The Laryngoscope
Lippincott Williams & Wilkins

Gold Laser Versus Curettage Adenoidectomy: Incidence of Complications and Otorrhea After Concurrent Pressure-Equalization Tube Placement

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Objectives: To measure the incidence of postoperative complications and otorrhea in patients undergoing Gold laser or curettage adenoidectomy with pressure-equalization (PE) tube placement.

Study Design: A prospective study of 100 patients, ages 8 to 48 months, undergoing Gold laser (n = 50) or curettage adenoidectomy (n = 50) and PE tube placement in a pediatric outpatient setting.

Methods: Pediatric patients with chronic otitis media with effusion and adenoid hypertrophy after failure of medical management were included in the study. Adenoid size and middle ear status were recorded at surgery. The total adenoidectomy procedure time was recorded. All patients were evaluated at 1 week, 1 month, and 4 months postoperatively. The incidence of nasal complications and otorrhea was recorded.

Results: There was no statistical difference in age, race, sex, adenoid size, or middle ear status between groups. The laser group had a shorter procedure time ($P = .001$) and a lower incidence of otorrhea ($P = .024$). There was no difference in nasal complications between groups.

Conclusions: The Gold laser adenoidectomy technique can be safely performed with PE tube placement and may offer advantages over the traditional curettage adenoidectomy technique.

Key Words: Laser, adenoidectomy, otorrhea, complications.

***Laryngoscope*, 117:2026–2029, 2007**

INTRODUCTION

The effectiveness of adenoidectomy with pressure-equalization (PE) tube placement for the treatment of chronic otitis media with effusion (COME) and adenoid hypertrophy is well established in the literature. Various techniques have been developed to remove the adenoids and include traditional curettage, electrosurgical removal (suction coagulation), power-assisted (microdebrider), and laser. A recent paper reported a series of patients who developed nasopharyngeal stenosis after potassium-titanyl-phosphate (KTP) laser adenoidectomy.[1] However, another published report cited the safety and success of laser removal of adenoid tissue in the treatment of COME with no evidence of scarring of the eustachian tube or nasopharyngeal stenosis.[2]

A prospective study was performed to compare the postoperative outcomes in pediatric patients undergoing Gold laser (Medical Energy, Pensacola, FL) versus traditional curettage adenoidectomy. Specifically, the incidence of otorrhea after concurrent PE tube placement and nasal complications were evaluated to determine the safety of the laser technique compared with the control group.

MATERIALS AND METHODS

Pediatric patients who were referred to the first author's service for treatment of COME and symptoms of adenoid hypertrophy after failure of medical therapy were included in this study. All patients had an effusion that persisted for a minimum of 12 weeks despite antibiotic therapy. Preoperative symptoms of adenoid hypertrophy included nasal congestion, snoring, mouth breathing, or nasal obstruction. One hundred patients were prospectively studied. Fifty consecutive patients were assigned to receive Gold laser adenoidectomy with PE tube placement. A control group of 50 patients underwent traditional curettage adenoidectomy with PE tube placement. The study conforms to Health Insurance Portability and Accountability Act regulations, and institutional review board approval was obtained from our institution. All patients were treated in the same-day surgery unit at Children's Hospital New Orleans. Informed consent for adenoidectomy and bilateral tube myringotomy was obtained

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Editor's Note: This Manuscript was accepted for publication May 30, 2007.

Presented at the Triological Society Combined Sections Meeting, Marco Island, Florida, U.S.A., February 14–18, 2007.

