

Floppy Eyelid Syndrome and Obesity (FLO) Study

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Background

Floppy eyelid syndrome (FES) was first described in 1981 by Culbertson and Ostler^[1]. It is an under-diagnosed, usually bilateral eyelid malposition. It is strongly supported in the literature that floppy eyelid syndrome is the result of a diminished quantity of elastin fibers throughout the pretarsal orbicularis oculi muscle and tarsus^[1,2,3]. Ezra et. al also demonstrated a loss of elastin in the tarsal plate of FES patients compared to a control patient's tarsal plate using Verhoeff's Iron Haematoxylin and Masson Trichrome counterstain^[4]. Elastases (MMP-9 and MMP-7), which are responsible for degrading elastin, have also been found in the basal layer of the conjunctival epithelium, tarsal stroma, and blood vessel walls^[2].

Floppy eyelid syndrome is also known to be associated with obstructive sleep apnea and obesity^[1]. Muniesa et. al found that 85% of FES patients studied also had obstructive sleep apnea and Taban et. al found that 82% of FES patients studied had a body mass index (BMI) greater than 30. The literature has shown that pharyngeal elastin degradation is a key feature of obstructive sleep apnea, with MMP-9 and MMP-7 being found in pharyngeal soft tissue resulting in laxity of the hyoepiglottic ligament^[1].

Elastin Staining

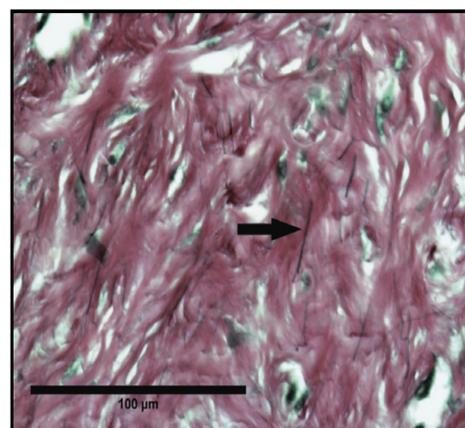


Image 3: Verhoeff stain positive for elastin^[4]

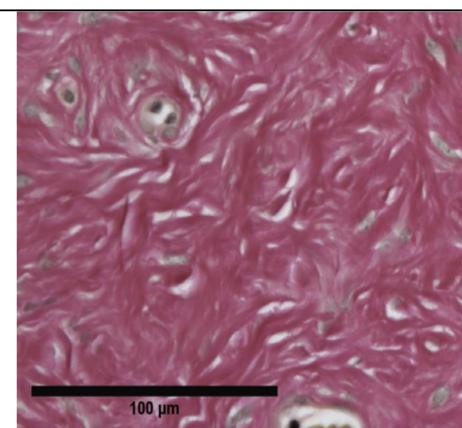


Image 4: Verhoeff stain absence of elastin^[4]

Methods

Floppy Eyelid and Obesity (FLO) Study Questionnaire

Participant ID#: _____

1. DOB: _____ Height: _____ Weight: _____

2. Sex at birth: Male _____ Female _____ Other _____ Prefer not to answer _____

3. Ethnicity: Asian _____ Black/African American _____ Caucasian _____ Hispanic/Latino _____ Native American _____ Pacific Islander _____ Other _____ Prefer not to answer _____

4. Have you ever been diagnosed with floppy eyelid syndrome? Yes _____ No _____

5. Have you ever experienced any of the following eye symptoms: dryness, redness, irritation, discharge, or pain of the eye especially when you wake up? Yes _____ No _____

6. Have you been diagnosed with obstructive sleep apnea? Yes _____ No _____
If yes, do you currently use a CPAP machine? Yes _____ No _____

7. Are you a heavy snorer? Yes _____ No _____

8. Do you sleep face down? Yes _____ No _____

9. Do you smoke cigarettes? Yes _____ No _____
If yes, how many packs per day? _____ pks./day

Figure 1: FLO Study Questionnaire

- Our patient population includes patients undergoing bariatric surgery from Lakeview Regional Hospital and Avala Hospital in Covington, LA.
- Participants will answer questions about FES symptoms, previous OSA diagnosis, age, weight, height, ethnicity, and smoking history.
- Gastric tissue will be obtained during the process of bariatric surgery and will be histopathologically evaluated by Delta Pathology Group in Covington, LA.
- The gastric tissue will be evaluated pathologically using the Verhoeff-van Gieson (VVG) stain to look for a reduction in quantity and quality of elastin fibers.

Patient Presentation



Triad of presentation:

1. Diffuse papillary conjunctivitis
2. Loose upper eyelid which everts easily
3. Soft, rubbery tarsus which folds in on itself

Presenting symptoms:

1. Recurrent ocular surface irritation worse in morning
2. Chronic papillary conjunctivitis of palpebral conjunctiva
3. Non-specific irritation, foreign body irritation, mucoid discharge, redness, eyelid swelling, photosensitivity

Image 1 & 2: Patient with floppy left eye^[5]

Chart Review Results

No.	Age	Sex	BMI (kg/m ²)	OSA	CPAP
1	45	F	53.1	No	No
2	57	F	44.8	No	No
3	68	M	37.9	Yes	No
4	55	M	40.7	Yes	Yes
5	85	M	30.1	No	No
6	54	F	37.7	Yes	Yes
7	65	M	40.7	Yes	Yes
8	65	M	26.9	No	No
9	48	M	39.5	Yes	Yes
10	69	M	39.2	Yes	Yes
11	51	M	36.9	Yes	No
12	70	M	36.4	No	No
13	62	M	36.3	Yes	Yes
14	63	M	36.9	Yes	Yes
15	78	M	38.9	Yes	Yes
16	50	M	46.2	Yes	Yes
17	67	F	41.2	No	No
18	63	M	46.7	Yes	Yes
19	53	M	45.1	Yes	Yes
20	67	M	37.3	No	No
21	73	M	35.4	Yes	No
22	66	M	43.4	Yes	Yes
23	58	M	22.1	No	No
24	32	M	30.3	No	No

Table 1: The average age of patients with FES was 61. 83% of FES patients were male, 63% had OSA (with 50% of those using a CPAP machine), and the average BMI was 38.5 kg/m² (92% prevalence of obesity; 38% morbidly obese).

Conclusion and Future Direction

Changes in the eyelid (redundancy, softness, ease of deformation, and increased stretchability) are findings consistent also with changes in pharyngeal tissue of OSA patients. All of these findings have been demonstrated in the literature to be directly related to a decrease in elastin fibers. Will these changes prove to be similar in the gastric tissue of obese patients? Thus, affecting the function of the stomach, which could lead to obesity.

In the Am Journal of Gastroenterology, Carmagnola et al. suggested that stretch (volume) is the more relevant stimulus on the perception of fullness. The floppy eyelid patient suffers from increased stretchability, softness, and redundancy in the eyelid tissue. Will we find these similar properties in the gastric tissue?

We hypothesize that there will be a decrease of elastin fibers in the gastric tissue of patients diagnosed with floppy eyelid syndrome. We expect to find a greater decrease of elastin fibers in patients with higher BMI's. We expect to find a loss of elastin in the gastric tissue, increasing stretchability, which will lead to obesity.

References

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