Editorial

Large ophthalmic segment aneurysms

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The focus of this retrospective review by Heran et al. is on the visual outcome obtained in 17 patients harboring unruptured ophthalmic segment aneurysms and presenting with chronic anterior optic pathway compression. There were 10 carotid artery (CA)–ophthalmic artery aneurysms, three superior hypophyseal artery aneurysms, and four pararophthalmic aneurysms. Six patients had two aneurysms; in three, previous microsurgical clip application had failed or was incomplete; in two, an attempt at clip surgery was aborted; and in one patient, vision loss developed after microsurgical clip therapy. All aneurysms had a neck of 4 mm or larger and a sac larger than 10 mm. Initially, the authors attempted to occlude the aneurysms by coil placement and preservation of internal CA (ICA) patency. This was achieved in 16 of the 17 cases—with complete aneurysm filling in only two cases, near-complete filling in eight cases, and incomplete filling in six cases. In one patient the aneurysm was trapped and the ICA occluded. On angiographic examination after a mean of 1.5 years, some degree of compaction was noted in 10 of 12 patients for whom follow-up studies were available. The vision improved in six patients, remained unchanged in four, and worsened in six. Twelve patients underwent retreatment because of aneurysm recurrence or unimproved vision. Repeated coil therapy was performed in five patients, and complete occlusion was achieved in one case and near-complete occlusion in four. Carotid artery occlusion with or without aneurysm trapping was performed in six patients, and the aneurysm was completely occluded in all cases. Intracranial decompression of the optic nerve was performed in one patient. Overall, of the 16 patients with sufficient follow up, eight had complete aneurysm occlusion, six had near-complete occlusion, and two had incomplete occlusion. In two patients an incompletely occluded aneurysm ruptured; one died 1 month after the first treatment and the other died 5 months after the optic nerve decompression. Due to stroke 6 months after the second endosaccular coiling, one patient had a Glasgow Outcome Scale (GOS) score of 3. All other patients had a good overall outcome (a GOS score of 5). After the second procedure vision improved in five patients, remained unchanged in three, and worsened in three. Overall, of the 16 patients available for follow up, vision improved in eight, was unchanged in four, and worsened in four after all procedures. In seven of eight patients with CA occlusion, vision was improved.

In their discussion the authors claim that “Even among experienced neurovascular surgeons, relatively high rates of complications and poor visual outcomes persist.” Surgical results with visual outcome need to be put into perspective with the results presented by Heran and colleagues.

In 1981, Ferguson reported the results obtained by Charles Drake in 32 patients with CA–ophthalmic artery aneurysms and visual symptoms, 25 of whom harbored unruptured aneurysms. A direct surgical approach was used in 17 of the latter. Postoperatively vision was improved in nine patients, unchanged in three, worsened in four, and one patient died.

In 1983, Heros and colleagues reviewed 25 cases of giant and nine cases of large paracclinoid aneurysms, 23 of which underwent direct clip placement and 11 of which were trapped or the CA or ICA was ligated. Of 18 patients with preoperative visual loss, 10 improved, four were worse, two remained unchanged, and two died.

In 1990, Day reported on 80 patients with ophthalmic segment aneurysms; 41 were ophthalmic artery aneurysms and 39 were superior hypophyseal aneurysms. In 23 patients only visual symptoms were observed at presentation. There were 23 giant aneurysms; 16 were ophthalmic artery lesions and seven were superior hypophyseal lesions. Of preoperatively recognized visual deficits in 23 patients, function improved in 17 (74%), remained unchanged in six (26%), and worsened in none. Three patients of 47 without recognized preoperative deficits developed a deficit postoperatively.

In 1998, Kattner and associates reviewed 29 surgically treated patients, 13 of which presented with progressive visual loss. Postoperatively vision improved in five patients, remained unchanged in four, was aggravated in one, and three patients were lost to follow up.

In 2001, Hoh et al. retrospectively reviewed their experience in the treatment of 238 aneurysms in 216 patients. In 139 cases the location of the aneurysm was the ophthalmic artery and in 46 the superior hypophyseal region. Of the 169 aneurysms that underwent clip application and were assessed on intra- or postoperative angiography, 159 (94%) were completely occluded, whereas 25 (44%) of the
57 coil-treated aneurysms were completely occluded. Sixteen patients presented with visual changes. Twelve were treated surgically; eight improved, three were unchanged, and one worsened. Four patients were treated endovascularly; vision improved in three and was unchanged in one. Overall, worsening of the visual deficits occurred in 3% of the surgically treated group and 4% of the endovascularly treated group. In the surgically treated group 90% of the patients had a GOS score of 5 or 4, and in the endovascularly treated group 74% of the patients had a GOS score of 5 or 4.

