VISUAL MANIFESTATIONS OF EHLERS-DANLOS SYNDROME

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DISCLOSURES

- No financial disclosures

OBJECTIVES

- Provide an overview of Ehlers-Danlos Syndrome
- Overview of common ocular findings associated with Ehlers-Danlos Syndrome
  - Structural ocular findings
  - Functional visual findings
- Review a case of a symptomatic Ehlers-Danlos patient

OVERVIEW OF EHLERS-DANLOS SYNDROME

EHLERS-DANLOS SYNDROME (EDS)

- Etiology
  - Inherited collagen disorder
  - Wide array of types and expressions
- Pathophysiology
  - Mutations disrupt collagen synthesis and/or processing
    - Collagen makes up 80% of the eye
- Prevalence
  - 1 in 2,500 to 1 in 5,000

Milolovic T, Sieg VC. Ehlers Danlos Syndrome. [Updated 2020 Jul 10]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK549814/

EHLERS-DANLOS SYNDROME (EDS)

- Inheritance
  - Majority of cases are autosomal dominant
  - Rare forms are autosomal recessive
- Prognosis
  - Variable
  - Does not typically affect hypermobile or classic types of EDS
  - Vascular EDS patients have a median lifespan of 48

Milolovic T, Sieg VC. Ehlers Danlos Syndrome. [Updated 2020 Jul 10]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK549814/

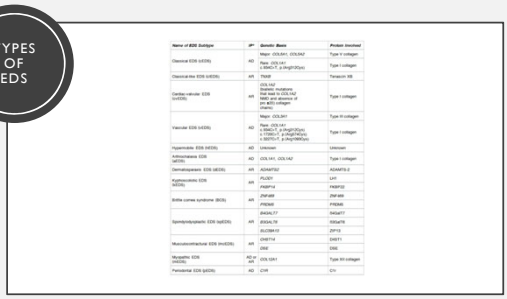
TYPES OF EDS

- 13 different types of Ehlers-Danlos Syndrome
- Hypermobile EDS – most common type

Classifications	
Type I and II	Classical
Type III	**Hypermobile**
Type IV	Vascular
Type VI	Kyphoscoliosis
Type VIIA and VIIB	Arthrochalasia
Type VIIC	Dermatosparaxis

Tullia W, Kiran A. Ehlers-Danlos syndrome. J Dent Res Rev 2015;2:42-6

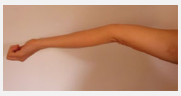
TYPES OF EDS

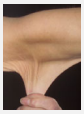


https://www.ehlers-danlos.com/eds-types/

COMMON SYSTEMIC FINDINGS OF EDS

- **Joint hypermobility**
- **Skin hyperextensibility**
- **Fragile tissues**
- Chronic joint pain
- Muscle fatigue
- Bruises easily
- Heart valve problems





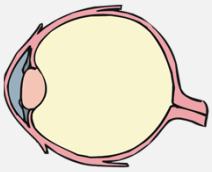
HOW EHLERS-DANLOS IS DIAGNOSED

- 2017 International Diagnostic Criteria
  - A list of major and minor criteria for each of the 13 types
  - Lists clinical signs and symptoms for each type
  - Most types will need a confirmation with genetic testing
- Medical doctors (primary care physicians) are able to diagnosis EDS
  - Many cases may need a referral to a geneticist

OCULAR FINDINGS WITH EHLERS-DANLOS SYNDROME

STRUCTURAL OCULAR FINDINGS WITH EHLERS-DANLOS SYNDROME

- Dry Eye
- Blue Sclera
- Keratoconus
- Lens subluxation
- Myopia
- Retinal Detachment
- Angioid streaks
- Glaucoma
- Strabismus



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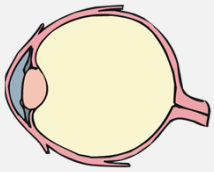
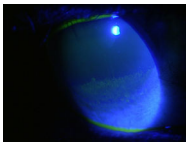


DRY EYE

- Large percentage of EDS patients experience dry eyes
- Due to inadequate closure of eyelids
  - Exposure keratitis
- Symptoms worse in the morning
- May experience fluctuating vision and light sensitivity

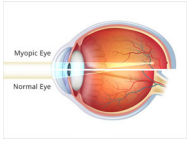


KERATOCONUS

- Due to loss of collagen integrity of the cornea
- Clinical Findings:
  - Paracentral corneal thinning
  - Scissor reflex with retinoscopy
  - Steepening on topography
  - Vogt striae

MYOPIA

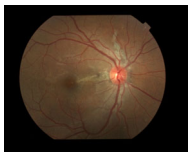
- Due to loss of collagen integrity of the sclera
- Tends to progress quickly
- Able to correct with glasses or contact lenses
- Be cautious with refractive surgery
  - One study: 23% of EDS patients had complications post-refractive surgery
  - Complications due to healing of the cornea



Louie, Anita et al. "Survey of Ehlers-Danlos Patients' ophthalmic surgery experiences." Molecular genetics & genomic medicine vol. 8,4 (2020): e1155. doi:10.1002/mgg3.1155

