

PERCEPTIONS OF THE LANAP Protocol

SURVEY RESULTS DEMONSTRATE CLINICIANS' SATISFACTION AND PERCEPTION OF TREATMENT SUCCESS WHEN UTILIZING THE LASER ASSISTED NEW ATTACHMENT PROCEDURE IN PERIODONTAL CARE

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Data is lacking relative to clinician satisfaction when utilizing the Laser Assisted New Attachment Procedure (LANAP) for treating periodontitis. Independent clinical outcomes of treatment success using LANAP are difficult to publish due to the fact most LANAP providers are independent dentists or periodontists working in small private clinics.

Among the factors that restrict an abundance of peer reviewed articles are the challenges of convening an institutional review board, statistical support, and the ethics of withholding treatment for study subjects diagnosed with periodontitis.

Accordingly, the study presented here surveyed trained LANAP providers about their satisfaction levels — as well as perceptions of treatment success — when utilizing the LANAP protocol in private practice. A series of multiple-choice questions, agreed upon and developed by the

authors, were emailed to trained LANAP providers on five occasions over seven months. The questions were designed to gauge clinicians' satisfaction with the LANAP protocol. These were subdivided into categories that included experience levels with the prod-

uct (i.e., years of use), reasons for purchasing the laser used in the procedure (PerioLase MVP-7, Millennium Dental Technologies), and the indications for clinical use. The survey further queried providers about patients' perceived satisfaction with the LANAP protocol over conventional periodontal therapies, such as scaling and root planing (SRP) and pocket reduction/guided tissue regeneration (GTR). It also asked about clinical results, patient comfort levels post-LANAP treatment, and whether clinicians would recommend the LANAP protocol to colleagues.

The data was compiled via a standardized intake portal (Survey Monkey) and exported to a Microsoft Excel file for statistical analysis at Rutgers School of Dental Medicine. The descriptive statistics were calculated and their values are presented here. Chi-square tests were used to compare the responses between periodontists and general dentists. Data analysis was conducted using statistical software (SAS version 9.4, SAS Institute). The significance level (two-sided) was set to 0.05 for all comparisons.

Of 2043 surveys sent, 512 respondents returned completed surveys, with a response rate of 25% (\pm 4%) at a 95% confidence level.

DISCUSSION

The widespread prevalence of periodontitis, as well as its significant role in oral-systemic health,^{1,2} makes successful treatment of periodontal disease critically important. If a treatment is not predictable and successful, most clinicians will

EDITOR'S NOTE: Due to the nature of this survey data and analysis, the following content has not been peer reviewed.

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seek a more predictable and successful approach. Marketing research has demonstrated a measurable difference between what people state versus their thoughts about a new product.³ Logic also suggests that an independent, confidential user-satisfaction survey would generate objective feedback relative to the clinician's actual perception of treatment success and satisfaction with the treatment modality, specifically the LANAP protocol.

The ethical balance that drives decisions to adopt new procedures or technologies is clearly apparent in the survey responses (Question 3). The top three points of reference that the respondents use before purchasing a product or adding a therapy protocol are balanced between wanting to ensure the efficacy of any new procedure as well as their ability to effectively implement and execute it.

OVERVIEW OF SURVEY FINDINGS

Q1. How long have you been trained in the LANAP protocol?	
70% of respondents have been trained in the use of LANAP for more than five years	
Q2. What are your top three points of reference before purchasing a product or adding a treatment option?	
Training and support	78.3%
Scientific literature and evidence-based studies	77.1%
U.S. Food and Drug Administration clearance	49.0%
Q3. What were your primary reasons for investing in LANAP technology? Choose all that apply.	
Perceived better patient care	71.9%
Decreased pain versus standard periodontal nonsurgical/surgical therapy	71.3%
Ability to offer patients all viable treatment options	60.7%
Patient acceptance and projected compliance	57.4%
Attract new patients/grow the practice	53.1%
Offer a new service	52.0%
Colleague recommendation/experience	42.8%
Increase income	31.6%
Peri-implantitis treatment option (LAIIP protocol)	31.3%
Collaboration with my peers and their successes relative to the LANAP protocol	23.6%
Clinical results guarantee	18.0%
Did not want to be left behind	16.6%
Ability to do full mouth treatment in one visit	14.3%
None of the above	1.0%
Q4. Which of the following best describes your practice?	
Periodontist	66.4%
General dentist	33.4%
Prosthodontist	0.2%
Oral surgeon	0.0%
Other	0.0%
Q5. What did you do with patients who had 6 mm pockets or greater prior to incorporating the LANAP protocol? Choose all that apply.	
Refer to a specialist	25.4%
SRP with subgingival or oral systemic antibiotics	19.1%
SRP alone	15.8%
Extraction/bridge (or something else)	5.3%
Extraction/implant	4.9%
Alternate treatment plan	2.1%
Nothing	0.4%

