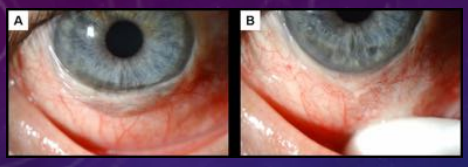


EHLERS-DANLOS SYNDROME AND THE EYE

2018 VICTORIA CONFERENCE
JAMES KUNDART OD MED FAAO FCOVD-A
PACIFIC UNIVERSITY COLLEGE OF OPTOMETRY

FINANCIAL DISCLOSURE: NOTHING TO DISCLOSE

LEARNING OBJECTIVES

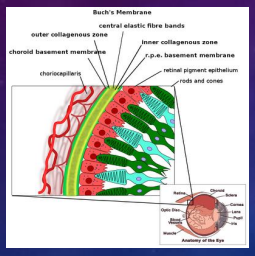
1. Why doesn't Ehlers-Danlos Syndrome(EDS) present more often with high myopia, keratoconus, and lacquer cracks in Bruch's membrane?
2. What are the most common presenting symptoms of EDS?
3. What are the most common clinical signs of EDS, including subtle ones?
4. How are these EDS problems best treated by the primary-care optometrist?

CONNECTIVE TISSUE DISORDERS AND OPTOMETRY

- The eye and adnexa are both made of connective tissue, from lid tissue, sclera and cornea to the zonules and extra-ocular muscle tendons
- Refractive error, binocularity, and eye disease are all impacted by connective tissue problems

The Ehlers Danlos Society

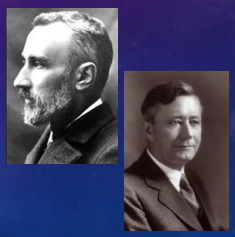
CONNECTIVE TISSUE DISORDERS IN PRIMARY EYE CARE



- **Ehlers-Danlos Syndrome**
- Pseudoxanthoma Elasticum
- Osteogenesis Imperfecta
- Marfan Syndrome
- Stickler Syndrome
- Others

EHLERS-DANLOS SYNDROMES (EDS)

- This connective tissue disorder comes in several types with slightly different systemic and ocular signs
- Hyperextensible joints, bruising, and poor-wound healing are a well-known feature of many types of EDS (especially the most common Types, II and III)
- "As of 2017, 13 Ehlers–Danlos syndromes had been characterized, with a significant overlap in features"



2017 GENETIC CLASSIFICATION OF EDS

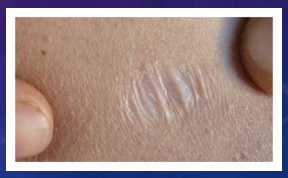
- **Hypermobile**
- **Classical**
- **Vascular**
- **Kyphoscoliosis**
- Arthrochalasia
- Dermatospraxis
- **Brittle Cornea Syndrome**
- Classical-like
- Spndylosplastic
- Musculocontractural
- Myopathic
- Periodontal
- Cardiac-Vascular

MOST COMMON: HYPERMOBILE EHLERS-DANLOS SYNDROME

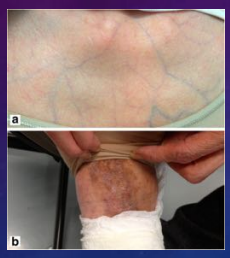
- "Characterized primarily by **joint hypermobility** affecting both large and small joints, which may lead to recurrent joint dislocations and subluxations (partial dislocation)
- In general, people with this type have soft, smooth and velvety skin with easy bruising and chronic pain of the muscles and/or bones

CLASSICAL-TYPE EHLERS-DANLOS SYNDROME

- Associated with extremely elastic (stretchy), smooth skin that is fragile and bruises easily, wide, **atrophic scars** (flat or depressed scars), and joint hypermobility
- Molluscoid pseudotumors (calcified hematomas over pressure points such as the elbow) and spheroids (fat-containing cysts on forearms and shins) are also frequently seen



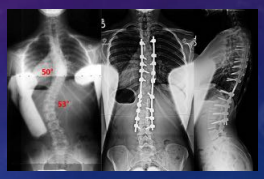
VASCULAR-TYPE EHLERS-DANLOS SYNDROME



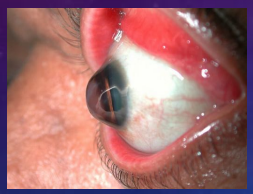
- "Characterized by thin, translucent skin that is extremely fragile and bruises easily
- Characteristic facial features including large eyes, a thin nose, and lobeless ears
- Joint hypermobility is present, but generally confined to the small joints (fingers, toes)"

