

Hypertrophic and Keloid Scar Formation in Orthopedic Incisions

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BACKGROUND & SIGNIFICANCE

- Hypertrophic and keloid scars are aberrant wound-healing responses, often precipitated by high closure tension and influenced by genetic predisposition.
- Orthopedic incisions may be particularly susceptible, with excessive collagen deposition driving scar overgrowth

PURPOSE



We aimed to examine prognostic factors and characterize outcomes among patients who developed hypertrophic or keloid scars following orthopedic surgery.

METHODS

- PubMed was searched from 2000 to 2025.
- **Key Search Terms:** "Orthopedic Incision," "Orthopedic Surgery," "Hypertrophic Scar," and "Keloid."
- **Inclusion Criteria:** Studies related to hypertrophic and keloid scar formation in orthopedic procedures
- **Exclusion Criteria:** Studies related to non-orthopedic procedures, scars formed from burns, acne, and non-surgical trauma, and non-human studies
- **Data extracted:** Study design, patient demographics, orthopedic subspecialty, anatomic site, procedure, scar type, and clinical outcomes

DISCUSSION

Interpretation of Results

- Orthopedic incisions can result in cosmetically and functionally significant scarring, with hypertrophic scars more prevalent than keloids.
- Upper extremity sites were the most frequently affected

RESULTS

- Twenty-five studies met inclusion, representing 700 patients (median sample size 66, IQR 36-86)

Table 1: Characteristics of Studies (N=25)

Study Design	Case Series	8 (32%)
	Randomized Trial	5 (20%)
	Meta Analysis	5 (20%)
	Cohort	2 (8%)
	Prospective	2 (8%)
	Other	3 (12%)
	Scar Phenotype	Hypertrophic
Keloid		7 (28%)
Orthopedic Subspecialty	Hand & Upper Extremity	8 (32%)
	Trauma	6 (24%)
	Foot & Ankle	4 (17%)
	Sports Medicine	2 (8%)
	Pediatrics	2 (8%)
	Arthroplasty	1 (4%)
	Oncology	1 (4%)
Anatomic Site	Hand/Wrist	7 (28%)
	Foot/Ankle	6 (24%)
	Shoulder/AC Joint	3 (12%)
	Clavicle	3 (12%)

- Across reporting studies, the average age range of patients was 6.0 – 61.0 years
- Reporting on peri-operative scar-mitigation strategies was limited across all studies

- Procedures frequently associated with exuberant scarring were mid-shaft clavicle fixation, AC joint stabilization, distal clavicle excision, and achilles tendon repair



Figure 1. Postoperative hypertrophic scar over the lateral shoulder following orthopedic incision



Figure 2. Keloid scar of the shoulder. Scar tissue extending beyond the boundaries of the original wound.

Recommendations for Practice

- Given the quality-of-life impact of surgical scars, standardized reporting and prospective evaluation of preventive and therapeutic strategies (e.g. silicone therapy, fractional/CO2 laser protocols) are warranted to define best practices post-operatively

Conclusion

- Hypertrophic scarring is more common than keloid formation following orthopedic incisions, particularly in upper extremity procedures
- Standardized outcome reporting and prospective studies are needed to guide evidence-based scar management in orthopedic surgery