, whether a second DSA is indicated during the clinical course to exclude – in addition to aneurysms – fistulas, too, is still under debate. We aimed to evaluate the benefit of repeated DSA in patients with pSAH.

Methods: The source of data was a prospective database set up at the neurological, neurosurgical and neuroradiological departments in our institution. A total of 69 patients with pSAH were enrolled and analyzed by reviewing the medical records and neuroradiological findings.

Results: 68 patients presented with Hunt & Hess Grade I – II and one patient with Hunt & Hess Grade III. Median inhospital stay was 8 days (3 – 22). In 2 patients mild vasospasm were diagnosed. DSA was performed in all patients at least once. DSA was repeated in 38 patients (55%) after a median of 7 (3 – 21) days. None of the repeated DSA did show any additional distinctive features with respect to the first DSA.

Conclusions: In our opinion the procedure of repeating DSA in patients with pSAH is likely to become obsolete. One DSA should be performed prior to discharge – and subsequent to possible vasospasm – to exclude hemorrhage caused by aneurysms of the posterior circulation mimicking a perimesencephalic SAH pattern.

Key words: perimesencephalic subarahnoid hemorrhage, cerebral angiography.

RÉSUMÉ

Faut-il répéter l’angiographie cérébrale après hémorragie sous-arachnoïdienne périmésencéphalique ?

Objectifs : Chez les patients présentant une hémorragie sous-arachnoïdienne périmésencéphalique (pHSA), une angiographie digitalisée est recommandée pour rechercher un anévrisme du fait des faux négatifs de l’angioscanner. Toutefois l’intérêt d’un deuxième contrôle pour éliminer un anévrisme ou une fistule artério-veineuse reste débattu. Le but de notre étude est d’évaluer l’intérêt du deuxième contrôle angiographique chez les patients ayant présenté une pHSA.

Méthode : La population étudiée est issue d’une base de données prospective commune aux services de neurologie, neurochirurgie et neuroradiologie de notre institution. Au total, 69 patients ont été inclus et leurs dossiers médicaux et neuroradiologiques revus.

Résultats : 68 patients présentaient un grade de Hunt & Hess I – II et un patient un grade III. La durée moyenne d’hospitalisation était de 8 jours (3 – 22). Chez 2 patients un léger vasospasme était noté. L’angiographie était réalisée au moins une fois chez tous les patients et répétée chez 38 patients (55 %) après 7 jours en moyenne (3 – 21). La deuxième angiographie n’a jamais apporté d’informations supplémentaires par rapport au premier bilan.

Conclusions : Un bilan doit être effectuer avant la sortie du patient pour éliminer une hémorragie causée par un anévrisme de la circulation postérieur. En revanche, à notre avis, le fait d’effectuer un deuxième bilan est aujourd’hui vraisemblablement obsolète.

Mots-clés : hémorragie sous-arachnoïdienne périmésencéphalique, angiographie cérébrale.

INTRODUCTION

There are no uniform, internationally accepted guidelines for performing cerebral four-vessel digital subtraction angiography (DSA) in patients with perimesencephalic subarachnoid hemorrhage (pSAH). The European Societies of Neurologists, Neurosurgeons and Neuroradiologists recommend rapid DSA in patients demonstrating a perimesencephalic pattern of hemorrhage on the initial cCT scans considering that CT angiography (CTA) gives false-negative findings in 2.5 – 5% of cases (Velthuis et al., 1999). However, whether a second DSA is indicated during the clinical course to exclude – in addition to aneurysms – fistulas, too, is still under debate. Especially in the early stages of the disease, the presence of vasospasm might preclude the disclosure of aneurysms and fistulas (Topcuoglu et al., 2003; Velthuis et al., 1998). We aimed to evaluate the benefit of repeated DSA in patients with pSAH.

