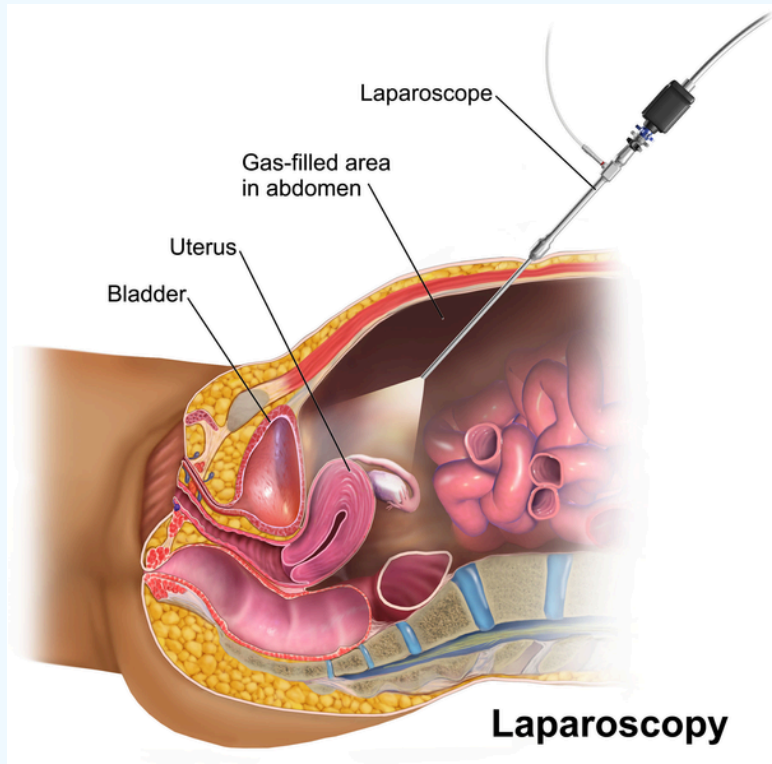


# ENHANCING LAPAROSCOPIC SURGERY THROUGH ADVANCED IMAGE PROCESSING: A FOCUS ON REDUCING VISIBILITY OBSTRUCTIONS

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## LAPAROSCOPY & FOGGING

### WHY FOG IN THE LAPAROSCOPE?

Cauterization

Temperature difference

1

## OBJECTIVES

2

### CREATION OF AN ALGORITHM THAT...

- Enhance image clarity
- Improve safety, reduce risks, and optimize surgical outcomes

## STATE OF THE ART

### WHAT ARE THE EXISTING SOLUTIONS?

- Anti-fog coatings
- Surfactant and mechanical devices
- Heated endoscopes
- Antifogging algorithms in other areas

3

## ALGORITHM

### KEY STEPS

- Dark channel extraction
- Atmospheric light estimation
- Transmission map calculation
- Guided filtering
- Image recovery
- Contrast enhancement (CLAHE)

## RESULTS



5

- Enhances visibility
- Easy to implement
- Low latency
- Allows for parameter regulation

- Over-enhancement -> visual artifacts
- Performance depends on smoke density and camera quality

## CONCLUSION

- Promising results suggest potential for integration into laparoscopic surgeries
- Future work includes testing in real surgical settings and further optimization

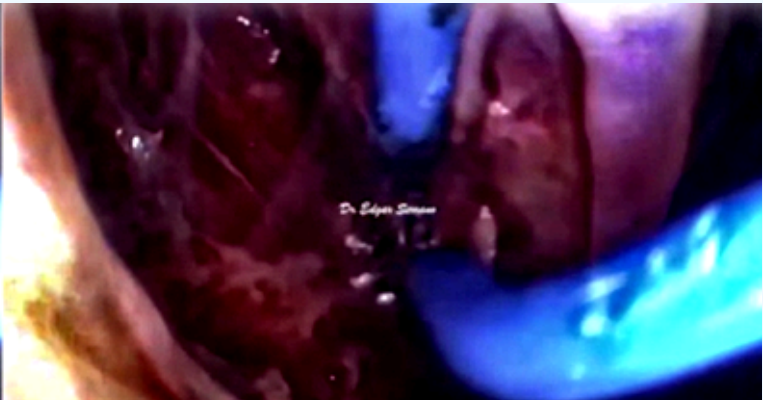
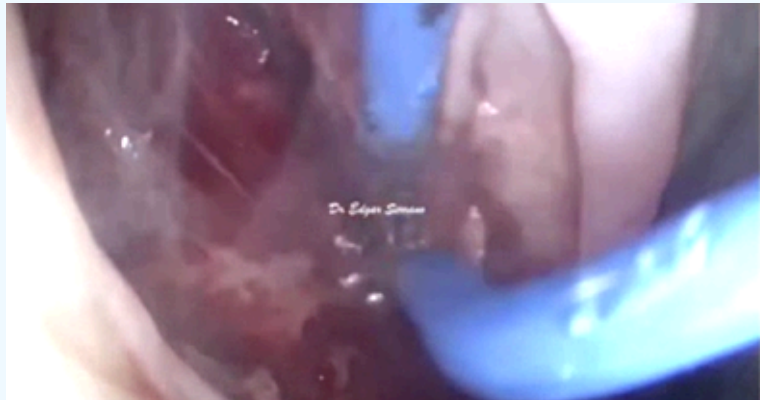
## RESULTS OF THE ALGORITHM

FOG

NO FOG

FOG

NO FOG



**CONTRIBUTIONS:** Alicia Ulierte (Implementation and testing of the algorithm, video references search, results, discussion and conclusion and leader of the team), Álvaro Herrador (State of the Art research), Gabriela Díaz and Laura Xifra (Introduction and objectives, importance of project, video references search, project presentation (Poster))