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Myofunctional Therapy to Treat Obstructive Sleep Apnea: A Systematic Review and Meta-analysis

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Objective: To systematically review the literature for articles evaluating myofunctional therapy (MT) as treatment for obstructive sleep apnea (OSA) in children and adults and to perform a meta-analysis on the polysomnographic, snoring, and sleepiness data.

Data Sources: Web of Science, Scopus, MEDLINE, and The Cochrane Library.

Review Methods: The searches were performed through June 18, 2014. The Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement was followed.

Results: Nine adult studies (120 patients) reported polysomnography, snoring, and/or sleepiness outcomes. The pre- and post-MT apnea-hypopnea indices (AHI) decreased from a mean ± standard deviation (M ± SD) of 24.5 ± 14.3/h to 12.3 ± 11.8/h, mean difference (MD) −14.26 [95% confidence interval (CI) −20.98, −7.54], P < 0.0001. Lowest oxygen saturations improved from 83.9 ± 6.0% to 86.6 ± 7.3%, MD 4.19 (95% CI 1.85, 6.54), P = 0.0005. Polysomnography snoring decreased from 14.05 ± 4.89% to 3.87 ± 4.12% of total sleep time, P < 0.001, and snoring decreased in all three studies reporting subjective outcomes. Epworth Sleepiness Scale decreased from 14.8 ± 3.5 to 8.2 ± 4.1. Two pediatric studies (25 patients) reported outcomes. In the first study of 14 children, the AHI decreased from 4.87 ± 3.0/h to 1.84 ± 3.2/h, P = 0.004. The second study evaluated children who were cured of OSA after adenotonsillectomy and palatal expansion, and found that 11 patients who continued MT remained cured (AHI 0.5 ± 0.4/h), whereas 13 controls had recurrent OSA (AHI 5.3 ± 1.5/h) after 4 y.

Conclusion: Current literature demonstrates that myofunctional therapy decreases apnea-hypopnea index by approximately 50% in adults and 62% in children. Lowest oxygen saturations, snoring, and sleepiness outcomes improve in adults. Myofunctional therapy could serve as an adjunct to other obstructive sleep apnea treatments.

Keywords: exercise therapy/methods, myofunctional therapy/methods, obstructive sleep apnea, sleep apnea syndromes

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INTRODUCTION

Several medical and surgical treatment modalities exist as treatment for obstructive sleep apnea (OSA).[1–3] Four pathophysiological traits seen in patients with OSA are: the passive critical closing pressure of the upper airway (Pcrit), arousal threshold, loop gain, and muscle responsiveness (PALM) with categories of 1, 2, 2a, 2b, and 3.[4] It has been demonstrated that patients in four of five PALM categories will benefit from anatomic interventions.[4] Because the dilator muscles of the upper airway play a critical role in maintaining an open airway during sleep, researchers have explored exercises and other airway training (singing, didgeridoo, instrument playing) that target oral cavity and oropharyngeal structures as a method to treat OSA.[5–7] Myofunctional therapy (MT) and proper tongue positioning in the oral cavity have been described since 1918 to improve mandibular growth, nasal breathing, and facial appearance.[8] Guimaraes has proposed MT as a treatment for OSA since the 1990s.[9] MT is composed of isotonic and isometric exercises that target oral (lip, tongue) and oropharyngeal structures (soft palate, lateral pharyngeal wall).[7,10] There have been an increasing number of studies evaluating the effect of MT in the form of case studies, case series, and most recently, two randomized controlled trials.[7,10–13]

The most comprehensive MT exercises are d
Guimaraes et al.[7] and involve the soft palate, tor
cial muscles and address stomatognathic functic
palate exercises, patients pronounce oral vowel s
continuously (isometric exercises) or intermitten
exercises).[7] Tongue exercises include moving the t
the superior and lateral surfaces of the teeth,
the tongue tip against the anterior aspect of the
pressing the entire tongue against the hard and sof
forcing the tongue onto the floor of the mouth.[7] Fac
address the lip (i.e., contraction and relaxation o
laris oris), buccinators (i.e., suction movements anc
of intraoral finger pressure against the buccinat
and jaw muscles (i.e., lateral jaw movements).[7] In a
matognathic functions are addressed by instructin
inhale nasally and exhale orally without and then
inflation, and performing specific swallowing a
exercises (i.e., swallowing with the teeth clench
tongue positioned in the palate and without co

