ORIGINAL ARTICLE

Effectiveness of Diode Laser Powered Adenoid Gland Ablation in patients with Adenoid Hyperplasia

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ABSTRACT

Objective: To evaluate the surgical efficacy of diode laser ablation of adenoid gland hyperplasia in terms of improvement in surgical technique, clinical symptoms and quality of life.
Methodology: In this study, we found out the results of diode laser ablation in the adult population who present with adenoid hyperplasia with grade 2 enlargement from the grading system of Parikh et al., Diode laser ablation was done under general anesthesia. Patients with grade 2 hypertrophy were diagnosed with endoscope and after informed consent laser ablation was done under general anesthesia .Postoperatively patients were followed ,examined and pro forma were filled.
Results: Results were analyzed on preoperative and postoperative endoscopic findings, improvement in symptoms of nasal obstruction, intraoperative blood loss, duration of surgery and postoperative complications. Results showed that diode laser effectively ablated adenoid tissues with less complications better surgical technique and improving symptoms and quality of life. Please mentions specif resuts in stats
Conclusion: It was observed that endoscopic laser ablation was better in terms of minimal blood loss, can be performed in less surgical time, and improves obstructive symptoms. There was no significant postoperative complication.

Keywords: Adenoid hyperplasia, diode laser ablation, endoscopic grading system, OSA obstructive sleep apnoea

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INTRODUCTION

Adenoid is a cluster of lymphatic tissue located at the rear of the nasal cavity or posterior superior wall of nasal passage. In 1724, Santorini identified the nasopharyngeal lymphoid mass, which he called ‘Lushka’s tonsil.’ Later, in 1870, Wilhelm introduced the term 'adenoid' to refer to what he described as ‘nasopharyngeal growths. Enlarged adenoids are often found in children. The adenoids may have swollen as a result of infections or allergies.

Adenoid hyperplasia is diagnosed on nasal endoscopy. When they increase in size, they can lead to noisy breathing and issues with airflow. Adenoids are a component of the immune system. These organs provide immunity against contamination. The adenoids expand until a child becomes six years old, at that point, they progressively reduce in size. In many adults it persists and presents with symptoms of obstructive sleep apnea and nasal obstruction.[1]

Typically, the adenoids become enlarged with recurrent infections and persist in their swollen state. Allergies can also cause this enlargement. Usually in adults, adenoids can become swollen due to ongoing infections, allergies, or environmental pollutants, smoking, or tumour[2]. The signs of swollen adenoids may involve raucous breathing during sleep and episodes of obstructed breathing while sleeping, strained or rattling breath, restless sleep, bad breath or dry oral mucosa, difficulty in swallowing, runny nose, ear infections, cervical lymphadenopathy, etc[2].

In certain individuals, swollen adenoids do not need intervention and a wait and watch policy is adopted. The most appropriate treatment is determined by the individual's age and size of pharyngeal tonsils. Corticosteroid nasal aerosol and antibiotics could

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potentially reduce the volume. Immune boosting measures and good hygiene can help prevent infections. Treatment depends on how severe the condition is[3]. However, it is common to be removed if they continue to cause problems despite medical management. One study by Manas Ranjhan et al indicates that 21% of nasal blockage in adults is due to hypertrophied adenoid. However, in patients with chronic tonsillitis, only 9% were linked to pharyngeal tonsil enlargement. Males are more frequently affected (70%) compared to females, possibly due to outdoor behaviors and more frequently exposed to environmental pollutants. The most commonly affected age group is 16–25 years (60%). Most cases of pharyngeal tonsil enlargement are linked to infections and allergies, including descending infections in 33.3% of cases, ascending infections in 20%, and allergic rhinitis in 30%.Sino nasal tumors, nonHodgkin's Lymphoma and HIV infections are occurring in 3.3% of cases. Therefore, adult pharyngeal tonsil enlargement should be addressed effectively and with utmost seriousness[4]. The occurrence of lymphoid tissue overgrowth in the adult nasopharynx, including the continuation of childhood pharyngeal tonsils, is linked to chronic inflammation. Interestingly, shrunken adenoidal tissue might begin to grow again due to infections and irritants. Hyperplasia can be due to compromised immunity[5]. Swollen pharyngeal tonsils can expand to almost the size of a ping pong ball, potentially obstructing airflow completely through posterior nasal airways. Pharyngeal tonsils can also block the nasal passages sufficiently to impact the sound of the voice[5].

