

Late mandibular fracture after third molar extraction: a malpractice case or not?

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ABSTRACT

Fractures of the mandibular angle following surgical extraction of the third molar occur at an incidence ranging from 0.0034% to 0.0075%. The low incidence and the data present in the literature reveal how legal claims based on late mandibular fractures from third molar extractions are unlikely, being an uncommon clinical condition. The present case investigates the causal relationship between the fracture of the mandibular angle and the intervention of extraction of a dental element 3.8 in conditions of semi-inclusion and the possible hypothesis of dental malpractice. About two weeks after the extraction, the patient felt a noise like that produced by shattering glass, followed by severe and sudden pain along the area of the left mandibular joint and numbness. The following day, the patient underwent an orthopantomogram performed by the same medical team that carried out the operation in question, with an incorrect diagnosis of dislocation of the condyle, which is to be treated with muscle relaxants and anti-inflammatories. Upon further radiological investigations performed by different operators, it is concluded that the patient is suffering from a "fracture of the left mandibular angle". The patient, therefore, reported and sued the dentists for the crime of negligent personal injury who had extracted element 3.8. From medical history, clinical examination, and documentation produced by the patient, it can be said that the extraction of element 3.8 was necessary as the pericoronary sac had caused an untreatable periodontal lesion at the distal root of the 3.7. From a medico-legal point of view, it was established that the extraction maneuvers may have caused the fracture of the mandibular angle, but it can be excluded professional responsibility in the criminal field of the medical team that carried out the *res judicata* intervention, since the fact in itself represents a known complication of the extraction of mandibular third molars.

INTRODUCTION

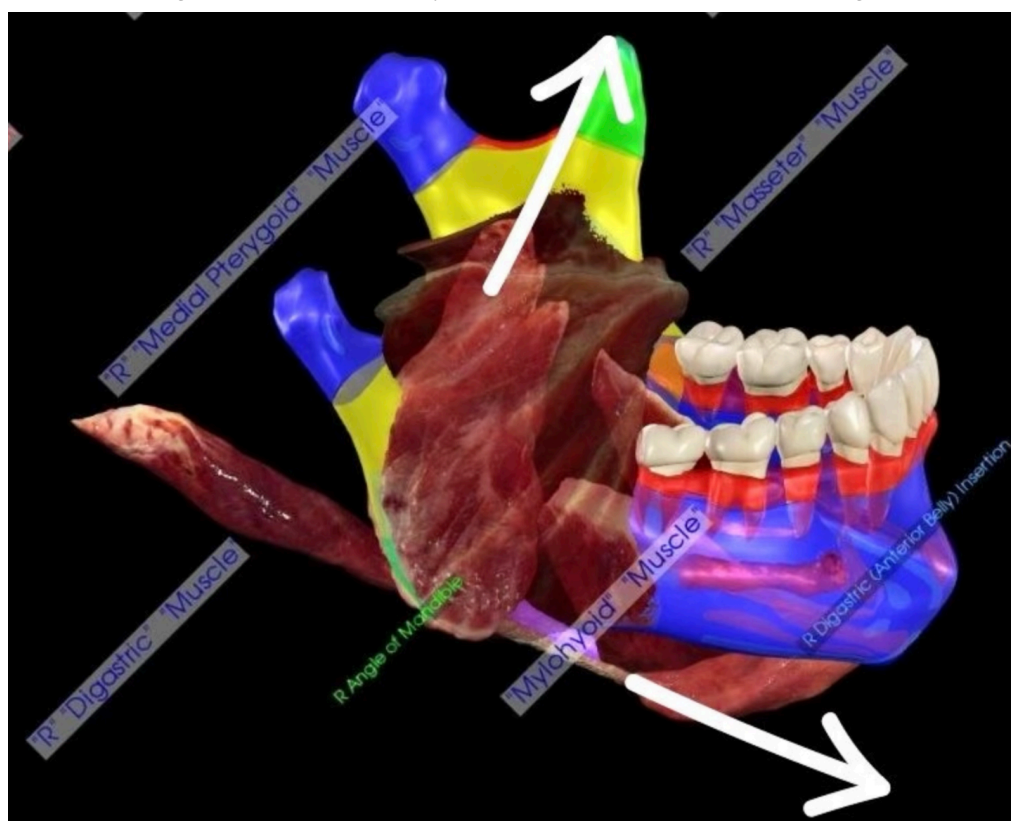
The dental inclusions, specifically the third inferior molar or supernumerary teeth, are classified as eruptive disorders¹: during their extraction different complications could occur². The inclusion and semi-inclusion of the mandibular third molar are primarily due to the mandibular angle anatomy region, which is unable to provide sufficient space for tooth eruption³. The surgical procedure for the extraction of

