Natural Resources for Human Health
eISSN: 2583-1194

Original Research

Received 26 May 2026
Revised 27 June 2026
Accepted 11 July 2026

Natural Resources for Human Health 2026, Vol. 6 (12s): 1334–1341

KEYWORDS:
Pediatric frenectomy, Ankyloglossia, Laser frenectomy, Scalpel frenectomy, Oral function

Pediatric Frenectomy Outcomes in Speech and Oral Function

Dr. Pavithran P[1], Dr. Deshana Shaha[2], Dr. Rinky Kukreja[3], Dr. Richa Acharya[4], Dr. Pooja Paresh Mundada[5], Dr. Ameen Siddiqui[6]

[1,2] Post Graduate Student in the Department of Pediatric And Preventive Dentistry, Pacific Dental College And Research Centre, Udaipur (Raj).
[3]Professor & Head in the Department of Pediatric And Preventive Dentistry, Pacific Dental College And Research Centre, Udaipur (Raj).
[4]Senior Lecturer In The Department Of Oral And Maxillofacial Surgery, College of Dental Science And Research Centre, Bopal , Ahmedabad (Gujarat).
[5]Assistant Professor In The Department of Oral And Maxillofacial Surgery, Bharti Vidyapeeth (Deemed to be University) Dental College and Hospital, Sangli (Maharashtra).
[6]Reader in the Department of Pedodontics And Preventive Dentistry, Shri Balaji institute of dental sciences mowa raipur C.G, Raipur (Chhattisgarh).
*Corresponding Author: Dr. Pavithran P 1
(3rd Year Post Graduate Student in the Department of Pediatric And Preventive Dentistry)
Email
Pavithran07051998@gmail.com
deshanashaha2015@gmail.com
dr.rinky.kukreja@gmail.com
richa.acharya18@gmail.com
drpoojasarda894@gmail.com
drameensidd@gmail.com

ABSTRACT: Restrictive lingual or labial frenula in children may compromise tongue mobility and contribute to difficulties in speech, feeding, mastication, swallowing, and oral hygiene. Scalpel and laser frenectomy are commonly used treatment modalities, but their comparative functional outcomes require further evaluation thus the aim of our study was to compare speech and oral functional outcomes following pediatric frenectomy performed using scalpel versus laser techniques among 00 children aged 3–12 years undergoing frenectomy at a tertiary-care hospital. Patients were divided into a scalpel group (n = 50) and a laser group (n = 50). Intraoperative variables, postoperative pain, wound healing, tongue mobility, speech and oral-function outcomes, parent satisfaction, and recurrence were assessed during follow-up. We have found that, the laser group demonstrated significantly shorter operative time, reduced intraoperative bleeding, and lower suturing requirement than the scalpel group ($p<0.001$). Postoperative pain scores at 24 hours and day 7, analgesic requirement, and wound-healing scores were significantly better in the laser group ($p\leq0.001$). At 1 month, oral-function scores and parent satisfaction were significantly higher in the laser group ($p=0.007$ and $p<0.001$, respectively). Both groups showed improvement in tongue mobility, speech, feeding, mastication, and swallowing; however, between-group differences in these outcomes and 3-month recurrence were not statistically significant.

Natural Resources for Human Health
eISSN: 2583-1194

Thus, we have come to conclude that, both techniques were effective; however, laser frenectomy provided superior intraoperative control, reduced postoperative discomfort, improved early healing, and greater parental satisfaction.

INTRODUCTION

The oral frenula are mucosal attachments that help stabilize the lips, cheeks, and tongue. A restrictive lingual frenulum, commonly termed ankyloglossia or tongue-tie, may limit tongue movement, while abnormal labial frenular attachment may contribute to functional, periodontal, or orthodontic concerns in selected children (American Academy of Pediatric Dentistry., 2022). Restricted tongue mobility has been associated with difficulties in feeding, swallowing, oral hygiene, and articulation (Ynurrigarro-Medina et al., 2026). However, the clinical effect varies among children and should be assessed functionally rather than on anatomical appearance alone. Moreover, speech-related concerns are particularly important in older children because limited elevation and movement of the tongue may interfere with production of certain lingual consonants (Suresh et al., 2026). Nevertheless, the relationship between ankyloglossia and speech disorders remains debated, because speech assessment can be subjective and some children compensate effectively despite a restrictive frenulum (Wanget al., 2022). Therefore, assessment by a speech-language professional, along with evaluation of tongue mobility and oral function, is valuable before and after surgical intervention.

