

# **A 3-year Retrospective Analysis of Dento-Alveolar Injuries at the University Children's Hospital Zurich (2018-2020)**

*Claudio Schmid<sup>1</sup>, Christelle Fongaufier<sup>1</sup>, Blend Hamza<sup>2</sup>, Tobias Höhn<sup>3</sup>, Georg Staubli<sup>3</sup>, Bernd Stadlinger<sup>1</sup>*

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<sup>1</sup> Clinic of Cranio-Maxillofacial and Oral Surgery, Center of Dental Medicine Zurich, University of Zurich.

<sup>2</sup> Clinic of Orthodontics and Pediatric Dentistry, Center of Dental Medicine, University of Zurich.

<sup>3</sup> Department of Pediatric Emergency Medicine, Children's' University Hospital Zurich, Zurich, Switzerland.

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## **Corresponding author:**

Claudio Schmid

Clinic of Cranio-Maxillofacial and Oral Surgery

Center of Dental Medicine Zurich

University of Zurich

Tel. +41 44 634 32 90

Email: claudio.schmid@zzm.uzh.ch

## **Abstract**

Children and adolescents are vulnerable to dental trauma due to their active lifestyles, lack of coordination, and inexperience in recognizing potentially dangerous situations. Early recognition and proper management of dental trauma is crucial in order to minimize the risk of complications and ensure optimal outcomes. The aim of this study was to perform a retrospective analysis of all dento-alveolar injuries in children and adolescents who were treated at the University Children's Hospital Zurich from 2018-2020 by the resident physicians of the Centre of Dental Medicine of the University of Zurich. All information concerning age and sex distribution, seasonal and weekly variations, as well as aetiology, types of trauma and co-affected structures in the head and neck area from 389 patients was analysed. For data extraction, a parameterised Excel list was created, enabling a continuous data collection. In the study, 65% of the patients were male and 35% female. The average patient age was 7 years and 4 months. The highest frequency of trauma occurred in mixed dentition (49%), followed by deciduous dentition (36%) and permanent dentition (15%). Most of the accidents occurred in the second quarter of the year, especially in the month of May slightly more injuries were reported. The most common injuries were increased tooth mobility (40%) and tooth fractures without pulp exposure (34%). Less frequent were tooth fractures with pulp exposure (12%), lateral dislocations (29%), avulsions (21%), intrusions (8%), extrusions (6%) and root fractures (4%). As in many studies the upper central incisors were most often affected. Main causes of dental trauma were falls, especially by bike (18%) or scooter (14%). Soft tissue injuries or fractures, in the area of the head and neck occurred in 59% and 10% of the cases simultaneously accompanied by dento-alveolar trauma.

## Introduction

Dento-alveolar injuries affect a large proportion of the population during lifetime. Especially children and adolescents have a high risk of injuries of teeth or teeth-related anatomical structures. These injuries can have long-term consequences if not managed appropriately.

Most of the dento-alveolar trauma result from falls, accidents during playing, physical actions or sport-related injuries (CALDAS & BURGOS 2001, TAPIAS ET AL. 2003). A meta-analysis performed by Petti et al. in 2018 showed prevalence rates of 22.7% in primary dentition and 15.2% in permanent dentition, although differences between regions were found (PETTI ET AL. 2018). Knowledge on the types of accidents can help improve the prevention of injuries. Different studies showed that the use of protective gear like mouthguards can reduce the risk of severe sport injuries significantly (FASCIGLIONE ET AL. 2007, VIDOVIC-STESEVIC ET AL. 2015). In Europe, around one in two children suffers a dental accident before the age of 17. The most frequently affected teeth are the central incisors of the upper jaw, followed by the lateral incisors in the upper jaw and the incisors in the lower jaw. Canines, premolars or molars are almost never affected. Boys are more likely to have accidents compared to girls and certain factors, as protruding anterior teeth or the extent of horizontal (anterior-posterior) overlap of the maxillary central incisors over the mandibular central incisors, may also raise the risk for accidents (FILIPPI 2017).

