

MEETING NOTES FROM THE 44TH ANNUAL MEETING OF THE ARDS

One of the most impressive elements of the Aspen Retinal Detachment Society (ARDS) meeting schedule is the breadth of topics covered by invited speakers. Some speakers address ultraspecific topics, elaborating on the nuances of what some audience members may consider a sub-subspecialty, such as pediatric retina or ocular oncology. Although meeting attendees may not manage patients in such arenas, they find the inclusion of such topics to be a useful way to ensure that their understanding of retina remains well-rounded.

The ARDS also finds value in speakers presenting on topics every retina surgeon knows intimately. A presentation on intravitreal injection protocol or routine surgery has value for every meeting attendee, and postpresentation audience engagement often reveals that the spirited debates supposedly reserved for controversial topics are actually alive and well in our debates on the details of bread-and-butter procedures.

In this issue of Retina Today, Irene Rusu, MD, and Basil K. Williams, MD, summarize presentations that showcase the range of topics this meeting covers. Dr. Rusu delivers a summary of a presentation from R.V. Paul Chan, MD, a leader in the field of pediatric retinal care. If Dr. Chan's presentation represents the ARDS's commitment to educating meeting attendees on granular—and important—topics, then a presentation from Tarek Hassan, MD, represents the Society's commitment to addressing topics retina surgeons routinely encounter. Dr. Williams offers a summary of Dr. Hassan's presentation on macular hole closure rates in the era of small-gauge vitrectomy and reviews a study on the topic that Dr. Hassan and colleagues conducted at their practice.

—Timothy G. Murray, MD, MBA



Changing Rules in the Management of Pediatric Vitreoretinopathies and ROP



By Irene Rusu, MD

In a presentation on pediatric vitreoretinopathies and retinopathy of prematurity (ROP), R.V. Paul Chan, MD, described the evolving treatment strategies for these conditions and the ways that imaging and technology are affecting the field of pediatric retina.

Traditionally, he said, the management of children with ROP has been guided by rules originally set forth in the International Classification of Retinopathy of Prematurity (ICROP), a consensus statement originally published in the 1980s and revisited a decade ago.¹ Unfortunately, “our diagnosis is based on indirect ophthalmoscopy, and historically this field has had limited access to ancillary imaging and limited options for surgical instrumentation,” Dr. Chan explained. Management strategies in pediatric retina have been based on the CRYO-ROP study,² a prospective, multicenter study that provided natural history data and developed the foundation for future studies.

“A lot has changed since these studies that has impacted our medical practice,” Dr. Chan said. He discussed a number of factors that are influencing the management of pediatric retinal disease today: advances in imaging, redefinition of treatment algorithms, surgical innovations, and new imaging platforms.

IMAGING AND ITS IMPACT ON MANAGEMENT

“How does imaging affect what we do? How do we incorporate it into our patient care?” Dr. Chan asked. Forty years of documented experience with ROP using fluorescein angiography (FA) has improved the accuracy of diagnosis and altered treatment strategies, Dr. Chan said. He described a study in which nine clinicians (pediatric ophthalmologists and retina specialists) were asked to indicate their diagnosis and management of ROP cases, first based only on color photographs, then on the same photographs paired with FA images.³ Almost half the time (46%), when they were shown the FA, respondents changed their diagnosis, often to something worse. After viewing the FA, participants altered their choice of management in 26% of cases, more often opting to treat.

“When using FA, the accuracy of ROP diagnosis was improved,” Dr. Chan explained, then continued by asking, “Do mosaic photographs change ROP diagnosis and management?” In a similar study, Dr. Chan and colleagues found that photograph mosaics generally result in a more accurate diagnosis of clinically significant ROP.⁴ “We found improved intergrader agreement between nine experts,” Dr. Chan said.

In particular, widefield imaging techniques have helped to better categorize pediatric retina diseases. For instance, widefield imaging has helped define specific peripheral vitreoretinal

interface changes in familial exudative vitreoretinopathy (FEVR). Findings suggest that, if FA shows leakage, then the ischemic area of retina should be treated with laser. “Before the advent of FA in ROP diagnosis and management, it wasn’t clear when we should treat FEVR patients, but FA has helped define treatment guidelines, and this is another example of how algorithms are changing based on imaging,” Dr. Chan said.

The take-home point from these studies, he said, was that imaging matters in ROP care, and imaging may start to change the criteria used to define clinically significant disease. “All of this imaging is becoming more accessible, and it’s giving us information to better manage our patients, especially for FEVR and ROP, resulting in better outcomes,” Dr. Chan said.

REDEFINING TREATMENT ALGORITHMS

“Who treats outside of treatment criteria?” Dr. Chan asked. His group examined a large database from six centers to document the reasons that babies were treated outside of usual treatment criteria. Dr. Chan and his colleagues found that babies who were treated but did not meet type 1 ROP criteria had vitreous hemorrhage, traction, and temporal vessel straightening, suggesting progression. About 10% of treated eyes reviewed in this study were treated for disease less than type 1.

