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LITERATURE

April 2018 – August 2024

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Content

Rhinology

ABSTRACTS

WOLF TRUBLUE 445 NM LASER

April 2018 – August 2024

Laryngology

April 2018

Hess, M.M., Fleischer, S. & Ernstberger, M.

New 445 nm blue laser for laryngeal surgery combines photoangiolytic and cutting properties

Eur Arch Otorhinolaryngol. 2018 Jun; 275(6):1557-1567. 29675755

https://doi.org/10.1007/s00405-018-4974-8

Abstract

Background: Photoangiolytic lasers have broadened the surgical armamentarium for many phonosurgical interventions. However, the pulse dye laser and potassium titanyl phosphate (KTP) laser have technical drawbacks and a smaller spectrum of indications.

Methods and results: The new 445 nm wavelength laser, the so-called ‚blue laser', proves to show tissue effects comparable to the KTP laser and is also capable of treating subepithelial vessels due to its photoangiolytic properties, it can coagulate and carbonize at higher energy levels, and can be used via glass fibers in non-contact and contact mode for in-office procedures.

Discussion: In contrast to the KTP, the new 445 nm laser can also be used as a cutting laser, thus combining very much wanted properties of diode or CO2 lasers with photoangiolytic lasers. Further advantages of the new laser are the; (1) portability of the shoe box sized, shock-proof laser machine for in-office and operating room usage, (2) the selection of pulse rates from continuous wave (cw) to less than a millisecond, (3) stronger tissue effects compared to KTP with similar energy and pulse settings, (4) far better cutting properties than the KTP, and thus (5) more possibilities for usage in laryngology as well as in other fields or surgery.

Conclusion: We demonstrate the feasibility of the 445 nm laser in several laboratory experiments and show clinical cases where photoangiolysis and cutting was possible. However, this is a preliminary report and further systematic studies in greater numbers are warranted.

Keywords:

- 445 nm wavelength
- blue laser
- laryngology
- lser surgery
- office based surgery
- phonosurgery
- photoangiolysis

September 2020

Markus Hess, Susanne Fleischer

Photoangiolytic Lasers in Laryngology

Laryngorhinootologie. 2020 Sep;99(9):607-612. German. 32851626

https://doi.org/10.1055/a-1071-0410

Abstract

With photoangiolytic lasers like KTP (Potassium-Titanyl-Phosphate, 532 nm) lasers or the new „blue" laser (445 nm), even the smallest vessels and capillaries within the vocal fold can be treated without destroying the covering epithelium. This enables effective treatment of benign and malignant sub- and intraepithelial lesions of the vocal folds such as papilloma, edema, polyps, leukoplakia, dysplasia and capillary vessels while preserving the vibratory properties of the different layers of the lamina propria. Because photoangiolytic laser light can be routed through tiny glass fibers, office-based surgery with channelled flexible endoscopes are feasible as well as phonomicrosurgical operations under general anesthesia. Furthermore, the so called „blue" laser can cut tissues and thus broadens the technical armamentarium of the phonosurgeon.

Keywords:

- photoangiolysis
- phonosurgery
- KTP laser
- blue laser
- 445 nm wavelength
- in-office phonosurgery

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February 2021

Miller BJ, Abdelhamid A, Karagama Y.

Applications of Office-Based 445 nm Blue Laser Transnasal Flexible Laser Surgery: A Case Series and Review of Practice

Ear Nose Throat J. 2021 Feb; 100(1_suppl):105S-112S. 32970490

https://doi.org/10.1177/0145561320960544

Abstract

Background: The recent introduction of 445 nm blue laser to office-based laryngology presents potential advantages. These include a desirable combination of cutting and photoangiolytic qualities and a lightweight, shock-resistant design. Despite its increasing use, current evidence is limited to experimental data and case reports.

Objectives: The authors present a case series and overview of office blue laser transnasal flexible laser surgery (TNFLS), considering indications, patient selection, safety, technique, and surgical outcomes. We also review the safety and relevance of TNFLS to the ongoing coronavirus pandemic.

Methods: Retrospective case series and narrative review. Our primary outcome measure was preoperative and postoperative Voice Handicap Index (VHI-10) score. Complications were documented by nature and severity.

Results: Thirty-six cases of office blue laser TNFLS were performed. A statistically significant improvement in VHI-10 score was demonstrated in cases of recurrent respiratory papillomatosis (RRP) and benign laryngeal lesions causing dysphonia ($P < 0.01$ and 0.045). Blue laser also proved effective in assisting office biopsy procedures. A minor and self-limiting complication was reported.

Conclusions: Office blue laser TNFLS is safe and effective in the treatment of RRP and a range of benign laryngeal lesions. Future research should compare the efficacy and safety of blue laser with potassium titanyl phosphate laser in office-based treatment of these conditions. Further assessment of the cutting qualities of blue laser, initially in the theater environment, is necessary to refine our understanding of future applications.

Keywords:

- laryngology
- laser surgery
- office laser surgery
- office procedures
- phonosurgery
- transnasal flexible laser surgery

June 2021

Nguyen DD, Pang JY, Madill C, Novakovic D.

Effects of 445-nm Laser on Vessels of Chick Chorioallantoic Membrane with Implications to Microlaryngeal Laser Surgery

Laryngoscope. 2021 Jun; 131(6):E1950-E1956. 33459366

https://doi.org/10.1002/lary.29354

Abstract

Objective: Previous research has shown that effective application of angiolytic lasers in micro-laryngeal surgery is determined by wavelength, pulse width (PW), and fluence. Recently, a 445-nm (blue) laser (BL) has been developed with a potentially greater hemoglobin absorption than previous lasers. The chick chorioallantoic membrane (CAM) represents a suitable model for testing various settings to find out the most optimal settings of this laser. This study used the CAM model to examine whether successful photoangiolytic effects could be obtained using BL.

Methods: Seven hundred and ninety three third-order vascular segments of viable CAM were irradiated using BL via 400-µm diameter fiber, 1 pulse/second, with PW and power varied systematically at standardized fiber-to-vessel distances of 1 and 3 mm. Outcome measures including vessel ablation rate (AR), rupture rate (RR), and visible tissue effects were analyzed using Chi-square test.

Results: Energy levels of 400, 540, and 600 mJ (per pulse) were most effective for vessel ablation. A working distance of 3 mm resulted in higher ablation and less vessel rupture compared with 1 mm at these optimal energy levels. At 3 mm, a longer PW resulted in higher AR. At 1 mm, AR increased with shorter PW and higher power. The 1-mm working distance resulted in lower tissue effects than 3 mm.

Conclusion: Findings in this study showed that BL was effective in vessel ablation using relevant combination of working distance, PW, and energy levels. To obtain high AR, longer working distance plus longer PW was required and if working distance was reduced, shorter PW should be set.

Keywords:

- blue laser
- 445-nm laser
- photoangiolysis
- microlaryngeal surgery
- chick chorioallantoic membrane

Level of evidence: NA
Laryngoscope, 131:E1950-E1956, 2021

ABSTRACTS

WOLF TRUBLUE 445 NM LASER

April 2018 – August 2024

Laryngology

August 2022

Guillermo Campos, Oswaldo Amaya, Juliana Valencia, Laura Arango

Transoral flexible laser surgery of the upper aerodigestive tract with blue laser

European Archives of Oto-Rhino-Laryngology
https://doi.org/10.1007/s00405-022-07606-1

Abstract

Purpose: The introduction of fiber-guided lasers was a breakthrough in laryngology practice, opening the path for treating different pathologies with minimally invasive procedures, both in the operating room and in the office. The most recent technology in the area is the blue laser, which combines photoangiolytic and cutting properties, characteristics that make this equipment suitable for its use in upper aerodigestive tract surgery. However, there is not enough experience in this area. The authors present a case series of patients with different pharyngeal, laryngeal, and tracheal pathologies who were treated by means of transoral procedures using fiber-guided blue laser.

Methods: The surgical records of patients with different upper aerodigestive tract pathologies who were treated with fiberguided blue laser in the operating room, under general anesthesia with jet ventilation or supraglottic ventilation using suspension laryngotracheoscopy techniques between February 2018 and March 2022 were reviewed.

Results: A total of 80 surgical interventions in a group of 38 patients were performed. A wide variety of procedures was executed, either using the laser alone or in combination with other techniques to treat different pathologies of the aerodigestive tract safely and effectively, with adequate functional results.

Conclusion: Following all necessary precautions, blue laser is a reliable tool to perform minimally invasive surgeries in the operating room using TOFLS techniques. It can be used alone or in combination with other devices to achieve the desired goals.

