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Case Report

Severe Incisor Tooth Wear and Apical Pathology in a Motocross Athlete- A Case Report

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Abstract

Background: Motocross is a high-impact sport that exposes riders to repetitive jumps, rapid acceleration and vibration. Although traumatic dental injuries are well recognized in motocross, the possible contribution of long-term repetitive occlusal loading to chronic tooth wear remains poorly documented. Acidic beverage exposure is another potential risk factor that warrants assessment in athletes with tooth wear. **Case Presentation:** A 38-year-old man with more than 20 years of competitive motocross participation presented with pain and palatal swelling in the maxillary anterior region. Clinical examination revealed incisal wear involving teeth 12, 11 and 21, with extensive enamel loss and flattened incisal edges. A fluctuant palatal swelling with a sinus tract was observed. Periapical radiography showed apical radiolucency associated with teeth 21 and 22, and a gutta-percha tracing was documented as localizing the sinus tract to tooth 21. The patient denied any history of significant acute dental trauma. Pulpal sensibility testing was not documented, and a definitive pulpal diagnosis could not be established. Initial management included antibiotics and analgesic medication because the patient reported fever; however, no measured temperature was documented. He was referred for endodontic assessment and treatment. **Clinical Significance:** This case highlights severe anterior tooth wear and apical pathology in a long-term motocross athlete. Repetitive mechanical loading, the apparent edge-to-edge incisal relationship (Figure 1), parafunctional activity and acidic beverage exposure warrant consideration as possible contributors, although their roles were not established in this patient. Sports dentistry screening in high-impact athletes should include assessment of tooth wear, dietary risk factors, parafunctional activity and pulpal status.

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1. INTRODUCTION

Participation in motocross exposes athletes to repetitive high-impact forces associated with jumps, landings and vibration over uneven terrain[1]. Long-term participation in this high-impact sport may expose athletes to repetitive mechanical occlusal loading. Bruxism, assessed as teeth clenching, has been reported among elite athletes participating in individual sports, including bicycle motocross; however, sport-specific data for BMX were not reported[2]. In this rider, whether teeth clenching occurred during competition or practice was not assessed, and a direct relationship between motocross participation and the observed tooth wear cannot be established.

Athletes may consume energy drinks to support alertness and exercise performance[3]. However, the clinical evidence linking sports and energy drink consumption to dental erosion in athletes remains limited[4]. Beverage consumption patterns were not documented in this patient, so their contribution to his tooth wear could not be determined.

Acute oral injuries during motocross have been reported[5]. Literature describing chronic tooth wear with associated apical pathology in motocross athletes remains limited. This report describes severe anterior tooth wear and apical pathology in a long-term competitive motocross rider and discusses preventive considerations for sports dentistry.

2. CASE REPORT

A 38-year-old man presented to a community health center for emergency dental care with pain and swelling in the maxillary anterior palatal region. His medical history was noncontributory.

The patient did not recall a significant episode of acute dental trauma involving the affected maxillary anterior teeth. When asked about sports participation, he reported riding motocross for more than two decades. Because he presented with acute dental pain, a large localized swelling and a reported history of fever, the examination focused primarily on management of the symptomatic condition.

Clinical examination demonstrated wear of the incisal and palatal surfaces of the maxillary right lateral incisor (12), right central incisor (11) and left central incisor (21) (Figure 1). A fluctuant swelling with a sinus tract was observed on the adjacent palatal aspect. An intraoral clinical photograph of the palatal region



Figure 1. Incisal wear involving teeth 12, 11 and 21.



Figure 2. Incisal wear involving teeth 12, 11 and 21.

could not be obtained because the patient declined additional photography.

Periapical radiography revealed a well-defined radiolucency associated with the apices of teeth 21 and 22 (Figure 2). A gutta-percha tracing was documented as localizing the sinus tract to tooth 21 (Figure 3).



Figure 3. Periapical radiograph with a radiopaque tracing documented clinically as localizing the sinus tract to tooth 21.

The involved teeth exhibited Miller Class 0 mobility, and tooth 21 was tender to percussion. Palpation, periodontal probing, fracture assessment and pulpal sensibility testing were not documented. An urgent endodontic referral was made for further evaluation and treatment. A definitive pulpal diagnosis could not be established from the available findings.

3. INITIAL MANAGEMENT INCLUDED

- Antibiotic Therapy: Amoxicillin 875 mg with clavulanate 125 mg every 12 hours for seven days.
- Pain Management: ibuprofen 800 mg every six hours as needed.

The European Society of Endodontology position statement advises against adjunctive systemic antibiotics for a localized apical abscess without systemic involvement[6]. In this case, the clinician prescribed antibiotics because the patient reported fever; however, no measured temperature was documented.

4. REFERRAL AND FOLLOW-UP

The patient was referred to an endodontic specialist for evaluation and possible endodontic treatment. Definitive restorative rehabilitation was recommended following completion of endodontic treatment. The patient also received counseling regarding reduction of acidic beverage intake and the importance of a custom-made athletic mouthguard.