DISCOVER MORE ONLINE: See the Clinical eLookbook version of this article, available at DecisionsInDentistry.com/millennium-lookbook, for the unabridged survey data and further analysis.

The incorporation of patient-reported outcome measures (PROMs) as a key factor in assessing treatment options is gaining traction.^{4,5} Within implant dentistry, PROMs are becoming a standard part of developing treatment studies and protocols, and are likely to be included in future assessment of clinical studies. The top reasons for investing in LANAP technology center on the patient experience and increasing treatment options for periodontal disease. As PROMs relate to this study, respondents ranked the patient experience with the LANAP protocol overwhelmingly positive in the areas of:

- Willingness to accept treatment
- Comfort level postoperatively
- Root sensitivity postoperatively
- Overall patient satisfaction
- Willingness to refer others for treatment

Compared with standard GTR protocols (as measured by pocket reduction, reduction of bleeding on probing and suppuration, with enhanced occlusal stability), more than 79% of LANAP clinicians have found this

Q6. Before you added the LANAP protocol, what would you do when presented with a case of moderate periodontitis (5 to 7 mm probing depth/3 to 4 teeth)?	
SRP alone	13.3%
SRP with subgingival antibiotics or oral systemic antibiotics	10.7%
Apically positioned flaps with osseous surgery	52.2%
GTR	10.1%
Extraction	0.0%
Implant	0.3%
Nothing	0.0%
Refer to a LANAP clinician	0.3%
Other	13.0%
Q7. After you integrated the LANAP protocol, what would you typically do when a case of moderate periodontitis (5 to 7 mm probing depth/3 to 4 teeth) presented in your office?	
SRP	9.1%
Apically positioned flaps with osseous surgery	6.0%
GTR	0.2%
Extraction	0.2%
Implant	0.0%
Nothing	0.0%
LANAP treatment	75.1%
Other	9.4%
Q8. Since incorporating the LANAP protocol into your practice, relative to attempting to salvage more teeth compared to traditional flap access surgery:	
I am treatment planning more conservatively (saving more teeth)	75.2%
I am treatment planning the same	24.6%
I am treatment planning less conservatively (removing more teeth)	0.2%
Q9. On average, how would you describe typical disease recurrence rates > 1 year post-LANAP treatment compared to flap access surgery?	
After LANAP treatment, disease recurrence is about the same as disease recurrence rates with flap access surgery	46.4%
After LANAP treatment, disease recurrence is less than disease recurrence rates with flap access surgery	41.6%
After LANAP treatment, disease recurrence is higher than disease recurrence rates with flap access surgery	12.1%

modality provides an equally predictable therapeutic outcome relative to periodontal regeneration. In addition, 41.7% of survey respondents state that LANAP is a more predictable procedure (Question 15). The reproducibility experienced by a significant number of LANAP clinicians, irrespective of years performing the protocol, suggests the bone fill visible in published LANAP case reports is a routine result. As the procedure has consistently yielded favorable outcomes, 71.7% of the respondents would elect to treat a previously treated LANAP patient with laser therapy (Question 17).

The survey showed statistically significant differences between general dentists and periodontists in the categories of reasons for purchase, points of

reference for product purchase, and perceived disease recurrence rates. Despite their differing reasons for adding the LANAP protocol, both groups had remarkably similar satisfaction ratings of the results of the LANAP protocol, increases in production, and its impact on a positive patient experience.