In a few studies, adult patients with expanded pharyngeal tonsil tissue in the nasopharyngeal region were observed[4-6]. Different symptoms were reviewed. Imaging techniques such as CT, MRI, and positron emission tomography (PET) reveal that adenoid size significantly diminishes with age[6]. While adenoid tissue typically reduces during adolescence, adenoid enlargement can still occur in the general adult population. In this advanced era of medicine and with the invention of endoscopes, now it is possible to find enlarged adenoids without further investigations[7]. Finkelstein et al. observed that 30% of heavy smokers had obstructive adenoids, though another study found that the prevalence in smokers was not notably greater compared to males of the same age group. In Hamdan et al.'s study, the incidence of adenoid enlargement in adults with nasal obstruction was about 63.6%, as compared to 55.1% in the control group ($p = 0.007$). Research carried out by Yaldrim et al. in 2008 demonstrated etiology and the pathological features of adenoid enlargement in both adults and children[8]. Clinical and structural characteristics, along with associated ENT conditions, were documented in 40 adults and 23 children undergoing adenoidectomy due to obstructive adenoid enlargement.[9] Adult adenoid enlargement was linked to nasal septum deviation in 25% of cases. Adult pharyngeal tonsils exhibited persistent inflammatory cell infiltration and subsequent alterations, such as squamous metaplasia. Adenoid enlargement may serve as an indicator of HIV infection.[8]

In our study, we included adults with adenoid hypertrophy. We used endoscopic classification of adenoid gland hyperplasia by Parekh et al., 2006 which describes the grading system in grade 1-4. Grade one adenoid tissue not in contact with neighboring structures is classified as Grade 1, while Grade 2 refers to adenoid tissue that is in contact with Taurus tuberous, Grade 3 indicates adenoid tissue in contact with the vomer, while Grade 4 denotes adenoid tissue in contact with the soft palate at rest[8-10]. In our study, we included only patients with Grade 2 enlargement and we did regular endoscopic examinations of patients.

The methods of surgical removal of adenoids include conventional curettage method, coblation method and micro debrider method with endoscope. Endoscopic LASER, specifically, diode laser can be utilized for the removal of adenoids. Diode LASER are compact solid state devices that generate coherent light. They are designed to emit light across a wide range of wavelength from 980-1470. With the advancement of LASER techniques, we utilize diode laser ablation to remove adenoid tissues.

This article will describe how diode LASER can be used to ablate enlarged adenoids in adults and the benefits of using the LASER technique.

METHODOLOGY

IRB/ERC Approval:

This 2-year retrospective longitudinal study, was conducted at KRL Hospital Islamabad—a 300-bed tertiary care facility. Ethical approval was taken with reference ERC: KRL-HI-PUB-ERC/24/07.

Thirty adult patients over the age of 16 with adenoid enlargement classified as Grade 2 were examined. The study was carried out in the Department of Otolaryngology and Head & Neck Surgery from February 2019 to January 2022. Participants were selected based on the inclusion criteria of having Grade 2 adenoid enlargement confirmed by nasal endoscopy, without comorbidities, and provided authorization for participation. They were required to consent to all

necessary examinations and attend follow-up appointments. The study aimed to assess this specific patient group, with no prior comparative research available.

Individuals were excluded if they were under 16 years old, had comorbidities such as diabetes, hypertension, HIV, HBV, or HCV, had severely enlarged adenoids (Grade 3 or 4), did not consent to research participation, missed follow-up appointments, were pregnant or breastfeeding, or had other nasal diseases such as deviated nasal septum, polyps, or nasal growths. Initially, the individuals visiting the ENT outpatient clinic having enlarged adenoids were recruited and diagnosis was confirmed with nasal endoscopy. They were informed about diode laser technique and written consent was taken from them. Their preoperative symptoms and signs were recorded using the pro forma and their preoperative endoscopic findings were confirmed for enlarged adenoids occupying the posterior choana, also their grading was confirmed. Detailed history including duration of illness to complete symptoms was taken. A detailed history was obtained from these individuals concerning additional symptoms such as unilateral or bilateral nasal obstruction, sneezing, runny nose, nasal itching, headache, fever, anosmia, cough, and so forth. Significant medical history, occupation, and family history were also taken into consideration. Zero-degree nasal endoscopy was done to confirm the degree of obstruction. Adenoid enlargement was accessed with a grading system. Classification 1: adenoid tissue not touching neighboring structure; Classification 2: adenoid tissue touching Taurus tuberous; Classification 3: adenoids adjacent to the vomer; Classification 4: adenoids touching the soft palate.