Frenectomy may be performed using the conventional scalpel technique or laser technology. Conventional scalpel frenectomy is widely used and effective but may involve greater intraoperative bleeding, suturing, and postoperative discomfort (Yadav et al., 2019). Laser-assisted frenectomy has been reported to provide improved hemostasis, shorter operative time, reduced intraoperative and postoperative pain, fewer postoperative complications, and less need for sutures (Lebret et al., 2021). However, its effectiveness in improving longer-term speech and oral function compared with scalpel surgery requires further clinical evaluation.

Henceforth, the available literature indicates that frenectomy can improve selected functional outcomes, but evidence regarding speech improvement and the superiority of one technique over another remains limited and inconsistent. Therefore, the present study was undertaken at a tertiary-care hospital to compare speech and oral functional outcomes following pediatric frenectomy performed using scalpel and laser techniques, while also evaluating perioperative and postoperative outcomes in 100 children.

Research Objectives

1. To evaluate speech and oral functional outcomes in pediatric patients following frenectomy.
2. To compare improvement in tongue mobility between scalpel and laser frenectomy groups.
3. To compare postoperative pain, intraoperative bleeding, operative time, and requirement for suturing between the two techniques
4. To assess postoperative wound healing and complications following scalpel and laser frenectomy.
5. To compare improvement in feeding, mastication, swallowing, oral hygiene, and speech-related difficulties after treatment.
6. To evaluate parent/guardian satisfaction with treatment outcomes in both groups.
7. To assess the incidence of reattachment, recurrence, or need for repeat intervention during follow-up.

LITERATURE REVIEW

Ankyloglossia is a congenital condition in which a short, thick, or restrictive lingual frenulum limits tongue mobility (Ynurrigarro-Medina et al., 2026). In children, reduced tongue elevation and protrusion may be associated with functional concerns such as impaired feeding, swallowing, oral clearance, oral hygiene, and articulation difficulties (Ynurrigarro-Medina et al., 2026). However, anatomical appearance alone does not reliably indicate functional impairment. The American Academy of Pediatric Dentistry recommends individualized assessment based on functional limitation and clinical symptoms before considering frenulum treatment (American Academy of Pediatric Dentistry., 2022). Speech is a relevant but debated indication for pediatric frenectomy. Certain consonants may be difficult for children with restricted tongue-tip movement, but

many children compensate and develop normal speech (Carnino et al., 2024). A systematic review found that improvement in non-breastfeeding outcomes included speech, articulation, feeding, and social function (Chinnadurai et al., 2015).

Conversely, a not more recent systematic review and meta-analysis reported an overall improvement in speech articulation after frenectomy, although speech outcomes were frequently based on clinician or parent assessment rather than uniform objective tools (Carnino, et al., 2024). Conventional scalpel frenectomy is a well-established technique that allows complete release of the restrictive frenulum but may involve bleeding, suturing, and postoperative discomfort. Laser-assisted frenectomy, particularly diode and CO2 laser procedures, has gained popularity in pediatric practice because it can provide hemostasis, facilitate a relatively bloodless operative field, reduce the need for sutures, and potentially improve patient acceptance (Komori et al., 2017; Riek and Vitruk., 2018).). A review of treatments in preschool- and school-age children reported that laser procedures were often associated with reduced pain and improved healing, but also emphasized that no universal diagnostic classification or standard indication for treatment currently exists (Khosraviani et al., 2019). Moreover, comparative findings should be interpreted carefully because results may differ by laser wavelength, power settings, surgeon experience, patient age, frenulum type, adjunctive myofunctional therapy, and outcome-assessment method. A study comparing parental perceptions after CO2-laser and scalpel frenectomy in children aged 2–6 years found higher parental-reported improvement and satisfaction at one month in the laser group, although postoperative pain results did not uniformly favor laser (Ginini et al., 2023). Similarly, systematic reviews have stressed that post-frenectomy exercises or myofunctional rehabilitation may influence tongue mobility and functional recovery, making them important variables to document in clinical research (Gonzalez Garrido et al., 2022).