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2016
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CONCLUSION

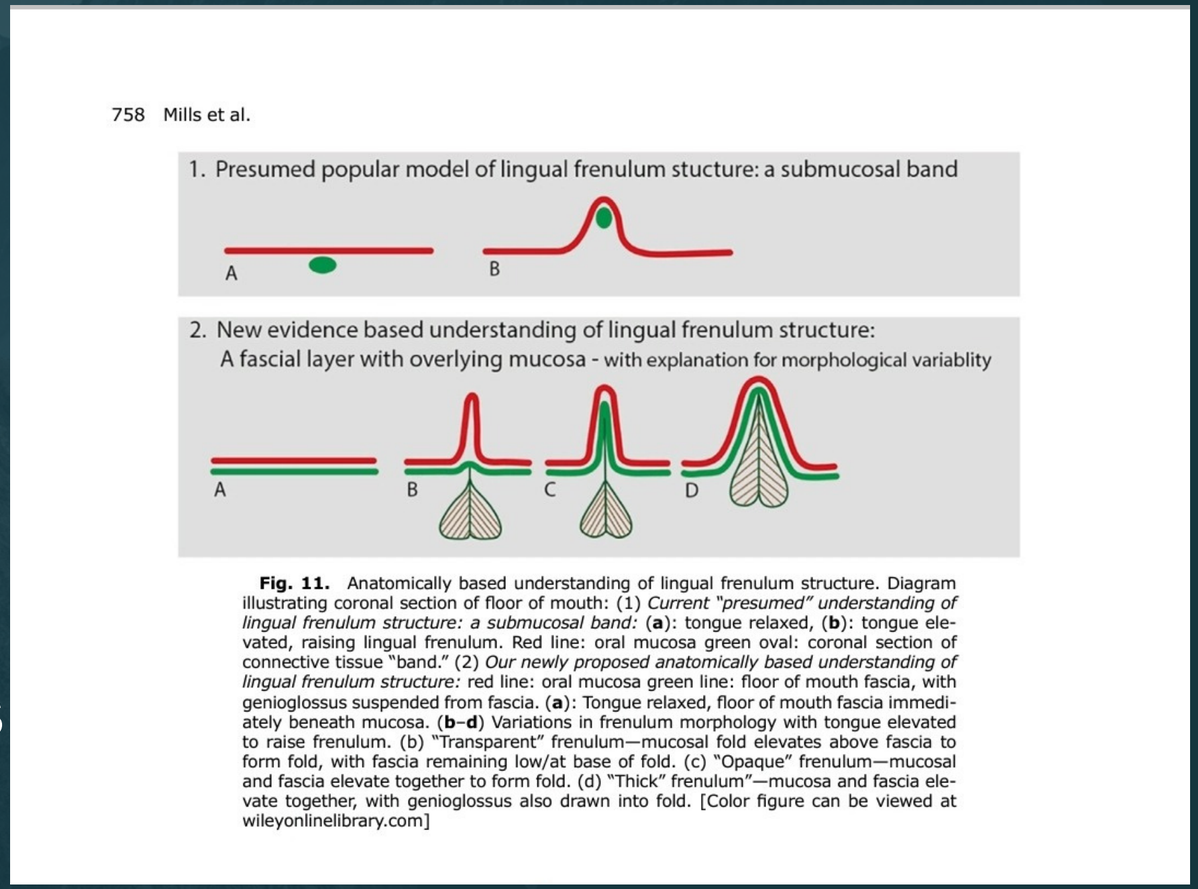
Current literature demonstrates that myofunctional therapy decreases AHI by approximately 50% in adults and 62% in children. Lowest oxygen saturation, snoring, and sleepiness outcomes improve in adults. Myofunctional therapy could serve as an adjunct to other OSA treatments.

