REPORTS

Retinal Detachment Diagnosed by Bedside Ultrasound in the Emergency Department

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ABSTRACT

This case study describes a patient who presented with vague visual complaints in the right eye, decreased visual acuity in the affected eye, and a difficult initial eye evaluation, including fundoscopic and slit lamp examinations, in the emergency department (ED). The preliminary finding included a darkened-appearing area of the retina on fundoscopic exam. The patient subsequently had bedside sonography of the eyes done by an emergency medicine (EM) intern which revealed a thin and serpentine strip appearing as a hyperechoic representation of the retina floating freely into the vitreous from the superior-lateral section of the posterior globe.

Guidelines for CaJEM Paper Submissions

OVERALL DESIGN
- Font should be in Times New Roman, 12 point.
- Submissions should be single-spaced and left-aligned with a space between paragraphs and no indentation.

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- Page margins should be one inch on all sides.
- The body of the paper should be left aligned.

TITLE PAGE
- The title page should have the following five elements, with one space below each element:
- The title of the submission in 18 point boldface, center aligned.
- The authors in 12 point boldface, the name separated from the titles by a comma.
- The institution of origin in 11 point italics.
- The word "**Correspondence**" in 12 point boldface, with address information in 12 point regular.
- Any history of prior data presentation, financial interests, or other pertinent information regarding the submission in 11 point italics.

ABSTRACT
- If an abstract is included, it should be in 11 point boldface, justified text.

HEADINGS
- Headings should generally be entitled: ABSTRACT, INTRODUCTION, METHODS, RESULTS, DISCUSSION, REFERENCES. A CONCLUSIONS section could be included as well, at the author's discretion. Furthermore, an OBJECTIVES section may be substituted for the INTRODUCTION section if the author wishes.
- Limitations to the study should be addressed in the DISCUSSION section.
- Headings should be separated by one line from the prior section, and by one line from the section following.
- Headings should be in 12 point Times New Roman boldface caps.
- Headings should not have a colon attached to them.

INDENTED TEXT
- Indented text should be employed instead of quotation marks for quotations more than three lines long, approximately.
- It should be in 11 point, justified, with a space above and below the quotation, and the margins of the quotation should be ½ inch inset from both the left and right page margins (so, 1½ inches from the edges of the page).
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FOOTNOTES
- Please place footnotes at the end of sentences only.
- They should be placed after the period, like this.[1]
- Use the superscript function to place a footnote.
- There should be no spaces between multiple footnotes attached to the same sentence, and commas and hyphens should separate them, like this.[2,3,5-7]

TEXT CONVENTIONS
- Place one space after punctuation.
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- When using the terms i.e. or e.g., they should be punctuated with periods, and a comma should be placed after them. They should not be italicized, and nor should etc., et al., or other commonly used Latin terms.
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- A comma should be placed between a month and a year, as in September, 1975.

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- Tables and figures should be placed at the end of the paper.
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- Please capitalize the initial letter of important words in the row and column headings.
- Captions should be in boldface.
- Title captions should follow this basic format:

Figure 2. Effect of amiodarone on blood pressure.

REFERENCES
- References should be listed in 11 point, justified.
- Listings in references should have only one space after periods, and no spaces after colons and semicolons in the nomenclature that denotes year, volume, pages, and so on.
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4. Keyes LE, Snoey ER, Christy D, Simon BR, Frazee BF. Ultrasound guided brachial and basilic vein cannulation in emergency department patients with difficult intravenous access. *Annals of Emergency Medicine* 1999;34:711-4.

Adhering to these guidelines will greatly facilitate the review process, and is much appreciated. Thank you very much.

INTRODUCTION

Emergency department (ED) bedside ultrasound is a fast and accessible tool for clinical evaluation. The use of ED sonography has grown from traditional uses in trauma, obstetric and gynecologic presentations, and abdominal pain, to other situations and anatomical locations such as foreign body localization, assessment of peritonsillar abscess, and in the eye.[1,2,3] Retrobulbar hematoma, increased intracranial pressure, foreign bodies, and retinal detachment have been documented in the literature as examples of ocular pathology discovered using ED ultrasound.[4,5] This technique allows for easier visualization and magnification. Considering that many eye complaints are associated with a high degree of concern by the patient and physician, and ophthalmic emergencies such as retrobulbar hematoma and retinal detachment may progress to permanent vision loss, bedside ocular ultrasound can be a useful tool in selected ED patients.