impacted lower third molars can be associated with both intraoperative and postoperative complications, including severe pain, significant bleeding, extensive edema, potentially permanent inferior alveolar nerve injury, and even rare but serious mandibular fractures.^{4,5} These complications, particularly in weak areas of the mandible such as the angle region, condylar

region, and symphysis, underscore the gravity of the clinical situation.⁶

The mandibular angle is particularly vulnerable due to the transitional nature of the zone between the toothed and non-toothed portion of the mandible⁵ and solicited by the vectorial forces of the masticatory and suprahyoid muscles (Figure 1).

Figure 1. Anatomy of mandibular angle region with muscles inserted. Arrows show the vectorial forces developed during masticatory acts. Picture from Anatomage Inc. - Anatomage Table EDU. The 3D rendering of the donated body to science data is from Anatomage Table.



The third molar, often partially impacted, reduces bone mass, making the structure more vulnerable and increasing the fracture risk.⁷ Mandibular fractures associated with the extraction of lower third molars account for approximately 75% of all cases.⁵ Factors contributing to the risk of fracture include the level of impaction on the surrounding bone, dental anatomy, characteristics of dental roots, previous infections, age, sex, postoperative period, bruxism, drugs affecting bone metabolism, and the patient's athletic activity.⁸ Despite the relatively low incidence of this complication, ranging from 0.0033% to 0.0036% for intraoperative fractures and 0.0042% to 0.0046% for postoperative fractures⁹, it's crucial for clinicians to be aware of the risks associated with retained impacted teeth, emphasizing the need for

vigilance and caution in these procedures. It's important to note that the occurrence of late mandibular fractures, particularly those that become the subject of malpractice lawsuits, is a rarity in the literature.¹⁰

Given the low incidence, forensic dentistry associates the late mandibular fracture after third molar extraction as an unforeseen and unpredictable complication, provided the oral surgeon has diligently evaluated the medical history, excluded any factors predisposing to the fracture, informed the patient comprehensively, and used the hand-piece and surgical instruments correctly, while also monitoring the patient in the post-operative period.¹¹

The law regulating medical responsibility in Italy is the 24/2017 law. The text of the law regulates the

responsibility at the penal, civil, and administrative levels. Article 590 sexies of the Penal Code states, "When the lesion is due to incompetence, but the guidelines and literature indications are respected, liability is excluded".¹² The penal liability of the health operator (doctor, dentist) is excluded for technical errors but not for negligence (when the operator does not take the appropriate precautions for the case) and for imprudence (when the operator does not respect guidelines).¹³⁻¹⁴ In cases such as late mandibular fracture after third molar extraction, the operator should not be prosecuted criminally if the lesion is due to technical errors.

Here, we report a case of a late mandibular fracture after third molar extraction. The operators and their professional actions have been investigated by technical consultants of the prosecutor's office to assess their eventual criminal responsibility.

THE CASE

A 40-year-old male patient went to a private healthcare structure affiliated with an insurance company, reporting an episode of inflammation at the level of the left hemiarch of the mandible. After undergoing an orthopantomography (OPG) conducted by dentist "1", the patient underwent extraction of tooth 3.8 by dentist "2", operating in the same healthcare facility. The patient reported that the post-operative course was uneventful until seven days after the removal when, during lunch, he reported hearing a noise like "breaking glass," followed by intense pain. He stated that he contacted the healthcare facility and went there for a check-up. Furthermore, the patient reported that, after examination of the X-ray, a dislocation of the condyle was diagnosed; therefore, the treatment prescribed was based on anti-inflammatory drugs and muscle relaxants, and another appointment for the following day was scheduled.