Hence, the literature supports the potential functional benefit of frenectomy but also identifies an important evidence gap. There were only few adequately powered prospective comparative studies in past which had evaluated speech, tongue mobility, feeding, mastication, swallowing, and parent satisfaction together in pediatric patients. There is also inconsistency in comparing scalpel and laser methods using standardized perioperative and longer-term functional outcomes. Therefore, the present tertiary-hospital study comparing 50 scalpel and 50 laser frenectomy patients is relevant for determining whether a laser technique offers measurable advantages in speech and oral function in addition to perioperative comfort and healing.

METHODOLOGY

A prospective comparative clinical study was conducted among 100 pediatric patients requiring frenectomy at a tertiary-care hospital. The patients were divided into two equal groups: Group I underwent conventional scalpel frenectomy (n = 50), while Group II underwent laser frenectomy (n = 50). Children aged 3–12 years with clinically diagnosed restrictive lingual or labial frenulum associated with speech difficulty, impaired tongue mobility, feeding or mastication difficulty, swallowing difficulty, or other oral functional limitations were included after obtaining written informed consent from parents or legal guardians. Children with systemic diseases, bleeding disorders, uncontrolled medical conditions, acute oral infection at the surgical site, previous frenectomy, craniofacial syndromes, neuromuscular disorders, developmental conditions affecting speech independently, or incomplete follow-up records were excluded. Baseline demographic and clinical variables, intraoperative parameters, postoperative pain, bleeding, wound healing, tongue mobility, speech improvement, oral functional outcomes, parent satisfaction, and recurrence or reattachment were recorded at scheduled follow-up visits. Data were entered into Microsoft Excel and analyzed using SPSS software; continuous variables were expressed as mean ± standard deviation and categorical variables as frequency and percentage. The Shapiro–Wilk test was used to assess normality of data, and intergroup comparisons were performed using the independent-samples t-test or Mann–Whitney U test for continuous variables and the chi-square test or Fisher's exact test for categorical variables. Within-group preoperative and postoperative comparisons were performed using the paired t-test or Wilcoxon signed-rank test, and a p-value of less than 0.05 was considered statistically significant.

RESULTS

*VARIABLE	SCALPAL GROUP	LASER GROUP	P- VALUE
Age (years), mean ± SD	7.42 ± 2.11	7.28 ± 2.06	0.74
Male, n (%)	28 (56.0)	27 (54.0)	0.84

Female, n (%)	22 (44.0)	23 (46.0)	0.84
Lingual frenulum, n (%)	38 (76.0)	39 (78.0)	0.81
Labial frenulum, n (%)	12 (24.0)	11 (22.0)	0.81
Baseline tongue-mobility score, mean ± SD	5.10 ± 1.24	5.18 ± 1.19	0.74
Baseline oral-function score, mean ± SD	4.86 ± 1.10	4.92 ± 1.08	0.78

TABLE 1 : BASELINE CHARACTERISTIC

Table 1 showed that, the mean age was 7.42 ± 2.11 years in the scalpel group and 7.28 ± 2.06 years in the laser group, with no statistically significant difference between the groups (p=0.74). The gender distribution was also similar, with males comprising 56.0% and 54.0% of the scalpel and laser groups, respectively (p=0.84). Lingual frenulum involvement was observed in 76.0% of patients in the scalpel group and 78.0% in the laser group, while labial frenulum involvement was observed in 24.0% and 22.0% of patients, respectively. So, these differences were not statistically significant (p=0.81). Furthermore, baseline tongue-mobility scores (5.10 ± 1.24 vs. 5.18 ± 1.19; p=0.74) and oral-function scores (4.86 ± 1.10 vs. 4.92 ± 1.08; p=0.78) were statistically comparable. Thus, both groups were well matched before treatment, allowing postoperative outcomes to be compared reliably between scalpel and laser frenectomy techniques.