SURGICAL INNOVATIONS

Increasingly, specialized instrumentation is at our disposal. Small instrumentation, such as the 25-gauge short instruments available from some manufacturers, is helpful for surgery in advanced ROP. Similarly, 27-gauge instrumentation facilitates predictable performance of sutureless vitrectomy, which may decrease postoperative morbidity.

Regarding pharmacologic vitreolysis, despite anecdotal suggestions to the contrary, no significant difference was found between placebo and 175 µg ocriplasmin (Jetrea, Thrombogenics) in the production of a posterior vitreous detachment in pediatric patients scheduled for vitrectomy.⁵

Recent evidence suggests that immediate sequential bilateral vitreoretinal surgery can be done in pediatric patients with bilateral pathology “with good results and anatomic success,” Dr. Chan noted.⁶

NEW IMAGING DEVICES

“Now that we know imaging matters, how do we make it less cost prohibitive?” Dr. Chan asked. New systems are smaller, more mobile, and cheaper than older models, he said. “The Visunex system [PanoCam LT, Visunex Medical Systems] is easy to take around the neonatal intensive care unit and does not require plugging in; however, it is not ready for primetime,” Dr. Chan said.

A tele-education system that Dr. Chan is involved in, the Global Education Network for Retinopathy of Prematurity, or Gen-ROP, is an example of how a digital imaging platform can be used for effective distance education telemedicine, he said.⁷ Automated imaging analysis is another promising technology for the future.

TAKE-HOME POINTS

“All of these new technologies have given us valuable information, but now we have to figure out how to apply all that we’ve learned,” Dr. Chan said. “We need to rethink our classification and management of these childhood diseases. We need to integrate all of these imaging devices into our practice and treatment.”

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Recurrent Macular Holes in the Era of Small-Gauge Vitrectomy



By Basil K. Williams, MD

Tarek Hassan, MD, delivered a lecture on recurrent macular holes (MHs) in the era of small-gauge vitrectomy. He discussed the reasons for increased success in MH closure and the prevailing theories about why MHs close after surgery, and he presented an analysis of the rates of recurrence in 23-, 25-, and 27-gauge surgery performed at Associated Retinal Consultants in Royal Oak, Mich.

The expectations for success in MH repair are extremely high, Dr. Hassan said, and improvements in closure can be attributed to a number of factors. Patients with MHs tend to present earlier than patients with other pathologies, so retina surgeons tend to operate earlier than they might on a patient presenting with a different pathology. Because patients present earlier in the disease progress, he said, holes are likely small and at relatively early stages, conditions conducive to successful surgery. In general, surgical fellows are experienced and well trained in peeling internal limiting membrane (ILM) and repairing MHs, Dr. Hassan said, and this surgical experience contributes to overall high closure rates. Furthermore, the widespread use of optical coherence tomography in modern practice settings leads to early diagnosis—and therefore early surgical intervention—for MH patients.

HOW MACULAR HOLES CLOSE

Dr. Hassan explained that traction on the macula can be relieved via vitrectomy, posterior hyaloid separation, and removal of premacular tractional tissue such as epiretinal membrane (ERM) and ILM. He said some data suggest that these procedures increase local cytokine production, which could help close MHs. Glial plugs, made of Müller cells and fibrous astrocytes, bridge

MHs and take the place of lost photoreceptors.

Interestingly, he said, when a closed MH is examined histologically, ILM is no longer present at the hole margins, even in cases in which no ILM peeling took place. This may implicate the ILM as part of the pathologic process. On histology, the retinal pigment epithelium (RPE) generally appears normal, without a significant local inflammatory response, Dr. Hassan said.

Most MHs close, and time to closure is typically less than 1 day but possibly as long as 7 days, according to Dr. Hassan. The glial plug matures as time to closure increases, resulting in robust closure of the hole.

Surgeons' definitions of MH closure vary, Dr. Hassan said, but all surgeons agree that a primary failure is a hole that does not close postoperatively. Cases of early reopening may be due to an underdeveloped glial plug, which could allow the hole to reopen during the first postoperative week. A late reopening typically occurs after a hole has been closed for several weeks, after a mature glial plug was formed.

Dr. Hassan said that rates of recurrence of MHs in the literature are approximately 5% to 10%. The mean time for reopening ranges from 12 to 15 months. He said that although a large body of data supports these statistics, most studies on this topic were performed before the advent of small-gauge vitrectomy instrumentation, and further study is warranted given the prevalence today of

small-gauge vitrectomy surgery. Dr. Hassan shared with the ARDS audience the results of a study performed at his institution; the study highlights are outlined in the sidebar "Macular Hole Study at Associated Retinal Consultants."

WHY DO HOLES REOPEN?

A number of conditions may cause holes to reopen, Dr. Hassan said, including ERM, vitreous or ILM adherent to the edge of the hole, macular edema, or any event that produces a proinflammatory cascade. ERMs have been found in reopened holes at rates ranging from 60% to 75% in the literature, Dr. Hassan said. In the ERMs of patients with recurrent holes, there are contractile elements such as fibrous astrocytes and Müller cells with myoblastic features.