5. CLINICAL TIMELINE

- **12 June 2025**: The patient presented to the community health center for emergency dental evaluation.
- **At that Visit:** Referral to an endodontic specialist and recommendation for definitive restorative rehabilitation following endodontic treatment were provided.
- **Subsequent Months:** The patient did not return to the center for continued care. No documentation of root canal therapy or its outcome was available in the patient's record.

Because the patient initially presented for emergency care and did not continue treatment at the center, the completion of endodontic therapy and subsequent clinical outcome could not be confirmed.

6. DISCUSSION

This case illustrates anterior tooth wear and apical pathology in a long-term motocross athlete. Repetitive mechanical loading, clenching and acidic exposures are possible contributors that warrant investigation. However, clenching during riding and dietary or intrinsic acid exposures were not systematically assessed in this athlete. A direct causal relationship

between motocross participation and the observed findings cannot be established in this case.

The present case raises the hypothesis that prolonged motocross participation, repetitive jumping and landing, and acidic beverage consumption may contribute to dental wear beyond physiological wear. This possibility requires further investigation in longitudinal studies; beverage consumption itself was not documented in this patient.

7. TOOTH WEAR IN ATHLETES

Athlete studies have documented dental erosion, but they do not consistently establish its relationship with beverage consumption. In a cross-sectional study of 304 university athletes, Mathew *et al.*, reported a dental erosion prevalence of 36.5% and found no association with sports drink consumption[7]. This finding supports careful assessment of multiple possible contributors rather than attributing tooth wear to sports drinks alone.

In the London 2012 Olympic Games study, Needleman *et al.,* found dental erosion in 45% of examined athletes, with some athletes reporting that oral health problems affected training and performance[8]. Gallagher *et al.,* subsequently documented substantial oral disease despite generally positive self-reported oral health behaviours; sports nutrition product use was common in their elite and professional athlete sample[9]. These cross-sectional findings indicate a need for preventive assessment but do not establish the cause of tooth wear in this patient.

Participants in high-impact sports such as motocross warrant further investigation because repetitive jumps and landings may plausibly affect occlusal loading. This mechanism remains unconfirmed in the present case.

8. BRUXISM DURING ATHLETIC PERFORMANCE

Bruxism has been reported among athletes, although the available evidence varies in how awake and sleep bruxism are assessed[2]. In the present case, the presence, type and frequency of bruxism were not evaluated. Tooth wear alone does not establish that clenching occurred during motocross participation, and its relationship with the dental findings remains uncertain.

A comparative cross-sectional study of professional wrestlers reported differences in bite force and masseter muscle thickness associated with high-intensity training[10]. Whether similar findings occur in motocross riders, or contribute to tooth wear, remains unclear.

Although the patient reported approximately two decades of motocross participation, the contribution of sport-related loading could not be assessed without a more detailed evaluation of riding exposure, diet, occlusion, awake clenching, sleep bruxism and potential erosive exposures.

The brief emergency consultation and absence of follow-up prevented further assessment of these factors.

9. ENERGY DRINKS AND DENTAL EROSION

The role of acidic beverages in this case could not be determined because consumption patterns were not documented. Energy drinks are used in sporting settings for their potential effects on alertness and exercise performance[3]. Their use should not be assumed in this patient.

Gálvez-Bravo *et al.,* conducted a systematic review of athlete studies and concluded that the available evidence did not establish an association between sports drink consumption alone and dental erosion; they called for more prospective studies[4]. Energy drink intake and other dietary or intrinsic acid exposures were not quantified or systematically assessed in the present case.

10. DENTAL INJURIES IN MOTOCROSS

Motocross injury literature has primarily considered acute injuries associated with falls and collisions[1].

Oral lacerations during motocross have also been described[5]. Dental trauma is generally discussed in the context of crown fractures, luxation injuries, avulsions and facial lacerations. These reports do not establish a mechanism for chronic tooth wear.

Another proposed mechanism involves "roost": rocks, dirt and debris projected by the rear tyre of another motorcycle. A Kawasaki USA video describes riders' experiences of roost-related impacts[11]. This audiovisual account provides anecdotal context rather than clinical evidence of chronic dental injury. Riders report that roost can produce direct impacts to the neck and orofacial region despite the use of protective helmets, particularly when the mouth is open. Motocross riders are also exposed to airborne dust and soil. Airborne particles could therefore be considered in future studies of possible abrasive wear, including potential interactions with acid-softened surfaces; this mechanism was not assessed in the present patient.

The patient exhibited incisal wear of the maxillary anterior teeth without a recalled significant acute traumatic event. However, the rate and progression of wear were not documented. This case supports consideration of tooth wear during assessment of motocross athletes without establishing that the sport caused it. Longitudinal investigation is needed to determine whether motocross-specific exposures contribute to progression of tooth wear.