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DOI: 10.1097/MLG.0b013e31812e95fa

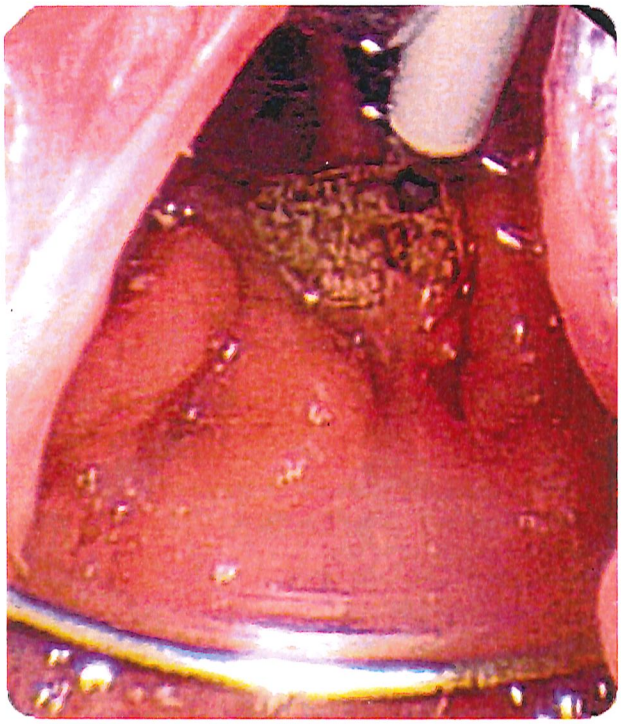

Fig. 1. Initial application of laser energy to adenoid tissue.

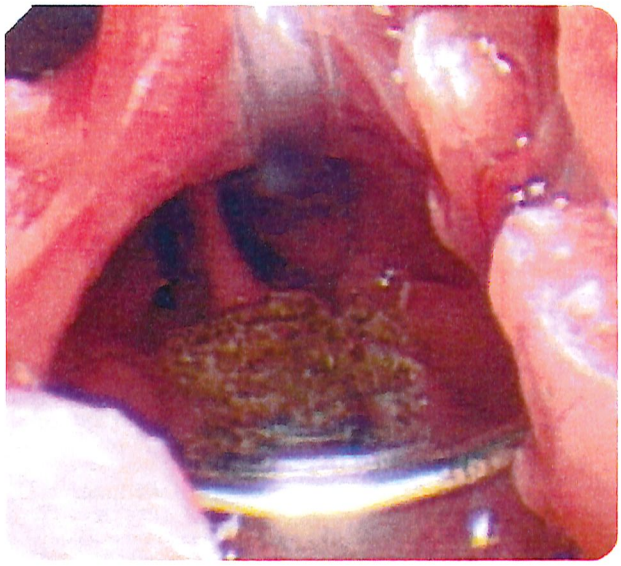

Fig. 2. Appearance of the nasopharynx after completion of laser adenoidectomy.

from the parent or guardian using the legal requirements developed by the Louisiana Medical Disclosure Panel. No funds or grants were received from any medical equipment company for the completion of the study.

The surgical techniques were standardized. No perioperative steroids were administered. All patients received ofloxacin otic solution 0.3% (Floxin Otic, Daiichi Sankyo, Tokyo, Japan) twice daily for 7 days postoperatively. The Gold laser adenoidectomy was performed orally in the same manner as the traditional curettage adenoidectomy technique. A Davis-Crowe mouth gag was inserted and the palate suspended using an 8 F catheter for exposure of the nasopharynx. Indirect mirror examination was used throughout the procedure. The Gold laser adenoidectomy was performed using a 2.2 mm ball-tip adenoidectomy handpiece with suction at a setting of 16 W power (Figs. 1 and 2). No packing or suction electrocautery was used for hemostasis in the laser group. The curettage adenoidectomy was performed using various nondisposable curettes for complete adenoid tissue removal. Hemostasis was obtained using packs and Bovie electrocautery with suction at a setting of 30 W power. Bilateral anterior inferior myringotomies were performed using a disposable myringotomy blade, and Armstrong beveled grommet tubes were inserted. Three drops of Floxin Otic solution were placed bilaterally after tube insertion.

The procedure time for adenoidectomy was defined as the time from application of laser energy or initiation of curettage to the completion of the adenoidectomy including time to control bleeding. The adenoid size and degree of obstruction was measured intraoperatively using a grading system as described in the literature.[3] The status of the middle ear and the type of fluid was noted at the time of myringotomy and was classified as no effusion, acute purulent, serous, or a thick mucoid effusion (glue ear).