It was useful to exclude patients with other diseases like nasal septum deviation, septal spur, nasal tumor, foreign object, nasal stone, and so forth. Once patient inclusion criteria were finalized we planned a patient for endoscopic surgical diode laser ablation under general anesthesia. A proper and standardized routine preoperative anesthesia assessment was done. Then post-operative patients were re-accessed by filling pro forma and recording the findings in terms of symptomatic relief, improvement in quality of life (well-being questionnaire 18 for obstructive sleep disorder), and post-operative endoscopic findings. Surgical duration was measured to be less than 20 minutes in laser assisted and bleeding was also less than 50 ml. Usually bleeding is 50 ml in adenoid with cold curettage system and time duration is more than 20 minutes. We followed the patients after one week, three weeks, six weeks and 1-year post surgery. Results were analyzed and incidence (frequency) of each result was calculated .

RESULTS

In this study we evaluated the effectiveness of diode laser ablation of adenoid tissue in terms of improvement in symptoms, shorter surgery duration, lesser blood loss than usually seen with cold curettage, and improvement in adult patient's quality of life. Among 30 patients, 24 were men and 6 were women. All patients had improvement in symptoms. Interestingly, those patients who had palatal issues, neck cervical issues, Eustachian tube dysfunctions, benefited more from this technique. Patients with cervical issues underwent the procedure without exerting the neck. Patients with palatal and Eustachian tube dysfunctions were benefited due to precise endoscopic ablation. Twenty-seven patients showed endoscopic improvement on follow ups. Three patients showed recurrence of tissue on endoscopy after one year of follow up. Over all surgical time was shorter in diode laser use as compared to average conventional system cold curettage which was average 20 minutes or more according to all published literature, but in diode laser it was reduced to between 5 and 15 minutes. Bleeding was also minimal as our study showed average 15-25 ml of blood loss as compared to cold methods that show 50 ml of blood loss on average.

Table 1: Age and Gender Distribution of Individuals with Adenoid Enlargement (n = 30)

ID	Age Bracket	Men	Women
1	16-25	12	3
2	26-35	6	2
3	36-45	6	1
	Total	24	6
	Percentage	80%	20 %

Table 2: Improvement in Symptoms of Patients in Adenoid Hypertrophy n =30

Symptoms n=30	Improve	No Improvement	% of Improvement
Nasal obstruction	30	0	100
Obstructive sleep apnea	24	6	80
Mouth breathing	23	7	76.6
Voice change	24	6	80
Nasal discharge filled nose	30	0	100
snoring	28	2	93.3

Table 3: Duration of Surgery in Patients of Adenoid Hypertrophy n =30

Time Duration	10-15 min	15-20 min
No of Patients n =30	n=21	n=9
Total	21	9
Percentage	70%	30%

Table 4: Blood Loss in Patient of Adenoid Hypertrophy n =30

Blood loss in cc	10-15 cc	15-20 cc	20-25 cc
No of pt. n =30	7	13	10
Percentage %	23.3%	43.3%	33.3%

Table 5: Endoscopic Grading Improvement (Endoscopic Grading by Parikh et al.)

Pre-operative Grading	n=30	
Post-operative Grading	Remained the same n=4	Grading improved no enlargement of adenoids identified n=26
Percentage	13.3%	86.6%

Pro Forma: Follow up was taken with a pro forma filled on the first week, three weeks, 6 weeks, and one year following the operation.

