


Laser-assisted surgery of the upper aero-digestive tract: a clarification of nomenclature. A consensus statement of the European Laryngological Society

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Abstract Acronyms and abbreviations are frequently used in otorhinolaryngology and other medical specialties. CO₂ laser-assisted transoral surgery of the pharynx, the larynx and the upper airway is a family of commonly performed surgical procedures termed transoral laser microsurgery (TLM). The abbreviation TLM can be confusing because of alternative modes of delivery. Classification and definition of the different types of procedures, performed transorally or transnasally, are proposed by the Working Committee for Nomenclature of the European Laryngological Society, emphasizing the type of laser used and the way this laser is transmitted. What is usually called TLM, would more clearly be defined as CO₂ laser transoral microsurgery or

CO₂ TOLMS or CO₂ laser transoral surgery only (with a handpiece) would be defined as CO₂ TOLS. KTP transnasal flexible laser surgery would be KTP TNFLS. Transoral use of the flexible CO₂ wave-guide with a handpiece would be a CO₂ TOFLS. One can argue that these clarifications are not necessary and that the abbreviation TLM for transoral laser microsurgery is more than sufficient. But this is not the case. Laser surgery, office-based laser surgery and microsurgery are frequently and erroneously interchanged for one another. These classifications allow for a clear understanding of what was performed and what the results meant.

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Introduction

Acronyms and abbreviations are frequently used in otorhinolaryngology and other medical specialties: PTSD for post-traumatic stress disorder, FNA for fine needle aspiration, FESS for functional endoscopic sinus surgery, and FEES for flexible endoscopic evaluation of swallowing, and finally LASER itself means light amplification by stimulated emission of radiation.

CO₂ laser-assisted transoral surgery of the pharynx, the larynx and the upper airway is a family of commonly performed surgical procedures termed transoral laser microsurgery (TLM) [1]. TLM was initially intended, for the treatment of early laryngeal and pharyngeal cancers, using the CO₂ laser straight beam in combination with a surgical microscope. Recent advances and refinements of laser tools and surgical techniques now make it possible to use lasers, delivered through different methods, for advanced carcinomas, microendoscopic laryngotracheal reconstruction, treatment of recurrent respiratory papillomas and phonomicrosurgery. The abbreviation TLM can be confusing because of alternative modes of delivery. Wave-guides made of a pliable hollow glass-tube covered inside with a metallic alloy have been designed to be used to direct the CO₂ laser beam transorally with a handpiece or transnasally through flexible endoscopes [2]. Also, fiber-guided lasers like KTP (potassium titanyl phosphate) or thulium can also be used transnasally through the operative channel of a video endoscope [3–5].

The authors, members of the Working Committee for Nomenclature of the European Laryngological Society (ELS), propose a classification and definition of the different types of procedures, performed transorally or transnasally, emphasizing the type of laser used and the way this laser is transmitted.

Only the pharynx and larynx are concerned in this ELS classification and not the ear.

Materials and methods

Our proposition is to define three separate domains for laser-assisted surgery of the larynx and pharynx: the approach, the laser in use and the way the laser beam is transmitted.

Approach

The approach can be either transnasal (TN) or transoral (TO). In rare specific cases a different approach might be possible, but it seems unnecessary to include these rare approaches in a general classification scheme.

The laser in use

The most frequently used laser in otolaryngology is the CO₂ (carbon dioxide) laser. Other lasers used are the KTP (potassium titanyl phosphate), TH (thulium), LD (laser diode), PDL (pulsed dye laser), or Nd:YAG laser (Neodymium Yttrium Aluminum Garnet), just to name a few. In a classification system, there should be no doubt as to what kind of laser has been used. Therefore, the most frequently used acronym in the literature should be applied in each case or otherwise clearly specified.

The way the laser beam is transmitted

The laser can be transmitted to the target using different optical devices. Two surgical modalities are most frequently used. The first is microsurgery in which a straight laser beam is directed via a microscope through a micro-manipulator. The second modality is performing flexible laser surgery, using flexible fibers to deliver lasers like KTP or the CO₂ wave-guide. A third modality, using a rigid CO₂ laser handpiece with either a straight beam or reflecting handpiece can be employed for surgery under direct illumination and vision or with rigid endoscopic assistance (e.g., laser ablation of tonsils).