KYPHOSCOLIOSIS-TYPE EHLERS-DANLOS SYNDROME

- "Associated with severe hypotonia at birth, delayed motor development, progressive scoliosis (present from birth), and scleral fragility
- Affected people may also have easy bruising, fragile arteries that are prone to rupture, unusually small corneas, and osteopenia (low bone density)"

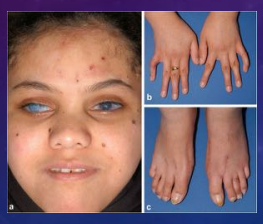


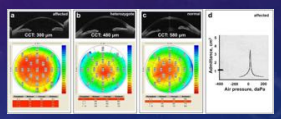
BRITTLE CORNEA VARIANT OF EHLERS-DANLOS SYNDROME (RARE)



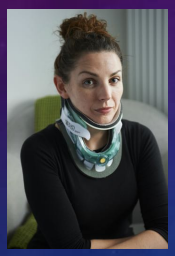
- Brittle Cornea Syndrome (BCS) is "characterized by thin cornea, early onset progressive keratoglobus and blue sclerae"
- Like blue sclera, this is rare in ambulatory patients

BRITTLE CORNEA SYNDROME: PRESENTATION AND ANT SEG OCT





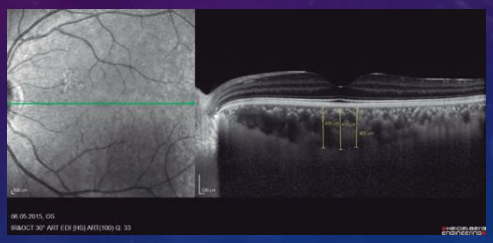
SYSTEMIC SYMPTOMS OF EHLERS-DANLOS SYNDROME



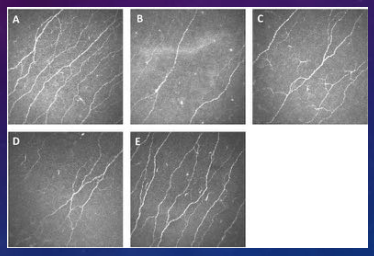
- In general, these patients are athletic, so diagnosis of EDS is often delayed
- Mild hypermobility may have some advantages for pregnancy and childbirth
- But not much later in life, the number of surgeries they have may exceed their age

INFLAMMATORY DISEASES AND EDS

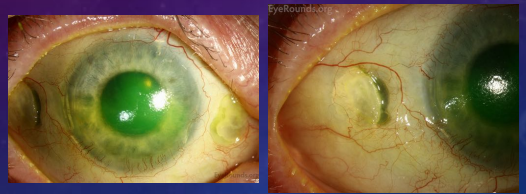
AUTOIMMUNE AND EDS: BECHET DISEASE IN THE NFL/CHOROID



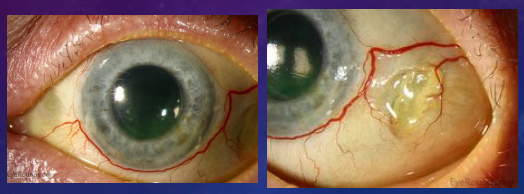
AUTOIMMUNE AND EDS: FIBROMYALGIA AND THE CORNEA



AUTOIMMUNE AND EDS: RHEUMATOID ARTHRITIS



RA AND SCLEROMALACIA



RHEUMATOID ARTHRITIS AND EDS: JOINT SUPPORT RING SPLINTS

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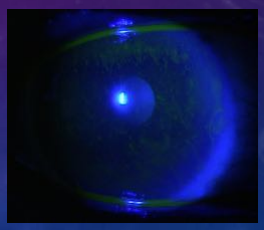
OTHER OCULAR CONSEQUENCES OF EHLERS-DANLOS SYNDROME

- Exposure Keratitis
- Corneal Hysteresis
- Refractive Error
- Strabismus
- Postural Orthostatic Tachycardia Syndrome



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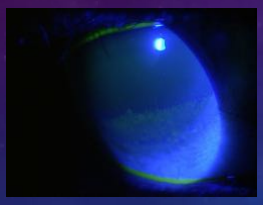
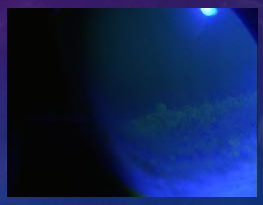
1. EXPOSURE KERATITIS AND EDS





