Creation of a 3D Printed Universal Endoscope Smartphone Adapter

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Background

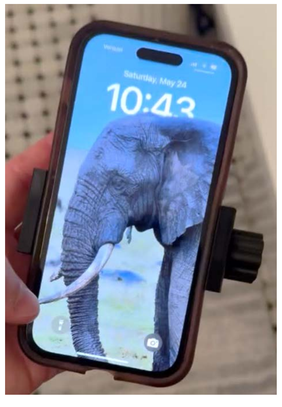
- Flexible nasal endoscopy (TFL) is ubiquitous in ENT
- Traditionally uses bulky, expensive video towers
- Inpatient setting poses logistical challenges
- Documentation and teaching opportunities are often missed or inconsistent

Objectives

- Identify the limitations of current flexible nasal endoscopy options in inpatient settings
- Describe the design and function of the universal smartphone adapter
- Highlight potential clinical and educational benefits

The Problem

- Eyepiece-only exams limit review and supervision
- Inconsistent diagnostic accuracy; repeat exams cause patient discomfort and added cost
- Current video solutions: bulky, expensive, disposable, or quickly outdated; often phone-specific

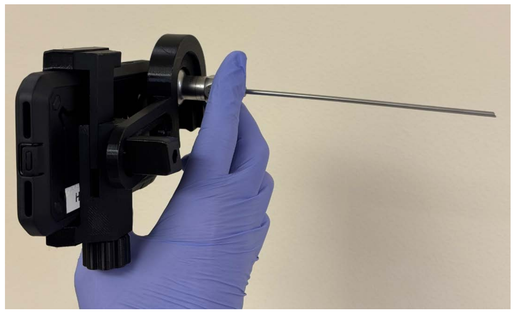


Our Solution

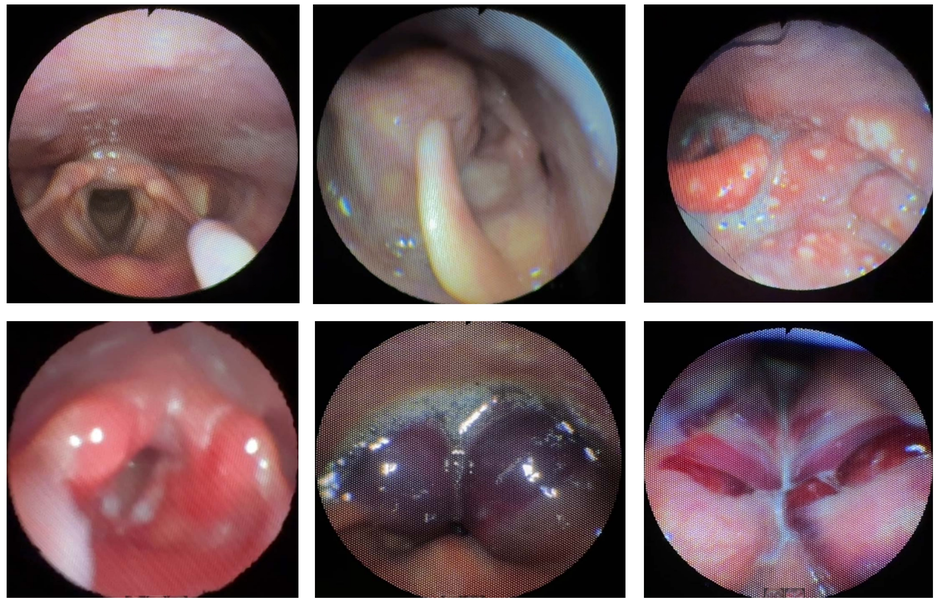
- 3D-printed universal adapter
- Securely attaches to any modern smartphone
- Compatible with flexible or rigid scopes
- Uses existing portable light source
- Enables high-quality video capture
- Easily shareable and reproducible

Design Features

- Modular eyepiece holder
- Adjustable clamp for different phone widths
- Lightweight, durable PLA/TPU filament
- Cleanable and reusable



Clinical Examples



Benefits

- **Diagnostic**: Improved accuracy and communication
- **Educational**: Supervisor review, resident feedback, teaching archive
- **Practical**: Portable, reusable, cost-effective
- **Environmental**: Reduces reliance on disposables
- **Universal**: Works across modern smartphone models

Feature	Traditional Tower	Disposable Scope	Our Adapter
Portability	Low	Medium	High
Cost	$$$$	$$$	$
Reusable	Yes	No	Yes
Video Quality	High	Medium	Medium

Limitations & Future Directions

- Not autoclavable
- Dependent on phone camera quality
- Requires an app that is buggy with a steep learning curve
- Future improvements:
  - Optical lens integration
  - Medical-grade materials
  - Commercial production
  - In-house app that is more user friendly

Summary

- Inexpensive, effective, and versatile solution to documenting TFL exams
- Increases access to video documentation
- Enhances inpatient workflow and trainee education
- Potential for global and low-resource settings