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CASE REPORT - VASCULAR NEUROSURGERY - ANEURYSM

Clipping of a superior hypophyseal artery aneurysm during endoscopic transnasal removal of a Rathke cleft cyst: a case report

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Abstract

The concomitant presence of an aneurysm in contact with a sellar lesion usually contraindicates a transsphenoidal approach (TSS). Clipping of an intracranial aneurysm is however possible in highly selected cases also through an endoscopic TSS approach, as long as the basic principles of cerebrovascular surgery are respected. We report thus on a case of a patient harboring a Rathke cleft cyst (RCC) and an aneurysm of the carotid artery (ICA) in close contact with the RCC. The anatomical characteristics of both lesions warranted an endoscopic TSS for removal of the RCC and clipping of the aneurysm during the same approach.

Keywords Transsphenoidal · Rathke'cyst · Brain aneurysm · Clipping

Introduction

Intracranial aneurysms requiring treatment are usually managed through microsurgical clipping or endovascular coiling, depending on location, size, and angioarchitecture of the aneurysm as well as on available expertise. These same factors, together with patient's age and history, dictate also the indication for treatment in case of unruptured incidentally discovered aneurysms [8].

There are however rare situations where the indication for treatment of an aneurysm is given by the need to surgically remove a pathology in close contact to the aneurysm itself, since the latter may rupture during or immediately after the surgical procedure [9, 12, 15, 19, 21]. In such cases, a common strategy is to treat both pathologies within the same transcranial approach [18] or alternatively to preoperatively secure the aneurysm through endovascular coiling [22, 23]. A therapeutic dilemma may arise however if the lesion to be treated is a sellar- or suprasellar tumor (adenoma, craniopharyngioma, Rathke cleft's cyst), which under normal circumstances would best be removed through a transnasal transsphenoidal approach (TSS). In such cases, the concomitant presence of an aneurysm in close contact with the sellar lesion usually contraindicates a TSS or at least prompt preoperative endovascular securing of the aneurysm. In the first scenario, the optimal surgical strategy must be modified to suit the aneurysm, whereas in the second, an additional procedure with adjunctive morbidity and costs must be performed.

Data in literature show however that clipping of an intracranial aneurysm is possible in highly selected cases also through an endoscopic TSS approach, as long as the basic principles of cerebrovascular surgery are respected [7, 5]: rapid access to the parent vessel to gain proximal control, careful microsurgical dissection in order to guarantee sufficient exposure of the aneurysm, and ideal clip application. Under such circumstances, the concomitant presence of an intracranial aneurysm may no longer be seen as a contraindication to remove a sellar or suprasellar lesions through a TSS approach.

We report thus on a case of a patient harboring a Rathke cleft cyst (RCC) and an aneurysm of the carotid artery (ICA) of the superior hypophyseal artery and in contact with the

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RCC. The anatomical characteristics of both lesions warranted an endoscopic TSS for removal of the RCC and clipping of the aneurysm during the same approach.

Case report

History and examination

This 60-year-old lady presented in the emergency department of our institution because of acute onset of right hemiparesis, dysarthria, and dysphagia. Careful neurological examination of the patient revealed also a bitemporal hemianopsy, which according to the patient had been persisting since almost two years. The CT and MR scan showed a stroke in the left putamen, caudate nucleus, and external globus pallidus (see Fig. 1a). As an adjunctive finding, the neuroimaging revealed an intra- and suprasellar cystic lesion, cranially displacing the whole optic apparatus, expansively growing into the right lateral wall of the third ventricle through the posterior perforated substance (see Fig. 1b, c). The lesion was dyshomogeneously hyperintense in T1 due to intracystic calcification. Two aneurysms were seen: a 4 × 2 mm aneurysm originating at the beginning of the C6 segment of the left ICA [1] (Fig. 1d–f), which was projecting infero-medially and was indenting the RCC. For this reason, securing of the aneurysm was deemed mandatory to resect safely the RCC. Further, a small aneurysm (3 × 2 mm) at the junction of the left A1 and A2 segment was also seen (see Fig. 1f). However, no treatment of this second aneurysm was deemed necessary, since it was not adherent to the RCC (see Fig. 1g). After careful evaluation of the preoperative imaging, it was decided to recommend the clipping of the left ICA aneurysm and the resection of the RCC through a single endoscopic TSS approach.