Dento-alveolar injuries can be divided into tooth fractures and dislocations. Former can affect the crown, the root or both. A distinction is also made between fractures with exposure or without exposure of the pulp. Dislocations are differentiated between concussions, loosening, displacements, intrusions, extrusions or avulsions of the teeth. All dento-alveolar injuries can occur alone or in combination with other injuries.

Anatomical structures close to the teeth like the alveolar ridge may be equally involved. While adults with permanent dentition mainly suffer from crown fractures, children and adolescents with deciduous or mixed dentition mainly suffer from dislocations (FILIPPI 2009). Depending on the type of injury to the teeth or the surrounding structures more or less time and cost are required for adequate care (GFELLER & VON ARX 2021). What might be considered as straightforward treatment in adults, may pose serious challenges in the treatment of children and adolescents. Compliance is often a major challenge and the involvement of the parents may also complicate treatment. Further, the developing dentition and skeletal growth of the patient need to be taken into consideration prior to treatment. Especially children may develop anxiety, fear and other negative emotions related to dental treatment, and may also experience social and emotional difficulties due to changes in appearance. (CORTES ET AL. 2002, LEE & DIVARIS 2009).

In this context, it is important to educate dentists, health care professionals, parents and caregivers about the most common dento-alveolar injuries, their causes and the importance of an accurate and immediate treatment of the affected anatomical structures (AMERICAN ACADEMY OF PEDIATRIC DENTISTRY 2008). Further, they should be informed, how they can avoid dento-alveolar accidents and in case of an injury how to react properly.

In Switzerland all accidents of children have to be reported at their health insurance company. The Swiss health insurance system obliges dentists to fill in a standard form declaring the trauma. This document details the circumstances of the trauma, the teeth affected, the type of dental trauma, but also the soft tissue injuries, the presence of other fractures, the immediate management as well as the result of the imaging and the medium- and long-term prognosis.

The aim of this study was to analyse retrospectively all dento-alveolar injuries in children and adolescents who were reported and treated under local or general anaesthesia at the University Children's Hospital Zurich from 2018-2020 by the resident physicians of the Centre of Dental Medicine of the University of Zurich.

## **Materials and methods**

The University Children's Hospital Zurich uses the clinical information system "CGM Clinical" (Koblenz, DE). All dental emergencies, seen by the resident physicians of the Centre of Dental Medicine of the University of Zurich, were recorded after the supply in this system under the heading of "dental consil". These reports formed the basis for this study.

First a list was extracted from the patient data system CGM Clinical (Koblenz, DE), showing all children who consulted the University Children's Hospital Zurich for dental emergencies and were seen by residents from the Centre for Dental Medicine of the University of Zurich between January 1st, 2018, and December 31st, 2020. This included all patients being under 18 years of age, who were referred directly to the paediatric dentistry department by the children hospital during day time, or patients that were seen/treated by the oral surgery department after 5 pm until 8 am and on weekends. In the evening, at night and on weekends, patients were first seen at the University Children's Hospital in Zurich by paediatricians, who then contacted the on-call oral surgery specialist.

In total, 109559 outpatient consultations were recorded in the University Children's Hospital between 2018-2020. Of the 445 (0.4%) patients who consulted during this 3-year period due to oral injury, a total of 389 dento-alveolar trauma were recorded during this time period. Exclusion criteria was any reason for consultation not being an oral or maxillofacial trauma, i.e., infections (abscesses), secondary bleeding and pain of dental origin (mainly pulpitis).

The medical records including X-rays were exported from the electronic patient charts of the Centre for Dental Medicine and the University Children's Hospital. The data

extraction was performed by a dental student of the University of Zurich as part of her master thesis (C.F.). Data were encoded and stored in a secured database at the Centre of Dental Medicine. Parameters of analysis were patient age, gender, dental status, date and season of trauma, cause of trauma, and details of trauma: teeth involved, type of dental trauma, soft tissue injuries, associated bone fracture.