OUTCOME	SCALPAL GROUP	LASER GROUP	P- VALUE
Operative time (minutes), mean ± SD	15.24 ± 3.86	8.62 ± 2.41	<0.001
Intraoperative bleeding score, mean ± SD	2.36 ± 0.64	0.74 ± 0.45	<0.001
Requirement of sutures, n (%)	46 (92.0)	4 (8.0)	<0.001
Procedure completed without interruption, n (%)	47 (94.0)	49 (98.0)	0.31

TABLE 2 : INTRA-OPERATIVE OUTCOMES

Table 2 showed that, the mean operative time was significantly lower in the laser group (8.62 ± 2.41 minutes) compared with the scalpel group (15.24 ± 3.86 minutes), and this difference was statistically significant (p<0.001). Similarly, the mean intraoperative bleeding score was significantly lower in the laser group (0.74 ± 0.45) than in the scalpel group (2.36 ± 0.64) (p<0.001). Sutures were required in 92.0% of patients in the scalpel group, whereas only 8.0% of patients in the laser group required suturing, showing a highly significant difference (p<0.001). Although a slightly higher proportion of procedures was completed without interruption in the laser group (98.0%) than in the scalpel group (94.0%), this difference was not statistically significant (p=0.31). Overall, laser frenectomy was associated with a shorter operative time, reduced intraoperative bleeding, and substantially lower suturing requirement compared with conventional scalpel frenectomy, while both techniques showed similarly high procedural completion rates.

OUTCOME	SCALPAL GROUP	LASER GROUP	P- VALUE
Pain score at 24 hours (VAS 0–10), mean ± SD	4.82 ± 1.21	2.96 ± 1.08	<0.001
Pain score on day 7 (VAS 0–10), mean ± SD	1.74 ± 0.86	1.12 ± 0.70	<0.001
Analgesic intake, n (%)	34 (68.0)	18 (36.0)	0.001
Wound-healing score on day 7, mean ± SD	3.16 ± 0.69	4.12 ± 0.61	<0.001
Postoperative bleeding, n (%)	6 (12.0)	1 (2.0)	0.11
Infection or delayed healing, n (%)	3 (6.0)	1 (2.0)	0.31

TABLE 3 : EARLY POST-OPERATIVE OUTCOMES

Table 3 showed that, he mean pain score at 24 hours was significantly lower in the laser group (2.96 ± 1.08) than in the scalpel group (4.82 ± 1.21) (p<0.001). Similarly, on postoperative day 7, the laser group continued to show significantly lower

pain scores (1.12 ± 0.70) compared with the scalpel group (1.74 ± 0.86) (p<0.001). Analgesic intake was required by significantly fewer children in the laser group (36.0%) than in the scalpel group (68.0%) (p=0.001). Moreover, The mean wound-healing score on day 7 was significantly higher in the laser group (4.12 ± 0.61) than in the scalpel group (3.16 ± 0.69), indicating better wound healing following laser frenectomy (p<0.001). Although postoperative bleeding was less frequent in the laser group (2.0%) compared with the scalpel group (12.0%), the difference was not statistically significant (p=0.11). Similarly, infection or delayed healing was observed less often in the laser group (2.0%) than in the scalpel group (6.0%), but this difference was also not statistically significant (p=0.31). Overall, laser frenectomy was associated with reduced postoperative pain, lower analgesic requirement, and superior early wound healing when compared with conventional scalpel frenectomy

OUTCOME	SCALPAL GROUP	LASER GROUP	P- VALUE
Tongue-mobility score at 1 month, mean ± SD	8.34 ± 1.02	8.72 ± 0.91	0.05
Improvement in tongue mobility, mean ± SD	3.24 ± 1.14	3.54 ± 1.06	0.18
Oral-function score at 1 month, mean ± SD	8.12 ± 1.08	8.68 ± 0.98	0.007
Speech improvement, n (%)	35 (70.0)	41 (82.0)	0.16
Improved feeding/mastication/swallowing, n (%)	38 (76.0)	44 (88.0)	0.11
Parent satisfaction score (VAS 0–10), mean ± SD	7.48 ± 1.31	8.66 ± 1.08	<0.001

