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Anatomical Rationale for Low-Access Techniques in Thread Reinforcement

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Abstract

The article presents a minimal-access program centered on two patent-level solutions for the midface–lower-face and nose: a dual-entry malar–retro-jowl bridge for jawline redraping, and a single-entry radix-to-tip nasal refinement with an optional columellar support loop. Clinical and anatomical syntheses are aligned with device claims and corridor mapping (retaining ligaments, neurovascular "no-go" lines, glide planes). Emphasis is placed on midline dorsum rails from a radix port and on bridged vectors spanning zygomatic and mandibular ligament systems, where plane control and traction geometry curb extrusion, visibility, and fold recurrence. The objective is to translate atlas-level anatomy and complication evidence into vector-economical protocols suitable for patent documentation and routine practice. Methods combine comparative reading, evidence mapping, and technique synthesis across ten recent sources, with imaging guidance (HFUS/Doppler) formalized for port minimization. The manuscript serves surgeons and dermatologists engaged in thread lifting and device developers documenting inventive steps.

Keywords: *Thread Lifting, Radix Single-Entry, Dual-Entry Malar–Retro-Jowl Bridge, Dorsum Rail, Columellar Support.*

INTRODUCTION

Thread reinforcement has moved from multi-port choreography to vector-economical layouts informed by retaining-ligament seams and predictable neurovascular corridors. Recent atlases and reviews converge on safe planes for the malar–retro-jowl bridge, midline nasal rails, and bridged malar–mandibular vectors. Revision cohorts and systematic reviews elucidate where failures cluster—tip and dorsum for rhinothreads, exit-site dimpling and asymmetry in the face/neck—supporting a reduction in entry points for a radix-only nasal route and a dual-entry malar–retro-jowl bridge when plane control and traction geometry are respected. The manuscript positions two independent patentable solutions—(i) a dual-entry malar–retro-jowl bridge for mid/lower-face redraping and (ii) a radix-only single-entry nasal narrowing with an optional columellar support loop—within an anatomy-first logic and a safety gradient defined by midline corridors and ligament seams.

Aim and tasks. The study aims to justify minimal-access thread techniques through anatomy-driven route design and complication evidence. Tasks:

1) consolidate ligamentous and neurovascular maps for two routes: radix midline rail and malar–retro-jowl bridge;

2) integrate safety and revision evidence to explain risk reduction for a radix-only nasal entry and a two-port jawline plan;

3) align these routes with imaging-guided execution supportive of reproducibility and inventive step.

Novelty. The manuscript integrates atlas-level anatomy with patent-ready protocols focused on two routes—radix midline nasal rail and dual-entry malar–retro-jowl bridge—and codifies HFUS/Doppler checkpoints that reduce auxiliary rescue punctures.

MATERIALS & METHODS

The source base comprised the registered IP documents on thread-based nasal refinement—"Atraumatic narrowing of the nose with threads and smoothing of the nasolabial triangle" (Certificate No. 14565, 20 Jan 2021) and "Nasal correction with threads, tip elevation by a three-point method, and hyaluronic-acid filler placement in the columella" (Certificate

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No. 14570, 20 Jan 2021)—used to extract claim logic, entry ports, and vector geometry for a radix-only route. In parallel, peer-reviewed anatomical and clinical publications listed in References [1–10] were analyzed to delineate retaining-ligament seams, neurovascular "no-go" lines, glide planes, and complication patterns that constrain minimal-access designs for the midface–lower-face and nose.

Methods. Comparative reading, structured evidence mapping, and targeted synthesis were applied to: (i) extract layered corridors and danger lines for radix midline and malar–retro-jowl trajectories; (ii) correlate complication profiles with midline rail and bridged-vector execution; (iii) translate atlas findings into patent-oriented protocols for nose and jawline; (iv) define HFUS/Doppler checkpoints that support single radix entry and two-port jawline plans.

RESULTS

Vector design grounded in retaining-ligament topology and neurovascular "no-go" corridors permits reduction of cutaneous entry points without loss of lift stability. Contemporary anatomical syntheses map predictable fixation seams—zygomatic, upper/lower masseteric, mandibular, and temporal systems—together with facial artery/vein and frontal-branch trajectories; these maps define safe subcutaneous or sub-SMAS tunnels for a single-entry radix rail and a dual-entry malar–retro-jowl bridge [1, 2]. System-level complication surveys further highlight that each additional breach increases cumulative risks of dimpling, thread exposure, ecchymosis, and track inflammation; consolidation of vectors through fewer ports therefore targets risk minimization while preserving mechanical efficacy [7, 10].