A key strength in employing ultrasound technology by the emergency physician (EP) is that it can be learned quickly and effectively. A study of 29 subjects revealed an effective method of teaching bedside emergency ultrasound to fourth year medical students over a two to four week period.[6] In this case of retinal detachment, the sonographer was an intern who participated as a medical student in the aforementioned study of 29 subjects and retained enough technical and interpretive skills to diagnose this uncommon but emergent problem one year after first learning how to perform emergency ultrasound.[6] Another advantage of bedside ultrasound is that it is also easily accessible for ED use. Finally, the images can be printed (and then faxed or emailed), recorded on video, or simply obtained again for expert review by repeat scanning of the patient. This provides objective and concrete evidence for the EP and the consultant aiding in the decision for further management. We describe a situation where emergency ultrasound facilitated the diagnosis and treatment of a patient with an eye complaint.

CASE

A 60 year-old African American female presented to the ED with visual changes in her right eye described as red and black spots for almost one week which coalesced into a larger area of darkness. She denied ever having any of these symptoms previously. The patient had experienced some dizziness the previous night. One week prior to this presentation, the patient had fallen down a flight of seven stairs and hit her head on a concrete floor. She reported that after the fall, she was seen at an outside ED and was discharged after an unremarkable workup. At the time of our evaluation, the patient did not have any complaints of headache, jaw claudication, photopsia, or a curtain of darkness. The patient denied any eye pain. Her past medical history was only significant for hypertension and right cataract surgery with an intraocular lens implant. The patient was not diabetic and had no other previous surgeries or medical problems. Her only medications were metoprolol and a "fluid pill" for her blood pressure. She denied usage of alcohol, tobacco, or illicit drugs.

On presentation to the ED, the patient's vital signs were: pulse 80, respiratory rate 16, blood pressure 130/84 mmHg, and a temperature of 36.3 degrees Celsius. Physical exam revealed a well-dressed and well-nourished female. Visual acuity was 20/200 in the right eye and 20/13 in the left eye. Intraocular pressures were 9 mmHg and 8 mmHg in the right and left eye, respectively. Extraocular movements were intact. Pupils were equal, round, and reactive to light. Eyelids and eyelashes were normal. The conjunctiva were unremarkable. Slit lamp examination did not reveal any corneal defects, hyphema, or other abnormalities. Fundoscopic exam was remarkable for darkness noticed in the superior region of the right retina. The discs were sharp. Cranial nerves II-XII were intact and the neurological exam did not reveal any focal findings. There was no tenderness in the scalp, including the temporal region. The remainder of the physical exam was unremarkable.

A bedside ultrasound was performed using an 8.0 Mhz linear probe (BK Ultrasound, Copenhagen, Denmark). Sagittal and transverse planes of the right and left globe were obtained by asking the patient to close her eyelids and then applying ultrasound gel to the inside and outside of a clean glove covering the high frequency probe as it was gently placed on each eyelid. No abnormalities in th