Prior to purchase, 53.8% of general practitioners include return on investment as a key investment factor, as compared to 35.4% of periodontists. When financial return on a treatment is a key reason for incorporating it into practice, it stands to reason that clinician satisfaction will be influenced by both clinical results and financial return. General dentists ranked "perceived better patient care" as their No. 1 reason for adopting the LANAP protocol (84.2%), while periodontists ranked it third (69.0%). Colleague recommendation and "not being left behind" are much more important to periodontists than general dentists.

Both segments ranked training and support as a key point of reference in purchase decisions, and both also valued support in the scientific literature. While neither segment listed organizational reviews as a top reason for product adoption, these reviews are held in higher esteem by periodontists than general dentists (11.7% versus 4.7%, respectively). The American Academy of Periodontology released a statement on lasers in 2018,⁶ and LANAP research was not included in this document. In light

Q10. What has been your experience regarding acceptance of retreatment by patients who have had traditional osseous surgery since adding the LANAP protocol?

Recall patients who previously had traditional surgery are more likely to accept LANAP/laser assisted periodontal therapy (LAPT) compared with traditional flap surgery	92.1%
Recall patients who previously had traditional surgery are less likely to accept LANAP/LAPT treatment compared with traditional flap surgery	0.0%
Patients do not have a modality preference for retreatment	3.8%
Not sure	4.0%

Q11. Since adding the LANAP protocol, what has been your experience regarding acceptance of retreatment by patients who have previously had LANAP treatment?

Recall patients who previously had LANAP treatment are more likely to accept LANAP/LAPT therapy compared with traditional flap surgery	80.5%
Recall patients who previously had LANAP treatment are less likely to accept LANAP/LAPT retreatment compared with traditional flap surgery	3.9%
Patients do not have a modality preference for retreatment	5.1%
Not sure	10.6%

Q12. How would you respond to the following statements?

	Agree (%)	Neutral (%)	Disagree (%)
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	Agree (%)	Neutral (%)	Disagree (%)
Compared to SRP, LANAP treatment is more effective	87.0	5.2	7.7
I am saving more hopeless teeth with LANAP treatment and extracting less teeth than with conventional periodontal procedures	76.2	9.3	14.6
I am recording more shallow probing depths at one year of < 3 mm with LANAP therapy	70.6	20.7	8.7
Compared to apically positioned flaps with osseous surgery, patients prefer LANAP treatment	91.8	3.2	5.0
The LANAP protocol has improved my assessment and treatment of mobile teeth via continual reevaluation of occlusal therapy (as needed)	83.3	9.0	7.6
Compared to GTR, LANAP results are more consistent	54.6	29.7	15.7
Patients prefer to keep their teeth	94.7	1.1	4.1
Compared to osseous surgery, LANAP results are more consistent	51.6	28.6	19.8
I am more confident in treating medically compromised patients using the LANAP protocol versus other traditional surgical periodontal treatment protocols	86.8	6.4	6.9
LANAP treatment results in less gingival marginal recession than SRP	54.3	25.0	20.6
LANAP treatment results in less gingival marginal recession than osseous surgery	93.8	1.6	4.6
LANAP treatment eradicates bacteria better than SRP	88.2	6.5	5.3
LANAP treatment eradicates bacteria better than osseous surgery	70.2	17.9	11.8
LANAP treatment is easier to perform than traditional surgery	82.1	9.4	8.5
I treat more patients because I offer the LANAP protocol	78.2	13.6	8.2
Offering LANAP treatment has increased my production	74.3	15.8	10.0
My office vibe feels different after adding the LANAP protocol	63.7	24.2	12.1
I feel increased personal satisfaction as a healthcare professional after adding the LANAP protocol	85.0	7.2	7.8

Q13. Compared to osseous surgery, how would you rank the following results with the LANAP protocol?