Operation

The patient was positioned under general anesthesia in the MR compatible head-fixation system (Noras Head Holder™, NORAS MRI Products Gmbh, Höchberg, Germany) at 20° anti-trendelenburg. A right-sided mononostril endoscopic TSS approach was chosen. After elevation of a standard right-sided nasoseptal flap for later closure according to Hadad [10], a broad sphenoidotomy was performed to expose the whole anterior wall of the sella. The anterior wall of the sella was then opened widely for a transtubercular approach [14] extending the osteotomy laterally on the left side to expose the dura mater of the anterior wall of the cavernous sinus. The dura was opened under Doppler guidance in a cruciform fashion just above the level of the pituitary, from the medial margin of each cavernous sinus to the other. The translucent wall of the tumor appeared upfront filling the intra and suprasellar space. After initial careful central debulking of the lesion, the left lateral wall of the lesion could be gently medialized thus exposing the aneurysm dome. Under careful bimanual dissection, the arachnoid of the carotid cistern was peeled from the aneurysm dome and neck. Microdissection was carried on exposing the course of the C6 segment of the left ICA and of the transition C5-C6 thus gaining control of the ICA proximal and distal to the aneurysm. The superior hypophyseal artery could be seen running from lateral to medial. At this point, the angioarchitecture of the aneurysm appeared clearly (see Fig. 2a) using both 0° and 45° optic. The visualization and control of the aneurysm was excellent, the application of a test clip was simulated and confirmed the possibility of safe clipping. The removal of the RCC was undertaken next. Definitive clipping was postponed to the very end of the RCC resection in order to avoid conflicts between the surgical instruments and the aneurysm clip. The aneurysm was clipped with a straight FT 710 T Yaşargil clip using a tubular micro clip applier® (Aesculap, Tuttlingen, Germany) (see Fig. 2b, c) through the right nostril which prompted a binostril technique for the clipping phase.

Discussion

Rathke cleft cysts are benign lesions arising from remnants of the Rathke's pouch, usually growing in the sellar and suprasellar regions. Although they usually present a rather uneventful course, some of them may grow expansively investing the arachnoidal sleeves of the surrounding cisterns to extend eventually into the neighboring parenchyma and cisternal spaces. The vessels of anterior and posterior circulation may also get in contact or be displaced by the growing tumor. The best surgical strategy to remove a RCC is highly dependent on its pattern of growth. Median located RCC, as the one presented in this case report, are best managed with a TSS removal whereas RCC extending laterally are deemed to be better removed through an open microsurgical approach [2, 4].

Intracranial aneurysms are reported to occur rather frequently in concomitance with pituitary adenomas [16, 17], whereas they appear to be more rare in patients harboring craniopharyngiomas [20]. We could find in literature only two cases of Rathke cleft cyst associated with intracranial aneurysm [12, 15], a finding which is difficult to explain given the relative high incidence of RCC [11] and which may possibly be due to underreporting.

We present to the best of our knowledge the first case of concomitant removal of a RCC and clipping of an ICA aneurysm within a single TSS endoscopic session. The main element of novelty consists in the rather heterodox surgical strategy. Patients with similar findings are usually treated with two-staged procedures: an endovascular

