Jeffrey Klein, MD  Hi I’m Jeff Klein, editor or RadioGraphics and today I’m pleased to have with us Dr. Viet Nguyen and Dr. Bundhit Tan of the University of Texas Health Science Center at San Antonio Department of Radiology who are the first and last authors and senior authors respectively of one of our featured papers in the current May 2017 issue of RadioGraphics. This paper is entitled “Demystifying Orbital Emergencies: A Pictorial Review.” Dr. Nguyen, Dr. Tan, welcome.

Viet D. Nguyen, MD  Thank you.

J.K.  Dr. Nguyen let’s start with you. Your paper reviews what I think is a very important topic that many radiologists aside from those who are dedicated head and neck imagers are likely somewhat uncomfortable with, but they may encounter when on call. I know as a radiologist who takes call, on occasion I’m asked to interpret some of these exams. Your paper properly begins with a discussion of the anatomy of the orbit and then goes into the imaging modalities that are used in the assessment of the orbit in the emergency setting. Any quick summary for our listeners today of the relative futility of the various modalities in the emergency setting that they might be able to take away from today’s discussion?

V.D.N.  Sure. Orbital imaging plays an important role in the workup of orbital emergencies. It is particularly useful in the emergency department where clinical evaluation is often limited due to the patient’s inability to cooperate, extensive facial trauma, and more life threatening injuries elsewhere in the body. Ocular ultrasonography is often done to evaluate the globe and its contents, however it’s contraindicated when there’s a possibility of globe rupture. In addition, ultrasonograms often you often operator dependent. Sectional imaging with CT and MRI often done in addition to ultrasound, CT is fast to perform and it is the preferred modality for evaluating intraocular foreign body, fractures or calcification of a mass lesion. It is often performed as part of a trauma (inaudible) scan. MRI is the preferred modality for evaluating soft tissues within the orbit and the visual pathways. Both CT and MRI are the main supplement clinical evaluation by providing an accurate diagnosis, objective assessment of disease extent and progression and also pre-treatment planning.

J.K.  Great. Well thank you for that. Dr. Tan let’s move to you. In the paper, you describe infection as the most common emergency condition that affects the orbit. In particular you detail that the location of the infection particularly as it relates to the orbital septum has significant implications for outcome and management. Can we look at Figure 2 which I think nicely illustrates both the CT and MRI features of a patient with an intraorbital abscess?

Bundhit Tantiwongkosi, MD  Thanks a lot Dr. Klein. So the orbital septum separate the orbit into the pre and postseptal spaces. In patients with preseptal cellulitis they tend to have milder symptoms compared to the postseptal infection, and most of them get treated as an outpatient with oral antibiotics. However, if the infection is severe enough and get into the orbit postseptal space so they tend to have, they may have vision loss, that’s a bad thing to have, and most of them get treated in the inpatient setting with IV antibiotics and usually get monitored very closely. On axial CT you may see the infection involves both spaces. The right globe is deformed, it look like a guitar pick. That is a bad thing to have. The stretching of the optic nerve and on MRI that is well defined peripheral enhancing fluid collection with restricted diffusion representing intraorbital abscess. So I believe the radiologists need to fully describe the infection in both extent and try to find or detect the complication that may happen.

J.K.  Terrific. Thank you very much for that. Dr. Nguyen let’s go back to you. In the section on infection, you describe the orbital compartment syndrome with is recognized as an ophthalmologic emergency and is although primarily a clinical diagnosis, you do show a case of this entity with both preoperative and postoperative imaging findings. Can you take us through this case and describe the findings which is Figure 6 in the paper?

V.D.N.  Sure. Orbital compartment syndrome is a serious orbital emergency requiring rapid intervention to prevent vision loss due to ischemia to the globe and the optic nerve. Post traumatic retrobulbar hemorrhage is the most common cause. Orbital compartment syndrome may occur following infection, inflammation, or periorcular or sinus surgery. On imaging ocular compartment syndrome will demonstrate tenting of the posterior globe and stretching of the optic nerve. Figure 6a which is a case of a 50-year-old woman with uncontrollable type II diabetes who was found to have orbital compartment syndrome secondary to MRSA orbital cellulitis. The figure is an axial contrast-enhanced CT demonstrating periorbital soft tissue edema, severe proptosis, retrobulbar fat stranding, tenting of the posterior globe and stretching of the optic nerve. So management of orbital compartment...
syndrome includes lateral canthotomy and inferior cantholysis to the compressed orbit. Figure 6b demonstrates these postoperative changes with intervention including the lateral canthotomy and endoscopic medial wall decompression.

J.K. Terrific. Thank you very much for that. Dr. Tan let’s move on to the trauma section of your paper. In patients with open globe injuries, CT looks to be the modality of choice for assessing associated intraocular foreign bodies. Can you describe the advantages of CT over both ultrasound and MR in this particular setting and then review the findings that are illustrated in Figures 9a and 9b which are two different patients in your paper.

B.T. Of course, Dr. Klein. So CT is quick and widely available and can be used in a setting of suspected globe rupture which is contraindicated for ultrasounds and also can be used in metallic foreign bodies contraindicated on MRI, but one pitfall is if the foreign body is not opaque or not metallic, CT can miss that easily. Globe rupture could be a complication of either blunt trauma or penetrating injury and may or may not be associated with foreign body, but every single globe rupture case I’m looking for a foreign body and like for instance this case your image on the right on CT, you may see obvious decrease in the right globe volume representing globe hemorrhage and globe rupture and also associated with intraocular hemorrhage. The other image on the right I would like to bring to your attention of the right anterior segment which is decreased in volume. In this case there is rupture of the anterior segment. There is a magic number, if you don’t use it all the time but it’s cited in the literature, the anterior segment depth at 3.1 mm is normal. If there is any change plus or minus 0.8 mm that may indicate anterior chamber depth rupture. It could be subtle, but measurement can be very helpful.

J.K. Thank you. Dr. Nguyen let’s move to the next item I wanted to discuss. In the next to last section of the paper you deal with a variety of different emergent vascular pathologies. You detail several conditions including carotid cavernous fistula, posterior ischemic optic neuropathy, papilledema and superior ophthalmic vein thrombosis. Let’s review Figure 18 which shows a very nice example of superior ophthalmic vein thrombosis.

V.D.N. Superior ophthalmic vein thrombosis may occur in the setting of infection, inflammation, hypercoagulable states or orbital mass lesion. It is most commonly due to infection from paranasal sinusitis. In this case we have a coronal contrast-enhanced CT demonstrating a dilated non-opacified left superior ophthalmic vein. The axial MR venogram confirms this occlusion with the lack of MR signal. Here we also have serial diffusion-weighted images demonstrating restricted fusion within the left superior ophthalmic vein and cavernous thrombophlebitis with a small abscess. The pyomucocele is the cause of the thrombosis. This case really demonstrates nicely how infection within the orbits and paranasal sinuses can have rapid intracranial spread.

J.K. Terrific. Thank you very much for that. Well Dr. Nguyen and Dr. Tan I want to thank you for taking the time today to discuss your paper on the imaging of orbital emergencies which can be found in the current May 2017 issue of Radiographics. Doctors thank you very much.

V.D.N. Thank you.

B.T. Thanks for having us.