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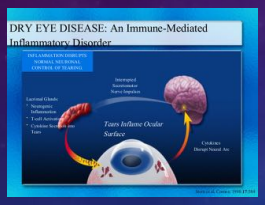
TREATING DRY EYE IN EDS: ANT-INFLAMMATORIES



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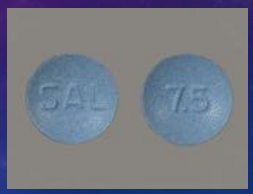
TREATING DRY EYE IN EDS: SALAGEN (ORAL PILOCARPINE)



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2 .CORNEAL HYSTERESIS IN EDS: OCULAR RESPONSE ANALYZER

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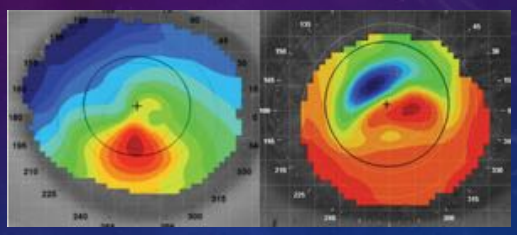
WHY YOU WON'T OFTEN SEE BLUE SCLERA IN EDS

- Blue sclera is normal in newborns and the elderly
- Adult patients with thin blue sclerae have a brittle cornea and ectasia risk
- The weak cornea and sclera puts the patient at risk for retinal detachment and globe rupture with ocular injury

gmara/

WHY REFRACTIVE SURGERY IS CONTRAINDICATED IN EDS



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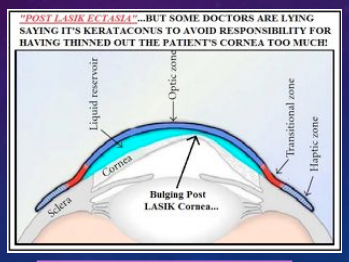
TREATING POST-LASIK ECTASIA IN EDS: SCLERAL CONTACT LENSES



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SCLERAL LENSES TREAT POST-LASIK ECTASIA AND DRY EYE IN EDS

- Corneal transplants are a particular challenge for most EDS patients with keratoconus due to risk of a ruptured globe
- Preceding penetrating keratoplasty, a 360 degree conjunctival peritomy must be done
- Descemet's membrane from the donor eye has to be sutured on in a ring first, followed by a PK 1 months later

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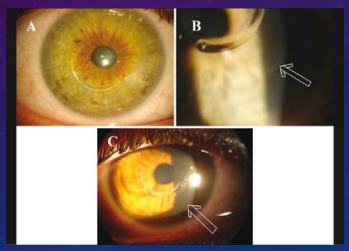
TREATING POST-LASIK ECTASIA: KERARING



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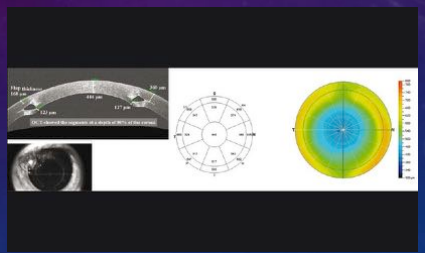
ANTERIOR SEGMENT OCT FOR EDS AFTER KERARING



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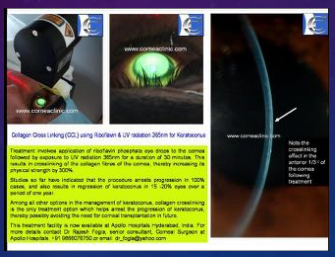
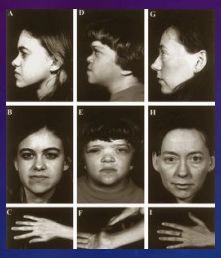
TREATING ECTASIA IN EDS WITH CORNEAL COLLAGEN CROSS-LINKING



http://www.cornealclinic.com/procedures/collagen-cross-linking.html

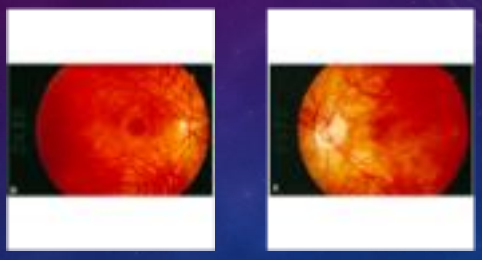
3. REFRACTIVE ERROR IN EDS



- Most casual references to Ehlers-Danlos syndrome and the eye report high myopia in these patients
- While scleral or corneal hyperextensibility would logically result in myopia, these patients are often too sick to report to us in an ambulatory setting
- But they may have another connective tissue disorder

http://www.[illegible]/features/

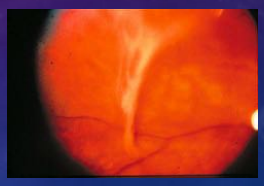
HIGH MYOPIA IN EDS? OD: -8.00 D, OS: -14.00 D