All patients were evaluated in the clinic at 1 week, 1 month, and 4 months postoperatively. The presence of otorrhea was noted at each visit. A review of systems was obtained at each visit from the parent or guardian concerning the presence of nasal congestion, rhinorrhea, snoring, mouth breathing, or other complaint of nasal obstruction. Also, the presence of any complication such as bleeding, fever, or acute purulent rhinorrhea was noted. In the laser group, any patient presenting with symptoms of nasal obstruction at 1 month or 4 months postoperatively underwent flexible fiberoptic nasopharyngoscopy to evaluate for evidence of scarring or stenosis.

RESULTS

There was no statistical difference in age, sex, race, adenoid size, or middle ear status between adenoidectomy groups (Table I). The outcomes measured for the laser adenoidectomy and the standard curettage adenoidectomy groups are summarized in Table II. The laser adenoidectomy procedure time was statistically shorter than the curettage adenoidectomy time ($P = .001$). The control group

TABLE I.
Patient Demographics, Middle Ear Status, Adenoid Grade.

Variable	Laser Group (n = 50)	Curettage Group (n = 50)	*P* Value
Median age (mo)	21.2 (12.3)	19.6 (8.6)	.437
Race, W/AA (%)	88/12	90/10	1.000
Sex, M/F (%)	54/46	62/38	.544
Middle ear fluid			
Serous	36	30	
Glue ear	40	48	
Acute	24	22	
Adenoid size			
Grade 1	0	0	
Grade 2	20	20	
Grade 3	24	25	
Grade 4	6	5	

n = 100 ears in each group.
W = white; AA = African-America.

TABLE II.
Clinical Outcomes.

Variable	Laser Group (n = 50)	Curettage Group (n = 50)	*P* Value
Procedure time (min)	4.6 (0.9)	7.7 (1.6)	.001
Postoperative otorrhea*			
1 wk	1	4	.181
1 mo	2	9	.026
4 mo	3	8	.100
Total	6	21	.024
Nasal complaints†	7	6	
Postoperative stenosis	0	0	

*Number of patients with any incidence of otorrhea postoperatively at 1 week, 1 month, or 4 months.
†Any patient with nasal complaint in review of systems postoperatively.

undergoing curettage adenoidectomy had a significantly higher association with postoperative otorrhea (P = .024). There was no statistical difference in nasal complaints or complications between the groups (P = 1.0). Seven patients in the laser adenoidectomy group and six patients in the curettage group had nasal congestion with a clear mucoid rhinorrhea noted at 1 week. There were no postoperative complications in either group. None of the patients in the laser group developed nasopharyngeal stenosis or obstruction.

DISCUSSION

Numerous published studies have compared the operative technique and clinical outcomes of traditional curettage adenoidectomy with other surgical methods of adenoidectomy such as electrocautery (suction coagulation) and power-assisted (microdebrider).[3–6] Laser removal of the adenoids has not been a favored technique, as reports of postoperative nasopharyngeal stenosis using the KTP laser exist.[1] Our objective was to report the surgical technique and incidence of postoperative complication in patients undergoing Gold laser adenoidectomy with concurrent PE tube placement.

The Gold laser delivery system uses a flexible quartz fiber core and an Indium Gallium Arsenide Phosphate III (InGaAsPIII) medium. Laser energy is delivered through a suction handpiece to a 2.2-mm ball-shaped coated tip. The contact nature of the laser allows for precise suction vaporization of adenoid tissue and prevention of noncontact thermal energy and possible injury to other mucosal surfaces in the nasopharynx. As with any surgical laser, eye protection and standard laser safety precautions should be used even though the risk of contact thermal injury to the surgeon or assistants has not occurred with our use of the laser.

The mean procedure time in the laser adenoidectomy group of 4.6 (0.9) minutes is significantly shorter (P = .001) than the control group procedure time of 7.7 (1.6) minutes. Our results for the laser technique compare favorably with the partial curettage adenoidectomy procedure time of 8.11 minutes as reported by Rodriguez et al.[5] In the literature review by Elluru et al.,[4] the shortest electrosurgical (suction coagulation) adenoidectomy procedure time was 8.3 (3.6) minutes, which is significantly longer than the laser adenoidectomy time we report.