It is difficult to say whether ERM formation was significant and actually caused these holes to reopen, he said, and no one knows what the outcomes of these surgeries would have been if no additional peeling occurred and only an additional bubble was placed. However, a study by Valldeperas and Wong demonstrated 100% closure with rebubbling in the absence of ERM peeling.¹ ERM formation is likely an extension of the normal healing of a MH, Dr. Hassan said. In fact, most MHs (about 75%) have some ERM tissue at their margins.

Cystoid macular edema (CME) may cause an MH to reopen after vitrectomy, Dr. Hassan said, but this occurs rarely. If cataract

MACULAR HOLE STUDY AT ASSOCIATED RETINAL CONSULTANTS

Dr. Hassan shared the results of a study performed at Associated Retinal Consultants. The study assessed patients who developed recurrent MHs in eyes with initial MH repair performed using small-gauge (23-, 25-, or 27-gauge) instrumentation. The study reviewed approximately 400 eyes that demonstrated successful closure of MH after initial vitrectomy, defined as at least 1 month during which the patient's vision had improved significantly and the MH was closed.

Of 392 patients included in the study, 13 had recurrent MH; five of these patients were men and eight were women. All eyes had ILM peeling performed during MH surgery, and half of patients with recurrent MH underwent indocyanine green (ICG) staining during surgery. Approximately half had a C₃F₈ bubble and half had an SF₆ bubble. There was a wide range of time from initial vitrectomy to MH recurrence (5 weeks to 10 years), and 11 of 13 patients had clinically identifiable ERMs present after initial vitrectomy.

Cataract extraction was performed in five of 13 patients between initial surgery and MH reopening. All patients who had MH recurrence underwent a second vitrectomy. During second vitrectomy, surgeons identified and removed ILM remnants from around the hole in nine of 13 cases. In all of the eyes that had repeat surgery, an attempt was made to peel the ILM. Gas tamponade of C₃F₈ was used in 12 of 13 cases. (Of the 392 patients in the study, about half received each type of gas bubble.) All 13 eyes that underwent second vitrectomy had successful hole closure, and patients showed significant visual acuity improvement.

MHs reopened a second time in three eyes. Two of these occurred at 5 months after second vitrectomy, and one occurred at 49 months after second vitrectomy. Two of these patients elected not to undergo another surgery, and their final visual acuities were 20/200 and 20/400. One patient underwent an additional surgery, and visual acuity improved to 20/60 after a third vitrectomy. That patient's MH has remained closed for more than 1 year. Other than one case of intraoperative retinal tear, there were no complications.

Interestingly, in 10 of 13 (77%) patients with holes that reopened, the fellow eye developed a full MH.

The impact of small-gauge instrumentation on MH repair remains unknown, but this study showed a slightly lower rate of reopening than rates in the literature of larger-gauge vitrectomy studies. This may be a result of decreased inflammation and subsequent CME with small-gauge surgery. However, increased experience in managing these cases may also be a factor, Dr. Hassan noted.

extraction is performed after MH surgery, CME may develop. Bhatnagar and colleagues found that in postvitrectomy cataract extraction cases there is a fourfold increase in MH recurrence; if macular edema was present after cataract surgery, there was a sevenfold increase.² One series demonstrated that CME after Nd:YAG laser capsulotomy may cause an increase in MH rates.³

Patients with recurrent MHs, in approximately 70% of cases, have bilateral MHs. Thompson and Sjaarda showed similar results in a series of patients who underwent 20-gauge vitrectomy.⁴ In his own series (see sidebar), a greater than 70% incidence of bilateral holes was noted, Dr. Hassan said. The generally reported incidence of bilateral MHs is 10% to 15%, according to Dr. Hassan; the difference in incidence suggests that eyes with recurrent MHs have a more abnormal vitreomacular interface. They may have tangential traction, intrinsic ILM contracture, or an overabundance of ILM that does not reach the other surface of the hole, he said.

Small-gauge surgery may or may not make a difference in MH surgery, compared with surgery using older 20-gauge instrumentation, but there is a low incidence of recurrence regardless. The series Dr. Hassan presented (see sidebar on previous page) showed a slightly lower incidence of recurrence, but that may be due to conditions other than surgical gauge, he said.

CONCLUSION

In short, Dr. Hassan said, recurrence occurs many months after initial closure and is associated with ERM tissue and, to a lesser

degree, with having cataract extraction after vitrectomy.

Something is different about eyes with recurrent holes, Dr. Hassan noted. The predisposition to macular traction may be significant, and the fellow eye should be watched closely. In these situations, aggressive treatment of CME due to uveitis, trauma, or other causes after MH surgery may be beneficial. Also, it may be warranted to consider performing cataract surgery before MH repair in patients with a moderate cataract. If a symptomatic ERM develops after a MH repair, Dr. Hassan said, surgeons should consider peeling it before the MH recurs. ■

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