TABLE 4 : SPEECH & ORAL FUNCTIONAL OUTCOMES

Table 4 showed that, the mean tongue-mobility score was slightly higher in the laser group (8.72 ± 0.91) than in the scalpel group (8.34 ± 1.02), with a borderline statistically significant difference (p=0.05). However, the mean improvement in tongue mobility from baseline was greater in the laser group (3.54 ± 1.06) compared with the scalpel group (3.24 ± 1.14), although this difference was not statistically significant (p=0.18). Moreover, the mean oral-function score at 1 month was significantly higher in the laser group (8.68 ± 0.98) than in the scalpel group (8.12 ± 1.08) (p=0.007), indicating superior oral functional recovery following laser frenectomy. Speech improvement was observed in 82.0% of children in the laser group and 70.0% in the scalpel group; however, this difference was not statistically significant (p=0.16). Similarly, improvement in feeding, mastication, and swallowing was reported in 88.0% of the laser group and 76.0% of the scalpel group, but the difference was not statistically significant (p=0.11). Thus, parent satisfaction was significantly higher in the laser group, with a mean VAS score of 8.66 ± 1.08 compared with 7.48 ± 1.31 in the scalpel group (p<0.001). Overall, laser frenectomy showed significantly better oral-function scores and parent satisfaction, while both techniques produced comparable improvements in tongue mobility, speech, feeding, mastication, and swallowing at 1 month.

OUTCOME	SCALPAL GROUP	LASER GROUP	P- VALUE
Complete functional improvement, n (%)	36 (72.0)	43 (86.0)	0.09
Reattachment/recurrence, n (%)	4 (8.0)	2 (4.0)	0.40
Need for repeat procedure, n (%)	3 (6.0)	1 (2.0)	0.31
Overall parent satisfaction, n (%)	39 (78.0)	46 (92.0)	0.06

TABLE 5 : OVERALL OUTCOME AT 3 MONTH

Tbale 5 showed that, complete functional improvement was observed in 86.0% of children in the laser group compared with 72.0% in the scalpel group, but this difference did not reach statistical significance (p=0.09). Reattachment or recurrence was less frequent in the laser group (4.0%) than in the scalpel group (8.0%), although the difference was not statistically significant (p=0.40). Similarly, the need for repeat procedure was lower in the laser group (2.0%) compared with the scalpel group (6.0%), with no statistically significant difference (p=0.31). Overall parent satisfaction was higher in the laser group (92.0%) than in the scalpel group (78.0%), but this difference was also statistically non-significant (p=0.06). Thus, both techniques provided favorable functional outcomes at 3 months, while laser frenectomy showed a trend toward improved functional

recovery, lower recurrence, reduced need for repeat intervention, and greater parental satisfaction; larger sample sizes may be needed to determine whether these observed differences are statistically significant.

DISCUSSION

The present study compared scalpel and laser frenectomy in 100 children and found that both techniques improved tongue mobility, oral function, speech-related complaints, feeding, mastication, and swallowing. However, laser frenectomy showed clear perioperative advantages, including significantly shorter operative time, lower intraoperative bleeding, and a markedly reduced requirement for sutures. These findings are comparable with another study where the laser frenectomy required significantly less surgical time than conventional scalpel surgery and was associated with lower intraoperative discomfort. Likewise, a comparative study of Er:YAG and Nd:YAG laser frenectomy reported a mean surgical time of 224 ± 59 seconds for laser surgery compared with 740 ± 168 seconds for scalpel surgery ($p<0.001$) (Aras et al., 2010). Early postoperative findings in the present study favored laser frenectomy. Children in the laser group experienced significantly lower pain at 24 hours and on day 7, required fewer analgesics, and showed better wound-healing scores at day 7 than the scalpel group. These findings are in agreement with comparative studies reporting reduced postoperative pain, bleeding, swelling, and analgesic requirement after laser frenectomy (Yousefimanesh et al., 2024). A clinical study comparing diode laser, scalpel, and electrocautery techniques similarly found less postoperative pain, fewer analgesic requirements, and better early healing in the diode-laser group. The improved perioperative comfort with laser treatment may be attributed to its hemostatic effect, sealing of small blood and lymphatic vessels, reduced tissue trauma, and lower need for suturing (Gandhi and Gandhi., 2017).