Keywords:

- laser fiber
- direct laryngoscopy
- Tracheoscopy
- transoral flexible laser surgery
- blue laser

September 2022

Aleksandr A. Krivopalov*, Ekaterina S. Mazeina, Pavel I. Panchenko, Polina A. Shamkina
Saint Petersburg Institute of Ear, Throat, Nose and Speech, Saint Petersburg, Russia

A new approach in the treatment of chronic bilateral paralytic stenosis of the larynx

Consilium Medicum. 2022;24(9):

DOI: 10.26442/20751753.2022.9.201909

Abstract

The issues of surgical treatment of bilateral paralytic stenosis of the larynx do not lose their relevance today, since the proportion of patients suffering from this pathology is steadily increasing. Neurogenic disorders of laryngeal motor function most often occur due to previous surgical intervention on the thyroid gland and upper mediastinum. The predominant complaints of such patients are dyspnea, decreased tolerance to physical exertion and impaired lantern function. Thus, the main objectives in the treatment of chronic laryngeal stenosis are: restoration of the lumen of the vocal slit to ensure adequate respiratory function, prevention of respiratory failure and preservation of socially significant voice. The use of semiconductor lasers for laryngoplasty in bilateral paralytic stenoses of the larynx is a very common technique, however, there are no data in the literature on the use of semiconductor laser energy with a wave length of 445 nm for this surgical intervention. In their work the authors tried to show the advantages of the surgical treatment of bilateral paralytic laryngeal stenosis using 445 nm semiconductor laser, developed at the Saint Petersburg Institute of Ear, Throat, Nose and Speech, which allowed to reduce rehabilitation period of respiratory function and preserve socially significant voice, using a clinical example.

Keywords:

- bilateral chronic paralytic laryngeal stenosis
- laryngeal paralysis
- laryngoplasty
- laryngeal surgery
- blue laser
- laser 445 nm

October 2023

Bailey Balouch, Razmig Garabet , Philip J. Maxwell , Harleen K. Sethi , Eli Bress , Omar Ramadan , Robert T. Sataloff

The Safety and Efficacy of the 445-nm Blue Laser for Operative Management of Benign Nonvascular Laryngeal Lesions

https://doi.org/10.1016/j.jvoice.2023.09.010

Abstract

The 445-nm blue laser combines the features of photocoagulative vascular lasers and cutting lasers in one device. The purpose of the present study was to evaluate the safety and efficacy of the 445-nm blue laser for the treatment of benign laryngeal pathologies, other than vascular lesions. Outcomes were compared to those when already-established therapies were used.

Methods: Adult voice center patients who underwent surgical intervention for vocal fold (VF) mass, VF scar, laryngeal stenosis, laryngeal web, or Reinke's edema were included in this retrospective study. Outcomes were compared to those achieved when traditional treatment modalities were used, including cold steel, CO2 laser, potassium-titanyl-phosphate (KTP) laser, and coblator. Strobovideolaryngoscopy footage was evaluated using a previously described model at four time points: postoperative visit #1: 1-14 days, postoperative visit #2: 30-60 days, postoperative visit #3: 61-365 days, postoperative visit #4: >365 days.

Results: Eighty cases using the blue laser and 153 controls (n = 78 cold steel, n = 51 KTP laser, n = 22 CO2 laser, n = 2 coblator) were included in this study. Procedures performed using blue laser included VF mass excision (n = 45), VF scar reduction (n = 16), laryngeal stenosis resection/repair (n = 25), laryngeal web excision (n = 7), and reduction of Reinke's edema (n = 1). On postoperative strobovideolaryngoscopy examination, the surgical objective score did not differ significantly between the blue laser cohort and all controls at any postoperative visit. VF edema did not differ significantly between the blue laser cohort and all controls at any postoperative visit. VF hemorrhage scores were significantly lower in the blue laser cohort compared to all controls at the first postoperative visit, but hemorrhage had resolved almost entirely by the second postoperative visit in all groups. Postoperative VF stiffness was worse in the blue laser group at the third postoperative visit compared to controls, but both groups had improved to similar levels by the fourth postoperative visit. The rate of lesion recurrence (24.29% versus 17.19%) did not differ significantly between the blue laser cohort and controls on multivariate analysis (Odds ratio [OR] = 1.081 [0.461- 2.536]). The complication rate (12.50% versus 10.46%) did not differ significantly between the blue laser cohort and all controls on multivariate analysis (OR = 0.992 [0.375-2.624]). The blue laser was associated with a lower rate of revision surgery (30.00% versus 34.64%) on multivariate analysis (OR = 0.380 [0.168-0.859]).

Conclusion: The 445-nm blue laser is safe and effective for the management of benign laryngeal lesions. It has efficacy and safety similar to those of traditional treatment modalities (including cold steel, CO2 laser, and KTP laser). Use of the blue laser may lead to lower rates of early postoperative hemorrhage and revision surgery. No adverse effects attributed directly to the use of the blue laser were observed in this study. Further research is encouraged to confirm or refute these findings.

Keywords:

- 445 nm blue laser
- CO(2) laser
- cold steel
- KTP laser
- laryngeal stenosis
- vocal fold mass
- vocal fold scar

ABSTRACTS

WOLF TRUBLUE 445 NM LASER

April 2018 - August 2024

Laryngology

November 2023

R. Bar, A. Mattei, R. Haddad, A. Giovanni

Laryngeal office-based procedures: A safeapproach

Am J Otolaryngol. 2024 Mar-Apr;45(2):104128

https://doi.org/10.1016/j.amjoto.2023.104128

Abstract

Purpose: Laryngeal surgeries using a flexible nasopharyngoscope equipped with an operative channel has gained popularity, with gradual increase in the variety of interventional office-based procedures, under local anesthesia. The purpose of this study is to analyze the tolerance of such procedures.

Materials and methods:: Retrospective cohort study. 337 cases were performed during 2 years. We collected the following data: type of pathology, type of procedure and modalities of anesthesia, adverse events .

Results: 19 % of the visits were for the purpose of Biopsy, 65 % for an injection, and Trublue Laser was utilized in 12 % of the procedures. Regarding the pathologies, 27 % were vocal fold paralysis, 18 % leukoplakia or another suspicious lesion, 15 % recurrent respiratory papillomatosis, 13 % neuromuscular disorder, 9 % vocal fold scarring, 7 % vocal cord atrophy and 6 % had an inflammatory presentation. Side effects were documented in 26 visits (7.7 %) and were minor in almost all the encounters: they included strong reflexive cough, deep throat pain, discomfort, gag reflex, anxiety, vagal discomfort, malaise, hypersalivation, nose pain, labile hypertension. More severe side effects were very rare and included septal wound and epistaxis, erythematous rash, dyspnea, and transient dysarthria. 13 procedures were either aborted, or canceled at initial steps, due to inability of the patient to tolerate the procedure and were rescheduled for general anesthesia. 97 % of the cases were released home after 1 h of surveillance.

Conclusion: Office-based flexible interventional laryngoscopy under local anesthesia is a safe and well-tolerated procedure, with abundance of various interventions feasible on ambulatory, office-based setup.

Keywords:

- benign vocal fold lesions
- Biopsy
- in-office procedures
- laser
- medialization

June 2024

David E. Rosow, MD; Eytan Keidar, DO; Luke J. Pasick, MD; Nicolas J. Casellas, MD; Mursalin M. Anis, MD, PhD

Use of the 445 nm Blue Laser for Management of Early Glottic Carcinoma: Preliminary 1-Year Results

Laryngoscope 00:1–5, 2024

https://doi.org/10.1002/lary.31569

Abstract

Objective: To analyze oncological efficacy and voice outcomes of the 445-nm blue laser (BL) in the treatment of early glottic carcinoma and compare results with the 532-nm potassium-titanyl-phosphate (KTP) laser.

Study Design: Single institution, retrospective chart review.

Methods: All patients who underwent microlaryngoscopic KTP or BL laser excision of early glottic carcinoma from 2018 to the present day with at least 1-year follow-up were included. Primary and recurrent disease, including radiation and surgical failures, were included. Demographic data, voice outcomes and oncologic outcomes were compared between the two laser groups.

Results: Forty-nine patients met the inclusion criteria for the BL group and 88 for the KTP group, with average follow-up of 635 and 1236 days, respectively. Oncologic outcomes were not significantly different, with disease-specific survival rates of 95.9% for BL and 100% for KTP ($p = 0.13$), organ preservation rates of 98.0% for BL and 95.6% for KTP ($p = 0.39$), and local control rates of 93.9% for BL and 92.1% for KTP ($p = 0.81$). Both BL and KTP groups showed significant improvement in CAPE-V ($p = 0.04$, 0.006 respectively) and VHI-10 scores ($p = 0.003$, <0.00001) following surgery.