	More Effective (%)	Equally Effective (%)	Less Effective (%)
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	More Effective (%)	Equally Effective (%)	Less Effective (%)
Resolution of gingival inflammation and associated reduction of gingival index (reduction of probing depths and bleeding on probing)	65.7	26.9	7.4
Less marginal gingival recession with LANAP	97.0	2.3	0.7
Bone fill/regeneration	69.5	22.1	8.4
Pocket reduction	50.4	32.2	17.3
Mobility reduction	76.1	22.0	1.9
Stability of results (> 1 year)	57.8	31.3	11.0
Patient satisfaction with results	94.3	4.4	1.4
Ease of procedure for the clinician	89.7	8.3	2.1
Patient comfort level postoperatively	96.8	2.5	0.7
Significantly less root sensitivity postoperatively	92.4	6.6	1.0

Q14. Compared to osseous surgery, how would you rank the patient experience with the LANAP protocol?

	Positive (%)	Equal (%)	Less Positive (%)
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	Positive (%)	Equal (%)	Less Positive (%)
Increased willingness to accept treatment	95.2	4.1	0.7
Patient comfort	96.5	3.0	0.4
Patient comfort level postoperatively (pain scale of 1 to 10)	97.5	2.1	0.4
Patients more likely to be compliant with home care (personal plaque control)	64.5	33.3	2.1
Keeping periodontal maintenance appointments	60.5	37.9	1.7
Root sensitivity postoperatively	89.4	9.7	0.9
Need for postoperative opioids	87.3	8.0	4.7
Patients report fewer postoperative complications	94.0	5.3	0.7
Overall patient satisfaction posttreatment	95.2	3.9	0.9
Patient likelihood to refer others for treatment	90.3	9.0	0.7

Q15. In your clinical experience, please choose the answer that best completes the sentence: "Comparing osseous regeneration using biologics/membranes to that of the LANAP protocol ..."

LANAP is a more predictable outcome of regeneration/bone fill	41.7%
There is no difference in the predictability of regeneration/bone fill	36.5%
LANAP is a less predictable outcome of regeneration/bone fill	21.8%

of this, one of the reasons why this survey was conceptualized was to add to the dental literature relative to the efficacy of LANAP treatment and the consistently favorable nature of LANAP in regard to PROMs.

Significant differences in the perceived disease recurrence rates exist between various practitioners. The survey revealed 28.6% of periodontists report that disease recurrence rates after LANAP treatment were less than recurrence rates with flap surgery, while general dentists reported these recurrence rates at 70.8%. In addition, 55.6% of periodontists said disease recurrence rates were similar between LANAP and flap surgeries; however, only 25.6% of general dentists indicated the same. These differences could be based on subjective measurement, differences in diagnostic criteria, or understanding of root morphology based on periodontal residency training and flap surgical experience.

Differences between specialties are also noted in shallow probing depths at one year, consistency of results, ease of performance, and personal satisfaction. General dentists believe they are saving more hopeless teeth and feel increased personal satisfaction after adding the LANAP protocol, as compared to periodontists (87% versus 71%, and 95% versus 80%, respectively). However, both measurements exhibit inarguably positive responses. Both segments report similar, positive numbers for patients wanting to retain their teeth, an increase in production after adding LANAP as a treatment option, and a “different vibe” in their office.

Specialty training or degree of experience in performing the LANAP protocol does not influence patients’ acceptance rates or postoperative experience. Cumulatively, more patients accept this periodontal treatment and are more satisfied postoperatively — which makes this a successful treatment modality, both subjectively and clinically. If the goals of treatment are greater case acceptance and successful outcomes, these are achieved more often when LANAP is added as a treatment option.⁷

It is important to stress that clinical endpoints for success with the LANAP protocol are similar to that of flap surgery from a periodontal assessment perspective. Pocket reduction, including decreases in probing depths, bleeding upon probing, tooth mobility and fremitus, is the ultimate long-term goal. LANAP therapy is either a closed or semi-closed surgical procedure. The authors, five of whom are periodontists with extensive surgical experience, believe that knowledge of root morphology is critical to success, as tooth roots have known concavities, various root trunk morphologies and furcation locations based on their position in the arch and which jaw is being treated. Thus, extensive knowledge of root anatomy, along with meticulous SRP and definitive occlusal therapy (i.e., mobility and fremitus reduction), are key to successful outcomes.