In our group studied, the laser adenoidectomy technique was associated with no measurable blood loss. In other reports, mean blood loss from the techniques of curettage, electrosurgical, and power-assisted adenoidectomy are much higher.[4–6] The technique we described results in suction vaporization of adenoid tissue and prevention of blood loss during the procedure from simultaneous coagulation of the blood vessels.

There was no statistical difference in the incidence of postoperative nasal complaints or complications between the laser group and the curettage group. The risk of potential scarring, stenosis, or adverse effect on nasal function, such as reported by Giannoni et al.,[1] was not evident in our laser adenoidectomy group.

Multiple variables affect the development of postoperative otorrhea after insertion of PE tubes for COME. The analysis of these variables is beyond the scope and design of our present study. However, we attempted to determine whether the patients undergoing the laser adenoidectomy procedure with PE tube insertion were associated with a statistically significant difference in the incidence of postoperative otorrhea when compared with a control group. If the laser technique, as described in our report, results in adverse function of the eustachian tube or middle ear and adversely affects other variables associated with otorrhea, then an increased incidence of postoperative otorrhea might have been seen. In fact, the laser group was associated with a statistically significant decrease in the incidence of otorrhea (P = .024, RR = 3.14).

The difference in postoperative otorrhea measured between the two groups was an unanticipated result of our study. The current study's design does not provide for an explanation of the variables that might account for the difference in postoperative otorrhea observed. However, several possible explanations are proposed. First, an unmeasured or unrecognized variable or bias may exist between the two surgical groups. Also, the postoperative drainage through the PE tubes was not cultured, so the presence and difference in any bacteria present is unknown. The difference in the application of thermal energy by the suction Bovie and the Gold laser and the depth of penetration to the peritubal tissue may have a different effect on the postoperative function of the eustachian tube. Any difference in thermal injury to the eustachian tube may result in different middle ear status postoperatively between the two surgical groups. Because the exact reason for the difference in postoperative otorrhea observed is currently unknown, we believe that further studies should be performed to confirm the outcome noted in our study.

Smith and Yung[2] reported the resolution of COME in three patients by using a laser to remove adenoid tissue adjacent to the eustachian tube and without myringotomy or PE tube insertion. Smith and Yung suggest that the laser adenoidectomy provides for more precise removal of obstructive peritubal adenoid tissue. However, one cannot definitely conclude that the laser technique alone was responsible for the reported successful outcome in the

treatment of COME. Further study is needed to determine the exact effect of laser adenoidectomy on the function of the eustachian tube and the etiology for a decrease in postoperative otorrhea, as seen in our study.

Because the Gold laser adenoidectomy technique is a newly described surgical technique, an analysis of the costs and procedure set-up time is warranted. The time required to set up the laser handpiece is brief and essentially the same as needed to set up the suction Bovie handpiece. At our institution, the cost of the disposable, laser suction handpiece is much less than our institution's cost for the disposable, power-assisted (microdebrider) blade and supplies. Also, if the reduction in postoperative otorrhea is duplicated in future studies, this could potentially reduce the patient's overall medical costs.

The patients in our study were followed for a minimum of 4 months postoperatively. We believe that although our initial study shows that the laser adenoidectomy technique is safe and effective for the treatment of COME and adenoid hypertrophy, additional study is needed to determine the long-term results of this new technique. We hope to report the long-term results with regard to middle ear status after PE tube extrusion in these patients as well as the long-term success of the laser adenoidectomy in eliminating symptoms of adenoid hypertrophy.

CONCLUSION

The Gold laser adenoidectomy technique can be safely performed with concurrent PE tube placement for the treatment of COME. The laser technique may offer advantages over the traditional curettage adenoidectomy. The advantages may include a decreased procedure time, decreased blood loss, no increase in nasal complaints or complications, and a potential decrease in associated postoperative otorrhea after PE tube insertion.

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