Conclusion: Photoangiolytic removal of early glottic carcinoma with BL appears to be equally safe and effective as with KTP laser at minimum one-year follow-up, and with excellent voice outcomes. Additional study will be warranted over time to assess long-term outcomes in BL patients.

Keywords:

- blue laser
- glottic cancer
- KTP laser
- laryngeal cancer
- laser

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June 2024

Kevin Tie MD, Regan C. Manayan MD, Pavan S. Mallur MD

445 nm Blue Laser for Cricopharyngeal Myotomy/ Zenker's Diverticulotomy: Proof of Concept and Use

Laryngoscope, 134:4620–4624, 2024

https://doi.org/10.1002/lary.31632

Abstract

Objective: Treatment for Zenker's diverticulum and cricopharyngeal dysfunction has evolved to include flexible endoscopic approaches. Currently, no flexible modalities combine the precision cutting of CO2 laser and the hemostasis of knife electrocautery. We present the first series describing fiber-based 445nm blue light (BL) laser for endoscopic cricopharyngeal myotomy/Zenker's diverticulotomy. We describe usage characteristics and laser parameters with rigid esophagoscopy to determine the feasibility of use with flexible endoscopy.

Methods: Retrospective review and literature review.

Results: The first nine cases of endoscopic diverticulotomy (n = 5) and cricopharyngeal myotomy (n = 4) with BL were reviewed. Rigid exposure was achieved with the Dohlman Slimline diverticuloscope. Mean age was 75.6 years. Average diverticulum depth was 0.89 cm ±1.0 cm. Pulsed mode was used in seven cases with mean of 6.86 W, 54 ms pulse on, and 286 ms pulse pause and overall mean of 6.00 W and 405 J. Complete myotomy with intact buccopharyngeal fascia and without bleeding limiting view was achieved in all patients. One of two patients in whom continuous wave setting was used developed subcutaneous emphysema following vigorous cough on POD0; this resolved after 7 days nothing per oral (NPO). Eight patients were started on oral intake without evidence for leak. Pulsed mode with fiber-to-tissue contact provided effective muscle cutting without disruption of buccopharyngeal fascia. Literature review yielded three articles examining flexible approach with laser for Zenker's and none with BL.

Conclusion: BL provides safe and effective fiber-based cutting and hemostasis in endoscopic cricopharyngeal myotomy/Zenker's diverticulotomy. Future use in flexible endoscopic approaches appears feasible, though continuous wave should be avoided.

Level of evidence: 4

Keywords:

- TruBlue
- Zenker's diverticulotomy
- cricopharyngeal myotomy
- endoscopic
- laser

ABSTRACTS

WOLF TRUBLUE 445 NM LASER

April 2018 - August 2024

Otology

July 2019

H.M. Diab, N.A. Daikhes, P.U. Umarov,
O.A. Pashchinina , D.A. Zagorskaya

The use of photoangiolytic laser in the surgical treatment of temporal bone paraganglioma

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Department of Otorhinolaryngology, Faculty of Additional Professional Education, Russian National Research Medical University n.a. Pirogov N.I.
Doi: 10.25792/HN.2019.7.4.27–32

Abstract

Background: Over the past few decades, laser surgery has completely changed the clinical practice of doctors of various specialties, including otorhinolaryngologists.

Material and methods: Surgical treatment of a 42-year-old woman with a diagnosis of type A temporal paraganglioma was performed on the basis of the FBSI SCCO. We used the settings of the 445 nm high-power photoangiolytic laser and shortened the working cycles at the highest power of 10 W; a very short time duration of impulses and a distance of 1–3 mm from the target tissue was used for photoangiolysis.

Results: The tumor of the right middle ear was revealed on the X-ray examination (MSCT of the temporal bones). During revision of the tympanic cavity under conditions of moderate bleeding, a tumor was removed while maintaining the auditory ossicles. The vessels supplying the tumor were coagulated using a photoangiolytic laser with a wavelength of 445 nm.

Conclusions: The ability to remove a tumor of the middle ear with minimal blood loss in the pre- and postoperative periods without damaging the surrounding structures of the inner and middle ear was achieved. In the future, it is planned to conduct an analysis of long-term postoperative changes both at the tissue and functional levels. Such data can only be obtained after 36 months from the date of the operation, and after the sufficient number of operations using this technique will be reached used via glass fibers in non-contact and contact mode for in-office procedures.

Keywords:

- temporal bone paraganglioma
- surgical treatment
- photoangiolytic laser

December 2022

Wai Tsz Chang

Department of Otorhinolaryngology, Head and Neck Surgery, the Chinese University of Hong Kong

TruBlue LASER in Cholesteatoma surgery

© Oral presentation
EES 2022 4th World Congress on Endoscopic Ear

Abstract

Purpose: The retrospective cohort study aims to determine the efficacy and safety of TruBlue laser application in cholesteatoma surgeries.

Methods: All cholesteatoma surgeries conducted from January 2018 to January 2022 by NTEC ENT, with and without use of TruBlue laser, were included. Pure tone audiogram was done pre- and post-operatively to assess hearing. Disease extent was graded with ChOLE score and ChOLE staging. Recurrence of disease was determined clinically, radiologically, or surgically with second look operation.

Results: 120 cholesteatoma cases were identified. 39.2% (n=47) of the cholesteatoma surgeries utilized TruBlue laser, while 60.8% (n=73) did not. Overall follow-up duration was 21 ± 12.4 months, ranging from 2-47 months. When comparing the two groups of cholesteatoma surgeries with and without TruBlue laser usage, there are no significant differences in terms of length of stay (2 ± 2 days in non-laser, 1 ± 1 day in laser, p=0.31) and complications (1.4% in non-laser, 1.3% in laser, p=0.97, all prelated to mild perilymphatic leak, no facial nerve palsy reported). Bone conduction hearing threshold in the laser group after operation is preserved (pre-operative BC 26.8 ± 24.9dB, post-operative 25.6 ± 23.9 dB, p=0.59). Recurrence of cholesteatoma occured in 17.8% (n=13) in non-laser group, and 21.3% (n=10) in laser group, which is not statistically significant (p=0.64). Location of recurrence was found in the mastoid attic and middle ear in the non-laser group, where recurance are around the facial nerve and stapes footplate in the laser group.

Conclusion: In this study we observed no BlueLASER related complications. Unfortunately we did not show statistically significant numer of reduction in recurrence. Probably due to the location of recurrence in the laser group were the area that laser cannot be applied.

October 2023

Sudhoff, H.

Permanent occlusion of the Eustachian tube: a retrospective study on reopening procedures

Eur Arch Otorhinolaryngol 281, 1693–1700 (2024)

https://doi.org/10.1007/s00405-023-08271-8ttzt

Abstract

Purpose: This study retrospectively evaluated the efficacy and versatility of reopening procedures for the permanent occlusion of the cartilaginous Eustachian tube (POET) by analyzing four consecutive cases.

Methods: The study included all patients diagnosed with POET who suffered from Eustachian tube occlusion and glue ear. A combined approach of endoscopic transnasal/ transoral laser surgery was utilized to reopen the POET. This was subsequently followed by balloon dilation (BET) and stenting for a duration of six weeks. In one distinct case, the Eustachian tube orifice was approached via a transtympanic method, where a balloon catheter was placed. The primary outcome measures targeted the success rate of reopening, which was quantified using audiological outcomes and Eustachian tube patency verified by a positive Valsalva maneuver.

Results: Four patients, with an age range of 14-62 years (mean age of 29.3 years), were subject to Eustachian tube reopening. The duration of follow-up varied between 10 and 24 months, averaging at 16.2 months. Notably, 75% of the surgically treated ears displayed no evidence of glue ear upon their last follow-up and showed restoration of Eustachian tube patency. The procedures were executed without any surgical complications. The causes for POET in these patients were heterogeneous: two were attributed to scarring post adenoidectomy, one to occlusion following orthognathic surgery and the remaining one due to prior radiotherapy treatment for squamous cell carcinoma located at the soft palate.

Discussion: Total occlusion of the cartilaginous Eustachian tube may be linked to persistent middle ear diseases. It is imperative to conduct nasopharyngeal endoscopy in these cases. The findings from this study suggest that the Eustachian tube reopening procedure is predominantly effective and safe for patients with POET stemming from a variety of pathologies. Future research should focus on exploring advanced stenting devices and necessitate longer follow-up periods for comprehensive understanding.