A descriptive statistical analysis was performed. A Freeman Tukey test was applied to compare the data in each category against a null hypothesis. The p-values for the different tests are reported in Table I. The p-value was considered significant being less than or equal to 0.05.

The study was conducted after having received the permission by the cantonal ethical commission (Nr. 2022-00951, BASEC).

## **Results**

### **Patients**

Between January 1<sup>st</sup> 2018 and December 31<sup>st</sup> 2020, 389 emergency consultations for dental trauma were recorded at the University Children's Hospital in Zurich. The youngest patient was 9 months old, the oldest patient 16 years and 3 months old. The median age was 7 years and 4 months (Table II). The majority of the patients were boys (Table II), with a significant difference between the genders (Table I).

The patients were divided into three groups, according to their stage of dentition: deciduous dentition (0-71 months of life), mixed dentition (72-143 months of life) and permanent dentition (>143 months of life). Almost half of the cases (49%) were in mixed dentition, 36% in deciduous dentition and 15% in the permanent dentition (Table III).

### **Number of cases**

Regarding the distribution of injuries over time, there was a slight increase in 2020 (Figure 1) compared to 2018 and 2019. However, this increase was not statistically significant (Table I).

In terms of season, spring (second quarter of the year) showed most consultations (Figure 1), although not being statistically significant (Table I).

Referring to the month, May and April showed the largest number of patient consultations. The lowest number of consultations was registered in December (Figure 1). The differences were not statistically significant (Table I).

In terms of distribution during the week (Figure 2), there were significantly more consultations on weekends (Table I). During the week, the greatest number of patient



consultations happened on Wednesdays and the lowest on Tuesdays, although this was not statistically significant (Table I).

Most injuries occurred during school periods, with holiday periods showing less emergencies (Figure 3).

### **Cause of injury**

Analyzing the causes of injury, most accidents were related to falls. Less often injuries were caused by collisions or physical action (Figure 4). Boys were significantly higher represented.

Analyzing the causes of falls, the majority were due to bike or scooter accidents . This is followed by home related causes such as falling down from furniture or the stairs. Often the exact cause of the fall was not reported in the patients records (Table IV).

### **Characteristics of dental injuries**

The great majority of teeth affected by trauma are the frontal teeth and more precisely the incisors, either in permanent or deciduous teeth (Figure 5).

In this analysis, concussion was the most common dental injury. However, the exact number was not investigated, as a concussion is difficult to assess. Increased tooth mobility was the second most common dental injury. In our study 40% of the affected teeth had at least an increased tooth mobility. 34% of the teeth had a fracture without pulp exposure, 29% had lateral dislocation and 21% showed avulsion (Table V). Intrusions, extrusions, root fractures or fractures with pulp exposure were less frequent.

### **Soft tissue injuries**

Most of dental trauma were accompanied by contused and lacerated soft tissue (Figure 6), the majority of which was intraoral.

### **Associated fractures**

Analyzing associated bone fractures, a small number of cases showed an associated fracture of the mandible or maxilla (Figure 7). We did not report fractures of the rest of the facial mass (orbital ground, zygoma) because they were seen and treated by the Department of Cranio-Maxillo-Facial and Oral Surgery of the University Hospital Zurich.

## Discussion

The present study is a retrospective analysis of dento-alveolar injuries in outpatient consultations recorded at the University Children's Hospital Zurich from 2018 to 2020. All patients were treated by resident physicians of the Centre of Dental Medicine of the University of Zurich.

