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Obesity and Jaw Bone: Marrow Adiposity, Bone Remodeling, Medication-Related Osteonecrosis of the Jaw, and Surgical Risk

A narrative review

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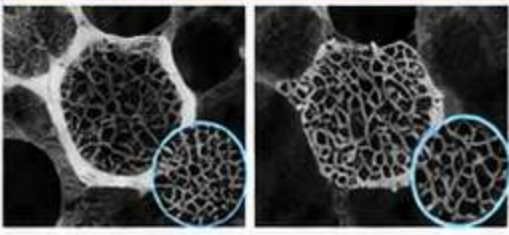
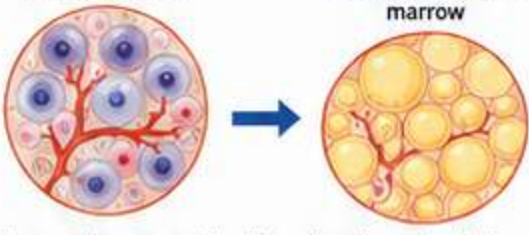
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Type of study:
narrative review

Keywords: obesity; jaw bone; marrow adiposity; bone remodeling; medication-related osteonecrosis; bisphosphonates; denosumab; implant; oral surgery

1. BACKGROUND	2. OBJECTIVE	3. KEY BIOLOGICAL MECHANISMS
 Obesity is a multisystem metabolic disease characterized by chronic low-grade inflammation and systemic insulin resistance.	 - To summarize the mechanisms linking obesity with jaw bone alterations. - To discuss practical implications for oral surgery, implantology, bone augmentation, medication-related osteonecrosis of the jaw, and perioperative risk assessment.	 Chronic low-grade inflammation (TNF-α, IL-6, MCP-1) → Increased osteoclast activity and bone resorption
 Chronic inflammation, insulin resistance, adipokine imbalance, and microvascular dysfunction disrupt bone remodeling and tissue healing.		 Adipokine imbalance (leptin, adiponectin, resistin, visfatin) → Impaired bone turnover and angiogenesis
 Jaw bones are especially vulnerable due to high remodeling turnover, lack of a periosteum, frequent trauma, and dependence on microcirculation.		 Mitochondrial dysfunction and oxidative stress → Osteoblast dysfunction and reduced osteogenesis
		 PPAR-γ activation and Wnt/β-catenin inhibition → Suppressed osteoblast differentiation and bone formation
		 Insulin resistance and hyperglycemia → Altered bone metabolism and increased fracture risk
		 Oxidative stress and impaired endothelial function → Reduced bone perfusion and cell viability
		 Vitamin D deficiency and impaired mineralization → Poor mineralization and bone quality
		 Mechanical overload, poor biomechanics, and delayed healing → Lowered bone strength and increased risk of implant failure and delayed healing

4. STRUCTURAL AND CLINICAL CONSEQUENCES IN THE JAWS		
A. Cortical and trabecular bone	B. Marrow adiposity and local degeneration	C. Healing and implant-related implications
 - Obesity may reduce bone volume and cortical thickness. - Lower bone mineral density and poorer microarchitecture. - Decreased bone quality and regenerative capacity.	 - Increased marrow adiposity reduces hematopoiesis and osteogenesis. - Chronic adiposity alters the bone microenvironment and promotes a hypoxic state. - Fatty degeneration and changes in cytokine profiles predispose to vascular and tissue damage and compromise healing.	 - Slower and poorer postoperative healing. - Higher risk of marginal bone loss and peri-implant complications. - Greater caution may be needed in implant planning and augmentation procedures.

5. IMPLANTS, MARGINAL BONE LOSS, AND MRONJ RISK	6. PRACTICAL RISK ASSESSMENT	7. CLINICAL RECOMMENDATIONS	8. CONCLUSIONS
 Obesity may influence implant outcomes through inflammation, impaired healing, and altered bone quality.	 Assess Obesity, comorbidities, and medications.	 Do not rely on obesity alone to determine surgical risk.	 Obesity impacts jaw-bone biology through inflammation, insulin resistance, oxidative stress, marrow adiposity, vitamin D deficiency, and microvascular dysfunction.
 The relationship between obesity and peri-implant conditions is complex and modified by diabetes, smoking, medication, and microbiota.	 Check Vitamin D status (25[OH]D).	 Optimize inflammation, oral hygiene, glycemic control, and nutritional deficiencies before surgery.	 These factors reduce regenerative potential and increase complication risk.
 A critical literature review supports a possible association between obesity and increased risk of MRONJ in patients using antiresorptive therapy.	 Antiresorptive management Individualize timing and oncologic context.	 Ensure adequate vitamin D levels (≥ 30 ng/mL) and correct any deficiencies.	 Clinically important implications include delayed healing, higher peri-implant complication rates, and a possible association with MRONJ risk in susceptible patients.
 Risk may be higher with vitamin D deficiency, diabetes, and long-term use of glucocorticoids or immunosuppressive drugs.	 Multidisciplinary approach Consider diet, physical activity, and bone health.	 Use gentle surgical technique and atraumatic extraction.	 Obesity should not automatically contraindicate oral surgery or implant therapy, but it requires a careful risk assessment, metabolic optimization, and preventive strategies.
	 Bone quality and healing Evaluate bone quality and healing capacity.	 Allow longer healing time and consider staged treatment.	
	 Preventive care Optimize oral hygiene, periodontal health, and nutrition.	 Increase postoperative surveillance for infection, dehiscence, dry socket, and delayed healing.	
		 Use interdisciplinary cooperation when systemic risk is high.	

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