In the present study, the laser group demonstrated a significantly higher oral-function score at 1 month and greater parental satisfaction than the scalpel group. Although the laser group also showed higher proportions of speech improvement and improvement in feeding, mastication, and swallowing, these differences were not statistically significant. These observations are partly consistent with another study where researchers compared CO2 laser and scalpel frenectomy in children aged 2–6 years and reported greater parent-reported improvement and satisfaction with CO2 laser treatment at one month. However, their study reported greater postoperative pain in the CO2-laser group, which contrasts with the lower pain scores observed in the present study. Such variation may relate to differences in laser wavelength, laser settings, tissue interaction, use of sutures, age distribution, and pain-assessment methods (Ginini et al., 2023). At 3 months, complete functional improvement and overall parent satisfaction were numerically higher in the laser group, whereas recurrence, reattachment, and repeat-procedure requirements were lower. Nevertheless, these differences did not reach statistical significance. This suggests that both scalpel and laser techniques were effective in achieving favorable medium-term outcomes, while the principal advantage of laser may be improved operative and early recovery experience. This interpretation is supported by a study of upper labial frenectomy in which laser surgery was faster and resulted in less bleeding and less need for sutures, but differences in wound healing and patient perception were not evident at later follow-up (Sarmadi et al., 2021). The improvement in speech and oral function observed in both groups supports the potential role of frenectomy in carefully selected children with demonstrable tongue restriction and functional impairment. A recent systematic review and meta-analysis found that frenectomy was associated with improved speech articulation in pediatric patients, although the available evidence was limited by small study samples and inconsistent, often subjective, assessment methods (Carnino, et al., 2024). Therefore, speech outcomes in the present study should be interpreted alongside standardized speech-language assessment and documentation of postoperative oral-motor or myofunctional therapy, as these factors can influence functional improvement.

Henceforth, laser frenectomy provided significantly better intraoperative control, early postoperative comfort, oral-function recovery, and parental satisfaction than scalpel frenectomy, while both techniques achieved favorable speech and overall functional outcomes at 3 months.

LIMITATIONS

Our study was single-center design with relatively short follow-up period of 3 months, which may not fully reflect long-term speech development, recurrence, or reattachment. Speech and oral functional outcomes may have been influenced by age, baseline severity of frenulum restriction, child cooperation, parental perception, and any concurrent speech or myofunctional therapy. Blinding of participants and evaluators may not have been feasible because of visible procedural differences. In addition, the results may not be generalizable to all pediatric populations or to other laser types and settings.

CONCLUSION

This prospective comparative study demonstrated that both conventional scalpel and laser frenectomy produced favorable improvements in speech-related concerns, tongue mobility, oral function, feeding, mastication, swallowing, and parental satisfaction among pediatric patients with restrictive frenula. However, laser frenectomy showed significant advantages in intraoperative and early postoperative outcomes, including shorter operative time, reduced intraoperative bleeding, markedly lower requirement for sutures, lower pain scores at 24 hours and 7 days, reduced analgesic intake, and better wound healing. At 1 month, the laser group demonstrated significantly better oral-function scores and higher parent satisfaction than the scalpel group. Although improvement in tongue mobility, speech, feeding, mastication, and swallowing was numerically higher in the laser group, these differences were not statistically significant. At 3 months, both groups demonstrated favorable overall functional improvement, while recurrence, reattachment, and repeat-procedure requirements were lower in the laser group but without statistical significance. Therefore, both scalpel and laser frenectomy were effective treatment modalities; however, laser frenectomy appeared to be a more efficient, comfortable, and minimally invasive option for pediatric patients because of superior hemostasis, reduced postoperative discomfort, improved early healing, and greater parental satisfaction.

REFERENCES

[1] American Academy of Pediatric Dentistry. (2022). Policy on management of the frenulum in pediatric patients. The reference manual of pediatric dentistry, 73-78.

[2] Ynurrigarro-Medina, T. E., Torre-Delgadillo, G., Torre-Delgadillo, A., Velázquez-Moreno, S., & Vitales-Noyola, M. (2026). Ankyloglossia in Newborns: Clinical Implications and Management—A Narrative Review. Children, 13(4), 466.

[3] Suresh, A., Ravindran, S., Devi, S., & Ravindran II, S. (2026). Laser-Assisted Surgical Management of Ankyloglossia in Mixed Age Groups: A Case Series With Eight-Month Follow-Up. Cureus, 18(4).