Based on this brief review of selected literature concerning the surgical treatment of aneurysms arising from the CA segment between the origin of the ophthalmic artery and the origin of the posterior communicating artery, several conclusions can be drawn. 1) Most of the aneurysms causing visual disturbances are giant and are thus difficult to treat by any method. 2) The visual results obtained by direct surgery and clip placement are similar or even better than the results presented by Heran et al. 3) If one considers only unruptured aneurysms, the morbidity and mortality rate in the surgical series is similar or lower than that in the series of Heran et al. 4) In the majority of the cases in the surgical series, the patency of the ICA could be preserved whereas it was sacrificed in half of the cases in the endovascular series of Heran et al. 5) Although the comparison between the surgical and endovascular series is asymmetrical, because the latter approach is usually chosen for cases presenting a high surgical risk, one has to admit that the aneurysms mentioned in the aforementioned surgical series are as giant or large as in the series of Heran et al.

Because of recurrence and aggravation of vision in half of the patients, Heran et al. had to resort to CA occlusion. In the group of patients in which the patency of the CA was preserved, two patients with an initially unruptured aneurysm died of subarachnoid hemorrhage. It thus appears that the main advantage of current endovascular technique is its minimally invasive character, however, without being more effective or safer than surgery today.

Heran et al. provide a good description of the rapid evolution of endovascular techniques that were all applied in their cases to overcome the difficulty of endovascular reconstruction in this particular anatomical location. It seems that neither the use of bare and bioactively coated coils nor the adjunct of endovascular remodeling involving currently available stents and balloons provides the ideal modality for endovascular repair of such lesions. Most promising is the use of more recently introduced stents. However, presently these devices may be difficult to deliver and may cause in-stent thrombosis, which requires the use of antiaggregation therapy. With their current design these stents do not help to correct the blood flow sufficiently. This deficiency may have to do with the demanding flow conditions to which the CA siphon is exposed. There seems to be a need to improve endovascular implants to allow for satisfactory correction of such obviously harsh flow conditions prior to promoting endovascular repair in a general fashion for the treatment of such aneurysms.

In summary, surgery, although more invasive than coil application, allows the surgeon to obtain satisfactory results in terms of visual outcome and aneurysm occlusion.

Any symptomatic ophthalmic segment aneurysm should be evaluated by a team specialized in vascular neurosurgery and endovascular minimally invasive treatment. The neurosurgeons should have experience in treating these difficult lesions, with expertise in drilling of the anterior clinoid process, controlling the proximal ICA, and using suction-type decompression. The choice of treatment in centers that provide both treatment options likely will be in favor of neurosurgery as the first choice for the aforementioned reasons. Only in cases in which an increased surgical risk is estimated should the endovascular approach be proposed as treatment that can preserve the arterial lumen and provide a lasting repair, using stents, coils, or a combination of both.

If neither of the two is feasible, a balloon test occlusion will determine if a bypass needs to be performed before trapping-based occlusion. Carotid artery occlusion is deconstructive and may put the patient at a long-term risk difficult to evaluate in individual cases. Once endovascular procedures accomplish the challenge of using stents to correct blood flow at a lower risk than surgery, this modality may become the operation of choice for aneurysms in this location.

References


Response: We would like to thank Dr. de Tribolet for his thoughtful review of the literature, but several of his conclusions merit further discussion.

Dr. de Tribolet makes two assertions: “2) The visual results obtained by direct surgery and clip placement are similar or even better than in the results presented by Heran et al.” If one considers only unruptured aneurysms, the morbidity and mortality rate in the surgical series is similar or lower than that in the series of Heran et al.” It is not appropriate or valid to extrapolate from the limited data obtained in our series and jump to this conclusion. This is an asymmetrical, uncontrolled small series with the important selection bias that these patients were already evaluated by experienced neurosurgeons and deemed at high surgical risk. Indeed, as Dr. de Tribolet points out, 35% (six of 17) of the patients in our series were referred to our team for endovascular treatment after failed or incomplete microsurgical clip therapy, after attempted microsurgical clip application, or after developing visual loss following microsurgical clip surgery. To substantiate Dr. de Tribolet’s statements, we would need a prospective comparison of both methods in matched groups of new, previously untreated patients. We simply cannot conclude from our data that clip therapy
would have been equivalent, better, or worse in these particular patients. In addition, except for the study by Ferguson and Drake,¹ the assessment of visual outcome in the surgical reports was very limited, and one of our patients died soon after neurosurgical intervention. As the results of our series show, endovascular treatment can be effective in certain higher-risk patients, but it is difficult to predict in which 25% of the patients current endovascular techniques will fail. Each multidisciplinary team must realistically assess its own local surgical and endovascular morbidity and mortality events to recommend the best treatment(s) for each patient.

Dr. de Tribolet is critical of our use of ICA occlusion because in the surgical series he reviewed, “In the majority of the cases in the surgical series, the patency of the ICA could be preserved . . . .” Although we would concur that preservation of the ICA is preferred, ICA occlusion is well tolerated when the proper collateral circulation exists, and it has a low morbidity rate when used in the treatment of giant intracranial aneurysms. We anticipate that newer flow-diverting stents may improve endovascular results and preserve patency of the ICA.

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