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# Managing Airway In Dohlmann's Procedure Using Carbon Dioxide Laser By An Innovative Method

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**Abstract**

We report a case of a 26 year old man with corrosive acid ingestion and pharyngeal stricture who had undergone a gastric pull up surgery 1 year back. The patient presented for Dohlmann's Procedure using carbon dioxide laser. We had a special double cuffed laser tube for the laser surgeries. However, on preoperative evaluation the cuff of the laser tube was found to be leaking and inappropriate for anaesthetic use. We innovated a dramatic combination of a plain uncuffed 6.0 mm I.D. laser tube and a normal cuffed 7.5 mm I.D. polyvinylchloride (PVC) endotracheal tube to control the airway during laser surgery. We propose that use of our invention be an option in controlling the airway in laser surgeries.

## INTRODUCTION

Use of LASER for oropharyngeal/laryngeal surgeries necessitates protection of the airway by a special endotracheal tube that is of a material that does not support combustion and in case of fire, does not get affected and compromise the airway protection in such an event. In our patient we tried a novel way to manage the upper airway by combining an uncuffed laser tube with the cuff of a PVC endotracheal tube with great benefit.

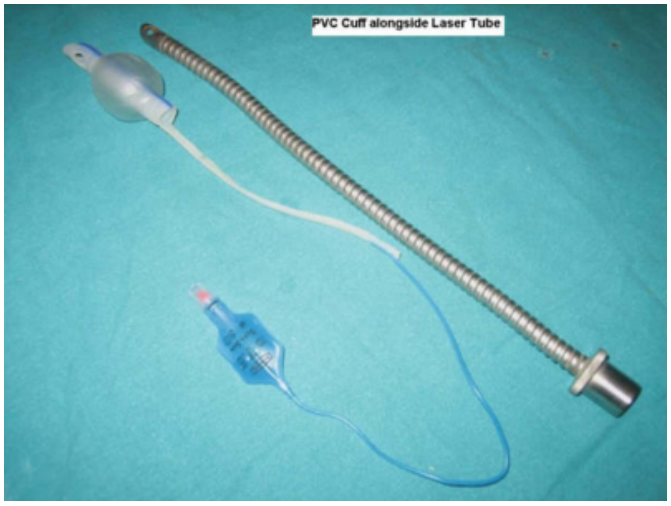
## CASE REPORT

A 26 year old thin and emaciated man weighing just 37 kg reported to the hospital with history of corrosive acid ingestion about 1 year back. His pharynx ended as a blind pouch at the cricopharynx level due to a completely stenosing stricture. He had difficulty in ingestion of food and water. He could not speak at length because it produced copious amounts of saliva which he could not swallow and hence had to spit out after every three four words he spoke. Subsequently, he had undergone an emergency tracheostomy which was later closed, was operated for a gastric pull up and kept on feeding jejunostomy for last 10 months since the proximal opening of the gastric pull up in the pharynx failed to function properly. He was planned for a CO2 LASER assisted Dohlmann's procedure by the ENT surgeons.

On the day of surgery, we prepared the drugs and inspected the laser tubes we had with us for such cases. There was only one double cuffed 6.0 mm I.D. laser endotracheal tube and three plain uncuffed 6.0 mm I.D. laser endotracheal tubes. The patient weighed just 37 kg and was thin and emaciated. We filled the cuffs of the laser tube with normal saline to check their integrity and to our dismay we found the water leak out of the cuffs. We were in a fix since the only appropriate sized cuffed laser tube was not functional and the rest of the tubes were uncuffed. The approximate duration of surgery was 1.5-2 hours. We started searching for options available to secure the airway.