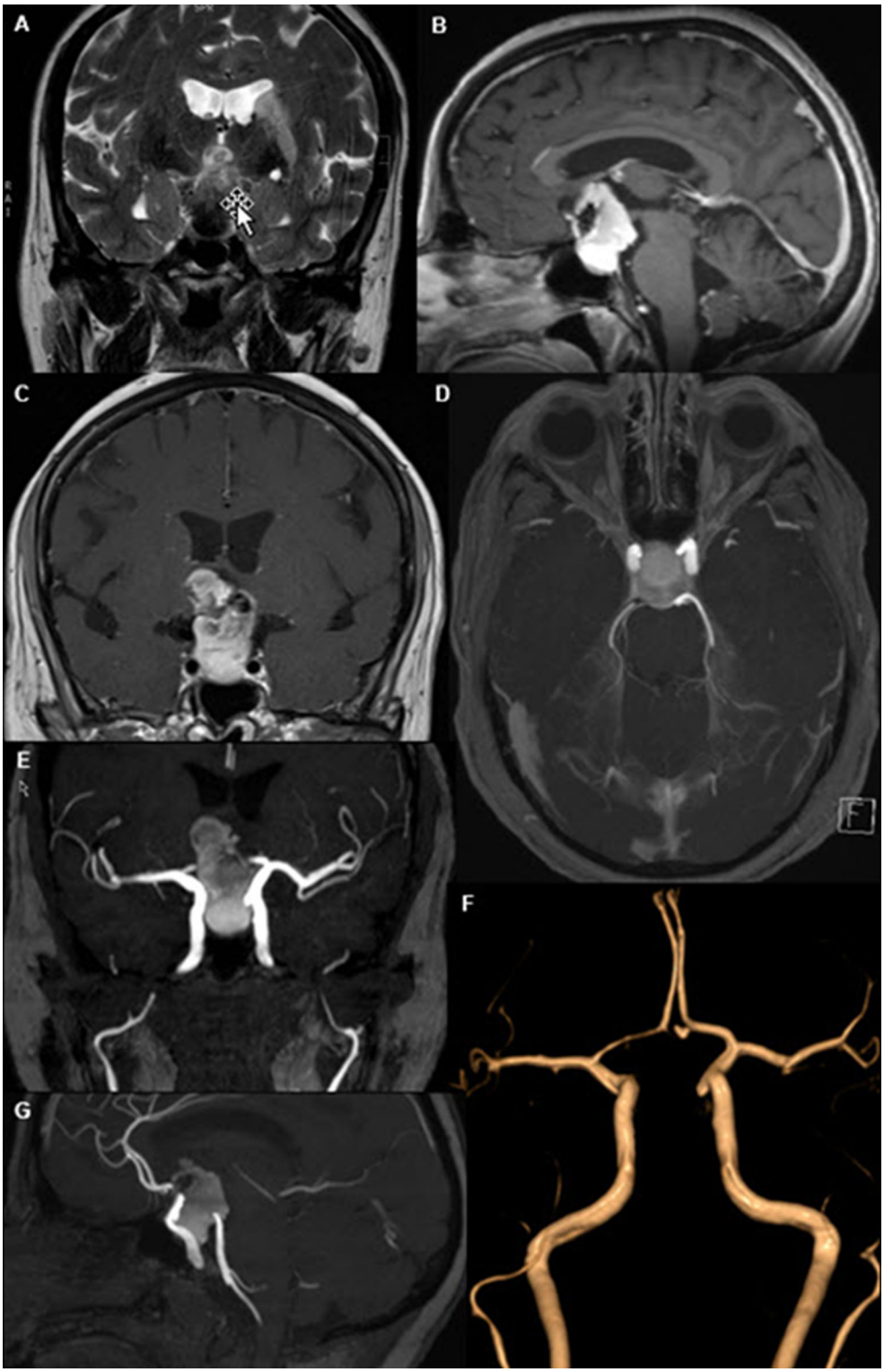

Fig. 1 Preoperative MR of the reported patients. Coronal T2 (**a**) shows the location and extent of the stroke in head of caudate, internal capsule, and putamen. **b** and **c** Sagittal and coronal T1 MR imaging after injection of gadolinium. Both pictures illustrate the anatomical relationship of the RCC with the surrounding parenchyma whereas **d** and **e** highlight the relationship between the RCC and the ICA aneurysm which dome contacts medially the RCC. A 3-D reconstruction of the Angio-MR is visible in panel **f**, whereas **g** illustrates the relationship of the A1-A2 aneurysm with the RCC

preoperative coiling to secure the aneurysm and then a TSS removal of the tumor. The reason of this two-staged concept is the fear of an intraoperative rupture of the aneurysm which is deemed to be difficult to manage through a TSS approach. Indeed, intraoperative aneurysmal subarachnoid hemorrhage during a TSS represents a rare but devastating complication [9], which is however often due to misdiagnosis of the aneurysm at the time of surgery [19, 21], and thus to a lack of preoperative information and inadequate surgical planning.