Keywords:

- dilatory Eustachian tube dysfunction
- eustachian tube reopening
- Glue Eustachian tube
- Glue ear
- middle ear effusion
- Permanent occlusion of the Eustachian tube

ABSTRACTS

WOLF TRUBLUE 445 NM LASER

April 2018 - August 2024

Otology

January 2024

Leonardo Elías Ordóñez Ordóñez, Daniela Cerón Perdomo, Claudia Paola González Saboya, Felipe Osorio Mejía, Jorge Medina-Parra, Esther Sofía Angulo Martínez

Conventional vs. diode laser stapedotomy: audiological outcomes and clinical safety

European Archives of Oto-Rhino-Laryngology (2024)

https://doi.org/10.1007/s00405-023-08429-4

Abstract

Purpose: To compare the hearing results and clinical safety of patients undergoing stapes surgery with conventional technique and diode laser.

Methods: Retrospective observational study, which included patients treated with primary stapes surgery performed between January 2009 and January 2020. Three audiometric measurements (PTA, GAP and SDS) were evaluated as main results, evaluated by analysis of covariance (controlling the preoperative value). Intraoperative and postoperative complications were also analyzed. Outcomes were measured 6 months (± 1 month) after surgery.

Results: 153 cases were included, 97 operated with conventional technique and 56 with laser technique. Postoperative GAP ≤ 10 dB was obtained in 85.6% of the total sample, 82.5% in the conventional technique and 91.1% in the laser technique. Analysis of covariance showed no significant differences in the three surgery outcomes between the two groups (PTA, p = 0.277; GAP, p = 0.509 and SDS, p = 0.530). Regarding surgical complications, sensorineural damage was higher in the conventional technique group (p = 0.05). On the other hand, there were four cases of facial paresis, all in the laser group, three of them with the 980 nm laser.

Conclusion: Stapedotomy offered a high percentage of hearing success in the two groups studied. There were no significant differences in audiometric result, but there was a differential presentation of complications, being more frequent sensorineural hearing loss in the conventional technique group and facial paresis in the laser group.

Keywords:

- hearing loss
- Otosclerosis
- surgery outcomes
- Stapedotomy
- laser
- Stapedectomy

February 2024

M. Quer-Castells , M. Sandoval, F. Larrosa

Blue laser for the exclusive endoscopic transcanal approach to middle ear paraganglioma

Eur Arch Otorhinolaryngol. 2024 Apr;281(4):2041-2045.

https://doi.org/10.1007/s00405-024-08470-x

Abstract

Background: The management of glomus tympanicum tumours can be challenging. Blue laser coagulation may improve bleeding control thus facilitating an endoscopic transcanal excision. The objective of this presentation is to illustrate the authors' experience using this novel tool.

Methods: Case report of a patient that underwent exclusive endoscopic transcanal blue laser surgery of a class A2 glomus tympanicum tumour in a tertiary referral center.

Conclusion: The present study provides evidence of the safety and efficacy of endoscopic blue laser surgery, for the minimally invasive treatment of early-stage glomus tympanicum tumours.

Keywords:

- blue laser
- endoscopic ear surgery
- glomus tympanicum
- middle ear
- Paraganglioma
- Transcanal

June 2024

Tam, Ka Yue Aurora; Lui, Kary Choi Mui; Cheng, Horace; Tong, Michael Chi Fai; Chang, Wai Tsz

The Role of Trublue Laser in Cholesteatoma Surgery

Otology & Neurotology 45(5):p 552-555, June 2024

DOI: 10.1097/MAO.0000000000004183

Abstract

Objective: The retrospective cohort study aimed to determine the safety and efficacy of TruBlue laser application in cholesteatoma surgeries.

Methods: All cholesteatoma surgeries conducted from January 2018 to January 2022 in two tertiary referral hospitals in Hong Kong, with and without use of TruBlue laser, were included. Pure tone audiogram was done pre- and post-operatively to assess hearing. Disease extent was graded with ChOLE score and ChOLE staging. Residual disease was determined clinically, radiologically, or surgically with second look operation.

Results: One hundred twenty cholesteatoma cases were identified. There are 39.2% (n = 47) of the cholesteatoma surgeries that utilized TruBlue laser, while 60.8% (n = 73) did not. Overall follow-up duration was 21 ± 12.4 months, ranging from 2 to 47 months. Both groups were similar in demographics, pre-operative hearing and ChOLE staging. The length of stay was comparable in both groups (2 ± 2 days in nonlaser, 1 ± 1 day in laser, p = 0.31). There was no facial nerve injury related to surgery in both groups, and overall complication rates were similar (4.1% in nonlaser, 4.3% in laser, p = 0.97). The postoperative hearing was comparable with good hearing preservation in both groups. Residual cholesteatoma occurred in 17.8% (n = 13) in nonlaser group, and 21.3% (n = 10) in laser group, which was not statistically significant (p = 0.64). Seventy percent of the cholesteatoma residual in laser group occurred at area that TruBlue LASER cannot be applied.

Conclusion: TruBlue LASER was safe in cholesteatoma surgeries, though no added benefits were shown in reducing cholesteatoma residual rate. A larger controlled study is warranted to discern the true effect of TruBlue LASER.

Level of evidence: 3

ABSTRACTS

WOLF TRUBLUE 445 NM LASER

April 2018 – August 2024

Otorhinolaryngology

February 2021

Karkos PD, Koskinas IS, Triaridis S, Constantinidis J.

Lasers in Otolaryngology: A Laser Odyssey From Carbon Dioxide to True Blue

Ear Nose Throat J. 2021 Feb; 100(1_suppl): 1S-3S. 32845805

http://dx.doi.org/10.1177/0145561320951681

Abstract

In this special issue of the Ear Nose and Throat (ENT) journal entitled Lasers in Otolaryngology, we attempted to cover and accommodate different experiences from around the globe on both established and some not so well-known techniques and indications for Lasers in most ENT subspecialties. Despite the COVID 19 pandemic, authors from all over the world have expressed their interest in publishing their Laser experiences with ENT journal and for this we are very grateful.

Keywords:

- ear nose throat
- larynx
- lasers
- otolaryngology

June 2023

Ovchinnikov A. Yu., Edzhe M. A., Bakotina A. V., Atlashkin D. N.

Experience with a blue diode laser with a wavelengthof 445 nm in otorhinolaryngologyy

Head and neck. Russian Journal. 2023;11(2):25–30

https://doi.org/10.25792/HN.2023.11.2.25-30

Abstract

The 445 nm blue laser has only recently come into surgical practice for the treatment of diseases of the ENT organs. The article describes experience of using the 445 nm Wolf TruBlue laser during planned surgical interventions in the otorhinolaryngology departments of the University Clinic of the A.I. Evdokimov MSUMD. The 445 nm blue laser is a lightweight compact laser operating with a fiber light guide, combining the possibility of contact and remote tissue exposure, with a pronounced photoangiolytic and hemocoagulating effect. The study of the prospects for its further application in endoscopic endonasal surgery of the paranasal sinuses and the skull base, ear microsurgery, and endolaryngeal surgery is currently of scientific interest.

Keywords:

- 445 nm wavelength
- blue laser
- laser surgery
- phonosurgery
- photoangiolysis

ABSTRACTS

WOLF TRUBLUE 445 NM LASER

April 2018 – August 2024

Phonosurgery

January 2020

Srieth, S., Hagemann, J. & Hess, M.

Angiolytic laser applications for the larynx; Phonosurgical concepts for transoral laser microsurgery

HNO. 2020 Jan; 68(1):59-68. German.31950226

http://dx.doi.org/10.1007/s00106-019-00801-3

Abstract

Transoral laser microsurgery (TLM) for treatment of laryngeal cancer has reduced temporary tracheotomies, increased organ preservation rates, and improved functional results. Gold standard for laser-based transoral resection of laryngeal cancer is the application of CO2 lasers. Oncologically safe radical resection and postoperative voice outcome must be weighed up individually. Angiolytic laser effects enable modification of the tumor micromilieu by targeted obliteration of microvessels and antagonization of angiogenesis with preservation of vibrating laryngeal tissue for good voice function. Introduction of the German S3 guideline on diagnosis, treatment, and follow-up of laryngeal cancer is a critical step towards national evidence-based standardization. Internationally, the evidence for treatment of laryngeal mucosal dysplasia and T1a cancer with angiolytic potassium titanyl phosphate (KTP) lasers is increasing. Angiolytic lasers are also used for juvenile papillomatosis and suspension microlaryngoscopy under general anesthesia or local anesthesia in selected patients.