A two-port plan that couples a superior malar entry with an inferior retro-jowl entry bridges the zygomatic and mandibular retaining systems. The superior vector repositions ptotic malar fat and reduces the nasolabial transition, while the inferior vector spans the pre-jowl sulcus toward the parotidomasseteric fascia. Depth control maintains a superficial subcutaneous plane anterior to the mandibular ligament to spare the marginal mandibular branch. Bridged vectors shorten cross-over tunneling across the modiolus and lower ischemic exposure to facial artery branches compared with multi-port layouts. When vectors align with native glide planes, redraping power persists with fewer skin breaches and shorter tunnels.

A radix port enables a midline dorsum rail with controlled seating at the tip; loop geometry can extend into a columellar support sling when base definition or rotation is desired. Restricting passes to the avascular midline reduces visibility and extrusion compared with multi-pass, multi-entry rhinothreads. Revision cohorts attribute tip exposure and dorsum irregularity to off-midline, repeated passes; a single radix entry confines seating to robust fibrous zones. Blunt cannula runs with low-pressure hydrodissection stabilize depth and reduce rescue punctures, while post-deployment massage normalizes surface contour.

Gravitational jowl and labiomandibular fold formation correlates with the mandibular-ligament barrier, ptotic jowl fat, and the course of the marginal mandibular branch; anatomical dissections resolve the jowl's border geometry and nerve proximity, guiding safe lifting corridors [4]. A two-port plan—malar entry plus retrojowl entry—lets vectors "bridge" the zygomatic and mandibular retaining structures. The superior vector captures ptotic malar fat and nasolabial transition, while the inferior vector spans pre-jowl sulcus toward the parotidomasseteric fascia, avoiding marginal mandibular nerve depth by maintaining a superficial subcutaneous plane anterior to the mandibular ligament [2, 4, 6]. Consolidating to two ports reduces cross-over tunneling across the modiolus where facial artery branches elevate ischemic risk during multi-port methods [1].

Reverse and antegrade vectoring from a single malar entry (or from a perinasal lateral entry when anatomy allows) diminishes the fold by redistributing cheek volume superolaterally while avoiding passes directly within the artery-dense nasolabial groove. A one-port "reverse" sweep can be followed by a shallow antegrade return to seat barbs across the alar base–malar transition without violencing the angular artery path; case-based guidance supports these trajectories when executed with a blunt cannula and low-pressure hydrodissection [1, 6].

Doppler and transillumination paired with high-frequency ultrasound confirm cannula depth and midline confinement along the nasal dorsum and verify superficial subcutaneous planes along the malar–retro-jowl bridge. Three-dimensional cues support a single radix entry and a two-port jawline plan while reducing rescue punctures [9].

Systematic and narrative reviews converge on transient bruising/edema, dimpling, and contour irregularity as modal signals; serious outcomes cluster near vessel-dense or shear-prone zones such as the modiolus and nasal tip. A single radix entry curbs tip exposure and dorsum irregularity by limiting off-midline passes, whereas a dual-entry malar–retro-jowl bridge reduces cross-over near the modiolus and shortens tunnels, which lowers exit-site trauma and asymmetry [3, 7, 10].

Mapping of patent-relevant minimal-port schemes to anatomical proofs.

— Two-port mid-/lower-face bridge: malar + retro-jowl ports align with zygomatic and mandibular ligament systems to restore jawline symmetry while sparing the marginal mandibular branch [2].

— Single-entry nasal narrowing with radix port: a midline dorsum rail with an optional columellar support loop lowers tip exposure risk and limits dorsum irregularities reported in revision cohorts [3, 8].

Figure 1. Single-entry nasal thread pathway from the radix to the tip illustrating a dorsum "rail" and a columellar support loop [8]

The schematic underlines how a single radix port supports dorsal narrowing while constraining passes to midline zones with lower vessel density, dovetailing with the complication profile reported for rhinothreads.

DISCUSSION

The results support consolidation of access around two routes: a single radix port with a midline dorsum rail and an optional columellar loop, and a dual-entry malar–retro-jowl bridge. Rhinothread revision cohorts link multi-pass, off-midline layouts to visibility, tip extrusion, and irregular dorsum that often require removal and structural grafting; a radix-only entry confines seating to relatively avascular midline tissues and reduces these events. Reassessment of the jowl–mandibular region localizes the jowl to the supraplatysmal plane over the posterior mandibular ligament and details proximity of the marginal mandibular branch; a malar–retro-jowl bridge permits superior vectoring for malar support and an inferior span across the pre-jowl sulcus while remaining superficial anterior to the ligament to spare the nerve [4].

Midline entry at the radix with a dorsal "rail" and a controlled columellar support loop confines thread seats to relatively avascular midline tissues and reduces tip exposure risk compared with multi-entry routes. Technique standards confirm feasibility, while revision series catalog the downstream burden of off-midline multi-pass placements [3, 8].

Reassessment of the jowl–mandibular region localizes the jowl to the supraplatysmal plane over the posterior mandibular ligament and details the proximity of the marginal mandibular branch. A two-port bridge—malar entry plus retro-jowl entry—allows one superior vector to re-suspend malar and nasolabial transitions and a second to span the pre-jowl sulcus while remaining superficial anterior to the mandibular ligament, reducing nerve traction and need for extra ports. Glideplane studies bolster the rationale by explaining why limited-release, vector-efficient lifts retain redraping power when vectors align with native mobility planes [4].