On the same evening, the patient reported that, after a discussion with his wife, it seemed advisable to seek a second opinion and, therefore, contacted Dentist 3, his wife's physician. The next day, the patient went to Dentist 3's office and underwent further examination with OPG and Computerized Tomography (CBCT): the radiographic exams revealed a fracture of the angle of the left mandible, and Dentist "3" decided to treat it through arch ligation for four weeks. After four weeks, the previous treatment was ineffective, and

a new treatment consisting of immobilization with metallic wire and brackets was scheduled. Due to the above-described events, the patient made a formal complaint to Dentists "1" and "2", suing for personal injuries.

Technical consultation operations of the public prosecutor

Following the complaint filed by the patient, the public prosecutor proceeded to appoint their consultants to ascertain:

§ Any responsibilities for fault, malpractice, and negligence of the current suspects;

§ The necessary precautions by the individuals and/or medical personnel who have treated the patient; in affirmative case, the consultants must individuate expressly the negligent conduct (commission or omission) and the person responsible for it, as well as representing, according to medical science evaluations, the causal relationship between the negligent conduct (active and omissive) and the diagnosed injuries listed below:

- a) Circular bone lesion of large dimensions as a result of osteotomy in position 4.8 and still the presence of well-represented radicular fragments;
- b) Circular bone lesion of large dimensions as a result of osteotomy in position 3.8;
- c) Fracture of the angle of the left mandible

§ The severity of the injuries suffered by the victim, including the relation to the days of prognosis, as direct consequences of any negligent or intentional conduct attributable to the suspects. The Technical Consultation Operations were performed in the presence of the prosecutor's office's panel of technical consultants, the party's technical consultants, and the patient. After identifying the expert witness, anamnestic data were collected. The medical history resulted clear and without any peculiarities to report.

He reported taking painkillers three times a day in the period following the events in question and that he had taken psychotropic drugs for sleep until September 2021.

Extraoral and intraoral examinations.

At the time of the expert operations, the patient reported a dull-discontinuous pain associated with a level 5 on the Visual Analogue Scale (VAS).

No asymmetries were appreciable (Fig. 2a, b, and 2c). Intraorally, an alveolar crestal bone resorption is present (Figure 3a, 3b), and mandibular dynamics appear congruent and functional (Fig. 4a, 4b).