2019

What Is a Tongue Tie? Defining the Anatomy of the In-Situ Lingual Frenulum

By: NIKKI MILLS,1,2 SETH M. PRANSKY,3 DONNA T. GEDDES,4 AND SEYED ALI MIRJALILI 2*

This information tells us there is mucosal, fascial, and genioglossus involvement when identifying the type of tongue tie restriction.



1. Presumed popular model of lingual frenulum stucture: a submucosal band

2. New evidence based understanding of lingual frenulum structure:
A fascial layer with overlying mucosa - with explanation for morphological variablity

Fig. 11. Anatomically based understanding of lingual frenulum structure. Diagram illustrating coronal section of floor of mouth: (1) *Current "presumed" understanding of lingual frenulum structure: a submucosal band:* (**a**): tongue relaxed, (**b**): tongue elevated, raising lingual frenulum. Red line: oral mucosa green oval: coronal section of connective tissue "band." (2) *Our newly proposed anatomically based understanding of lingual frenulum structure:* red line: oral mucosa green line: floor of mouth fascia, with genioglossus suspended from fascia. (**a**): Tongue relaxed, floor of mouth fascia immediately beneath mucosa. (**b**–**d**) Variations in frenulum morphology with tongue elevated to raise frenulum. (b) "Transparent" frenulum—mucosal fold elevates above fascia to form fold, with fascia remaining low/at base of fold. (c) "Opaque" frenulum—mucosal and fascia elevate together to form fold. (d) "Thick" frenulum"—mucosa and fascia elevate together, with genioglossus also drawn into fold. [Color figure can be viewed at wileyonlinelibrary.com]

Laryngoscope Investigative Otolaryngology
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Lingual Frenuloplasty with Myofunctional Therapy: Exploring Safety and Efficacy

ANKYLOGLOSSIA aka TONGUE TIE

INTERVENTION

MYOFUNCTIONAL THERAPY
(strengthen tongue)

- ≥ 1 month pre-op
- ≥ 2 months post-op

+

LINGUAL FRENULECTOMY

Scissor and Suture Technique

OUTCOMES

n = 348 (83% response rate)
- Ages 29 months - 79 years

Patient Surveys
- 91% Satisfaction
- Improvement in:
  * Mouth breathing: 78%
  * Muscle tension: 77%
  * Snoring: 73%
  * Clenching: 91%
- Minor Complications: <5%

CONCLUSION

Frenuloplasty + myofunctional therapy can be safe and effective

Zaghi S, Valcu-Pinkerton S, Jabara M, Norouz-Knutsen L, Govardhan C, Moeller J, Sinkus V, Thorsen R, Downing V, Camacho M, Yoon A, Hang W, Hockel B, Guilleminault C, and Liu S