Keywords:

- KTP
- laryngeal cancer
- laryngeal papillomatosis
- TLM
- voice

January 2020

Markus M Hess, Susanne Fleischer

Percutaneous fibre guided laser surgery of the endolarynx

https://www.entandaudiologynews.com/development/how-i-do-it/post/percutaneous-fibre-guided-laser-surgery-of-the-endolarynx

Occasionally, getting access to the larynx for an intervention can be challenging. Markus Hess and Susanne Fleischer describe a novel way to perform laser treatment in such difficult instances.

Method and results: Our patient (male, aged 33) with progressive adult onset recurrent respiratory papilloma (RRP) could not be treated satisfactorily with in-office transnasal fibre guided photoangiolytic laser surgery due to pronounced gag response and hypersalivation and, unfortunately, his larynx also could not be entirely exposed during direct suspension microlaryngoscopy.

A laser glass fibre could easily be advanced and retracted within the cannula and its tip was proud of the tip of the cannula bevel by a few millimetres. This is always visualised on the monitor. With joystick-like movem_ents of the cannula's hub combined with advancement or retraction of the glass fibre, the glass fibre tip could be positioned close to or into the papilloma tissue at different endolaryngeal sites. With a photoangiolytic laser at 445nm wavelength (WOLF TruBlue®, A.R.C. Laser Comp, Nuremberg, Germany) we treated RRP at different sites, including the free edge of both vocal folds, inferior aspects of vocal folds, ventricular folds, inside of Morgagni's ventricles, and papilloma within the anterior commissure. We used various laser effects such as photoangiolysis, coagulation, carbonisation, and vaporisation (see also Hess et al [1]; Mallur et al [2]). For all laser applications during anaesthesia, laser safety precautions were complied with, especially lowering of ventilation oxygen saturation far below 50% during anaesthesia.

"The technique allows one to deliver laser light into the larynx via glass fibre in cases where office-based indirect surgery, as well as direct microlaryngoscopy, are not possible"

Conclusions: In patients with difficult-to-expose larynges in suspension microlaryngoscopy and impossible transnasal or transoral office laser approach, this new percutaneous laser technique can be a very helpful alternative to achieve access to the endolarynx while avoiding open neck surgery. A 20G cannula serves as an introduction tool and joystick-like guiding instrument, enabling access even to endolaryngeal regions that cannot be accessed easily in transnasal flexible channelled endoscopy or in direct microlaryngoscopy. This approach extends our armamentarium for endolaryngeal surgery.

August 2020

R. Jun Lin MD, FRCSC, MSc, Vladimir Iakovlev MD, FRCPC, FCAP Catherine Streutker MD, MSc, FRCPC, Daniel Lee MD, Mohammed Al-Ali MBBS, FRCSC, Jennifer Anderson MD, MSc, FRCSC

Blue Light Laser Results in Less Vocal Fold Scarring Compared to KTP Laser in Normal Rat Vocal Folds

Laryngoscope. 2021 Apr;131(4):853-858.32750168

https://doi.org/10.1002/lary.28892

Abstract

Objectives: Preliminary investigations suggest that a novel blue light (BL) laser with a wavelength of 445 nm is comparable to the commonly utilized potassium titanyl phosphate (KTP) laser (532 nm) for treatment of various laryngeal pathologies. The objective of the current study is to make a direct histological comparison of the degree of vocal fold scarring after either BL or KTP laser treatment in an animal model.

Study design: This was a randomized controlled study using rats.

Methods: Twenty-four Sprague-Dawley rats were randomized to BL or KTP laser treatment. Laser was delivered in non-overlapping pulses to normal rat vocal folds. Larynges in each group were harvested at three time points: post-operative day 1, 30, and 90. Three animals served as negative controls. The excised whole larynges were sectioned transversely and stained with hematoxylin/eosin and trichrome. Presence of subepithelial inflammation and protein deposition/fibrosis indicative of scarring were scored semi-quantitatively (from grade 1-3) by two pathologists blinded to treatment groups.

Results: Between-group comparison showed that both laser treatments resulted in significantly elevated subepithelial protein deposition/fibrosis 90 days after treatment compared to negative controls (BL: 2 ± 0; KTP: 2.67 ± 0.29; control: 1.17 ± 0.29; $P < .05$). However, the degree of protein deposition/fibrosis was significantly higher in the KTP group compared to the BL group ($P = .016$). Within-group comparison showed that the KTP group showed evidence of fibrosis as early as 30 days after treatment, which was not observed in the BL group.

Conclusions: The current study suggests that the degree of scarring is significantly less after BL laser treatment compared to KTP in normal rat vocal fold tissue.

Level of evidence: NA

Laryngoscope, 131:853-858, 2021

Keywords:

- blue light laser
- KTP laser
- vocal fold scar
- larynx
- voice
- scarring

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ABSTRACTS

WOLF TRUBLUE 445 NM LASER

April 2018 – August 2024

Phonosurgery

January 2021

Krivopalov A. A., Shamkina P. A., Stepanova Yu. E., Koren' E. E., Gotovyakhnia T. V.

Surgery of benign and tumor-like laryngeal formations using 445 nm semiconductor laser

Rossiiskaya otorinolaringologiya. 2021;20(6):102-108

http://dx.doi.org/10.18692/1810-4800-2021-6-102-108

Abstract

The issues of phonosurgery remain truly relevant today since there is a high prevalence of benign and tumorlike laryngeal formations among the pathology of the upper respiratory tract (up to 55–70%). Nowadays, laser technologies are coming to the fore among the possibilities of laryngological practice. Photoangiolytic lasers, such as the KTP laser, are actively used to coagulate subepithelial vessels without destroying the superficial epithelium. A novelty among laser systems is a laser with a wavelength of 445 nm certified in 2018, which combines high hemostatic and cutting effects without the extensive zone of thermal damage to surrounding tissues. This paper presents two clinical cases where a 445 nm laser is used. The first clinical case describes a patient with an anterior commissure scar after previous surgical interventions. Treatment using a 445 nm laser made it possible to dissect the scar and restore the normal laryngeal anatomy without stent placement. 5 weeks after the operation, the patient underwent phonopedic therapy and was satisfied with the voice quality. The second clinical case describes a patient with a cystic-like neoplasm of the left vocal fold. Dissection and enucleation of the formation using a direct micro laryngoscopy was done, followed by laser coagulation of the incision edges. Within 2 weeks, the patient showed restoration of the laryngeal endoscopic state and a voice improvement with normalization of acoustic parameters. Thus, the 445 nm semiconductor laser has shown in practice highly pronounced photoangiolytic and cutting properties, which proves its effectiveness in phonosurgery.

Keywords:

- benign laryngeal neoplasms
- laryngeal surgery
- phonosurgery
- 445 nm laser
- TruBlue laser
- photoangiolytic laser

May 2021

Abdul Latif Hamdan, Anthony Ghanem

Un-sedated Office-Based Application of Blue Laser in Vocal Fold Lesions

https://doi.org/10.1016/j.jvoice.2021.03.031

Introduction: Office-based laser procedures in laryngology have gained a lot of popularity in the last decade with the use of the KTP, PDL and Thulium lasers. Preliminary investigations currently report on the use of the 445 nm wavelength Blue laser for the treatment of various laryngeal pathologies, given its dual photoangiolytic and cutting properties.

Objective: We aim to investigate the safety and efficacy of the Blue laser for the treatment of vocal fold lesions.

Methods: This is a retrospective chart review of eleven patients with a variety of vocal fold lesions (polyps, Reinke's edema, papilloma, and leukoplakia), that underwent un-sedated office-based treatment using the 445 nm blue laser. The primary outcome was to compare preoperative to postoperative Voice Handicap Index (VHI-10) score and self-reported voice improvement using a visual analog scale (VAS). We also compared fiberoptic laryngeal examination before and after treatment.

Results: Eleven un-sedated office-based procedures using the blue laser were performed. There was improvement in the mean VHI-10 score (n = 8) with a decrease from 15.13 ± 8.77 to 3.50 ± 3.46 (P= 0.015). Similarly, the mean VAS score (n = 7) decreased from 6.14 ± 1.21 to 1.71 ± 1.60 (P< 0.003). All patients had a complete or partial regression of the vocal fold lesions on fiberoptic laryngeal examination. None of the patients had complications after the procedure.

Conclusion: Blue laser therapy can be suggested as a safe and effective alternative treatment modality in office-based laryngology procedures for a variety of vocal fold lesions. A larger series is needed to better validate the efficacy of this laser as a new treatment modality.