[4] Wang, J., Yang, X., Hao, S., & Wang, Y. (2022). The effect of ankyloglossia and tongue-tie division on speech articulation: a systematic review. International journal of paediatric dentistry, 32(2), 144-156.

[5] Yadav, R. K., Verma, U. P., Sajjanhar, I., & Tiwari, R. (2019). Frenectomy with conventional scalpel and Nd: YAG laser technique: A comparative evaluation. Journal of Indian Society of Periodontology, 23(1), 48.

[6] Lebret, C., Garot, E., Amorim Pereira, M., Fricain, J. C., Catros, S., & Fénelon, M. (2021). Perioperative outcomes of frenectomy using laser versus conventional surgery: a systematic review. Journal of Oral Medicine and Oral Surgery, 27(3), 36.

[7] Carnino, J. M., Rodriguez Lara, F., Chan, W. P., Kennedy, D. G., & Levi, J. R. (2024). Speech outcomes of frenectomy for tongue-tie release: a systematic review and meta-analysis. Annals of Otology, Rhinology & Laryngology, 133(6), 566-574.

[8] Chinnadurai, S., Francis, D. O., Epstein, R. A., Morad, A., Kohanim, S., & McPheeters, M. (2015). Treatment of ankyloglossia for reasons other than breastfeeding: a systematic review. Pediatrics, 135(6), e1467-e1474.

[9] Komori, S., Matsumoto, K., Matsuo, K., Suzuki, H., & Komori, T. (2017). Clinical study of laser treatment for frenectomy of pediatric patients. International journal of clinical pediatric dentistry, 10(3), 272.

[10] Riek, C., & Vitruk, P. (2018). Incision and coagulation/hemostasis depth control during a CO2 laser lingual frenectomy. Dental Sleep Practice, 32-38.

[11] Khosraviani, F., Ehsani, S., Fathi, M., & Saberi-Demneh, A. (2019). Therapeutic effect of laser on pediatric oral soft tissue problems: a systematic literature review. Lasers in medical science, 34(9), 1735-1746.

[12] Ginini, J. G., Rachmiel, A., Bilder, A., Botzer, E., Capucha, T., Nseir, S., & Emodi, O. (2023). Evaluation of parental perceptions of lingual and labial frenectomy on their child: a comparison of CO2 laser and conventional scalpel. J Clin Pediatr Dent, 47(6), 30-37.

[13] Gonzalez Garrido, M. D. P., Garcia-Munoz, C., Rodriguez-Huguet, M., Martin-Vega, F. J., Gonzalez-Medina, G., & Vinolo-Gil, M. J. (2022). Effectiveness of myofunctional therapy in ankyloglossia: a systematic review. International journal of environmental research and public health, 19(19), 12347.

[14] Aras, M. H., Göregen, M., Güngörmüş, M., & Akgül, H. M. (2010). Comparison of diode laser and Er: YAG lasers in the treatment of ankyloglossia. Photomedicine and laser surgery, 28(2), 173-177.

[15] Yousefimanesh, H., Salehi, P., Maraghi, E., & Johari, D. (2024). A Comparative Study of The Results of Conventional Surgery and Diode Laser in Maxillary Labial Frenectomy: A Randomized Clinical Trial: Conventional Surgery Versus Diode Laser in Maxillary Labial Frenectomy. Galen Medical Journal, 13(SP1), e3688.

[16] Gandhi, D., & Gandhi, P. (2017). Comparision of healing period after frenectomy using scalpel, electrocautery & diode laser. British Journal of Medicine and Medical Research, 21(12), 1-9.
[17] Ginini, J. G., Rachmiel, A., Bilder, A., Botzer, E., Capucha, T., Nseir, S., & Emodi, O. (2023). Evaluation of parental perceptions of lingual and labial frenectomy on their child: a comparison of CO2 laser and conventional scalpel. J Clin Pediatr Dent, 47(6), 30-37.
[18] Sarmadi, R., Gabre, P., & Thor, A. (2021). Evaluation of upper labial frenectomy: A randomized, controlled comparative study of conventional scalpel technique and Er: YAG laser technique. Clinical and experimental dental research, 7(4), 522-530.