In this manner, what is usually called TLM, would more clearly be defined as CO₂ laser transoral microsurgery or CO₂ TOLMS (Fig. 1) or CO₂ laser transoral surgery



Fig. 1 CO₂ Transoral laser microsurgery or CO₂ TOLMS



Fig. 2 CO₂ Transoral laser surgery or CO₂ TOLS



Fig. 3 CO₂ Transnasal flexible laser surgery or CO₂ TNFLS



Fig. 4 CO₂ Transoral flexible laser surgery or CO₂ TOFLS. **a** With microscope. **b** With rigid telescope

only (with a handpiece) would be defined as CO₂ TOLS (Fig. 2). KTP transnasal flexible laser surgery would be KTP TNFLS (Fig. 3). Transoral use of the flexible CO₂ wave-guide with a handpiece would be a CO₂ TOFLS (Fig. 4a, b). In the case of CO₂ TOLFS, what is important to consider is the fact that the CO₂ fiber is used transorally that can be under microscope or rigid telescope visualisation.

Table 1 summarizes how the proposed classification system works.

Discussion

One can argue that these clarifications are not necessary and that the abbreviation TLM for transoral laser microsurgery is more than sufficient. But this is not the case.

Without a clear definition the M of TLM is referring the use of a microscope. But as other approaches are more and more used, a classification as clear as possible is necessary.

Laser surgery, office-based laser surgery and microsurgery are frequently and erroneously interchanged for one another during presentations and even in some articles [6, 7], with people confusing the tool, the approach, and the setting. Lasers of various wavelengths are a different way to interact with tissues during a surgical procedure, just as with cold steel instruments, and the approach might be endoscopic, transnasal or transoral. If all the parameters, settings and tools are not clearly specified, unintended confusion may result in difficulty reproducing results from a given institution. More importantly, it could lead to adverse clinical outcomes for a patient being treated by less experienced surgeons. The indications, expected

Table 1 Some domains and modalities and abbreviations to be mentioned in structural abbreviations of laser-assisted surgery of the upper aerodigestive tract

Domains	Modality 1	Modality 2	Modality 3	Modality 4	Modality 5	Modality 6
Laser in use	CO ₂	KTP (potassium titanyl phosphate)	LD (laser diode)	PDL (pulsed dye laser)	TH (Thullium)	Nd:YAG laser (Neodymium Yttrium Aluminum Garnet)
Approach	TO Transoral	TN Transnasal				
The way the laser beam is transmitted	LMS Microsurgery with a straight laser beam connected to a microscope via a micromanipulator	FLS Flexible laser surgery using fiber-guided lasers	LS With a rigid hand-piece			

results, laser parameters and type of anesthesia may vary greatly according to the approach and it is important that our nomenclature be accurate and flexible as new lasers and delivery systems are developed.

It is highly likely that the type of laser being used is not clearly mentioned. This is frequently the case with the CO₂ laser given its popularity. As such, we would then abbreviate transoral laser microsurgery as TOLMS, transnasal flexible laser surgery as TNFLS or transoral flexible laser surgery as TOFLS, preceded by the type of laser used to perform the procedure.

Consequently, the location, i.e., operating room or office; the type of anesthesia: general, sedation, awake with topical anesthesia/no sedation should be reported.

If other surgical instruments like microelectrodes [8] are used instead of lasers, the abbreviation can be modified accordingly: METOM for microelectrodes transoral microsurgery.

As this was already true with the TLM, different instruments and optics are used during laser-assisted surgeries: forceps, cold steel scissor, monopolar aspiration-coagulation, etc. This is beyond classification. It is the role of every author to using this classification in the future for presentation of his/her results to report the complementary instrumentation if needed.

We are aware that there may possibly be some degree of reticence about the proposal of this new system, as it was the case when the classifications for transoral cordectomies and supraglottic laryngectomies were proposed some years ago [9, 10]. Many authors and practitioners finally adopted these classifications because they allowed for a clear understanding of what was performed and what the results meant and they are now readily accepted.

Conclusion

In conclusion, the Working Committee for Nomenclature of the European Laryngological Society proposes this new and more precise classification system for laser-assisted surgery of the upper aerodigestive tract and we would recommend that this nomenclature system be used for all publications and presentations.

Compliance with ethical standards

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Faces of patients possibly have been covered. Surgeons present on the pictures are the first author, co-author or fellows consenting with this publication.

Conflict of interest The authors declare that they have no conflict of interest.

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