TABLE 1. Clinical evidence and surgical readiness of regenerative approaches by indication.

Clinical indication	Regenerative strategy / surgical role	Comparator / standard treatment	Highest level of human evidence	Main reported benefit	Key evidence limitation	Current clinical role
Alveolar ridge augmentation	MSC/cell-enriched adjunct to graft or scaffold	Conventional grafting or scaffold-based augmentation	Small clinical studies and heterogeneous comparative evidence	Potential to enhance bone regeneration and reduce graft requirements in selected settings	Small, heterogeneous clinical studies; limited evidence of superiority over conventional grafting	Investigational / early clinical translation
Maxillary sinus augmentation	MSC-assisted grafting in a contained defect	Conventional sinus augmentation with grafting	Clinical studies and systematic/meta-analytic evidence	Human clinical feasibility; a 2026 meta-analysis found no significant implant-success advantage over conventional treatment [15]	Small RCT evidence base; heterogeneous protocols; clinical superiority not established	Early clinical translation
Periodontal regeneration	MSC-assisted regenerative periodontal surgery	Conventional periodontal regenerative therapy	Clinical studies and systematic review/ meta-analysis [16]	Improvements in selected periodontal parameters reported in clinical studies	Limited number of trials; variable cell sources, scaffolds, and clinical endpoints	Early clinical translation
Alveolar cleft / complex craniofacial defects	Cell + biomaterial reconstruction	Conventional bone grafting or reconstructive surgery	Small clinical study demonstrating feasibility of MSC-assisted alveolar cleft repair [17]	Feasibility of biologically enhanced reconstruction in complex defects	Small cohorts and limited long-term comparative data	Investigational
Extraction, ridge preservation and selected regenerative procedures	PRF / platelet concentrates as surgical adjuncts	Conventional healing or graft-based ridge preservation	Randomised clinical trials and systematic reviews [18,19]	Supportive effects on soft-tissue healing and selected postoperative or ridge-preservation outcomes	Protocol heterogeneity; inconsistent hard-tissue effects; not a predictable substitute for grafting	Clinically integrated adjunct in selected indications

Abbreviations: MSC = mesenchymal stromal cell; PRF = platelet-rich fibrin.