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LITERATURE REVIEW

Urine Toxicology and Delay of Mandibular Fracture Treatment: A Literature Review

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Introduction

Mandible fractures are among the most common facial trauma injuries treated in emergency departments and oral and maxillofacial surgery practices. These fractures are associated with falls or motor-vehicle accidents, but are often due to interpersonal violence, and may present as an isolated serious injury in an otherwise intact patient. Substance use makes each of these mechanisms of injury more likely and is disproportionately represented in patients who present with fractured mandibles. The relationship between substance use and mandible fractures is multifaceted, involving behavioral, physiological, and socioeconomic factors that collectively increase both the risk of injury and the complexity of recovery [1,2].

The link between substance use and mandibular fractures lies not only in the behavioral and physical effects of intoxication, but also in its impact on the timing of surgical management. Mandibular fractures should be treated promptly, ideally within the first twenty-four hours after injury. Delays may result in an increased length of stay, enhanced financial burden and poor patient satisfaction [1,3]. Even more importantly, delayed treatment of mandibular fractures may affect outcomes and elevate the risk of complications. Alcohol and many other substances, individually or in combination, may be associated with mandibular fractures and with delays in providing definitive care. The focus of this review is cocaine, because current practices may be leading to unnecessary delays. The aim of this review is to shed light on those practices, to propose evidence-based guidelines and to provide a platform for further investigation.

Substance use disorders (SUDs), including cocaine use disorder, are prevalent in the United States, with a significant 12-month prevalence of 3.9% for substances like cocaine as defined by the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) [1]. Substances such as cocaine are well known to impair judgment, heighten aggression, and increase risk-taking behaviors. These effects frequently result in physical altercations and accidents leading to facial trauma. A number of studies have confirmed the relationship between substance use and maxillofacial trauma particularly fractures of the mandible [4-6]. In trauma centers and hospital emergency departments, it is considered appropriate for patients admitted with facial trauma to be routinely screened for drugs. Questions considered by the authors of this review include the following:

1. What is the true significance of the urine toxicology screen result "positive for cocaine?"
2. Is a mandatory twenty-four hold based on that positive test result supported by the available scientific literature?
3. Does that finding and the delays typically produced, lead to enhanced patient safety?

Abstract

A common practice in many surgical centers is to cancel or postpone surgery for patients who test positive for cocaine in their urine, often until they

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produce a negative test result. Some facilities impose a twenty-four hold or longer on non-emergent anesthesia and surgical services for patients who test positive for cocaine. While this approach may seem cautious from a provider's perspective, it can lead to financial implications due to unused operating room time, prolonged patient suffering, worsened patient experience, and treatment delays that can result in disease progression and poorer clinical outcomes [4]. Furthermore, SUDs, including cocaine use disorder, are more prevalent in socioeconomically disadvantaged populations with limited access to care, making the decision to postpone even more consequential. Some individuals with chronic cocaine use disorder may never test negative, potentially leading to indefinite delays in necessary surgical interventions.

Cocaine exerts its effects by blocking the reuptake of norepinephrine, dopamine, and serotonin in the brain, leading to a sympathetic stimulation syndrome characterized by increased heart rate, blood pressure, body temperature, and potential for myocardial ischemia and dysrhythmias. These acute physiologic effects of cocaine typically have a short duration, with a plasma half-life of 30-90 minutes. However, cocaine is rapidly metabolized into two inactive compounds, benzoylecgonine and ecgonine methyl ester, which can be detected in urine for several days to weeks after the last use [7]. This discrepancy between the short-lived clinical effects of cocaine and the prolonged detection of its metabolites by urine toxicology tests creates a significant dilemma in the perioperative management of patients presenting with mandible fractures.

This cohort is selected not only because a higher likelihood of substance use is associated with fractured mandibles, but because the treatment of this injury is neither elective nor is it typically a life-threatening emergency that would override a policy mandating a delay due to a positive urine toxicology result.

Methods

This review addresses a critical gap in perioperative care for a vulnerable patient population. Its findings will inform evidence-based recommendations, enhance patient safety, and support anesthetic and surgical decision-making in oral and maxillofacial surgery. A review for literature was conducted via the following electronic databases: PubMed, MEDLINE, Embase, and Cochrane Library. Keywords and phrases included- "cocaine," "oral surgery," "oral and maxillofacial surgery," "perioperative complications," "waiting period," "anesthesia," and "cardiovascular risks" (Figure 1).

Inclusion criteria:

- Studies involving patients who reported cocaine use before elective surgery

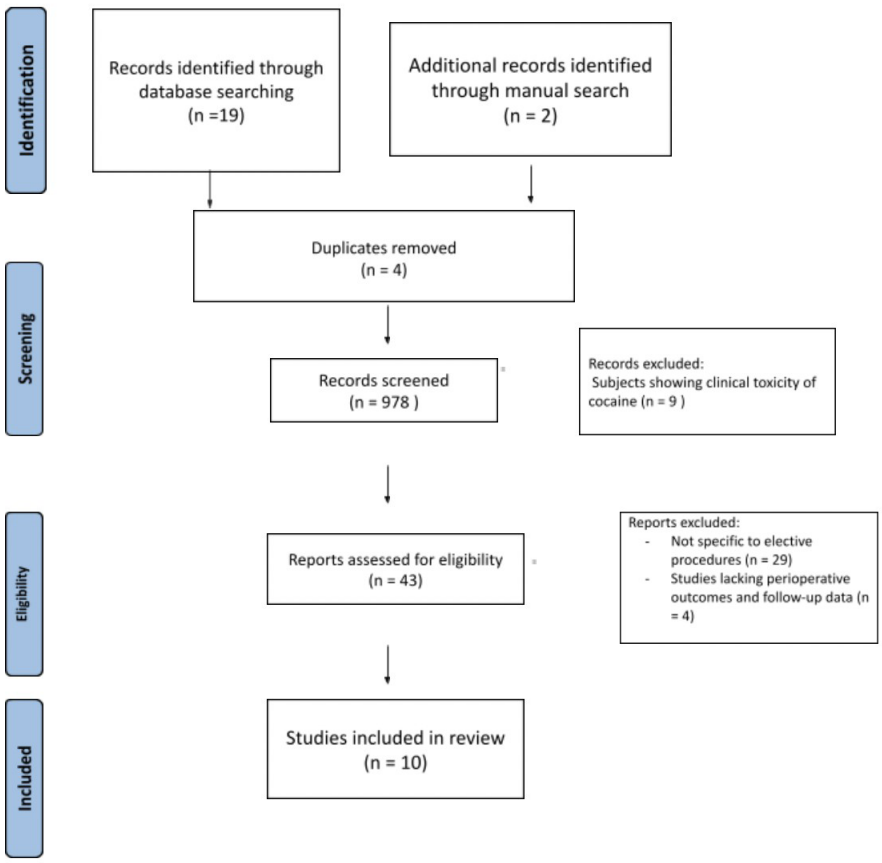

Figure 1: A literature review of various databases and manual search.

- Studies evaluating perioperative outcomes based on the timing of cocaine use
- Randomized controlled trials (RCTs), cohort studies, case-control studies, and case reports

Exclusion criteria:

- Studies not specific to elective procedures
- Studies lacking perioperative outcome data

Outcomes of interest:

- Primary outcomes: Incidence of perioperative cardiovascular events (ex. dysrhythmias, hypertension), financial burden of surgical delay
- Secondary outcomes: Adverse anesthetic reasons, surgical complications and overall patient safety

Data extraction

- Study characteristics, patient demographics, cocaine use timing, surgical details, perioperative outcomes and follow-up data

Results

Emerging evidence suggests that routine cancellation of elective surgery based solely on a positive urine toxicology result for cocaine in clinically asymptomatic and non-toxic patients may be unwarranted. Studies have shown that patients who test positive for cocaine but present with normal vital signs (blood pressure, heart rate, temperature) and a normal or unchanged electrocardiogram (ECG) can undergo general anesthesia for scheduled elective surgery without a significantly increased risk of intraoperative hemodynamic instability or adverse short-term outcomes compared to cocaine-negative patients [8].

A prospective cohort study by Hill, et al. [7] found no significant difference in cardiovascular stability during and after general anesthesia between non-toxic, cocaine-positive patients and matched drug-free controls [7]. Similarly, a retrospective cohort study by Moon, et al. [9] demonstrated that cocaine-positive patients did not experience a higher incidence of intraoperative hemodynamic events or require more vasopressors compared to match cocaine-negative controls [9]. These findings indicate that the presence of cocaine metabolites in the urine, indicative of past use rather than acute intoxication, does not necessarily preclude proceeding with surgery.

The consequences of imposing twenty-four hour or longer delays have been investigated and include: a higher likelihood of complications, increased length of stay, patient dissatisfaction, surgeon dissatisfaction, unnecessary use of resources in acute care facilities and possible patient elopement or signing out against medical advice only to require re-admission at a later date [2]. Given the many variables leading to complications of mandibular fractures, a quantitative assessment of the contribution of treatment delays to those outcomes is challenging. More easily quantifiable is the financial impact of delaying/cancelling surgery. A 2009 study estimated the average costs of hospitalization and providing necessary services in an acute care facility to be $35,804, with factors like drug abuse, alcohol abuse, mental illness, cardiovascular disease, and age over 40 increasing the cost. More recent data from 2008-2022 suggests a lower median cost of treatment, adjusted for inflation, around $8,869.49, with a median length of stay of three days [3,10,11].

Reimbursement may be compromised when hospital days are not clearly justifiable and in many communities, the payer mix for patients with mandibular fractures is not particularly favorable.

Discussion

The current literature increasingly supports the notion that asymptomatic patients with a positive urine toxicology test for cocaine do not inherently face a greater risk during elective surgery under general anesthesia compared to cocaine-negative patients. The practice of routinely canceling surgeries for these individuals based solely on the urine test results appears to be unnecessary and contributes to increased costs, resource wastage, and delays in necessary patient care. Instead, clinical assessment for acute intoxication (euphoria, tachycardia, hypertension) and evaluation of cardiac risk, including normal arterial pressure (MAP between 65-100 mm Hg) and heart rate (50 bpm-100 bpm), normothermic, and a normal (or unchanged from previous) ECG, including a QTc interval (< 500 ms) should guide the decision to proceed with surgery [4].

Hospitals should consider developing evidence-based policies that might allow surgery to proceed in hemodynamically stable, asymptomatic cocaine-positive patients. Given the limits of urine testing and the persistence of metabolites that trigger a positive result for up to several days after cocaine use, some authorities have suggested allowing treatment to proceed as soon as eight hours after the presumed discontinuation of cocaine, in patients with no clinical or ECG manifestations of acute intoxication. In view of the usual pathway from the emergency department to the operating room in patients with non-life-threatening injuries, eight hours seems to be reasonable and realistic. Moreover, the perioperative period offers an opportunity to implement screening, brief intervention, and referral to address underlying SUDs and improve long-term outcomes for these patients. Future research should focus on optimal management strategies for patients with substance use and the effectiveness of in-hospital interventions on SUD trajectories.

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Authors Contribution

Authors contributed equally to this work.

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