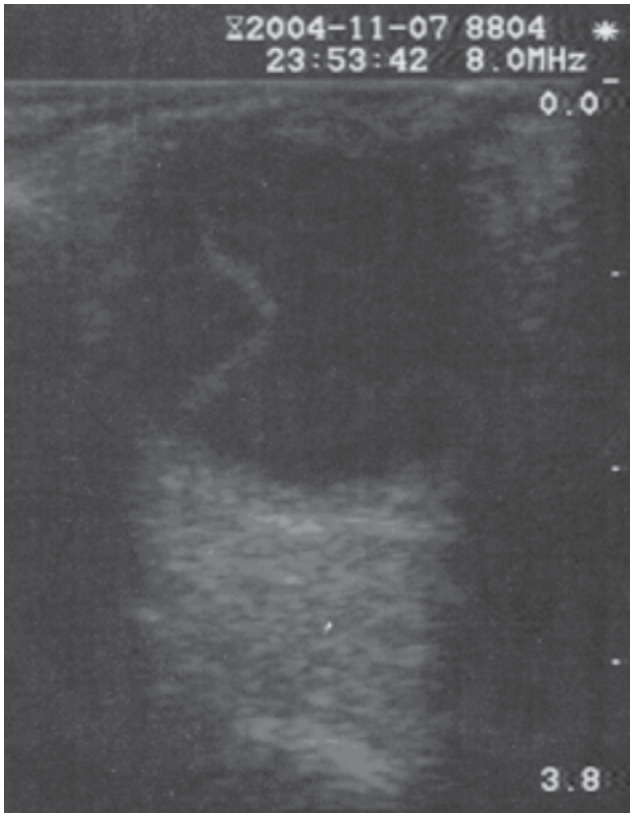

Figure 1. Sagittal Scan of Right Eye.

Figure 2. Sagittal Scan of Right Eye.

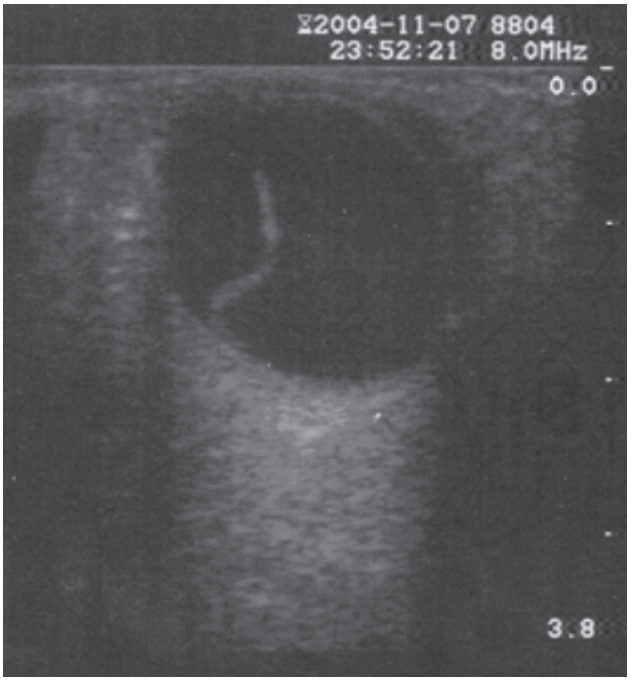

Figure 3. Transverse Scan of Right Eye.

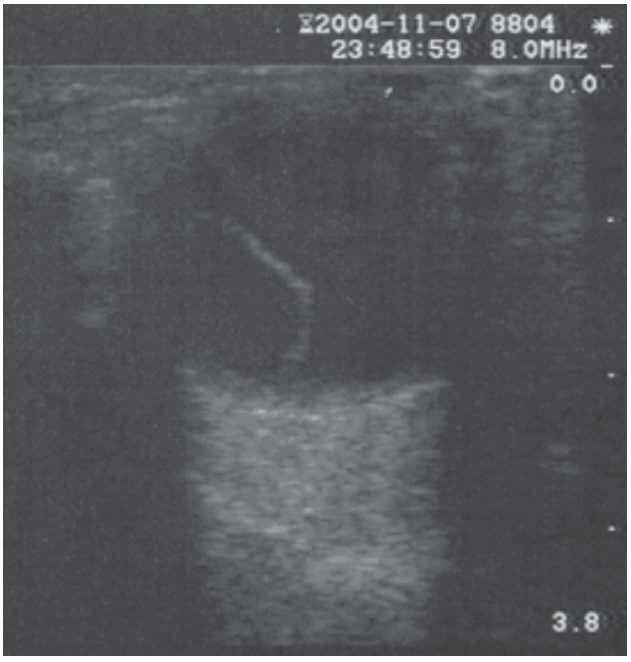

Figure 4. Transverse Scan of Right Eye.