The results show, that more boys suffered a dento-alveolar trauma compared to girls with a ratio of 1.86:1. This ratio is comparable to the results reported in other studies (ALTAY & GÜNGÖR 2001, SANDALLI ET AL. 2005, GFELLER & VON ARX 2021). It is believed that the higher proportion is associated with a greater propensity towards contact sports, a violent behaviour and because boys are often less mature (LAM 2016). Furthermore, it could be shown that mixed dentition is the most commonly affected stage with 49%, followed by deciduous dentition (36%) and permanent dentition (15%) in children and adolescents. This is also underlined by the results of another study from 2008, showing that the highest frequencies occurred in the 0-4 year age, followed by the 5-9 year age and the 10-14 year age (LAM ET AL. 2008). The lower number of permanent dentition may be influenced by elderly children and teenagers that may have been treated by their private dentist instead showing up at the Children's Hospital, as they do not require general anaesthesia in most of the cases.

Falls are the most common cause of dental trauma. Less frequently, traumas were caused by collisions or physical action. When examining the causes of falls, the most common causes were falls from bicycle (18%) or scooter (14%). This distribution also corresponds to the results of other studies (FLEMING ET AL. 1991, ALTAY & GÜNGÖR 2001, SANDALLI ET AL. 2005). In many cases, the exact cause of the accident was not known. This can be explained by the fact that often babies or toddlers

are treated in the Children's Hospital Zurich and they are not always under observation, are not yet able to speak and thus the exact cause of the accident cannot be reproduced.

The peak months differed from year to year. However, most accidents occurred in the 2nd quarter with the exception of 2018, where two more accidents occurred in the 4th quarter. Comparing the different years our study showed an increase in dental emergencies in 2020. This is a discordance to a study by Wadia et al. from 2021 (WADIA 2021) at King's College Hospital Dental Institute in London, UK. They compared the number of traumatic dental injuries from April 15<sup>th</sup>, to June 10<sup>th</sup> in 2019 with that from April 13<sup>th</sup>, to June 8<sup>th</sup> in 2020 and showed a reduction of 50%. Reasons for this discrepancy could be various. One possible reason could be the different handling of the Corona pandemic between countries.

In terms of distribution during the week, there is significantly more activity on weekends. This differs from other studies. A study from Gfeller et al. from 2021 (GFELLER & VON ARX 2021) in Bern, Switzerland, i.e. registered most accidents on Fridays. Similar to the mentioned study (GFELLER & VON ARX 2021), the fewest accidents occurred on Tuesday. Differences between these two studies could arise from the fact that our study only examined children and teenagers whereas Gfeller et al. (2021) (GFELLER & VON ARX 2021) analyzed age groups including adults. By comparison, in Gfeller's study (GFELLER & VON ARX 2021), the percentage of dental traumas in the permanent dentition was 44%. In our study the percentage was 15%. Another possible explanation for the weekend peak could be that most private dental offices are closed on weekends, especially on Sundays, possibly causing that more dental trauma are present in hospitals.

In the present study, out of 389 accidents, 70% were recorded during school periods and 30% during holidays, of which 9% were accidents during the summer vacations. A possible explanation for the higher number of events during school period could be that a lot of families go on vacation during holidays.

The great majority of teeth being affected by trauma were frontal teeth and more precisely incisors, either in permanent or deciduous dentition. This finding is similar to many other studies (CELENK ET AL. 2002, LAM ET AL. 2016, GFELLER & VON ARX 2021). The largest trauma group was the increased tooth mobility (40%). This category has often not been evaluated in other studies. The second largest trauma group was crown fractures without pulp exposure (34%), which is in accordance to Amadori et al. from 2017 (AMADORI ET AL. 2017). Unlike other studies, lateral dislocation (29%) was also very common, which is in discordance to a comparable study, that only shows 5% of lateral dislocations (AMADORI ET AL. 2017). Avulsions occurred in 21%, which is in accordance to other studies (AMADORI ET AL. 2017).

With regards to soft-tissue injuries, more than 58% of dental trauma were accompanied by soft-tissue injuries. The majority of which were intraoral wounds (32%).

In a minority of cases a fracture of the mandible or maxilla was diagnosed. We did not report fractures of the rest of the facial mass (orbital ground, zygoma) because they were not seen and treated by us.