Keywords:

- blue laser
- laryngology
- office-based procedures
- VHI-10

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November 2021

Krivopalov A. A., Shamkina P. A., Stepanova Ju. E., Koren' E. E., Gotovyakhina T. V.

Endolaryngeal surgery of benign vocal fold lesions with a 445 nm semiconductor laser: postoperative management

Meditsinskiy sovet = Medical Council. 2021;(18):178-183. (In Russ.)

https://doi.org/10.21518/2079-701X-2021-18-178-183

Abstract:

Introduction: Today the high prevalence of benign vocal fold lesions is shown (up to 55-70%). The possibilities of surgical management of this pathology are very extensive. Laser technologies are becoming more and more popular among high-tech treatment methods. However the comprehensive postoperative management of these patients is equally important.

The aim of the study was to assess the features of the postoperative period in patients undergoing the endolaryngeal surgery using a semiconductor laser with a wavelength of 445 nm.

Material and methods: On the basis of Saint-Petersburg Research Institute of Ear, Throat, Nose and Speech from February to June 2021 20 patients with benign vocal fold lesions 6 women and 14 men from 24 to 67 years old were examined and treated. All the patients underwent endolaryngeal surgery with direct microlaryngoscopy using a new semiconductor 445 nm laser in an inert gas atmosphere (intraoperative helium supply). After surgical treatment, the patients observed vocal rest, received antiinflammatory, antibacterial therapy, inhalations, as well as the drug Homeovox® according to the standard scheme.

Conclusion: Endolaryngeal surgery with the removing of benign vocal fold lesions using a semiconductor laser with a wavelength of 445 nm has been proven to be safe and effective. According to the results of video laryngostroboscopy, acoustic analysis of the voice (the questionnaire "Voice handicap index-30") it was noted that the laryngeal functions were restored in a short time. The inclusion of Homeovox® in the complex postoperative treatment had a favorable effect on the restoration of the phonatory function.

Keywords:

- benign vocal fold lesions
- phonosurgery
- photoangiolytic laser
- 445 nm semiconductor laser
- postoperative management
- endolgaryngeal surgery
- blue laser

April 2022

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Clinical aspects of laser surgery for chronic laryngeal diseases

HEAD AND NECK RUSSIAN JOURNAL Vol 10, №4 – 2022

Doi: 10.25792/HN.2022.10.4.30–40

Introduction: The problem of phonosurgery remains relevant today since the prevalence of benign and tumor-like laryngeal lesions is up to 55–70% among the productive pathology of the upper respiratory tract. A new 445 nm surgical laser having a high hemostatic and resection effects was certified for the medical market in 2018. To date, there are very few works in foreign and Russian literature devoted to the use of that laser device in ENT practice, particularly in laryngology.

Purpose of the study: Conducting of a comparative analysis of intraoperative and postoperative results in patients treated with semiconductor lasers.

Material and methods: The clinical study involved 80 adult patients aged 22 to 73 years (46,44±12,13 years) with chronic laryngeal diseases: group 1 – 50 patients treated with a semiconductor laser with a wavelength of 445 nm; group 2 – 30 patients treated with a semiconductor laser with a wavelength of 980 nm. The duration of surgical intervention, the occurrence of intraoperative bleeding and the need for laser hemostasis were evaluated. All patients underwent videolaryngostroboscopy, fibrolaryngoscopy and acoustic voice analysis before and after the surgery. Also patients completed the VHI-30 questionnaire.

Results: Among intraoperative parameters, a statistically significant difference was obtained by comparing the duration of surgery (group 1 – 14.9±5.5 minutes, group 2 – 17.9±6.3 minutes). According to the laryngeal fibroscopy results, faster rate of the endoscopic picture normalization was noted in the 445 laser group (on the 10th day; p=0,002). Also according to the laryngeal stroboscopy results significantly more positive dynamics was noted in group 1 (day 14; p=0,020). Two weeks after surgery, the VHI-30 index was significantly lower in the 445 nm laser group compared to the 980 nm laser group (p=0,042). Among the acoustic voice analysis parameters, the results of the maximum phonation time, Jitter, Shimmer significantly differed by groups two weeks after surgical treatment with more pronounced positive dynamics in group 1. The fundamental tone frequency and HNR index did not depend on the type of surgical laser used.

Conclusion. Work with a laser 445 nm was characterized by shorter duration of surgical intervention compared to a laser 980 nm (p=0,026). In the group of patients treated with a 445 nm laser, were determined faster periods of regression of the inflammatory process from the vocal folds, restoration of vibratory function, normalization of

acoustic parameters of the voice and the index of voice impairment and quality of life VHI-30 (p<0,05).

Keywords:

- chronic laryngeal diseases
- phonosurgery
- laser 445 nm
- Trublue laser
- intraoperative indicators
- postoperative indicators

May 2022

Bailey Balouch, Parastou Azadeh Ranjbar, Ghiath Alnouri, Ahmad Issa Al Omari, Vishnu Martha, Matthew Brennan, and Robert T. Sataloff, and zlrbid, Jorda

Surgical Outcome of Low-Power-Density Blue Laser for Vascular Lesions of the Vocal Fold

Journal of Voice

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https://doi.org/10.1016/j.jvoice.2022.05.007

Summary: Photoangiolytic lasers such as the 532-nm potassium-titanyl-phosphate (KTP) and the novel 445-nm blue laser (introduced into the United States in 2020) are absorbed selectively by hemoglobin, permitting targeted ablation of vascular structures such as vascular malformations of the vocal fold (VF). Previously, we reported the high rate of success of KTP laser photocoagulation for VF vascular lesions. Compared with other photoangiolytic lasers, blue laser has the highest absorption in hemoglobin, and therefore it can be operated at lower power densities to minimize thermal injury to adjacent tissue.

Objective: The purpose of this study was to determine the efficacy and safety of blue laser for treatment of VF vascular lesions using low power densities, and to compare outcomes of blue laser with those of KTP laser.

Methods: Adult voice patients who underwent blue laser treatment of VF vascular lesions in the operating room at the lowest power densities that appeared clinically to cause the effect desired were included in this retrospective study. Baseline lesion characteristics and postoperative outcomes were assessed with a model that we had described previously. Postoperative outcomes were compared to those of previously reported KTP laser.

Results: Thirty-one subjects (54 VFs treated) underwent blue laser vaporization of VF vascular lesions (average age was 40.63 § 17.51). Data were compared to those of 66 subjects (100 VFs) who had undergone KTP laser vaporization of VF vascular lesions. There were no significant differences in subject demographics, past medical or surgical history, or preoperative location or severity of vascular lesions. Surgical success for blue laser at the low power densities used was 3.74 § 0.50, 3.55 § 0.94, 3.90 § 0.94, and 3.70 § 1.11 (out of 5) at postoperative visits 1-4, respectively. Surgical objective score was significantly greater following KTP laser at every postoperative visit. Treatment with KTP laser resulted in significantly greater generalized postoperative edema, and blue laser resulted in significantly greater localized edema at postoperative visits one and two. At visit three and four, there are no significant differences. VF stiffness following blue laser was 2.41 § 0.67, 1.91 § 0.69, 1.33 § 0.47, and 1.10 § 0.18 (out of 4) at postoperative visits 1-4, respectively. Postoperative VF stiffness did not differ significantly from KTP laser. Postoperative hemorrhage severity after blue laser was 1.79 § 0.54,

1.59 § 0.48, 1.15 § 0.25, and 1.14 § 0.26 (out of 4) at postoperative visits 1-4, respectively. Blue laser resulted in significantly less VF hemorrhage than KTP laser at the first (1.79 § 0.54 versus 2.26 § 0.83) and second (1.59 § 0.48 versus 1.98 § 0.72) postoperative visits. Vascular lesions treated with low-power-density blue laser were significantly more likely to recur than those treated with KTP laser (40.74% versus 10.00%). New vascular malformations were significantly more likely to form after blue laser than KTP (24.07% versus 6.00%). Subjects treated with low-power density blue laser were significantly more likely to undergo repeat surgery than those treated with KTP (31.48% versus 14.00%). Significant predictors for the need for repeat blue laser included lesion recurrence, a lower surgical objective score at the third or fourth postoperative visit and a higher baseline lesion severity grade.

Conclusion: Blue laser is an effective tool for the surgical management of VF vascular lesions. Although overall surgical success ratings were inferior to KTP laser at the power densities used, the severity of postoperative edema and VF hemorrhage were significantly less with blue laser. Re-evaluation of blue laser using higher power densities is in progress.