left eye were identified. Sonography of the right eye detected a hyperechoic stripe that originated from the posterior wall of the globe (Figures 1-5). This thin line was slightly curved in its path towards the middle of the vitreous body from the superior-lateral region of the globe as determined by sagittal and transverse planes. When the patient was also asked to look in various directions with her eyelids closed, the hyperechoic line undulated with the associated ocular movements. The patient tolerated the sonogram without pain or complications. The ED preliminary diagnosis from the history, physical exam, and bedside ultrasound was retinal detachment. The ophthalmology consultant initially predicted a vitreous hemorrhage based on history and physical reported over the phone due to a lack of the classic presentation of "bright, flashing lights," a "shade of darkness" in that eye, or a definitive finding of elevated or folded retina on fundoscopic exam. After the bedside sonogram was completed, the same consultant was contacted again and informed of the new findings which prompted him to move the patient ahead of other planned consults.

The patient was found to have a preoperative and postoperative diagnosis of retinal detachment and received surgical repair by ophthalmologists in the operating room.

DISCUSSION

Eye complaints involving vision impairment commonly first present to the ED. It has been shown that ocular ultrasound performed by EPs can identify a variety of findings that facilitate the decision to request immediate ophthalmologic consultation.[7] In this case, a retinal detachment was first discovered by an ultrasound done by the EP after an inconclusive history, physical exam, and fundoscopic evaluation. As a result, the consultant was given more objective evidence which facilitated the subsequent diagnostic and therapeutic steps. This specific situation illustrates the usefulness of ocular ultrasound at the ED bedside.

Retinal detachment places the patient at risk of having vision loss if appropriate ophthalmologic surgical intervention is not provided. Bedside ultrasound allows for a quick, effective, and easy method for detecting retinal detachment in the ED. The EP must rule out vision-threatening causes of eye complaints before discharging a patient without a consultant's evaluation. This patient described seeing "floaters" but did not have other textbook symptoms or signs of retinal detachment. The nonspecific findings were not enough for the EP to confidently convey a diagnosis to the ophthalmologist until the ultrasound yielded very strong evidence for such serious pathology. Bedside ultrasound provides yet another tool for the physician trying to distinguish between benign presentations in contrast to rare but potentially damaging problems.

It is still recommended that an EP rely on their clinical skills, including ophthalmoscopic and slit lamp examinations. However, when findings are equivocal as in this case, we recommend expeditious ultrasound in the ED with appropriate consultation as a means to correct diagnosis and disposition of the patient.

Figure 5. Transverse Scan of Right Eye.

REFERENCES

1. Schlager D, Sanders AB, Wiggins D, et al. Ultrasound for the detection of foreign bodies. *Ann Emerg Med*. 2000;20:189-191.
2. Buckley AR, Moss EH, Blokmanis A. Diagnosis of peritonsillar abscess: value of intraoral sonography. *Am J Roentgenol.* 1994;162:961-964.
3. Blaivas M. Bedside emergency department ultrasonography in the evaluation of ocular pathology. *Acad Emerg Med.* 2000;7:947-50.
4. Estevez A, Deutch J, Sturmann K, Ziefer B, Ishikawa H, Hsu C. Ultrasonography evaluation of retrobulbar hematoma in bovine orbits. *Acad Emerg Med* 2000;7:1169c-1170c.
5. Blaivas M., Theodoro DL, Sierzenski PR. Elevated intracranial pressure detected by bedside emergency ultrasonography of the optic nerve sheath. *Acad Emerg Med.* 2003;10:376-381.
6. Zlidenny AM, Fox JC, Henson T, Barajas G. Can fourth-year medical students learn bedside ultrasonography? *Ann Emerg Med*. 2004 Supplement;44(4):S113-S114.
7. Blaivas M, Theodoro DL, Sierzenski PR. A study of bedside ocular ultrasonography in the emergency department. *Acad Emerg Med*. 2002;9:462b-463b.