Reverse + antegrade patterns from a single malar port redistribute volume superolaterally while avoiding direct passes in the artery-rich groove; targeted reports demonstrate correction of NLF and marionette lines when thread selection and vector geometry are tuned to tissue weight. Classification work on NLF etiology and the "Reverse Technique" for traction corroborate these vector logics and supports a one-port plan in appropriate cheeks [6]. These trajectories function as adjuncts to the malar–retro-jowl bridge rather than as stand-alone upper-third lifts.

High-frequency ultrasound (HFUS) and Doppler assist with plane confirmation, vessel mapping, and barb deployment, lowering reliance on auxiliary rescue punctures and reducing hematoma risk. Method papers and best-practice statements underscore routine pre-planning scans (depth to SMAS/galea) and intra-procedural checks in the retro-jowl, nasal dorsum, and perioral units (see Table 1) [9]. Routine pre-planning scans (depth to SMAS/galea) and intra-procedural checks at the radix, malar entry, and retro-jowl entry stabilize plane control for single-port nasal and two-port jawline protocols.

Table 1. Neurovascular danger zones and safe corridors with priority on radix midline and malar–retro-jowl routes [3-5, 8]

Region/target	Danger structure(s)	Safe corridor / depth	Preferred entry plan
Temple / lateral cheek–brow	Frontal branch of facial nerve; superficial temporal vessels	Lateral to frontotemporal line; superficial to deep temporal fascia	Single lateral hairline port; temporal anchoring with ante/retrograde I-runs
Eyebrow tail elevation	Supratrochlear/supraorbital bundles	≥1.5–2 cm above orbital rim; glide	Single lateral port with symmetric bilateral tensioning
Nasal dorsum/tip	Lateral nasal/alar branches; tip shear	Midline dorsum path; controlled columellar loop	Single radix port; dorsal "rail" + columellar support
Jowl / jawline	Marginal mandibular branch; mandibular ligament barrier	Superficial subcutaneous plane anterior to ligament; avoid deep traction	Dual ports (malar + retro-jowl) bridging zygomatic/mandibular systems

Nasolabial fold	Angular artery in groove	Vectors seated across alar base–malar transition; avoid direct passes in groove	Single malar port with reverse + antegrade sweeps
Plane control / all regions	Perforators; off-plane seating	HFUS/Doppler to confirm depth and trajectory	Same entry count with fewer rescue punctures

Evidence mapping shows that each additional skin breach introduces another exit-site for dimpling, exposure, and colonization and lengthens subcutaneous tracks, which correlates with bruising and edema [7]. Rhinothread failures concentrate at the mobile tip and in the cartilaginous dorsum after multi-pass layouts, with revision often involving thread removal and structural grafting [3]. Minimal-port schemes shorten tunnels, avoid cross-over near the modiolus and tip, and anchor in fibrous planes (radix midline and zygomatic/mandibular seams), which distribute traction and lower shear (see Table 2).

Table 2. Reported adverse events in facial/neck thread lifting and rhinothread revision cohorts (evidence signal) [3, 7]

Complication signal	Evidence summary
Swelling/edema (transient)	Frequent; typically self-resolving in face/neck lifts
Ecchymosis (transient)	Reported regularly across series
Dimpling/irregularity	Linked to superficial plane or barb seating near exit sites
Asymmetry	Most common signal in aggregated dataset of 14,222 pts
Thread visibility/extrusion (nose)	Seen after multi-pass, off-midline dorsum/tip placements; often managed by removal/reconstruction
Infection (nose)	Managed surgically in revision cohorts

The learning curve shifts from multi-port choreography to plane discipline, vector planning, and intra-operative imaging. HFUS-documented runs, standardized vector drawings, and post-procedure scans enable intra-team reproducibility and support regulatory/patent dossiers with objective evidence of distinct steps and safety performance.

CONCLUSION

Vector-economical thread reinforcement grounded in ligament seams and danger-zone avoidance supports a midline radix path in nasal refinement and a dual-entry malar–retro-jowl bridge for the jowl–mandibular unit. Evidence indicates that fewer breaches shorten tunnels, reduce exit-site trauma, and lower the probability of visibility, extrusion, or nerve-related events when midline confinement (nose) and superficial anterior planes to the mandibular ligament (jawline) are respected. Imaging guidance stabilizes execution across operators and facilitates patent documentation by recording depth and vector geometry. The three tasks are met: consolidated anatomical maps, safety synthesis linked to entry-count reduction, and patent-ready protocols with imaging checkpoints. The article provides clinicians with reproducible routes and device developers with anatomy- and risk-justified claims supportive of inventive step and clinical adoption.

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