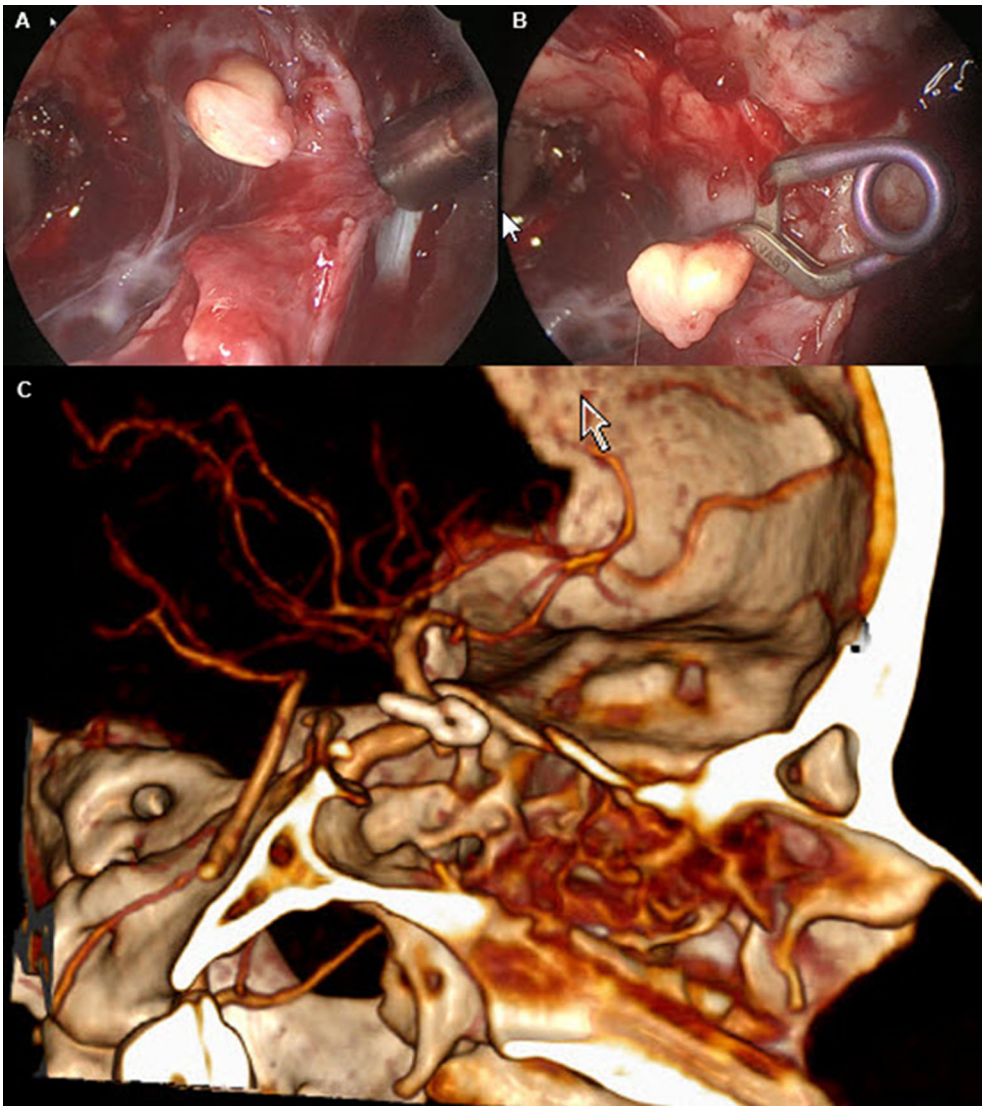

Fig. 2 Intra- and postoperative aneurysm view of the reported patients. Intraoperative appearance of the left ICA aneurysm as visible with 45° optic before (**a**) and after (**b**) clipping. In panel **c**, a sagittal view of postoperative Angio-CT scan is visible, showing the surgical TSS corridor and the complete clipping of the aneurysm

Preoperative endovascular securing of a concomitant aneurysm implies however two separated general anesthesias and is more resource demanding [3, 6]. Moreover, the adjunctive morbidity due to coiling must be taken into account. On the other hand, clipping of an intracranial aneurysm through a TSS approach has proven to be feasible and safe for both ICA [7, 13] and AComA aneurysm [5] as long as the basic principles of cerebrovascular neurosurgery are respected. The anatomical location of the aneurysm of our patient presented indeed anatomical characteristics which made a clipping advantageous: favorable neck to dome ratio, proximal control achievable already in the extradural phase, aneurysm located, and projecting medially, i.e., ideal exposure coming from a TSS approach and aneurysmal neck reachable immediately after dura opening. Furthermore, the subarachnoid space had to be opened for the treatment of the RCC, so the clipping of this aneurysm did not imply adjunctive opening of cisternal spaces. Under these circumstances, and with adequate preoperative planning, we believe that the concomitant presence of an aneurysm may no longer represent a contraindication to a TSS approach.

Patient consent The patient has consented to the submission of the case report to the journal.

Author statement The case report was written in accordance with COPE guidelines and complies with the CARE statement.

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Comments

The authors describe a case report of concomitant Rathke cyst removal and SHA aneurysm clipping. One could argue that the Acom aneurysm has a higher risk of bleed albeit small (and should have also been treated during the same setting). Then exposure of Acom is not quite more complicated once the suprasellar cistern is exposed. Also the addition of a binostril technique offers a much better maneuverability of instruments, and most importantly dealing with potential bleeding if it occurs. In larger medial carotid aneurysms, the best segment of carotid for proximal occlusion is the cavernous segment (C4). The presented case report has worked beautifully in their hand but attention to the criticism above is important for more complex cases.

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