Figure 2. a.b.c. Extraoral images showing the absence of visible asymmetries

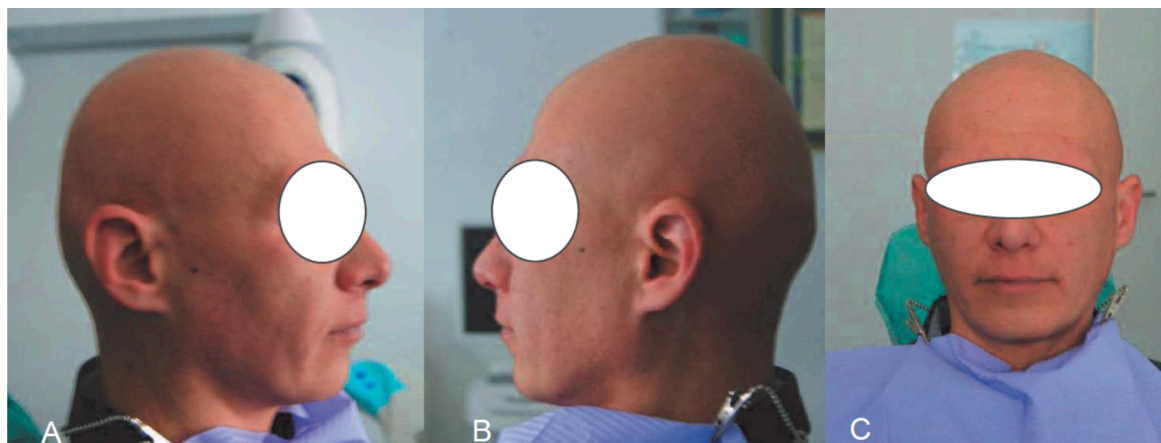
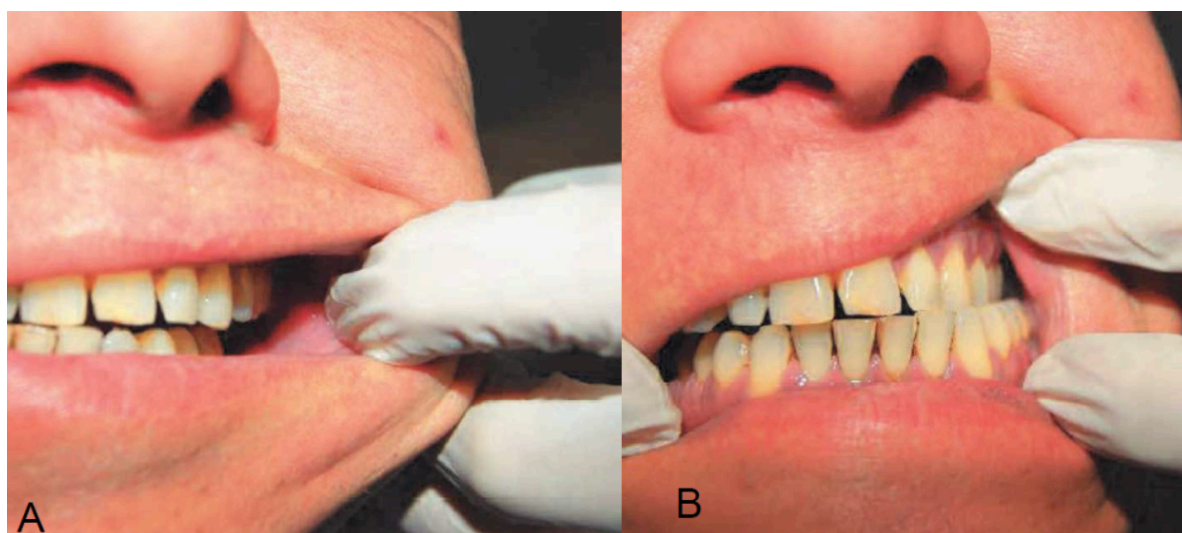


Figure 3. a.b. Intraoral images showing an area of resorption of the left alveolar ridge



Figure 4. a.b. Examination of the lateralization function appearing congruent and functional



Examination of the radiograms.

The pre-operative OPG (Figure 5) showed the presence of the left inferior third molar in a state of semi-inclusion, class IB according to the Pell & Gregory classification. The pericoronal sac shows mesially to have caused resorption of the supporting bone tissue at the distal root of the seventh.

The OPG performed the day of onset of the symptoms showed a lack of continuity at the posterior border of the left mandible (Figure 6).

The CBCT showed the presence of the lack of continuity of the angle of the left mandible

involving the lingual side as well (Figure 7).

the fracture is identified as an incomplete/nearly complete type, given the small amount of residual bone not involved at the level of the mandibular border. The classification of this fracture is therefore on the borderline between an incomplete and complete fracture type with minimal displacement of the fragments.

The OPG carried out more than two months later showed that the healing process of the fracture line is underway. The apices of the 4.7 are still within the bone (Figure 8).

