



# Effect of Suction Device Type on Risk of Oral-Surgical Fires

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## BACKGROUND

- Dental professionals performing procedures under deep sedation and general anesthesia (GA) are at risk of oral airway fires [2]
- Surgical fires occur when 3 components (**the fire triangle**) are present [3]
  - Oxidizer:** supplemental oxygen (O<sub>2</sub>) or nitrous oxide (N<sub>2</sub>O)
  - Ignition source:** heat generated from high-speed burs, laser or electrosurgery
  - Fuel:** surgical drapes, gowns, ET tubes, alcohol-based wipes, and soft tissue
- Procedures performed above the **xiphoid process** pose a significant fire risk when combined with the fire triangle [4]
- Increased knowledge is needed regarding prevention of oral airway fires during “high risk” dental procedures using oxygen supplementation

## OBJECTIVES

- To establish the time needed to produce **unsafe oxygen concentrations (>30%)** in a simulated oral cavity of a 10-year-old child
- To compare the ability of different dental suction tips to decrease the oxygen concentrations to safe levels

## METHODS

- Oral cavity (400 mL/cm<sup>3</sup>, 10-year old child) simulated with an acrylic dome (Supremetech®, Da Nang, Vietnam) (**Figure 1**)
- O<sub>2</sub> sensor [Viasensor G210 Medical Gas Analyzer (Diamond Scientific, LLC, Cocoa, FL, USA)] placed in a single-entry hole on the side of the acrylic dome (**Figure 1A-C**)
- 5 L/min of supplemental O<sub>2</sub> was added to the simulated oral environment via nasal canula (**Figure 1D**)
- Oxygen concentration was recorded at 10 second intervals with alternative periods of suction devices turned off and on (**Figure 2**)
- Suction groups tested (**Table 1, Figure 1F**)

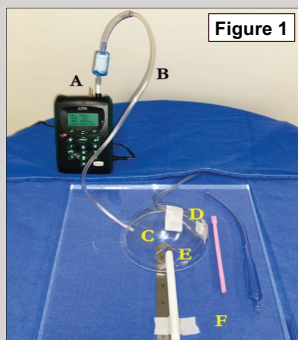


Figure 1

Group	Suction Device	Table 1
HVE-	None	
HVE5	High-volume Evacuation	
YS-	None	
YS5	Yankauer	
SE-	None	
SE5	Fixed Tip Saliva Ejector	

## Effect of Suction Device on Oxygen Concentrations

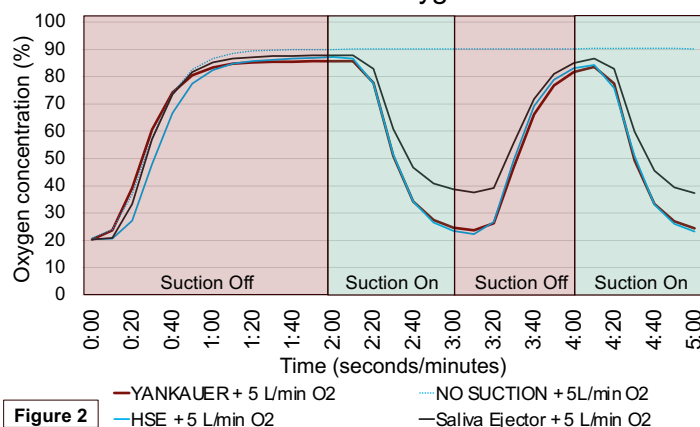


Figure 2

## RESULTS

- Suction slope for change (decrease) in oxygen concentrations
  - HVE vs. SE: statistically significant ( $p < 0.001$ )
  - YS vs. SE: statistically significant ( $p < 0.001$ )
  - HVE vs YS: **not** statistically significant ( $p = 0.265$ )
- Oxygen concentrations given at 5 L/min reach “high risk” (>30%) within **25 seconds**
- All three suction tips (HVE, YS and SE) decreased O<sub>2</sub> concentrations below 50% within **45 seconds**, HVE and YS within **30 seconds**
- HVE and YS decreased O<sub>2</sub> concentrations below 30% within **50 seconds** of suctioning

## DISCUSSION AND CONCLUSION

- Maintaining safe oxygen concentration levels with the use of supplemental oxygen during high-risk dental procedures to prevent oral surgical fires is imperative
- HVE suction, Yankauer suction and the fixed tip saliva ejector all decreased the oxygen concentration below 50% within **45 seconds**
- HVE and Yankauer suction decreased O<sub>2</sub> below 30% within **50 seconds**
- The results support the use of intraoral suctioning prior to the dental procedure to decrease oxygen pooling**
- HVE and YS are more effective than the SE in decreasing oxygen levels
  - When 5 L/min of supplemental O<sub>2</sub> is delivered, HVE and YS are recommended to be used to decrease the airway fire risk
- Further research is needed to evaluate the effectiveness of these specific suctioning within a clinical environment

## REFERENCES