Name	
Serial no	
Age	
Diagnosis	
Surgical procedure	
QOL questionnaire 18 OSA	Filled yes …. No…….
Intraoperative blood loss in	
Ml	
Duration of surgery in minute	
Post-operative complications	
Improvement in symptoms	
Preoperative endoscopic findings	
Post-operative endoscopic findings	

Quality of life in patients improved as assessed by quality of life questionnaire for OSA 18 on follow up.

DISCUSSION

Adenoids are lymphoid tissues which are present at the posterior superior wall of nasopharynx. Hypertrophy of adenoids is also known as enlarged adenoids[1-5]. Hypertrophy can lead to hearing impairment, recurrent ear infections, rhinorrhea with discharge that can be mucopurulent, airway obstruction, and malposition of teeth.[1-6]

Adenoids were first given the name by Santorini as 'Lushka's tonsil' in 1724. Wilhelm described them as 'nasopharyngeal vegetation' in 1870. They are a part of the immune system in the human body.[2] Adenoid hypertrophy is common in children. They may have enlarged due to infections or allergies. Initially, it was diagnosed on x-ray lateral view nasopharynx but now with the advancements in endoscopic examination, adenoid hyperplasia is diagnosed on nasal endoscopy[3].

With the hypertrophy of adenoids, patients may have many clinical symptoms that can be extremely disturbing. It includes recurrent nose and sinus infections, acute otitis media, hearing difficulty, and most important of all, airway obstruction[3]. It can lead to facial cosmetic problems due to the malposition of teeth. Airway problems present with snoring, mouth breathing, dry mouth etc. Usually by the age of 6 years, adenoids shrink in size and resolve the symptoms on their own[4]. If they persist, they can lead to sleep apnea and nasal obstruction[5].

Permanent hypertrophy is the result of recurrent infection. Allergies can increase the intensity of symptoms. The majority of adult patients do not require treatment as their symptoms are not extremely disturbing or their allergies and infections settle down and patients become symptom free[6] However, many of the patients present with severe symptoms. Treatment depends upon the age of the patient, size of enlarged adenoid, intensity, and duration of symptoms. Medical treatment includes steroid sprays, anti-allergies and antibiotics. Good hygiene, immune boosting, and nasal irrigation also help in many of the patients[7].

However, if the symptoms persist or the size of the adenoids is obstructing the airway, surgical options are utilized[7]. Traditionally, adenoids can be removed with curettage method. With the advancement of science, we have other options like the utilization of laser in selective cases. Adult adenoids should be treated seriously and effectively as studies show they may have tumors in them[8,9].

Enlarged adenoids were confirmed with x-ray nasopharynx in the past but now with the endoscopic examination, it is easily diagnosed in the same clinical OPD setting.

Enlargement is assessed with a grading system. Few grading systems are used for identification. One generally used grading system by Clemens and Mcmurray includes obstruction of back of the nose by adenoids from 25%, 25-50%, 50-75%, and to 100 % based on percentage of posterior choana that is blocked by adenoid tissues.[7-10] Another grading system is the ACE grading system. A for Airway represents grade ranging from 0 to 4 based upon volume of the adenoid, relative to the size of the nasopharyngeal airway; C for choana ranging from 0-2, depending upon the relationship between adenoid to the vomer; and E for Eustachian tube ranging from 0-1 based upon whether the Eustachian tube opening was blocked.[8-10]

One of the most valid subjective classification is by the Parikh method, which includes Classifications 1 to 4 . Classification 1 includes adenoid tissue not in

contact with neighboring structure; Classification 2: pharyngeal tonsils touching Taurus tuberous; Classification 3: adenoids touching the vomer; and Classification 4: adenoids touching the soft palate.[7-10]

Multiple studies have been published so far for adenoid hyperplasia and the prognosis in adults Manas Ranjhan et al indicates that 21% of nasal blockage in adults is due to adenoid enlargement[4]. However, in patients with chronic tonsillitis, only 9% were linked to adenoid enlargement. Males are more frequently affected (70%) compared to females, possibly due to outdoor engagements in activities and increased exposure to pollutants. The most frequently affected age group is 16–25 years (60 %). Association of malignant sino nasal tumors, nonHodgkin's lymphoma and HIV infections are infrequent at 3.3 % each. Finkelstein et al found that 30% of heavy smokers had obstructive adenoids, while another study showed that the proportion of smokers was not notably greater compared to males of the same age group[8] Research by Yaldrim et al in 2008 revealed the causes and pathological features of hypertrophied adenoids in both adults and children[9]. Clinical and structural characteristics, along with related conditions, were documented in 40 adults and 23 children. Mayra Soares Ferreira et al in 2018 did a comparison study between conventional curettage, micro debrider, and coblation methods for removal of adenoids and in that, conventional technique was found to be better than all others[10-12]. Diode laser was used for tonsillectomy in many researches and the results were optimal. We utilized this technique for the removal of adenoids with endoscopic approach.