11. MOUTHGUARDS AND OCCLUSAL LOADING

Mouthguards are recommended to reduce traumatic dental injury in contact and collision sports, with epidemiological evidence demonstrating reductions in dental injury[12,13]. Experimental laboratory research has examined how the type and thickness of Ethylene-Vinyl Acetate (EVA) mouthguard material influence force transmission, impact-energy absorption and stress distribution within dental structures[14]. These material findings do not establish prevention of chronic tooth wear in motocross riders.

Bruxism was not established in this patient, and its occurrence during wakefulness, sleep or riding could not be determined. Athlete studies report bruxism but do not consistently distinguish its types[2]. Takeda *et al.,* found that wearing an EVA mouthguard reduced tooth distortion during experimental clenching[15]. This finding does not demonstrate long-term prevention of chronic tooth wear or establish a relationship between bruxism, motocross participation and the findings in this case.

Full-face helmets and chin bars may influence the context in which a mouthguard is considered for motocross. A resilient athletic mouthguard should not be assumed to have the same effects as a hard stabilization splint if severe tooth wear and bruxism are established. Okeson reported increased nocturnal muscle activity in some participants using a soft splint[16]. Proposals to modify mouthguard design for load management during riding, or to use a separate night-time appliance when clinically indicated, require individualized assessment and further evaluation.

Custom mouthguards may be considered for trauma protection according to the athlete's individual risk and sporting circumstances[12,13]. Their ability to reduce chronic tooth wear in motocross remains a research question that requires longitudinal clinical investigation.

12. CLINICAL IMPLICATIONS FOR SPORTS DENTISTRY

This case emphasizes the role of sports dentistry beyond acute trauma management. Comprehensive oral evaluations of motocross athletes should include assessment of tooth wear, dietary habits, parafunctional activity and the pulpal status of heavily worn teeth. Individualized preventive strategies should include dietary counselling, monitoring of tooth wear and consideration of a custom mouthguard where clinically indicated.

Early recognition of tooth wear may allow conservative assessment and management before

further structural loss or pulpal complications occur.

13. LIMITATIONS

Although the clinical findings are consistent with chronic mechanical and/or chemical tooth wear, this case report cannot establish a direct causal relationship between motocross participation and the observed apical pathology. The patient was evaluated during a limited emergency consultation at a community health center, where the primary objective was to identify and manage the source of acute pain. Consequently, a comprehensive oral examination, complete intraoral photographic documentation, and full-mouth radiographic assessment were not completed. A standardized tooth-wear index was not recorded, and information regarding clenching or bruxism history, dietary habits, and energy-drink consumption was not quantified. The frequency and duration of motocross participation were also not fully documented. Furthermore, potential intrinsic sources of erosion could not be comprehensively assessed. Other contributing factors, including sleep bruxism, occlusal discrepancies, age-related physiological tooth wear, dietary and behavioral factors, and other sources of chemical or mechanical tooth wear, cannot therefore be excluded. The patient did not return for the recommended comprehensive examination or follow-up, and the subsequent treatment outcome is unknown. These limitations preclude determination of the relative contribution of motocross participation, dietary exposure, or other behavioral and clinical factors to the observed dental findings.

14. FUTURE RESEARCH DIRECTIONS

Prospective studies should assess motocross riders before and during follow-up, with appropriate comparison athletes where feasible. Repeated clinical examinations and standardized tooth-wear indices could establish whether wear progresses and at what rate. Investigators should record riding duration and intensity, helmet and mouthguard use, prior dental trauma, occlusal findings, and oral symptoms, while assessing awake clenching and sleep bruxism as separate exposures rather than inferring either from tooth wear alone.

Dietary and intrinsic acid exposures, salivary factors, and enamel erosion should be measured alongside mechanical wear so their relative contributions can be examined. Studies of custom mouthguards should distinguish established protection against acute dental injury from the untested possibility of reducing chronic tooth wear in motocross. Where a symptomatic tooth is identified, standardized pulp and periapical diagnoses and documented treatment follow-up would clarify clinical outcomes. These designs would test the mechanisms raised by this case and better characterize the potential contribution of sport-related mechanical loading and chemical exposures to long-term oral health.

15. CONCLUSION

This case documents severe anterior tooth wear and apical pathology in a long-term motocross athlete. The contributions of mechanical loading, parafunctional activity and acidic exposures were not established, and a causal relationship with motocross participation cannot be established from this single case. Greater awareness among sports dentists and healthcare providers may facilitate earlier recognition of tooth wear and other oral risk factors in high-impact athletes. Sports dentistry screening should include assessment of tooth wear, diet, acidic exposures, parafunctional activity and pulpal status. Comprehensive examinations and documented follow-up are needed to clarify diagnosis, guide management and assess outcomes.

15.1 Consent for Publication

The patient presented for emergency dental care and was subsequently lost to follow-up. The case has been fully de-identified and includes no direct personal identifiers or facial photographs. On this basis, specific consent for publication was not obtained.

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