The results of the present study show that dento-alveolar traumas are common. It is important to keep the awareness of healthcare professionals for these injuries on a high level in order to enable appropriate support. Further, it is also important to educate parents and caregivers about the most common dento-alveolar injuries and their causes, so that they can reduce the number of accidents and in case of an injury, they should know how to react properly.

Based on the experience of data extraction and analysis in this study, a parameterised data sheet was created to support future data collection.

## **Acknowledgment**

We gratefully acknowledge the team of the University Children's Hospital Zurich for their help in collecting the medical records.

## **Conflict of Interest**

The authors declare that there are no conflicts of interest.

# **Zusammenfassung**

## **Einleitung**

Dento-alveoläre Verletzungen treten häufig im Rahmen von Unfällen mit Beteiligung des Gesichts auf. Vor allem Kinder und Jugendliche haben ein erhöhtes Risiko, Verletzungen der Zähne und benachbarter anatomischer Strukturen zu erleiden. Diese Verletzungen können bei unsachgemässer Versorgung langfristige Folgen haben. Das Ziel dieser Studie war es, eine retrospektive Analyse aller dento-alveolären Verletzungen bei Kindern und Jugendlichen zu erheben, die von 2018 bis 2020 am Universitäts-Kinderspital Zürich von Zahnärzten des Zentrums für Zahnmedizin der Universität Zürich behandelt wurden.

## **Material und Methoden**

Die Krankengeschichten und Unfallmeldungen aller dento-alveolären Verletzungen bildeten die Datenbasis dieser Studie. Im dreijährigen Zeitraum (2018-2020) erfolgten im Universitäts-Kinderspital insgesamt 109'559 ambulante Konsultationen. Hiervon erfolgten 445 Konsultationen aufgrund zahnmedizinischer Notfälle. Davon waren 389 dento-alveoläre Traumata. Untersucht wurden: Alters- und Geschlechtsverteilung, saisonale und wöchentliche Schwankungen, Ätiologie der Unfälle, Art der Verletzungen, sowie mit den Verletzungen verbundene Weichgewebs- und Hartgewebsverletzungen.

## **Resultate**

Die Auswertung der 389 Traumata zeigte ein Geschlechterverhältnis von 65 % männlichen und 35 % weiblichen Patienten. Das Durchschnittsalter betrug 7 Jahre und 4 Monate. Die meisten Traumata traten im Wechselgebiss auf (49 %), gefolgt vom Milchgebiss (36 %) und dem bleibenden Gebiss (15 %). Die meisten Unfälle ereigneten



sich im zweiten Quartal des Jahres, insbesondere im Monat Mai. Die häufigsten Verletzungen waren erhöhte Zahnmobilität (40 %), Zahnfrakturen ohne Beteiligung der Pulpa (34 %) und laterale Dislokation (29%). Weniger häufig waren Pulpafrakturen mit Beteiligung der Pulpa (12 %), Avulsionen (21 %), Intrusionen (8 %), Extrusionen (6 %) und Wurzelfrakturen (4 %). Am häufigsten waren die oberen zentralen Schneidezähne betroffen. Hauptursache für Zahntraumata waren Stürze, insbesondere mit dem Fahrrad (18 %) oder dem Trottinett (14 %). Weichteilverletzungen traten in 59 % und Frakturen in 10 % der Fälle gleichzeitig mit den dento-alveolären Verletzungen auf.

## **Diskussion**

Die Ergebnisse dieser Studie zeigen, dass Jungen ein höheres Risiko für ein dento-alveoläres Trauma haben als Mädchen. Dieses Verhältnis ist vergleichbar mit der Literatur. Eine mögliche Erklärung hierfür könnte eine höhere Neigung zu Kontaktsportarten, ein höhere Risikobereitschaft und gewisse Unreife im Vergleich zu den Mädchen sein.

Im untersuchten Altersspektrum von 0-18 Jahren ist in dieser Studie das Wechselgebiss mit 49 % am häufigsten betroffen, gefolgt vom Milchgebiss in 36 % und dem bleibenden Gebiss in 15 % der Fälle. Der geringere Anteil an Traumata im bleibenden Gebiss könnte dadurch beeinflusst sein, dass ältere Kinder und Jugendliche eher einen Privatzahnarzt aufsuchen und in den meisten Fällen keine Behandlung in Narkose benötigen.

