# 1.11 Evacuation of Laser Plume

Purpose

To provide effective evacuation of laser plume and smoke from electrosurgical units. According to several studies, laser plume (smoke) is potentially hazardous and should be effectively evacuated (1-5).

Audience

All healthcare personnel who use the laser or electrosurgical unit

Guideline

During procedures using a laser or electrosurgical unit, the thermal destruction of tissue creates a smoke byproduct. Large smoke plumes can be captured and disposed of via smoke evacuators with an in-line filter. Healthcare workers should wear protective devices when using a laser or electrosurgical unit.

Procedure, Smoke Evacuation System in the OR

- The smoke evacuation system must be adequate to handle the amount of plume produced during surgical procedures. In-line suction filters may be used for small amounts of plume (e.g., for microlaryngoscopic vaporization of vocal cord polyps). A smoke evacuation system with an evacuation hose will be used for large amounts of plume. Endoscopic/laparoscopic smoke evacuation requires special efforts.
- The smoke evacuator should be ON (activated at all times when airborne particles are produced during all laser and electrosurgical procedures).
- The smoke evacuator or room suction hose nozzle inlet must be kept within 1 centimeter of the surgical site to effectively capture airborne contaminants generated by surgical devices (2, 4).
  - In-Line suction - An in-line filter is placed between the suction canister and the wall connection.
  - An in-line suction smoke evacuation filter can become blocked by the particulate matter in large amounts of plume. The filter should be monitored and changed as needed.
  - Work practices - Hold the smoke evacuation suction tube close (within 1 centimeter) to the tissue interaction site to remove as much plume as possible. Surgical plume contains extremely small particulate matter and may contain viable cells.
  - When purge gas flow is used with the CO2 laser or a fiber delivery device, the smoke evacuation tube must constantly be held close to the laser-tissue interaction site because the gas flow will tend to spread the plume.
  - If the smoke evacuation foot pedal is available, the assistant can operate it.

- Smoke evacuation hook up - Ensure the proper operation of the smoke evacuator prior to the beginning of the case. Check the plume filter, and if needed, install a clean filter. For the maximum filter life, operate the unit at the lowest settings that will adequately vacuum away the smoke plume. As the filter begins to clog, increasing the suction level will permit the filter to be used for a longer period of time. Filters should be changed as recommended by the manufacturer. At the end of the procedure, the filter is considered infectious waste and should be disposed of properly. Universal precautions should be used when changing filters.

- Endoscopic/Laparoscopic Smoke Evacuators - Instruments such as suction tubes, help decrease the retention of plume inside a body cavity or organ. A low-pressure suction valve can be used to gently remove plume during a laparoscopic procedure without significantly reducing the pneumoperitoneum.

**Laser Use**

Use in general medical/ surgical areas and clinics

- The smoke evacuation systems should be used to evacuate large volumes of smoke. Routine use of the laser or electrosurgical unit in a medical or surgical inpatient area or in a clinic requires only the use of masks and eye protection.

**Masks and Protection of Eyes**

- Masks, with filtering capacity of particulate matter between 2 and 5 microns, should be worn by healthcare workers during any nonendoscopic procedure that generates laser plume or smoke from an electrosurgical procedure.
- The sides of the mask should conform to the face adequately. The mask should be tight fitting so that there is no leakage of air around the edges. Universal precautions should be followed for the removal/disposal of masks.
- Goggles or glasses with side shields should be worn by members of the laser team (6,7).

**Decontamin-ation**

Decontamination of the treatment room after the procedure

- All patients are considered potentially infected with bloodborne pathogens. All procedures, therefore, are considered contaminated, and the same environmental cleaning protocols should be implemented for all procedures.

References

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Recommendation References

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