Figure 5. Pre operative OPG. The circle and the arrow indicated the 3.8 tooth



Figure 6. OPG performed after the onset of the post-operative symptoms. The circle indicated the fracture line



Figure 7. A) Axial projection where it is possible to appreciate the fracture line crossing the cortical bone sharply (arrow). B) Cross-sections: the fracture line crosses the cortical bone sharply and extends through multiple sections. C)-D)-E): 3D reconstruction showing how the fracture is identified as an incomplete/nearly complete type, given the small amount of residual bone not involved at the level of the mandibular border. The classification of this fracture is therefore on the borderline between an incomplete and complete fracture type with minimal displacement of the fragments

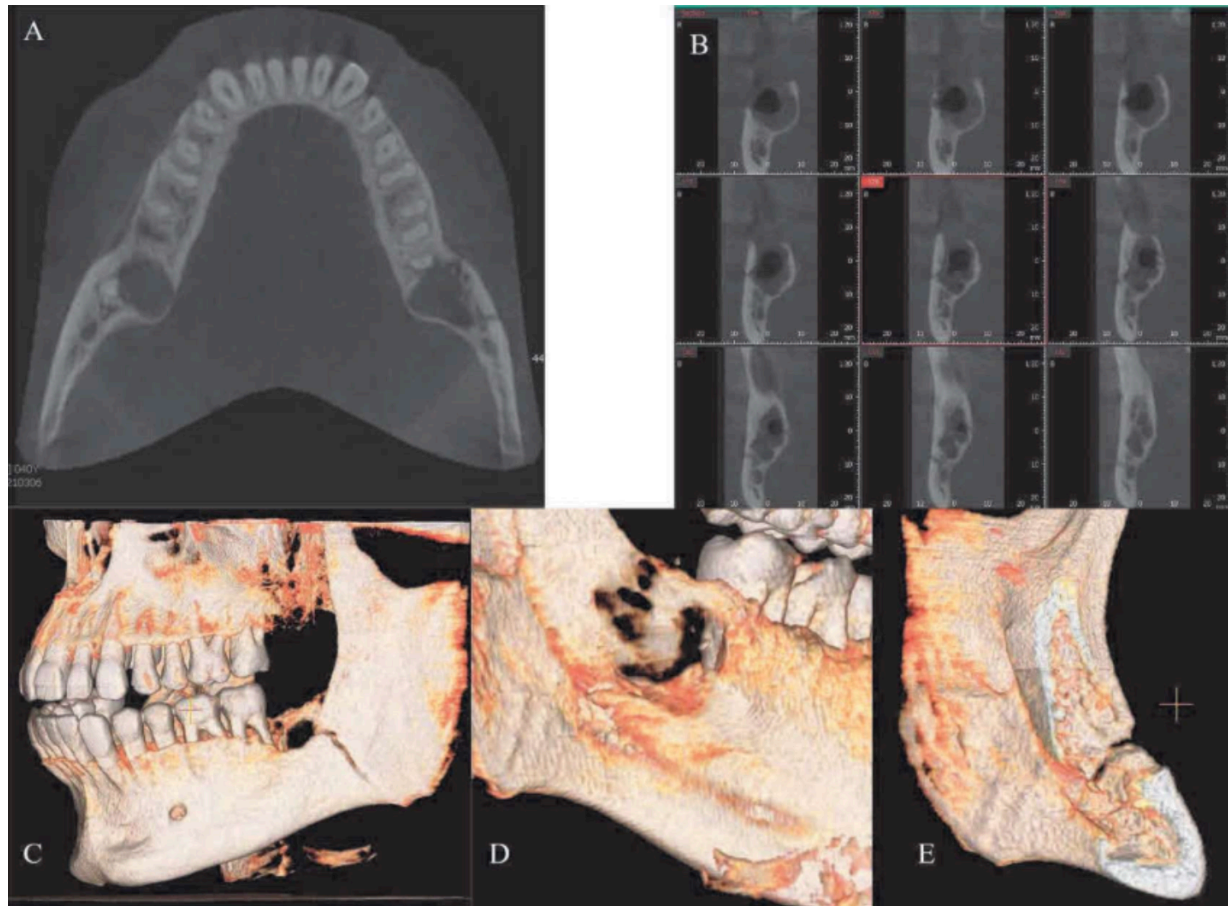


Figure 8. OPG carried out after two months after the treatment of the fracture



Medico-legal considerations

From the medical history, the clinical examination, and the documentation produced, as well as from the results of the new instrumental tests carried out during the appraisal, it is possible to state that:

1. The services provided by dentist 2 included the extraction of element 3.8, with the appearance of a fracture of the angle of the mandible after two weeks. As regards the services provided by dentist 1, they did not produce criminally relevant injuries to the patient;

2. From the examination of the pre-operative OPG, the extraction of the 3.8 was indicated as the pericorony sac at the mesial level, showing that it has caused an untreatable periodontal lesion at the level of the distal root of the seventh. The prevention of infectious pathologies and the presence of signs of periodontal pathology are among the indications for extraction, according to the Italian Clinical Recommendations in Odonto-stomatology ed. 2017¹⁵;

3. The fracture of the angle, although it occurred unusually, i.e., without any prodromal and opening symptoms, is a complication of the extraction of the semi-impacted lower third molar which, although rare, can occur after the extraction¹⁶;

4. The osteotomy results detected radiographically at sites 3.8 and 4.8 are compatible with the osteotomy maneuvers necessary for the extraction of impacted third molars¹⁶;

5. As regards the roots remaining from 4.7, and still present at the OGT of the last follow-up, produced during the appraisal, given that these did not give inflammatory results, it does not constitute a harmful act.

Considering the second intervention by dentist 3, not conclusive, as the fracture did not appear to be a greenstick fracture but an actual fracture of the angle which would have required immediate intervention by a specialist in maxillofacial surgery, with block rigid intermaxillary or application of intermaxillary fixation screws (IMF) between the third and fourth tooth to allow a stable intermaxillary block and reduction of operating times¹⁷, it was verified that the interruption of the causal link between the injury and the state of health

suffered by the injured person and objectified during this medico-legal investigation.

Ultimately, the medico-legal analysis allows us to state that the extraction maneuvers may have caused the fracture of the mandibular angle, but that this event appears to be among the complications of the lower third molar extraction operation⁸. Since dentist 2 performed the operation according to clinical recommendations and good practices, it does not constitute criminally relevant personal injury.

DISCUSSION

The late mandibular fracture after third molar removal: a remote possibility or concrete probability

The case presented offers a unique perspective on a relatively rare complication that can arise following a frequent surgical procedure. The incidence of mandibular fracture after third molar extraction (late fracture) is indeed rare, occurring in less than 1% of cases.⁽¹⁸⁻²⁰⁾ This rarity underscores the importance of understanding and managing this potential complication. In the literature, most authors report the onset of late fractures between the second and fourth week after surgical extractions, during chewing, especially during meals⁸. It has also been reported that male patients over 40 have a higher incidence of late mandibular fractures.⁽¹⁹⁻²¹⁾ In the case presented, the fracture seems to have occurred in the abduction phase of the mandible. Usually, the fracture is associated with an atrophic mandible, an impacted lower third molar, a large tooth volume (associated or not with bone cysts or tumors)^{19,22}, poor surgical planning, poor technique (adequate, inadequate instrumentation, and excessive use of manual force instruments during the extraction procedure). In the case presented, from the clinical documentation presented, there is no evidence of an inadequate use of instruments or surgical instruments unsuitable for the operations.

A combination of forces from the masticatory muscles (masseter, medial pterygoid, and digastric) on a possible fragile jaw can increase the incidence of fractures.^{19-21,23-25} Further causes, such as systemic disorders that cause bone fragility (osteoporosis,

hyperparathyroidism, rheumatism, osteogenesis imperfecta, and Pajet's disease), and local trauma with impact on the surgical site can lead to late mandibular fractures.^{20-22,24} During the extraction, it is crucial to remember that meticulous surgical planning is always preferable, including performing as many dental sections as necessary, minimizing the osteotomy, and, consequently, reducing the fragility of the jaw and the incidence of fractures.^(19, 26, 27) It is described in the literature that the use of the piezoelectric handpiece for osteotomy is indicated to re-duce excessive forces during tooth avulsion and reduce manipulation of neural structures, avoiding paresthesia.²⁸ Faced with the potential incidence of late mandibular fractures, patients must be informed to maintain a soft diet for at least 4 weeks.²⁵