Wie in anderen Studien sind Stürze die häufigste Ursache für Zahntraumata.

Die erhöhte Zahnmobilität, die Schmelz-Dentin-Frakturen ohne Pulpabeteiligung und die lateralen Dislokationen sind ähnlich zu anderen Studien die häufigsten Zahnverletzungen.

Kinder und Jugendliche sind aufgrund ihres aktiven Lebensstils, ihrer teilweise mangelnden Koordination und ihrer Unerfahrenheit im Erkennen potenziell gefährlicher Situationen besonders anfällig für Zahntraumata. Die frühzeitige Erkennung und angemessene Behandlung von Zahntraumata sind entscheidend, um das Risiko von Komplikationen zu minimieren und optimale Ergebnisse zu gewährleisten.

## **Résumé**

### **Introduction**

Les traumatismes alvéolo-dentaires surviennent majoritairement dans le cadre d'accidents impliquant la face. Les enfants et les adolescents, en particulier, présentent un risque élevé de lésions des dents ou de structures anatomiques liées aux dents. Ces atteintes peuvent avoir des conséquences à long terme si elles ne sont pas traitées de manière appropriée. L'objectif de cette étude était d'analyser rétrospectivement tous les cas de traumatismes alvéolo-dentaires chez les enfants et les adolescents pris en charge à l'Hôpital universitaire pédiatrique de Zurich ainsi qu'au Centre de médecine dentaire de l'Université de Zurich, de 2018 à 2020.

### **Matériels et méthodes**

Les dossiers médicaux et les déclarations d'accident de tous les traumatismes alvéolo-dentaires ont servi de base à cette étude. Au cours de la période de trois ans (2018-2020), un total de 109 559 consultations ambulatoires ont eu lieu à l'hôpital pédiatrique universitaire. Sur ce total, 445 consultations étaient dues à des urgences dentaires. Parmi celles-ci, 389 étaient des traumatismes alvéolo-dentaires. L'étude a porté sur : la répartition par âge et par sexe des patients, les variations saisonnières et hebdomadaires des traumatismes, la cause des accidents, le type de lésions, ainsi que les lésions associées des tissus mous et durs.

## **Résultats**

Parmi la population de l'étude, 65 % des patients étaient des garçons et 35 % des filles. L'âge moyen des patients était de 7 ans et 4 mois. La plupart des traumatismes se produisaient en dentition mixte (49 %), 36 % en dentition lactéale et 15 % en dentition définitive. La plupart des accidents survenait au cours du deuxième trimestre de l'année, notamment au mois de mai. Les lésions les plus fréquemment retrouvées étaient une mobilité dentaire accrue (40 %), des fractures dentaires sans atteinte de la pulpe (34 %) et des luxations latérales (29 %). Les fractures dentaires avec atteinte pulpaire (12 %), les avulsions (21 %), les intrusions (8 %), les extrusions (6 %) ainsi que les fractures radiculaires (4 %) semblaient moins fréquentes. Les dents le plus souvent touchées étaient les incisives centrales supérieures. Les chutes apparaissaient comme la première cause des traumatismes, notamment les chutes à vélo (18 %) ou en trottinette (14 %). Les atteintes des tissus mous étaient associées aux traumatismes alvéolo-dentaires dans 59 % et les fractures osseuses dans 10 % de cas.

## **Discussion**

Cette étude montre que les garçons ont un plus haut risque de subir un traumatisme alvéolo-dentaire que les filles. Ce rapport est comparable à celui d'autres études. On suppose que ce risque plus élevé est lié à une plus grande propension à pratiquer des sports de contact, à un comportement plus violent et à une certaine immaturité des garçons par rapport aux filles.

