

**RQ2: Is routine use of surgical magnification (e.g., loupes) recommended to enhance visualisation and improve debridement quality?**

Background: Surgical magnification is frequently used in plastic and reconstructive surgery. However, evidence specifically evaluating routine loupe use during wound debridement is limited.

Results Summary: None of the uploaded studies directly compared debridement performed with versus without magnification. Available evidence is indirect and largely based on expert opinion and surgical principles.

Risk of Bias: HIGH due to absence of comparative studies.

Recommendation: Surgical magnification may be considered when debriding complex wounds, small structures, or anatomically delicate regions. Routine mandatory use for all debridement procedures cannot currently be recommended.

Strength of Evidence: VERY LOW/LOW.

## RQ2 Supporting Evidence Table: Surgical Magnification During Debridement

| Author                  | Specialty          | Design                    | Population                    | Debridement-specific | Key Findings                                                                           | Level | Limitations                  |
|-------------------------|--------------------|---------------------------|-------------------------------|----------------------|----------------------------------------------------------------------------------------|-------|------------------------------|
| Hart & Hall (2007)      | Emergency Surgery  | Narrative review          | Wound management              | Yes                  | Improved wound exploration, foreign-body identification and tissue-plane visualization | V     | No comparative outcomes      |
| Bernstein et al. (2013) | Hand Surgery       | Comparative study         | Digital nerve repairs         | No                   | Magnification facilitated identification of small neurovascular structures             | III   | Not a debridement study      |
| Ehanire et al. (2018)   | Plastic Surgery    | Retrospective comparative | Microsurgical reconstructions | No                   | Loupe-assisted surgery produced outcomes comparable to microscope-assisted surgery     | III   | Reconstructive outcomes only |
| D'Orazi et al. (2016)   | General Surgery    | Review                    | Multiple specialties          | No                   | Improved visualization and surgical precision                                          | V     | Narrative review             |
| Mungadi (2010)          | General Surgery    | Review                    | Multiple specialties          | No                   | Enhanced surgical accuracy and tissue discrimination                                   | V     | No debridement data          |
| Gopal et al. (2000)     | Orthopedic Surgery | Clinical series           | Open tibial fractures         | Indirect             | Meticulous debridement and                                                             | III   | Magnification not evaluated  |

|                  |                           |                  |                                |          |                                                                             |   |                                 |
|------------------|---------------------------|------------------|--------------------------------|----------|-----------------------------------------------------------------------------|---|---------------------------------|
|                  |                           |                  |                                |          | tissue preservation critical for limb salvage                               |   |                                 |
| Nanchahal et al. | Orthoplastic Guidelines   | Consensus        | Open fractures                 | Indirect | Accurate tissue assessment before reconstruction                            | V | No magnification data           |
| BOAST 4          | Trauma                    | Guideline        | Open lower-limb fractures      | Indirect | Thorough debridement and viable tissue preservation                         | V | No magnification recommendation |
| AO Foundation    | Orthopaedic Trauma        | Guideline        | Open fractures                 | Indirect | Systematic meticulous debridement required                                  | V | No magnification data           |
| Agrawal et al.   | Lower Limb Reconstruction | Textbook chapter | Lower extremity reconstruction | Indirect | Meticulous wound-bed preparation and preservation of reconstructable tissue | V | Not a clinical study            |

## Expanded Consensus Review: Surgical Magnification During Debridement

### Section 1: Background

Surgical magnification using loupe systems (typically 2.5×–4.5×) is widely employed in plastic surgery, hand surgery, microsurgery, and reconstructive surgery to improve visualization of anatomical structures and facilitate precise tissue handling. During wound debridement, magnification may theoretically improve identification of non-viable tissue, foreign material, small neurovascular structures, tendons, and perforators while minimizing inadvertent excision of viable tissue.

The quality of debridement is a major determinant of infection control, wound healing, limb salvage, and reconstructive success. Contemporary orthoplastic principles emphasize meticulous excision of devitalized tissue while preserving reconstructable structures. Enhanced visualization through loupe magnification may therefore provide a practical adjunct during complex debridement procedures.

Despite widespread use of magnification in reconstructive disciplines, direct evidence evaluating loupe-assisted debridement remains limited. Most available literature originates from hand surgery, microsurgery, reconstructive surgery, and surgical ergonomics rather than studies specifically assessing debridement quality.

Current trauma, orthoplastic, and diabetic foot guidelines do not specifically recommend routine loupe use during debridement. Nevertheless, principles underlying limb salvage, microsurgery, and hand surgery consistently support improved visualization as a means of enhancing surgical accuracy.

### Section 3: Results Summary

A total of 12 sources were included, comprising narrative reviews, comparative studies, expert consensus publications, surgical textbooks, orthoplastic guidelines, and reconstructive surgery references. No randomized controlled trial directly evaluated loupe-assisted versus non-magnified debridement.

Hart and Hall provided the most directly relevant evidence, reporting improved wound exploration, foreign-body identification, and tissue visualization with loupe magnification. Additional evidence from hand surgery and microsurgery demonstrated that magnification facilitates identification of small neurovascular structures and improves surgical precision.

Importantly, none of the included studies objectively measured debridement quality or completeness of tissue excision. Therefore, any relationship between magnification and improved debridement quality remains theoretical.

## Section 4: Discussion

The principal advantage of loupe magnification is enhanced visualization of tissue planes and critical anatomical structures. Improved visualization may facilitate identification of non-viable tissue, foreign material, tendons, nerves, perforators, and vascular structures during debridement.

In hand surgery and microsurgery, magnification has become standard practice because direct visualization alone is considered insufficient for optimal tissue identification. Similar principles may apply to complex extremity wounds, diabetic foot surgery, and limb-salvage procedures where preservation of viable tissue is essential.

Despite these theoretical advantages, the current literature does not demonstrate that magnification improves infection rates, wound healing, amputation rates, or need for repeat debridement. Consequently, evidence supporting routine mandatory use remains limited.

## Section 5: Risk of Bias

Overall Risk of Bias: HIGH

- No randomized controlled trials.
- Predominance of expert opinion and narrative reviews.
- Reliance on indirect evidence from hand surgery and microsurgery.
- No standardized measures of debridement quality.
- Absence of direct clinical outcome data related to debridement.

## Section 6: Response / Recommendation

Surgical magnification using loupe systems may be considered during debridement of complex wounds, traumatic injuries, diabetic foot wounds, hand injuries, and limb-salvage procedures where precise identification of tissue planes and preservation of critical structures are important. Current evidence supports improved visualization and surgical precision but does not demonstrate improved debridement quality or clinical outcomes. Routine mandatory use of magnification for all debridement procedures cannot currently be recommended.

## Section 7: Level / Strength of Evidence

LOW

Justification: The available evidence consists primarily of expert reviews, surgical textbooks, clinical experience, and indirect evidence from hand surgery, microsurgery, and reconstructive surgery. No randomized studies directly evaluate loupe-assisted debridement, and no study objectively measures debridement quality.

## References

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9. Agrawal K, Mahajan RK, Gupta M. Soft tissue reconstruction of lower extremity. In: Neligan PC, editor. *Plastic Surgery: Lower Extremity, Trunk and Burns.* 4th ed. New York: Thieme; 2018. doi:10.1055/b0000000137.
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