

Computed Tomography: Not an Ophthalmic Polygraph

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Computed tomography is considered a standard diagnostic test for imaging the traumatized eye and orbit [1]. Some typical CT findings can indicate the existence of globe perforation (e.g., air bubbles, loss of normal eye wall contour) [1]. We describe three patients with severe ocular trauma resulting in ocular perforation, in whom CT, performed prior to thorough ocular examination, showed no sign of perforation.

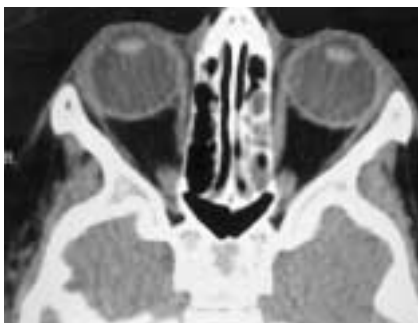
Patient Descriptions

Patient 1

This 62 year old man was injured by a car explosion during a terrorist attack. Ocular examination was nearly impossible in the emergency ward because of severe spasm. On CT examination, the eye contour looked normal. Vitreous hemorrhage and retinal detachment were suspected in the right eye, but no signs of globe perforation were seen in either eye [Figure]. In the operating room, bilateral globe perforations through corneal wounds with vitreous prolapse were observed in both eyes.

Patient 2

This 57 year old man was injured by shrapnel from a bomb carried by a suicide terrorist. Complete ocular examination was



Orbital CT scan of patient 1 at admission, showing no sign of injury to either globe. In the operating room both globes were found to have sustained perforating injury.

not possible in the emergency room because of his general condition. No major external injuries to the eyes were observed, although on palpation intraocular pressure in the left eye was considered low. On CT scan, no signs of globe perforation were observed in the right eye. The contour of the posterior wall of the left eye seemed irregular. In the operating room, a perforating corneal wound was found in the right eye and a perforating posterior scleral wound in the left eye.

Patient 3

This 5 year old boy was injured by glass from a broken thermometer. In the emergency room, effective ocular examination was impossible due to lack of cooperation. On CT scan, no signs of perforation were noticed. In the operating room, a perforating corneal wound was observed in the left eye.

Comment

In all three cases we used high quality studies with spiral acquisition technique in both bone and soft tissue algorithms. Slice thickness was 1.0 mm effective (1.3 mm spiral) and slice multiplanner reconstruction increment 0.6 mm. In two of the three cases coronal reconstructions were performed and showed no pathology. All studies were interpreted by a qualified senior radiologist. Retrospective examination of studies did not disclose any pathologic finding.

From the cases described above, it appears that perforating eye injuries, including severe injuries with intraocular tissue prolapse, can be overlooked on CT. CT is considered a valuable tool in the medical investigation of ocular trauma, especially when penetrating injury is suspected [1]. Reported attempts to assess

the yield of CT in identifying the existence of perforating ocular injury concluded that CT is not sensitive enough to be solely relied upon for diagnosis of all open globe injuries [2]. This observation is in good agreement with our findings. The cases presented here, along with previous data [2], should serve to warn ophthalmologists against considering the CT as a gold standard in the diagnosis of ocular perforation.

CT is a useful imaging option that can aid in the thorough clinical ocular examination. No conclusion regarding the existence of perforating ocular injury should ever be drawn based on CT alone. This is of special importance in the case of multi-organ trauma. Facing immediate threat to life, surgeons may argue that clinical ocular examination can be waived in order to save precious time as the CT will reveal all that is needed to know about the eyes. Our report highlights the importance of thorough ocular examination in the traumatized patient and the limitations of CT in this situation. This information should be emphasized and implemented by the emergency room trauma team as well as by ophthalmologists in training.

References

1. Coleman DJ, Rondeau MJ. Diagnostic imaging of ocular and orbital trauma. In: Shingleton BJ, Hersh PS, Kenyon KR, eds. *Eye Trauma*. St. Louis: Mosby-Year Book, 1991:25-40.
2. Joseph DP, Pieramici DJ, Beauchamp NJ Jr. Computed tomography in the diagnosis and prognosis of open-globe injuries. *Ophthalmology* 2000;107:1899-906.

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