RETINAL DETACHMENTS

- Weakened Bruch's Membrane
  - **Angioid streaks**
    - Irregular radiations in the peripapillary region
- Elongation of the eye increases risk



https://eyewiki.aao.org/Angioid_Streaks

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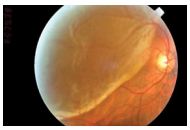


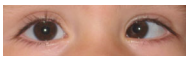
STRABISMUS

- Small misalignments
  - Patient may report occasional diplopia and eye fatigue from keeping proper alignment
- Exotropia
  - May be due to cranial nerve 3 palsy
    - Sudden onset diplopia
    - Monitor for ptosis and pupillary involvement

https://www.aao.org/editors-choice/early-surgery-intermittent-exotropia-tracks-with-b

STRABISMUS

- Esotropia
  - Potential causes of CN 6 palsies in EDS patients:
    - Cavernous Sinus Fistula
      - Spontaneous carotid-cavernous fistula is a well known complication in vascular-type EDS patients
      - Cranial nerve 6 travels through the cavernous sinus
    - Idiopathic Intracranial Hypertension
      - Not well researched in association to EDS
      - Increased pressure on nerve as it stretches over the petrous ridge of the temporal bone



FUNCTIONAL VISUAL FINDINGS WITH EHLERS-DANLOS SYNDROME

- Convergence Insufficiency
- Oculomotor Dysfunction
- Accommodative Insufficiency
- Basic esophoria or exophoria
- Dizziness

SMALL STUDY IN FRANCE

- Published September 2019
- Retrospective study of 21 patients
  - 17 women
  - 4 men
- Most frequent ophthalmological signs:
  - Ocular motility disorders (71.4%)
  - Convergence insufficiency (61.9%)
  - Blue sclera (38%)
  - Dry eye syndrome (33%)
  - High myopia (9.5%)

Perez-Roustit S, Nguyen DT, Xerri O, Robert MP, De Vergnes N, Mincheva Z, Benistan K, Bremond-Gignac D. Manifestations ophtalmologiques des syndromes d'Ehlers-Danlos : à propos d'une cohorte de 21 patients [Ocular manifestations in Ehlers-Danlos Syndromes: Clinical study of 21 patients]. J Fr Ophtalmol. 2019 Sep;42(7):722-729. French. doi: 10.1016/j.jfo.2019.01.005. Epub 2019 May 25. PMID: 31133401.

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CASE REPORT

CASE REPORT

- 19 year old white female
- Referred to our clinic from her chiropractor for a binocular vision evaluation

CASE REPORT

- Reported visual symptoms:
  - Has experienced 2 years of constant headaches
  - Dizziness
  - Difficulty with balance and walking
  - Difficulty with reading
  - Eye fatigue
  - Severe light sensitivity

CASE REPORT

- Onset of symptoms was 2 years ago
  - Symptoms happened after taking Tramadol for severe body pain
  - Took Tramadol for 5 weeks, then started becoming very symptomatic
- Later was diagnosed with Ehlers-Danlos Syndrome
- Also diagnosed with endometriosis and postural orthostatic tachycardia syndrome (POTS)
- At the time of the exam, was undergoing testing for Chiari malformation

CASE REPORT

- VAs sc: 20/20 OD, OS, OU
- PERRL, (-) APD OD, OS
  - Quick pupillary rebound
- EOM: full, no restrictions, no diplopia
- Saccades: hypometric, head movement across midline, slow to fixate
- Pursuits: multiple refixations with slight head movement across midline

CASE REPORT

- NPC: 5 cm with effort, reduced with repetition, became quickly fatigued
- Distance cover test: orthophoria
- Near cover test: 6 prism diopters esophoric
- VOR: quickly became dizzy, horizontal VOR was more symptomatic than vertical

CASE REPORT

- Subjective Refraction:
  - OD: +0.25 DS OS: +0.25 DS
- Distance Von Graefe phoria: 2 exo
- Near Von Graefe phoria: 2 eso
  - Intermittent OD suppression
- Distance Vergence Ranges:
  - BO: 8/10/2
  - BI: 16/18/6
- Near Vergence Ranges:
  - BO: 8/18/6
  - BI: 10/18/10

CASE REPORT

- NRA: +2.00 net
- PRA: -2.75 net
- FCC: +1.25 net

CASE REPORT

- Treatment and Management
- Glasses:
  - Trialed prism and low plus – no improvement in symptoms
  - Trialed small amount of binasal occlusion – improvements in gait, able to walk straighter and more comfortable
  - Added FL-41-2 tint to improve light sensitivity
- Recommended weekly vision therapy
  - Focus on oculomotor skills, balance, central-peripheral integration, accommodation, and binocularity

TAKE AWAY PEARLS

- Ehlers-Danlos is becoming more prevalent
- Large variation of types and clinical findings
- Many ocular findings secondary to EDS
- Refer to PCP for further evaluation

Systemic	Ocular
Joint hypermobility	BV issues (CI, OMD, AI, strabismus)
Stretchy skin	High myopia
Chronic pain	Dry eyes
Easily bruised	Keratoconus
Muscle weakness	Retinal Detachment

THANK YOU

- Email if you have any further questions or comments
  - drchristy@doctorbruce.net