Another factor that predisposes to fractures is the position of the dental element and the side where it is positioned. Although the distoangular position is generally considered the most technically difficult compared to the others, it requires more extensive bone removal. In the study of Galvao et al., however, the mesioangular and vertical angulations have been associated with the highest incidence of fractures despite being the most accessible positions to operate on and requiring less bone removal.²⁹ In terms of tooth position, class II and III, B, and C cases were found to have a higher incidence of mandibular fracture than class I and A cases.²⁹ This is probably linked to a greater degree of extraction difficulty and removal of more extensive bone. There was also a higher incidence of mandibular fracture for ultimately impacted teeth (64.8%) than partially impacted teeth.²⁹ When the tooth is completely covered by bone, it typically occupies a more significant portion of the mandibular angle and requires more bone removal during surgery. Post-operatively, this leads to a smaller amount of residual cortical bone and, therefore, a more fragile mandibular angle, which can be a significant causal factor of late fracture.⁸ It is crucial to educate patients about these potential risks and the importance of post-operative care, including maintaining a soft diet for at least 4 weeks, to minimize the incidence of late mandibular fractures.

As regards the hemimandible, the left side represents a possible risk factor that increases the incidence of fracture.

In the study by Wagner et al. (2005), teeth located on the left side of the mandible may require a major osteotomy due to the difficulty of visualization found in most right-handed operators.³⁰

In cases where an extensive osteotomy is necessary, it is prudent to administer the patient a bland liquid diet, especially during the first four weeks. This is the most critical period, when there is a greater probability of post-operative mandibular fractures.³¹

In the case presented, in addition to being a 40-year-old male patient, the fracture occurred on the left side, in agreement with the few data in the literature

The forensic dentistry point of view.

The case, beyond to be a fortuitous finding of a rare complication of third molar surgery, is the subject of medical-legal litigation in the criminal field. Specifically, the errors which are the subject of the complaint and attributed to dentists 1 and 2 by the party's consultants are two: errors of a technical nature (not verifiable with absolute certainty from the clinical and radiographic documentation produced) and of a diagnostic omission type (non-radiographic diagnosis of the fracture). The medico-legal analysis of the documentation produced found compliance with the clinical recommendations in dentistry in the indication for the extraction of the lower third molar and could only assume but not as-certain a causal connection between a technical error and the harmful event. The failure to diagnose the fracture is also a technical error: upon reporting the symptoms, dentist 2 promptly carried out the radiographic examination as well as wanted to check the patient again the following day. The intervention of dentist 3 interrupted the causal link between the incorrect diagnosis and the state of illness, prolonging and worsening it. However, what can also be seen from the immediate change of doctor by the patient is a significant lack of attention on the part of the suspects towards correct information for the patient. The "hardest" litigation is not based exclusively on technical errors and the lack of clinical documentation demonstrating that all the best means available in the specific case were used, but on the lack of communication; every single intervention will require adequate support, calibrating this support on the type of

intervention and its complexity, as well as on the type of patient and his need to "know".³² In this specific case, the patient reported that he had not been informed of this possible complication, although rare, nor had he received any prescriptions regarding its prevention.

The incorrect diagnosis that subsequently occurred severely damaged the doctor-patient relationship of trust, pushing the plaintiff first to change doctor within a few hours and subsequently to turn to criminal rather than civil law. The late onset of post-surgical mandibular fracture appears to be relatively rare, and the potential risks inherent to this complication, in the case of subjects with an unfavorable medical history for systemic bone pathologies, are often not explained to the patient. This case highlights the crucial role of active patient information in daily clinical practice, especially in cases of complex surgical

interventions. Informed consent and a dialogue duly suited to the patient's level of understanding play a significant role in this scenario as a tool for clinical communication, self-awareness, guarantee of the right to self-determination, therapeutic alliance, and consolidation of the doctor-patient relationship of trust.

CONCLUSION

If the mandibular third molars need to be removed, the oral surgeon should carefully evaluate the patient before performing the surgery, use appropriate instruments to minimize any potential complications, and spend enough time with the patient to explain the risks and complications that may arise after the surgery. One of the rarest post-operative complications is the fracture of the mandibular angle.

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