Bedside Optical Coherence Tomography for Terson's Syndrome screening in Acute Subarachnoid Hemorrhage: A pilot study.

Ciro Ramos Estebanez MD, PhD; Maryo Kohen MD; Jonathan Pace MD; Alirezi Bozorgi MD; Sunil Manjila MD; Vilakshan Alambyan MD; Ifeyinwa Nwankwo MD; Michael DeGeorgia MD; Nicholas C. Bambakidis MD; Faruk Orge MD

University Hospitals Cleveland Medical Center, Cleveland, Ohio 44106

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Introduction

Our goal was to evaluate the feasibility and potential role of bedside optical coherence tomography (OCT) in Terson's Syndrome (TS) in patients with acute subarachnoid hemorrhage (aSAH) and its potential role in blindness prevention.

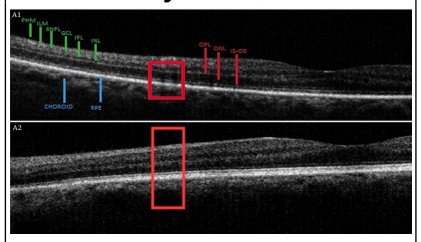
Methods

Open label pilot study: 31 patients with angiographic diagnosis of aSAH were first screened for TS with dilated fundoscopy and then with OCT in the acute phase and at 6-week follow-up visits. Outpatient mood assessments (PHQ-9, HDS), and quality of life general (NIH-PROMIS) and visual scales (VFQ-25) were measured at 1 and 6 weeks after discharge. Exclusion criteria included current or previous history or severe cataracts, severe diabetic retinopathy, severe macular degeneration, or glaucoma.

Results

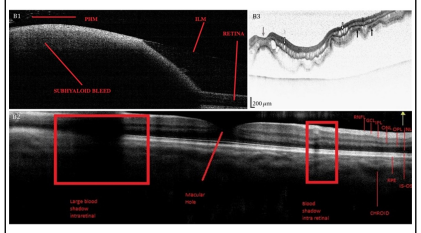
OCT identified 7 patients (22.6% incidence of TS in our aSAH sample: 7 in the acute phase, a large retinal detachment was initially missed by fundoscopy and diagnosed by OCT in follow up clinic). Dilated retinal fundoscopy significantly failed to detect TS (n=4, 57.1% missed cases). IVH was significantly more incident in TS cases (85.7% vs. 25%). None of the participants experienced any complications from OCT examinations. At follow-up 6 weeks after discharge, neither decreased quality of life visual scale scores nor a depressed mood correlated with objective OCT pathological findings. There were no significant mood differences between TS cases and controls.

Figure 1: Mild Terson's Syndrome



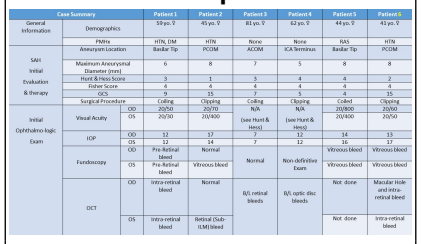
A1. Retinal image with hyporeflective areas representing shadows of blood remnants (rectangle). A2. Follow-up a month later confirmed Terson's syndrome resolution with intact anatomy (seerectangle). PHM indicates Posterior hyaloid membrane; ILM, Internal limiting membrane;RNFL, Retinal Nerve Fiber Layer; GCL, Ganglion Cell Layer; IPL, Internal Plexiform Layer;14INL, Internal Nuclear Layer; OPL, Internal Plexiform Layer; ONL, Outer Nuclear Layer; IS-OS,photoreceptor inner segment/outer segment junction; RPE, Retinal Pigment Epithelium.

Figure 2: Severe Terson's Syndrome



B1. Case 2: Subhyaloid and retinal sub-ILM bleeds, B2. Severe Terson's syndrome with largeretinal detachment (case 5), B3. Severe TS: Large retinal hemorrhage (see rectangle) and macularhole (case 6).

Table 1: Select Patient Examples



Case Summary		Patient 1	Patient 2	Patient 3	Patient 4	Patient 5	Patient 6
General Information	Demographics	59 yo. Y	45 yo. V	81 yo. V	62 yo. Y	44 yo. Y	41 yo. Y
SAH Initial Evaluation & Therapy	PMHx	HTN, DM	HTN	None	None	RAS	HTN
	Aneurysm Location	Basilar Tip	PCOM	ACOM	ICA Terminus	Basilar Tip	PCOM
	Maximum Aneurysmal Diameter (mm)	6	8	7	5	8	8
	Hunt & Hess Score	3	1	3	4	4	2
	Fisher Score	4	4	4	4	4	4
	GCS	9	15	7	5	4	15
	Surgical Procedure	Coiling	Clipping	Coiling	Clipping	Coiled	Clipping
Initial Ophthalmo-logic Exam	Visual Acuity	OD 20/50	20/70	N/A	N/A	20/800	20/60
		OS 20/50	20/400	(see Hunt & Hess)	(see Hunt & Hess)	20/400	20/50
	IOP	OD 12	17	7	12	14	13
		OS 12	14	7	12	16	17
	Fundoscopy	OD Pre-Retinal bleed	Normal	Normal	Non definitive Exam	Vitreous bleed	Vitreous bleed
		OS Pre-Retinal bleed	Vitreous bleed			Vitreous bleed	Vitreous bleed
	OCT	OD Intra-retinal bleed	Normal	R/L retinal bleeds	R/L optic disc bleeds	Not done	Macular Hole and intra-retinal bleed
		OS Intra-retinal bleed	Retinal (Sub-ILM) bleed			Not done	Intra-retinal bleed

Select patient examples highlighting the various types and severities of Terson's Syndrome identified on OCT testing

Conclusions

OCT is the gold-standard in retinal disease diagnosis. This pilot study shows that bedside OCT examination is feasible in aSAH. In our series, OCT enhanced TS detection by decreasing false negative/ inconclusive fundoscopic examinations. It allows early diagnosis of macular holes and severe retinal detachments, which require acute surgical therapy to prevent legal blindness. OCT also rules out potential false positive visual deficits in individuals with a depressed mood at follow up.

Learning Objectives

By the conclusion of this session, participants should be able to:

1) Discuss Terson's Syndrome, and its impact on vision in patients with subarachnoid hemorrhage

2) Discuss the implementation of bedside Optic Coherence Tomography in the diagnosis of Terson's Syndrome

3) Identify patients requiring urgent surgical treatment for Terson's Syndrome, to prevent legal blindness