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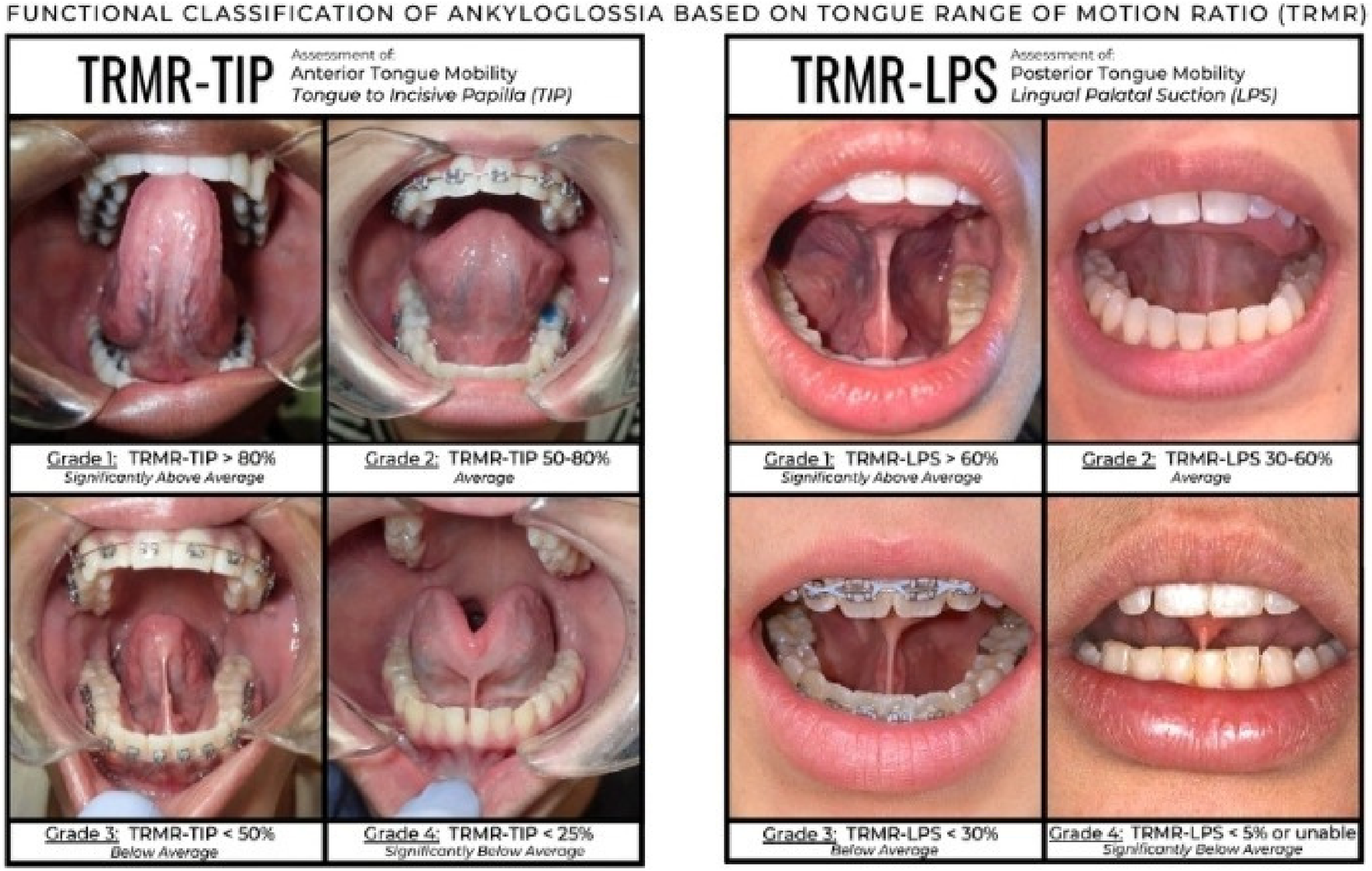
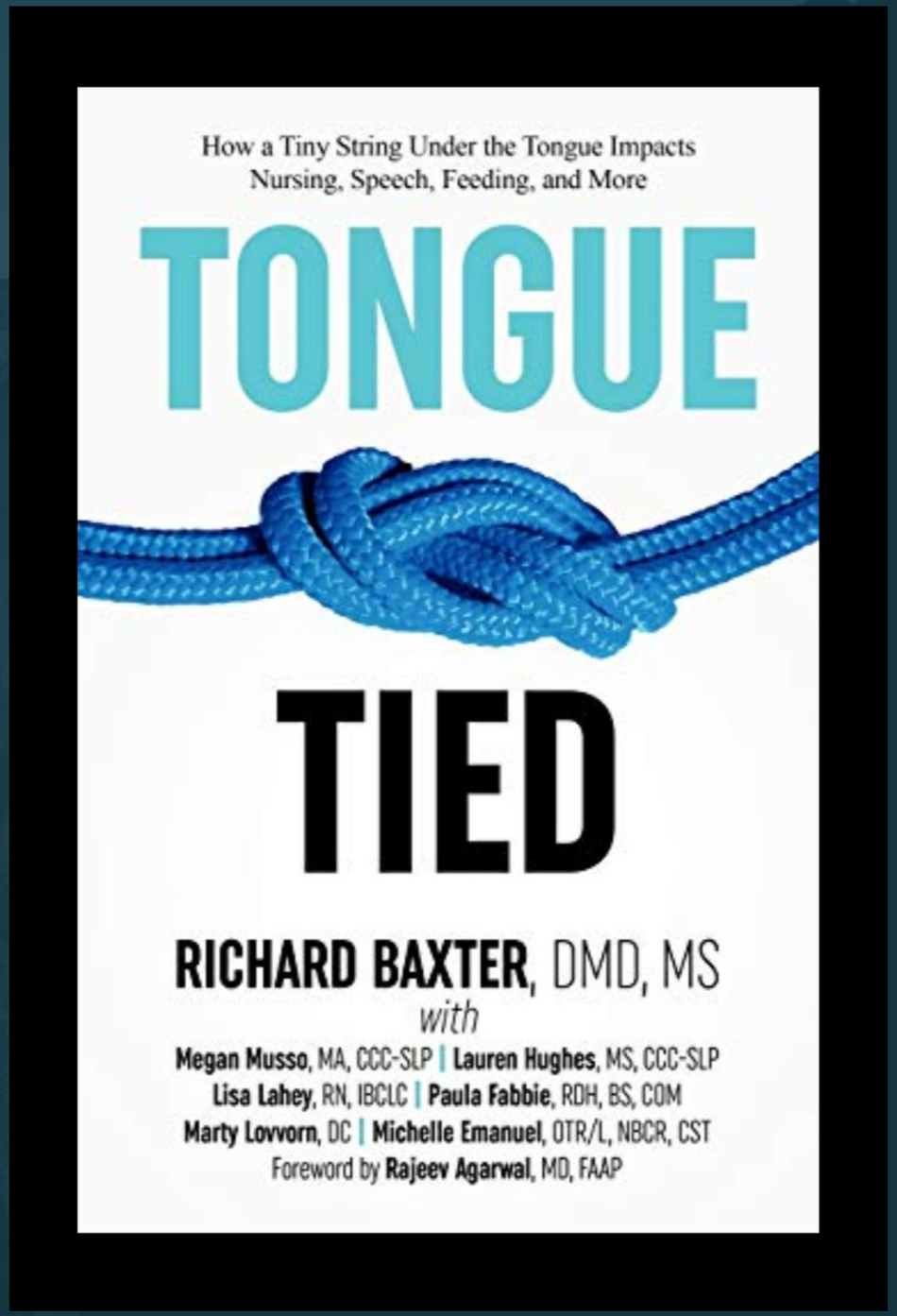


