

Dental Trauma Management

Nano-Silver Gel in Traumatic Tooth Avulsion as Adjunctive Support for Reimplantation Healing



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Focus

Comprehensive general dental practice with emphasis on preventive and restorative care
Clinical management of routine dental procedures and patient-centered treatment approaches



Profile

Dr. Ekta Singh completed her **BDS** in 2021 and currently serves as the **Managing Director of Family Dental Clinic in Chittorgarh, India**. She has over **3.5 years of clinical experience** as a **General Dental Practitioner**, providing comprehensive **dental care** with a strong focus on patient comfort and evidence-based treatment. She has completed a **certified course in Endodontics**, strengthening her expertise in **root canal therapy** and **restorative dental procedures**. **Dr. Singh** is actively **engaged in clinical practice** and is committed to delivering **quality dental care** while improving overall oral health outcomes.



Abstract

Traumatic tooth avulsion represents one of the most severe forms of dental injury, often associated with contamination of the periodontal ligament (PDL), inflammatory root resorption, and compromised soft-tissue healing. Human bite injuries further increase microbial contamination risk due to high oral bacterial load. This case report evaluates the adjunctive use of Multident Silver Gel following delayed reimplantation of an avulsed maxillary anterior tooth in a 45-year-old female patient. Standard management included socket debridement, saline preservation, atraumatic reimplantation, and semi-rigid splinting. Topical Nano-Silver Gel was applied to the root surface prior to placement and prescribed postoperatively. Clinical follow-up demonstrated reduction in edema, controlled inflammation, progressive tooth stabilization, and favorable soft-tissue healing by the third visit.





Clinical Background

Tooth avulsion is defined as complete displacement of a tooth from its alveolar socket, resulting in total disruption of the periodontal ligament and pulpal blood supply ⁽¹⁾. Prognosis depends largely on extra-oral time, storage medium, microbial contamination, and timely splinting ^(2,3).

Human bite injuries represent highly contaminated wounds due to polymicrobial oral flora including anaerobic species, increasing the risk of infection and inflammatory root resorption ⁽⁴⁾.

Silver nanoparticles have demonstrated broad-spectrum antimicrobial activity against Gram-positive and Gram-negative organisms, including biofilm-forming species relevant to oral infections ^(5,6). Additionally, Nano-Silver has been shown to modulate inflammatory cytokines such as TNF- α and IL-1 β , contributing to reduced edema and enhanced wound resolution ^(7,8).

Experimental evidence also suggests that silver nanoparticles, at controlled concentrations, support fibroblast viability and keratinocyte migration - essential components of periodontal and mucosal healing ^(9,10).

Case 1

Case Report

- ✓ A 45-year-old female patient presented with avulsion of a maxillary anterior tooth following a human bite injury sustained the previous night. Clinical examination confirmed complete avulsion with intact socket architecture and associated soft-tissue trauma.
- ✓ The socket was gently irrigated and debrided using sterile saline. The avulsed tooth was maintained in saline prior to reimplantation. As part of adjunctive local management, Nano-Silver gel was applied to the root surface before atraumatic reinsertion into the socket.
- ✓ Stabilization was achieved using a canine-to-canine semi-rigid splint. Systemic antibiotics, anti-inflammatory medication, and metronidazole were prescribed considering the contaminated nature of the injury.



Clinical Observations

Day

1-2

Mild postoperative edema noted around the re-implanted tooth, with no bleeding, purulence, or necrosis. Soft tissues appeared stable.

Day

5

Significant reduction in swelling observed. Mild mobility present; splint intact with no signs of infection.

Week

2-3

Improved tooth firmness and satisfactory gingival adaptation noted, indicating a favorable short-term prognosis.



Figure 1. Pre-operative view
Maxillary anterior region showing complete avulsion of the central incisor with visible empty socket and associated soft-tissue trauma.



Figure 2. Extra-oral preservation
Avulsed tooth maintained in saline to preserve periodontal ligament cell viability prior to reimplantation.



Figure 3. Adjunctive Nano-Silver application
Root surface coated with Multident Silver Gel prior to reinsertion into the alveolar socket.

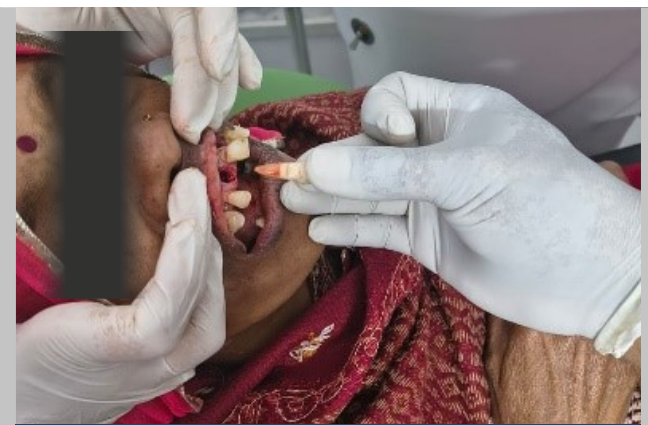


Figure 4. Reimplantation procedure
Atraumatic repositioning of the avulsed tooth into the prepared socket following saline irrigation and debridement.



Figure 5. Splint stabilization
Canine-to-canine semi-rigid splint placement ensuring stabilization of the re-implanted tooth.



Figure 6. Follow-up outcome
Improved gingival contour and satisfactory stabilization observed during follow-up visit.

Discussion

Avulsion injuries carry a high risk of inflammatory and replacement root resorption due to periodontal ligament damage and microbial contamination ^(1,2,3). Early infection control is essential to preserve periodontal ligament vitality and limit inflammatory complications. Human bite injuries introduce additional anaerobic bacterial contamination, increasing the risk of postoperative infection ⁽⁴⁾. Silver nanoparticles exhibit antimicrobial activity through disruption of bacterial cell membranes, interference with DNA replication, and generation of reactive oxygen species, contributing to broad-spectrum microbial suppression in contaminated environments ^(5,6).

In addition to antimicrobial effects, Nano-Silver has demonstrated anti-inflammatory properties through modulation of pro-inflammatory cytokines, which may help reduce edema and support wound stabilization ^(7,8). Experimental studies also suggest that controlled concentrations of silver nanoparticles maintain fibroblast viability and promote epithelial migration relevant to periodontal and mucosal healing ^(9,10). In this case, absence of early infection and progressive stabilization of the reimplanted tooth indicated a favorable early healing response, though long-term follow-up is required to assess root resorption risk.

Key Takeaways

1. Nano-silver gel may provide adjunctive antimicrobial protection in contaminated avulsion cases.
2. Root-surface application before reimplantation may reduce microbial burden.
3. Postoperative topical use may support early soft-tissue healing.
4. Early stabilization in this case suggests favorable short-term healing response.



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