Lastly, long-term preventive periodontal maintenance is needed to preserve the positive results of treatment. Knowledge of when it is necessary to retreat an area with either LANAP or a surgical protocol (as necessary) should be part of any periodontal maintenance protocol. It is this combination of inflammatory and occlusal control, followed by a comprehensive preventive periodontal maintenance program individualized for each patient, that ultimately spells success in all periodontal case types (I through IV), and for all periodontal nonsurgical and surgical protocols.

As a part of a comprehensive periodontal treatment plan, LANAP therapy yields consistent, predictable results that are at least comparable with other surgical modalities over time.⁸ The majority of survey respondents (53.6%) have performed LANAP treatment for a minimum of seven years. Of these clinicians, 87.9% indicated that LANAP results were equally stable or more stable than osseous surgery.

Q16. What is your response to the following statements?	Agree	Neutral	Disagree
LANAP costs less in materials compared to traditional osseous/GTR/guided bone regeneration (GBR) surgery	79.5%	12.2%	8.3%
LANAP treatment takes less time than traditional osseous/GTR/GBR surgery	69.4%	15.7%	15.0%
Patients are more willing to accept LANAP treatment than traditional osseous/GTR/GBR surgery	90.7%	6.6%	2.7%
LANAP has equal or better tissue results compared to traditional osseous/GTR/GBR surgery	68.5%	20.7%	10.7%


Q17. When retreating a previously LANAP-treated case, which of the following is your first approach?	
Localized laser treatment	71.7%
Surgical flap elevation for access to debridement	16.3%
Other	8.8%
GTR	3.2%

Q18. On a scale of 1 to 10, would you recommend the LANAP protocol?	
The respondents gave an average rating of 8.8 (SD = 3.7) for a recommendation of the LANAP protocol to their colleagues	

Q19. How would you rate the following patient experiences with the LANAP protocol compared to traditional periodontal treatment modalities?	Positive (%)	Equal (%)	Less Positive (%)
Preoperative	74.8	24.5	0.7
Perceived willingness to accept treatment	93.5	6.3	0.2
Treatment acceptance	91.5	7.3	1.1
During surgery	85.5	14.1	0.4
Pain	94.4	4.9	0.7
Keeping recall appointments	57.6	41.9	0.4
Home care	55.3	42.7	2.1

CONCLUSION

LANAP clinicians are highly satisfied with their perception of treatment success, independent of their specialty or experience with the protocol. The LANAP treatment is cost effective, has a higher patient acceptance rate, yields better tissue response, results in equal or more consistent regeneration, and increases the professional satisfaction of the clinician. Patients are happier, and report significantly reduced postoperative discomfort and increased motivation in maintaining their oral health with more diligent and conscientious plaque control (i.e., disease control).

Although these survey results are promising, randomized controlled trials are needed to further substantiate these findings. 

REFERENCES

1. Beck JD, Phillips KH, Rao SS. Periodontal disease and systemic interactions (periodontal medicine): current epidemiological evidence. *Curr Oral Health Rep*. 2020;7:54–61.
2. Seitz MW, Listl S, Bartols A, et al. Current knowledge on correlations between highly prevalent dental conditions and chronic diseases: an umbrella review. *Prev Chronic Dis*. 2019;16:E132.
3. The way the brain buys; the science of shopping. *The Economist*. 2008;389:105–107.
4. Feine J, Abou-Ayash S, Al Mardini M, et al. Group 3 ITI Consensus Report: patient-reported outcome measures associated with implant dentistry. *Clin Oral Implants Res*. 2018;29(Suppl 16):270–275.
5. Rosen EB, Donoff RB, Riedy CA. U.S. dental school deans’ views on the value of patient-reported outcome measures in dentistry. *J Dent Educ*. 2016;80:721–725.
6. Mills MP, Rosen PS, Chambrone L, et al. American Academy of Periodontology best evidence consensus statement on the efficacy of laser therapy used alone or as an adjunct to non-surgical and surgical treatment of periodontitis and peri-implant diseases. *J Periodontol*. 2018;89:737–742.
7. Miller PD, McEntire ML, Marlow NM, Gellin RG. Evidenced-based scoring index to determine the periodontal prognosis on molars. *J Periodontol*. 2014;85:214–225.
8. Tilt LV. Effectiveness of LANAP over time as measured by tooth loss. *Gen Dent*. 2012;60:143–146.