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METHODS

In this paper, the authors briefly present the results of retrospective analysis of patients diagnosed with pSAH. The source of data was a prospective database set up at the neurological, neurosurgical and neuroradiological departments in our institution. Screening for “perimesencephalic SAH” produced 73 matching patients for the period between 01.01.2000 – 31.12.2004. The diagnosis of pSAH was controlled independently by two physicians according to the following definition of pSAH: (1) hemorrhage location pursuant to published CT criteria (Ruigrok et al., 2002; i.e. center of hemorrhage being located immediately anterior to the midbrain, no complete filling of the anterior interhemispheric fissure and no extension to the lateral Sylvian fissure, and absence of frank intraventricular hemorrhage), (2) clinically benign presentation (SAH Hunt & Hess Grade I-III) accompanied by excellent outcome, and (3) absent evidence of aneurysms in initial CT-angiography. All patients with normal CT angiography underwent a DSA. A total of 69 patients were enrolled and analyzed by reviewing the medical records and neuroradiological findings. CT angiography was performed using a Siemens machine (Somatom Volume Zoom, mA 125 per slice, KV=120, slice thickness 1mm, slice spacing 0mm. The contrast agent was Imeron 400, individual delay). DSA was performed using a Philips machine (Integris, biplanar; all intracranial vessels – including Arteria carotid externa – were routinely investigated by intraarterial application of contrast agent Imeron 300). A second DSA was performed individually depending on the consultant in charge. In rare cases, one projection could not be evaluated perfectly which is why a second DSA was indicated.

RESULTS

Of 623 diagnostic DSA procedures performed in cases of SAH, 69 patients were discharged with the diagnosis of a pSAH. Of them, 68 patients presented with Hunt & Hess Grade I – II and one patient with Hunt & Hess Grade III. Median in-hospital stay was 8 days (3 – 22). To diagnose vasospasm, patients received at least 2 transcranial Doppler (TCD) examinations. In 2 patients mild vasospasm were diagnosed (present when (systolic value + 2x diastolic value) / 3 was > 120cm/sec).

DSA was performed in all patients at least once. Initially, all enrolled patients had been examined by CTA and 5 patients (7%) additionally by MR angiography (TOF).

DSA was repeated in 38 patients (55%). Of them, 36 patients received the second DSA examination during the course of the hospital stay (mean 8 ± 2 days; median 7 (3 – 21) days), and 2 patients (3%) were reappointed after discharge (one patient after 3, the other after 6 months). The repeated DSA did not show any additional distinctive features with respect to the first DSA; in particular no evidence of AV-fistulas or aneurysms was found. In the two patients with evidence of vasospasm, DSA was performed after 17 and 20 days, respectively, when the initial vasospasm had faded. 31 patients did not receive a second DSA because of the initial CTA and DSA as well as the clinical course being unsuspicious.

DISCUSSION

Our results are consistent with the findings of previous studies on pSAH, in which DSA did not show any evidence of aneurysms in patients with benign pSAH (Topcuoglu reported about 36, Velthuis and colleges about 15 patients; Velthuis et al., 1999; Topcuoglu et al., 2003). However, a pattern of hemorrhage similar to classical perimesencephalic CT findings might also occur in posterior fossa bleedings caused by small posterior circulation aneurysms (Velthuis et al., 1999). In these cases, a lack of sensitivity of CTA has been proposed (Velthuis et al., 1999). Moreover, early vasospasm might preclude the disclosure of small posterior circulation aneurysms even in initial DSA (Velthuis et al., 1999). Furthermore, the occurrence of fistulas during the course of the disease must be excluded. Therefore, despite the benign clinical pattern of the disease, repeated DSA was indicated in uncertain cases to exclude AV-fistulas or aneurysms masked by initial vasospasm. However, only presence of severe vasospasm might cause an aneurysm to be missed since aneurysms do not have a potentially constricting muscular layer; referring to this we had only 2 patients with mild vasospasm. To the best of our knowledge only Duong and colleges (Duong et al., 1996) investigated a comparably large patient contingent; however, a juxtaposition of CTA, first DSA, and repeated DSA, in particular, are relevant as immense advances have been made in CTA in the past few years. Thus, a discussion about the advantages in relation to potential risks of DSA in pSAH is warranted.

This study has limitations. Due to the nature of this non randomized and uncontrolled design, indications for a second DSA were dependent on the attending physicians, which is why almost 45% of our patients did not receive a second DSA. This partially undermines the central conclusion of this study, but, however, reflects the current dilemma as still no standardized diagnostic regimen exists.

We believe that the procedure of repeating DSA in patients with pSAH is likely to become obsolete. Of our 38 patients who received two DSA, not even one DSA yielded additional information to the initial CTA. If carried out adequately, cCT plus CT angiography are sufficient in the first few days after symptom onset, in our opinion. One DSA should be performed prior to discharge – and subsequent to possible vasospasm – to exclude hemorrhage caused by aneurysms of the posterior circulation mimicking a perimesencephalic SAH pattern.
RÉFÉRENCES