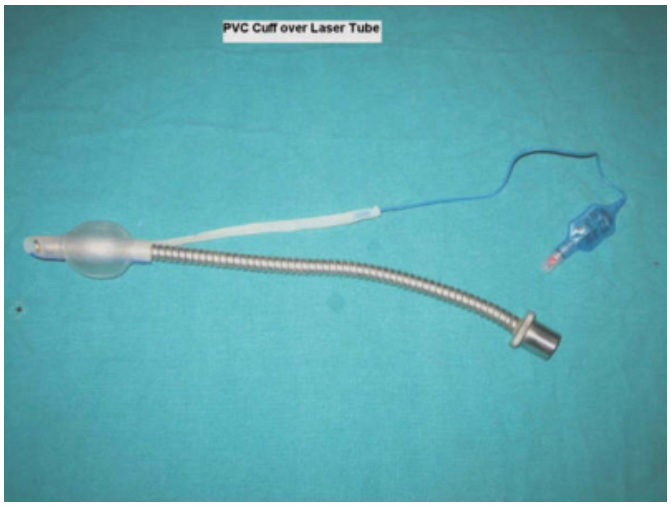
We placed the plain LASER tube alongside the cuffed PVC tube and suddenly it struck to us what if we somehow combine the cuff of the PVC tube with the plain laser tube? We took a 7.0 mm I.D. cuffed endotracheal PVC tube and spread out its pilot balloon and the inflating tube on a table. Then we cut and discarded the portion of the ETT proximal to the junction of pilot balloon with the endotracheal tube with a surgical blade. Then we segregated the inflating tube from the rest of the endotracheal tube another few centimeters distally till where the cuff merged with the tube proximally. Hence, we had with us an intact cuff and inflating balloon of a 7.0 mm I.D. PVC tube and now we softened it by dipping it in hot water. Next we tried to slide it onto the plain 6.0 mm I.D LASER tube. However, we were not able to slide it onto the LASER tube. So we repeated the entire exercise with a 7.5 mm I.D. cuffed ETT and isolated its cuff (fig 1).

**Figure 1**




We successfully slided its cuff onto the plain 6.0 mm ID LASER tube and to our excitement, our innovation was ready (fig 2).

**Figure 2**




The entire procedure was done under all aseptic precautions to maintain sterility of the tube. Just in case we failed to intubate with this tube because of a narrow glottic inlet relative to the outer diameter of the improvised laser tube, we also prepared a 6.0 mm ID cuffed PVC endotracheal tube by wrapping an aluminium foil over it. Monitoring was attached onto the patient and a 3 minute preoxygenation was done with 100% oxygen via a face mask. Rapid sequence induction with succinylcholine was performed. The patient's epiglottis was scarred and formed a complete veil in the centre of which was a narrow aperture. The glottic opening could be made out behind it though the vocal cords were not visualised. We were able to intubate the trachea in second attempt with the help of a stylet. Anaesthesia was delievered and the surgery went off uneventfully. Procedure lasted for 60 minutes.

## DISCUSSION

Lasers provide a source of intense energy that can ignite flammable material, such as tracheal tubes, catheters, sponges, or latex gloves, in the operative field. The most morbid complication of laryngeal laser use is an endotracheal tube fire. Risk of fire is particularly enhanced in oxygen (02) and nitrous oxide (N20) enriched atmospheres. There are many methods available for airway management that reduce the risk of fire during operations in which a laser is used. These include wrapping aluminum tape around the tube, placing neurosurgical cottonoids around the endotracheal tube cuff, placing saline within the cuff, using a metal or xomed endotracheal tube and providing ventilation with venturi (jet) method[1]. Conventional endotracheal tubes may consist of polyvinyl chloride (PVC), red rubber, or silicone rubber. Polyvinyl chloride tracheal tubes are highly combustible when used in an oxidizing atmosphere. Manufacturers discourage the use of unprotected PVC tracheal tubes in airway operations in which a laser is used. Presently available studies indicate that red rubber and silicone rubber tubes combust more readily than PVC tubes in air[2]. However, red rubber is more resistant to puncture and ignition by C02 laser energy than is PVC[3]. PVC tubes, if ignited, soften and deform. Silicone tubes, if ignited, become a brittle ash that crumbles easily and can separate and lead to retention of segments within the airway or be aspirated. In contrast, red rubber tubes, if ignited, tend to maintain their structural integrity. Hence, we decided to use the available metallic laser tube for the purpose. Since an air tight seal was required to protect the airway, we had to devise a novel way of converting the plain tube to a cuffed one. We propose that this method be considered as an airway alternative for LASER surgeries.

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