Wright 3, figure 12-1

EDS DIFFERENTIAL DIAGNOSIS: STICKLER SYNDROME

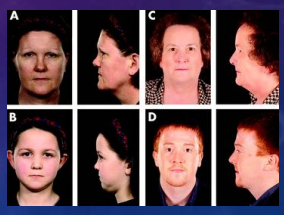
- Also called Hereditary Progressive Arthro-Ophthalmopathy is an autosomal-dominant connective tissue disease
- Like Marfan, it causes very high myopia and possible retinal detachment
- It is seen as frequently as one in 7,500 patients
- One characteristic feature is a vitreous veil, as seen here



Wright, Figure 5-5, page 241

AMBLYOPIA, STRABISMUS AND STICKLER SYNDROME

- One way in which a Stickler patient can present is with strabismus secondary to retinal detachment
- In this Stickler patient, an RD in OS resulted in LET
- If the eye turn occurs before age 2, it is amblyogenic
- More often, the poor VA in the strabismic eye is because the detachment affects the macula and is not true amblyopia



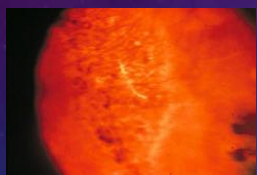
http://www.[illegible]/features/

ANTERIOR SEGMENT FEATURES OF STICKLER SYNDROME: CATARACT

FIGURE 6-5. Peripheral cortical "wedge" cataract common in patients with Stickler syndrome.

Wright, *Handbook of Pediatric Retinal Disease*, Figure 6-5, page 184

POSTERIOR SEGMENT FEATURES OF STICKLER SYNDROME



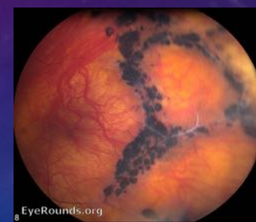
- Other anterior segment complications are rare
- For example, glaucoma is only seen in 5% of Stickler cases, although ocular HTN can occur
- However, congenital, progressive myopia is universally seen
- Retinal detachment is common
- Seen here is a "peripheral area of circumferential lattice degeneration", an early sign

Wright, Figure 5-6, page 241

Pacific University Oregon

RADIAL LATTICE DEGENERATION IN STICKLER SYNDROME

- Minor ocular trauma can cause vitreous hemorrhage and/or retinal detachments
- The vitreous is typically liquified with midperipheral circumferential condensations
- Radial perivascular patches of lattice degeneration are present in the posterior pole or mid-periphery
- **These patients have a 50% lifetime risk of retinal detachment!**



http://webeye.ophth.uiowa.edu/eyeforum/atlas/pages/radial-lattice-in-Sticklers-syndrome.html

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PROGRESSION OF LATTICE DEGENERATION IN STICKLER SYNDROME

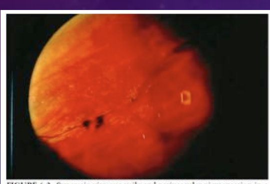

FIGURE 6-3. Syneretic vitreous veils and perivascular pigmentation in a patient with Stickler syndrome.

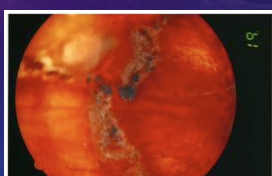

FIGURE 6-4. Severe pigmented lattice degeneration and perivascular pigmentation typical of Stickler syndrome.

Wright, *Handbook of Pediatric Retinal Disease*, Figures 6-3 and 6-4, page 183

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SYSTEMIC FEATURES OF STICKLER SYNDROME

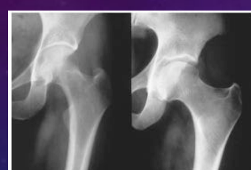

FIGURE 6-6. *Left*: normal pelvis. *Right*: anterior posterior radiograph of pelvis revealing stunting of the growth of the femoral epiphysis as well as stunting of the growth of the greater trochanter. Note irregularity of the joint surface. (Courtesy of March of Dimes Birth Defects Foundation, from Birth Defects Original Article Series, 1982;18:542.)