Keywords:

- angiolytic laser
- Photocoagulation
- blue laser
- Potassium-Titanyl-Phosphate (KTP) laser
- vocal fold vascular lesion
- varicosity and ectasia

October 2022

Anthony Ghanem, Abdul Latif Hamdan

Unsedated Office-Based Blue Laser Therapy in Female Patients With Reinke's Edema: A Retrospective Review of 8 Cases

J Voice. 2022 Oct 8; S0892-1997(22)00266-1. doi: 10.1016/j.jvoice.2022.08.025. Online ahead of print

https://doi.org/10.1016/j.jvoice.2022.08.025

Abstract

Objectives: To report on the outcomes of unsedated blue laser therapy in female patients with Reinke's edema.

Study design: Retrospective chart review.

Methods: A retrospective chart review of female patients undergoing unsedated office-based blue laser treatment of Reinke's edema between February 2020 and March 2022 at the Hamdan Voice and Swallowing Unit at the American University of Beirut Medical Center in Beirut, was conducted. Patients were assessed before and after the procedure with a follow-up interval of 3-6 weeks. Demographic data included age, history of smoking and grade of Reinke's edema. Voice outcome measures included the Voice Handicap Index-10 questionnaire, perceptual evaluation (GRBAS scale), acoustic analysis and maximum phonation time. Vocal fold lesions were evaluated using indirect laryngeal endoscopy.

Results: A total of eight patients were reviewed. The mean age was 59.63 ± 7.98 years. One patient was lost to follow-up. We report on a total of 10 Reinke's edema lesions treated with the blue laser. There was a significant decrease in the mean VHI-10 score (14.86 ± 5.84-6.71 ± 7.32; $P < 0.01$) as well as in the means of three perceptual evaluation parameters (G, R, B; $P < 0.05$). There was also a nonstatistically significant increase in the mean fundamental frequency and habitual pitch. Laryngeal examination showed complete regression in 50% of the lesions, and partial regression in the remaining 50%.

Conclusions: Office-based blue laser treatment of Reinke's edema under local anesthesia can be considered an effective treatment modality as evidenced by improvement in post-procedure voice outcome measures.

Keywords:

- vocal fold
- reinke's edema
- blue laser
- office procedure

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ABSTRACTS

WOLF TRUBLUE 445 NM LASER

April 2018 – August 2024

Phonosurgery

January 2023

Marta Filauro, Alessandro Ioppi, Alberto Vallin, Claudio Sampieri, Marta De Vecchi, Giulia Gabella, Pietro Benzi, Francesco Mora, Giorgio Perett

Office-Based Treatment of Vocal Fold Polyps and Reinke's Edema: A Rational Comparison With Suspension Laryngoscopy

The Laryngoscope, 00:1-8, 2023

https://doi.org/10.1002/lary.30576

Abstract

Objectives: Benign laryngeal lesions have traditionally been treated through suspension laryngoscopy under general anesthesia (GA). Recently, the development of operative videoendoscopes coupled with photoangiolytic lasers has allowed clinicians to treat these conditions in the outpatient clinic. We report our experience in the office-based (OB) setting for the treatment of patients affected by vocal fold polyps (VFPs) and Reinke's edema (RE), comparing it to patients treated under GA.

Methods: A retrospective analysis was conducted on patients affected by VFP or RE. A 445 nm diode blue laser was used through the operative channel of a flexible video-endoscope for OB procedures, while GA surgeries were carried out with cold steel instrumentation. The Voice Handicap Index-10 (VHI-10) represented the primary outcome. Endoscopic outcomes, duration, and morbidity of the procedures were investigated as secondary outcomes.

Results: A total of 153 patients were retrospectively enrolled. 52 were treated in an OB setting, while 91 underwent GA. Regarding patients with RE, both the OB and GA cohorts showed a significant improvement in VHI-10 (from 12.7 to 2.6 and 19.5 to 5.1, respectively; $p < 0.001$), as did those with VFPs (from 11.8 to 2.3 and 15.9 to 2.9 respectively; $p < 0.001$). No differences were found when comparing VHI-10 in the OB and GA cohorts. The mean procedural time of OB treatment (4.9 min) was significantly shorter than GA (37.1 min). No adverse events were reported.

Conclusion: Our data demonstrate the efficacy and safety of the OB setting. For selected patients, OB treatments offer comparable vocal outcomes, favorable morbidity, and reduced operation times, making them an appealing alternative to the traditional approach.

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Keywords:

- ambulatory surgical procedures
- blue laser
- laryngoscop
- Reinke's edema
- vocal fold polyps

Level of Evidence: 3

August 2023

Abdul-Latif Hamdan , Patrick Abou Raji Feghali, Jad Hosri, Anthony Ghanem , Elie Alam

Office-Based Laser Therapy for Vocal Fold Cyst: A Promising Alternative Therapy Using the 445 nm Blue Laser

https://doi.org/10.1016/j.jvoice.2023.05.019

Abstract

Vocal fold cysts are benign lesions commonly encountered in laryngology practice. They are traditionally classified as mucus retention cysts and epidermoid cysts. The mainstay treatment is surgical excision with diligent dissection of the cyst wall. The authors of this manuscript report a series of two cases of vocal fold mucous retention cysts and one case of vocal fold pseudocyst treated with the blue laser (Wolf TruBlue 445 nm; A.R.C. Laser Company) in an office setting. All three cases had complete regression of the lesion with improved glottic closure and mucosal waves during phonation. The disease regression was associated with a decrease in the VHI-10 score, perceptual voice evaluation scores, and acoustic perturbation parameters. There was also an increase in maximum phonation time in all three cases. The authors advocate office-based blue laser therapy for vocal fold cysts as a promising treatment modality, particularly in patients at high risk for general anesthesia. Nevertheless, the possible increased risk of vocal fold scarring given the lack of binocular microscopic examination should not be underestimated. A larger study is needed to cast more information on the surgical outcome and long-term effects of blue laser therapy in the management of vocal fold cysts.

Keywords:

- blue laser
- Dysphonia
- office-based
- vocal fold cyst

August 2024

Cong-Kai Lin, Yi-Ping Chen, Yuan-Hung Wang, Seth H. Dailey, Ying-Ta Lai

Photoangiolysis with the 445-nm Blue Laser and the Potassium-Titanyl-Phosphate Laser: A Comparison

Annals of Otology, Rhinology & Laryngology 1 –7

https://doi.org/10.1177/00034894241273280

Abstract

Objective: Photoangiolytic lasers have yielded significant innovation in laryngeal surgery in the last 25 years. After the discontinuation of the potassium titanyl phosphate (KTP) laser, a novel 445-nm blue laser was developed. The optimal balance between a laser's desired tissue effects and collateral tissue damage is a major determinant of laser selection in microlaryngeal surgery. The shell-less incubation system for the chick chorioallantoic membrane (CAM) simulates the microvasculature of the human vocal fold and is useful for testing effects of laser settings and in simulated surgery. The aim of this study is to compare the tissue effects of the KTP and blue lasers using the shell-less CAM model.

Methods: The shell-less incubation system contains: polymethylpentene film (used as a culture vessel), calcium lactate and distilled water supplementations. By using this system, the chick chorioallantoic membrane (CAM) can be fully exposed with a good field for surgery simulation. The effects of the 2 lasers (532 nm KTP and 445 nm blue) were quantified at clinically relevant energy settings and laser distances from target. Measures included imaging real-time vascular reactions in the CAM model, post-procedure histologic analysis of CAM tissue and temperature changes.

Results: Vessel coagulation and rupture rates were less common with the blue laser compared with the KTP laser. Histologic analysis demonstrated less tissue disruption with the blue laser. Temperature changes were less with the blue laser.

Conclusion: In this CAM model with specific conditions, the blue laser reveals less tissue damage than the KTP laser. Suitable working distance and power setting of the laser are necessary for desired tissue effects.

Level of evidence: NA

Keywords:

- blue laser
- 445 nm laser
- KTP laser
- Photoanigolysis
- Microlaryngeal surgery
- Chick chorioallantoic membrane

ABSTRACTS

WOLF TRUBLUE 445 NM LASER

April 2018 – August 2024

Rhinology

June 2020

Mattis Bertlich, Fatemeh Kashani, Bernhard G. Weiss, Robert Wiebringhaus, Friedrich Ihler, Saskia Freytag, Olivier Gires, Thomas Kühnel, Frank Haubner

Safety and Efficacy of Blue Light Laser Treatment in Hereditary Hemorrhagic Telangiectasia

Lasers in Surgery and Medicine 53:309-315

https://doi.org/10.1002/lsm.23289

Background and objectives: Hereditary hemorrhagic telangiectasia (HHT) is a hereditary condition that is associated with arteriovenous malformations. A common site for these malformations is the nasal mucosa, which is associated with severe epistaxis and debilitation for affected patients. We evaluated the efficacy and safety of blue light laser technology in treating these endonasal manifestations in a retrospective chart analysis. Additionally, we compared blue light laser technology to bipolar coagulation in an animal model.

