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림버그 피판을 이용한 배꼽하부
재발성 켈로이드의 장력 재배치 치료

(Management of Recurrent Infraumbilical Keloid
by Tension Redirection Using a Limberg Flap)



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Purpose: Keloids represent a pathologic form of wound healing characterized by excessive collagen deposition and progressive scar enlargement beyond the original wound margin. Mechanical tension has been recognized as a critical factor in scar widening and keloid formation, particularly when repetitive forces act perpendicular to the scar axis. Therefore, careful mechanical tension redistribution should be considered in keloid management. We report a case of recurrent infraumbilical keloid successfully managed through biomechanical correction using tension redistribution with a Limberg flap.

Methods: A 63-year-old man presented with an infraumbilical mass that had developed 8 months earlier and underwent surgical excision with satisfactory healing (Fig. 1). Three years later, the lesion recurred and was treated with repeat excision. Progressive scar widening with subsequent keloid formation was observed at 1-year follow-up (Fig. 2A). Conservative management including intralesional triamcinolone injections and silicone gel sheet application failed to control progression. Considering persistent mechanical stretching perpendicular to transverse scar caused by involuntary rectus abdominis contraction and gravitational forces, surgical revision was planned to modify the tension environment (Fig. 2B). The keloid was excised, and a Limberg flap was designed as a geometric solution to redirect perpendicular force vectors and redistribute mechanical tension through Z-limb extension (Fig. 3).

Results: At 3-month follow-up, the wound healed well without recurrence under a more favorable tension vector (Fig. 4). After one year, patient reported no recurrence of the keloid.

Conclusion: Tension redistribution using a Limberg flap may offer an effective geometric solution for managing keloids caused by unfavorable tension vector and preventing recurrent scar widening.



Fig. 1. Clinical photograph at initial presentation showing an infraumbilical mass.

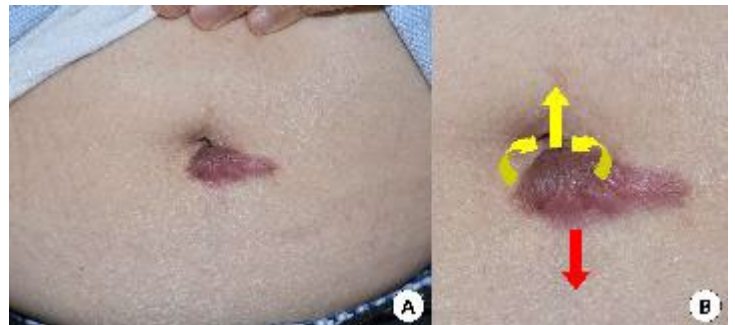


Fig. 2. Postoperative scar changes following repeated excisions. (A) Scar widening with keloid formation along the transverse incision. (B) Illustration showing perpendicular tension vectors acting on the scar caused by involuntary rectus abdominis contraction (yellow arrows) and gravitational force (red arrow).



Fig. 3. Intraoperative photographs demonstrating Limberg flap reconstruction. (A) Flap design. (B) Defect after keloid excision. (C) Flap inset and immediate postoperative appearance. Suture lines are aligned along the tension vectors.



Fig. 4. Clinical photograph at 3-month follow-up showing stable scar healing with improved alignment following tension redistribution.