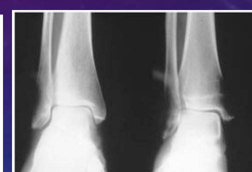

FIGURE 6-7. *Left*: normal ankle. *Right*: Stickler's syndrome anterior posterior radiograph of the ankle shows some stunting of the growth of the distal tibia with an abnormal slant to the distal tibia and shortening of the tip of the medial malleolus. (Courtesy of March of Dimes Birth Defects Foundation from Birth Defects Original Article Series, 1982;18:542.)

Wright, *Handbook of Pediatric Retinal Disease*, Figures 6-6 and 6-7, page 185

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FACIAL FEATURES OF STICKLER SYNDROME

http://syndromepictures.com/stickler-syndrome-pictures/

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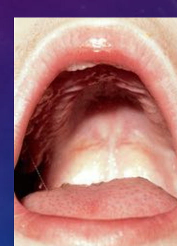
SYSTEMIC FEATURES OF STICKLER SYNDROME

- Sensorineural hearing loss (25%)
- **High arched palate (25%)**
- Progressive arthropathy (joint disease), becoming pronounced by 4th or 5th decade of life
- Conversely, instead of stiffness, some have hyperextensible joints
- Mitral valve prolapse is seen in almost half (45%)



http://syndromepictures.com/stickler-syndrome-pictures/

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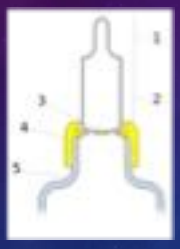
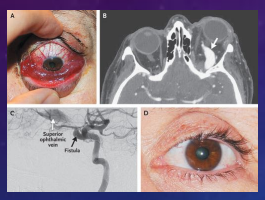
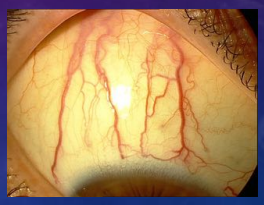
TREATING STICKLER SYNDROME



- Many of these patients may need laser photocoagulation for retinal holes and tears
- Some will need vitrectomy and scleral buckling for RD
- Like Marfan, you will want to have these patients tested for heart and valve defects
- **A Haberman Feeder baby bottle** can be used for Stickler babies with arched palate

4. STRABISMUS IN EDS: CN VI AND CAVERNOUS SINUS LEAKAGE

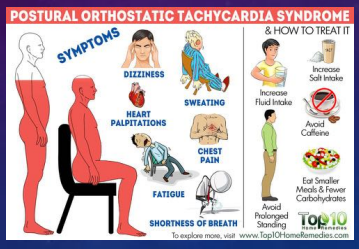




LISTENING FOR ORBITAL BRUIT IN CAROTID-CAVERNOUS FISTULA

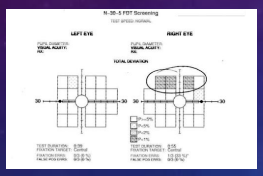
TREATING INDIRECT FISTULA AND DI: DIAMOX (ACETAZOLAMIDE)

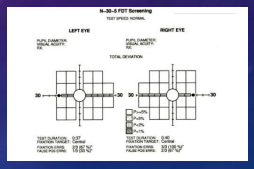
5. POSTURAL ORTHOSTATIC TACHYCARDIA SYNDROME IN EDS



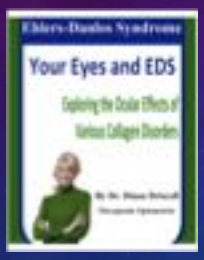
VISUAL SNOW AND POTS

VF LOSS IN A 12 YO WITH EDS: CURED WITH GATORADE?!?
(THANKS TO DRS. DIEP & NGUYEN)



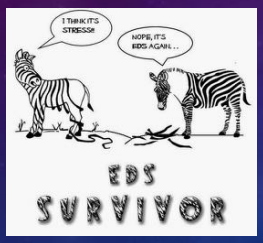


BOTTOM LINES ON EHLERS-DANLOS SYNDROME



- EDS tests all your optometric skills, from anterior to posterior segment
- While there are many structure effects of EDS, the patient wants you to treat their symptoms
- These patients will bring in multiple generations of their family with varying penetrance of the disease

QUESTIONS? THANK YOU!



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READINGS AND REFERENCES

- Today's lecture was inspired by *The Handbook of Pediatric Eye and Systemic Disease*, edited by Kenneth Wright. MD.
- See chapter 5, called "Connective Tissue, Skin, and Bone Disorders', by Elias Traboulsi.
- Ehlers-Danlos Syndrome has a great entry at Epocrates online if you upgrade to the disease database: https://online.epocrates.com/noframe/showPage.do?method=diseases&lMonographId=570&ActiveSectionId=11