Study design/materials and methods: We performed a retrospective chart analysis of all patients that were diagnosed with HHT and received endonasal blue light laser treatment between 10/2017 and 04/2019. In addition, we performed bipolar or blue light laser coagulation of all macroscopically visible vessels on thyroid gland lobes (n = 4) from Dunkin–Hartley Guinea Pigs. Hematoxylin-eosin (HE) staining was then used to visualize depth and area of coagulation surrounding these vessels.

Results: One hundred and fifty-one treatments in 23 patients were analyzed. Under regular blue light laser treatment, quality of life (QOL), indicated on a visual analog scale from 1 to 10, gradually increased significantly from 5.6 ± 0.5 (before the first treatment) to 7.5 ± 0.9 (after the second treatment). Following this, QOL remained steady throughout additional treatments. Adverse effects were not recorded. HE staining showed that coagulation depth (162 ± 56 vs. 586 ± 192 µm) and area (74 ± 35 vs. 1015 ± 449 µm2) were significantly lower after laser treatment.

Conclusion: Blue light laser therapy is safe and efficient in treating HHT. Damage to the surrounding tissue is significantly lower compared with bipolar coagulation.

Keywords:

- blue light laser
- laser
- HHT
- Osler
- hemorrhagic hereditary teleangiectasis

December 2021

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Experimental study of parameters and methods of surgical treatment with 445 nm laser

Rossiiskaya otorinolaringologiya. 2021;20(6)

https://doi.org/10.18692/1810-4800-2021-6-60-63

Abstract:

Compliance with standardized conditions for the use of lasers and the development of modes in experimental conditions is one of the main factors that make it possible to safely use a laser in surgical practice. To date, a new 445 nm blue laser has now become available for otorhinolaryngologists. The use of this type of laser in rhinosurgery requires some both experimental and clinical studies that will help signal the possibilities and limitations of the use of this laser.

Objectives: Choose the safest and most sparing mode of exposure to a laser with a wavelength of 445 nm for rhinosurgery.

Materials and methods: The experimental part of the study was carried out on samples of biological tissues with optical properties close to the tissues in the nasal cavity. As a biological model, preparations of chicken muscle tissue and preparations of chicken liver tissue were selected. A new laser with a wavelength of 445 nm was used. The results of the microscopic picture were evaluated by histological examination. The study was carried out using a biological microscope Biolam M-1 (JSC "LOMO", Russia), with standard magnification of 100 times. Staining of histological preparations was carried out according to hematoxylin-eosin, trichrome according to Masson. To measure the specified parameters, the VIDEOTEST system for morphometry was used.

Conclusion: A laser with a wavelength of 445 nm in the experiment showed the possibility of using it in a constant contact mode. The obtained results of the maximum depth of damage when using a laser with a wavelength of 445 nm suggest the most sparing and safe modes of using the laser in surgical practice.

Keywords:

- laser
- 445 nm
- nasal cavity surgery

March 2023

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Blue laser in endoscopic endonasal removal of juvenile angiofibroma of the skull base

HEAD AND NECK RUSSIAN JOURNAL Vol 11, №1 — 2023

https://doi.org/10.25792/HN.2023.11.1.14-20

Abstract

Background: Juvenile nasal angiofibroma (JNA) is a very rare benign lesion originating from the pterygopalatine fossa with distinctive epidemiological features and a specific growth pattern. The typical patient is an adolescent male with a clinical history of recurrent severe nasal bleedings and congestion. Currently, surgery is considered the golden standard of JNA treatment, even though it often causes severe intraoperative bleeding. Improvements in preoperative embolization provide a significant reduction in intraoperative bleeding. Despite breakthroughs in endoscopic techniques that minimize the risk of relapse, the search for new devices that can help treat JNA is still ongoing to minimize surgical complications. Lasers have been used extensively as a surgical tool in rhinology over the past few decades. Indications for intranasal laser surgery are limited due to deep nasal mucosal burns and changes in mucociliary clearance, even though these interventions are virtually bloodless and often do not require nasal packing. Blue laser has recently become used in ENT surgery, and there are no data in the literature on its use for JNA removal.

Purpose: The purpose of the study was to describe our experience of using new blue laser in JNA removal. Evaluation of advantages and disadvantages, determination of indications and limits of its use.

Material and methods: Endonasal endoscopic removal of JNA was performed in 7 patients. During the surgery, blue laser was used to cut the tissues and coagulate injured vessels.

Results: The average blood loss during surgery was 150 (50; 350) ml; there were no surgical complications. There were minimal reactive changes in the nose. All patients were discharged on the 2nd or 3rd day after the surgery. The special features of laser treatment included the possibility of coagulation and tissue dissection even in conditions of heavy bleeding and a minimal damage of the surrounding tissues with laser treatment.

Conclusion: The usage of the blue laser during endoscopic JNA removal showed good results with a minimal surgical trauma. The laser coagulates even in cases of severe nasal bleeding. Further studies should be conducted to understand the advantages and limits of using new blue laser in nasal surgery.

Keywords:

- juvenile angiofibroma
- nasopharyngeal tumor
- skull base tumor
- embolization
- endoscopic nasal surgery
- endoscopic removal of JNA
- blue laser
- laser surgery

© Nersesyan M.V., Polev G.A., Muntean V.V., Popadyuk V.I. Blue laser in endoscopic endonasal removal of juvenile angiofibroma of the skull base. Head and neck. Russian Journal. 2023;11(1):00–00

ABSTRACTS

WOLF TRUBLUE 445 NM LASER

April 2018 – August 2024

Rhinology

January 2024

Marina Nersesyan, George Polev, Valentin Popadyuk, Valeria Muntean

Our First Experience of Using Blue Light Laser for Endoscopic Endonasal Removal of Juvenile Angiofibromas

Otorhinolaryngology, Head and Neck Pathology (ORLHNP). 2023; 2 (4): 67-73.

https://doi.org/10.59315/ORLHNP.2023-2-4.67-73

Abstract

Background: Juvenile nasal angiofibroma (JNA) is a very rare benign lesion originating from the pterygopalatine fossa with distinctive epidemiologic features and growth patterns. The typical patient is an adolescent male with a clinical history of recurrent severe nasal bleedings and blockage the nose. Currently, even though surgery often caused severe operative bleeding, it is considered the ideal treatment for JNA. Refinement in preoperative embolization, which provides significant reduction of intraoperative bleeding. In spite of breakthrough of Endoscopic techniques which minimize the risk of residual disease, the search of new devises which can help to management of JNA is still continue in order to minimize the surgical complications. Laser methods as surgical treatment have been actively used in rhinology during the past decades. We purposed to summarize information about current lasers and their use in rhinology.

Aim: The purpose of the study is the literature review and to describe our experience of using new blue laser during JNA removal. Evaluation of advantages and disadvantages, determination of indications and limits of its use in rhinosurgery.

Methods: A literature review from 2000 to 2022 using the PubMed database was employed. Keywords used included "laser surgery", "blue light laser", "photoangiolytic laser", "laser in rhinosurgery". The most up to date studies published for each rhinology condition that was treated with laser surgery was reviewed.

Then endoscopic removal through the nose was performed. During the surgery TrueBlue laser was used to cut the tissues and coagulate injured vessels.

Results: Rhinological conditions appropriate for laser applications are discussed. There are related papers to a number of applications including hereditary hemorrhagic telangiectasia, rhinitis, turbinate surgery, dacryocystorhinostomy, septoplasty, choanal atresia, and sphenopalatine artery ligation, paying attention to the outcomes of the studies. It is the first experience of using blue laser in rhinosurgery and particulary ib removing JNA.

Conclusion: Intranasal laser surgery, despite the fact that interventions are performed almost bloodlessly, and often do not require nasal tamponade, indications for their performance are limited, due to deep burns of the nasal mucosa, and alteration of mucociliary clearance therefore lasers are not so often used in rhinology. The short-wave blue laser with a wavelength of 445 nm, used in Europe in oto- and laryngosurgery, may have some potential advantages in rhinosurgery, but the practical dataset are limited yet.

Keywords:

- Angiofibroma
- laser surgery
- blue laser

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2024-10_Literature_TruBlue_A.R.C.Laser_rev2-3_EN
Editors: M. Pyshchyk, R.Yoganantham, B.Dasargöl, M.Grimm