FIGURE 5 Updated grading scale for the functional classification of ankyloglossia based on the tongue range of motion ration (TRMR) performed with TIP and LPS—building on the previous classification proposed in Yoon et al 2017. Normative values and proposed grading scale are provided as TRMR-TIP Grade 1 > 80%, Grade 2:50%-80%, Grade 3: < 50%, Grade 4: < 25%; TRMR-LPS Grade 1 > 60%, Grade 2:30%-60%, Grade 3: <30%, Grade 4: <5% or unable to sustain. It should be noted that these measurements and grading scales may be unreliable in patients with limited mouth opening, strain and compensation patterns, children less than 12 years of age and any other patient who may not be able to follow the instructions for proper measurement

Tongue Restriction Questionnaire: A New Screening Tool to Identify Tongue-Tied Patients

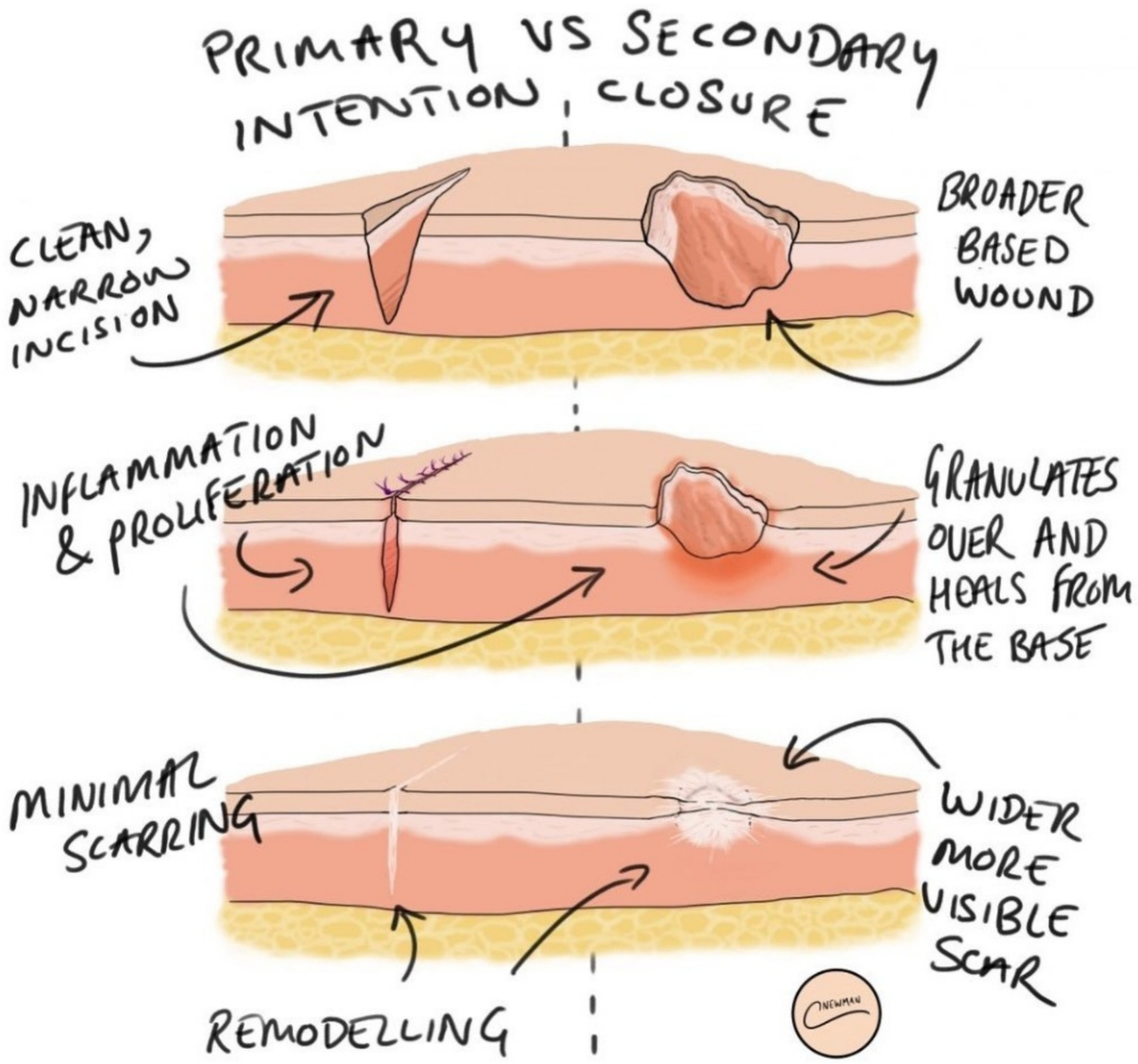
Richard Baxter, DMD, MS; Ashley Lashley, BS; and Nicholas R. Rendell, PhD

Conclusions: Tongue restrictions are common in pediatric patients presenting to dental practices, and symptom presentations vary between patients. Tongue elevation is an easy and reliable test of tongue mobility. Shared decision-making and proper assessments help prevent undertreatment and overtreatment



Wound Healing

Functional Frenuloplasty



https://teachmesurgery.com/skills/wounds/wound-healing/