When patient inclusion criteria were finalized, we planned endoscopic surgical diode laser ablation under general anesthesia, then post-operative patients were reassessed by filling pro forma.

CONCLUSION

This article describes how diode LASER can be used to ablate enlarged adenoids and benefits of using the LASER technique. The results are interesting as improvement in obstructive symptoms, less bleeding during surgery, decreased surgical time are seen in patients with diode LASER adenoidectomy. Although we had limitations that only mild to moderately enlarged adenoids can be treated in this way, but in future, we can utilize this technique for advance grading also. This technique will open the utilization of diode LASER further in the field of ENT surgery. In the past, multiple studies have been published for removing tonsils with LASER, but for adenoids this is a parent research with no previous research published till now in preforming adenoidectomy with diode LASER.

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REFERENCES

1. Fagundes NCF, Gianoni-Capenakas S, Heo G, Flores-Mir C. Craniofacial features in children with obstructive sleep apnea: a systematic review and meta-analysis. J Clin Sleep Med. 2022 Jul 1;18(7):1865-75.
2. Paramaesvaran S, Ahmadzada S, Eslick GD. Incidence and potential risk factors for adenoid regrowth and revision adenoidectomy: a meta-analysis. Int J Pediatr Otorhinolaryngol. 2020 Oct;137:110220.
3. Alaqeedy AA, Al-Ani RM, Rashid RA. Coblation versus diode laser tonsillectomy: a comparative study. Iran J Otorhinolaryngol. 2022 Mar;34(121):113-20.
4. Asnaashari M, Roudsari MB, Shirmardi MS. Evaluation of the Effectiveness of the Carbon Dioxide (CO2) Laser in Minor Oral Surgery: A Systematic Review: CO2 laser and minor oral surgery. J Lasers Med Sci. 2023;14:e44-48.
5. McGuire SR, Doyle NM. Update on the safety of anesthesia in young children presenting for adenotonsillectomy. World J Otorhinolaryngology Head Neck Surg. 2021 Jul;7(3):179-85.
6. Malas M, et al. Comparison of the efficacy and safety of conventional curettage adenoidectomy with those of other adenoidectomy surgical techniques: a systematic review and network meta-analysis. J Otolaryngol Head Neck Surg. 2023 Mar 4; 52:21.
7. Lawal J, Dadi HI, Sanni R, Shofoluwe NA. Prevalence of revision adenoidectomy in a tertiary otorhinolaryngo logy centre in Nigeria. J West Afr Coll Surg. 2021 Jan-Mar;11(1):23-8.
8. Mosaddad SA, Namanloo RA, Aghili SS, Maskani P, Alam M, Abbasi K, et.al. Photodynamic therapy in oral cancer: A review of clinical studies. Med Oncol. 2023;40(3):91-95.
9. Lady Aqnes KL, M Ilham Aldika AM, Budi Utomo B, Aditiawarman A. Risk Factor of Preeclampsia in a Secondary Indonesian Hospital: A Case-Control Study. Ind J Forensic Medicine & Toxicol. 2021;15(3):3474-82.
10. Baugh RF, et al. Clinical practice guideline: tonsillectomy in children. Otolaryngol Head Neck Surg. 2011 Jan;144(1 Suppl): S1-30.
11. Ferreira MS, et al. Comparison of three different adenoidectomy techniques in children: has the conventional technique been surpassed? Int J Pediatr Otorhinolaryngol. 2018 Jan.
12. Ahmed Z, et al. Adenoid hypertrophy diagnosis and treatment: the new S2K guideline. HNO. 2023 Aug.