Il ressort également que la dentition mixte (49 %) est la plus touchée par les traumatismes, suivie de la dentition lactéale (36 %) et de la dentition permanente (15 %). Le fait que la dentition permanente soit moins représentée ici pourrait s'expliquer par un biais de sélection. En effet, les enfants plus âgés et les adolescents ont souvent un dentiste traitant et peuvent, en cas de lésion, être traités directement par celui-ci, sans nécessiter de prise en charge sous anesthésie générale ou sédation.

Comme dans beaucoup d'autres études, les chutes sont majoritairement à l'origine des traumatismes dentaires.

La mobilité dentaire augmentée, les fractures de la dentine et de l'émail sans atteinte pulpaire et la luxation latérale sont, de manière similaire à d'autres études, les lésions dentaires les plus fréquentes.

Les enfants et les adolescents sont particulièrement exposés aux traumatismes dentaires en raison de leur mode de vie actif, de leur manque de coordination et leur inexpérience dans l'identification de potentielles situations dangereuses. Le diagnostic précoce et le traitement approprié des traumatismes dentaires sont donc essentiels afin de minimiser le risque de complications et d'obtenir des résultats optimaux à long terme.

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## Tables

	<b>Null hypothesis</b>	<b># categories</b>	<b>Test statistic</b>	<b>P value</b>
0	Gender uniformly distributed	2	34.97	0.0000*
1	Days of the week uniformly distributed	7	22.95	0.0008*
2	Months of the year uniformly distributed	12	18.19	0.0773
3	Quarters of the year uniformly distributed	4	6.99	0.0723
4	Years uniformly distributed	3	5.08	0.0789
5	Week day vs week end day distributed 5:2	2	17.48	0.0000*
6	Week days (Mo-Fr) uniformly distributed	5	5.07	0.2798
7	Saturday & Sunday uniformly distributed	2	-0.00	1.0000

Table I: Results of the statistic tests between the categories of each analyzed characteristic. \*: Statistical significance ( $p$ -value:  $<0.05$ ).

<b>Gender</b>	<b>Total (%)</b>	<b>Median age</b>
Female	137 (35%)	90
Male	252 (65%)	86.5
<b>Total</b>	<b>389</b>	<b>88</b>

Table II: Gender distribution and median age (in months) in the study population.

<b>Dentition</b>	<b>F</b>	<b>M</b>	<b>Total</b>	<b>%</b>
<b>Deciduous</b>	46	94	<b>140</b>	<b>36%</b>
<b>Mixed</b>	65	127	<b>192</b>	<b>49%</b>
<b>Permanent</b>	26	31	<b>57</b>	<b>15%</b>

Table III: Stage of dentition in the study population.



Fall Type	F	M	Total	%
Bike	20	37	57	18%
Scooter	11	34	45	14%
From furniture	6	12	18	6%
Stairs	2	11	13	4%
Onto table	2	6	8	2%
Fainting	2	3	5	2%
Swimming pool	2	4	6	2%
Other*	13	29	42	13%
Unknown	47	80	127	39%

Table IV: Different fall types between genders (M: male; F: female) and in total.

*Other\* includes: Balance bike (4x), Skateboard (3x), Bath tub (3x), Stroller (2x), Kickboard (2x), From tree (2x), Carousel (2x), Escalator (2x), Swing (2x), Ice skating (2x), Slide (3x), Roller blades (2x), Wheel chair (1x), Raft (1x), Buggy (1x), Epileptical attack (1x), Obstacle (1x), Wakeboard (1x), Ice (1x), Onto wall (1x), From windowsill (1x), Bobby car (1x), Onto bar (1x), Trampoline (1x), Wooden pole (1x).*

Dental Trauma	Total	%
Tooth fracture (with pulp exposure)	45	12%
Tooth fracture (w/o pulp exposure)	134	34%
Root fracture	16	4%
Tooth mobility	156	40%
Lateral dislocation	111	29%
Extrusion	23	6%
Intrusion	31	8%
Avulsion	80	21%

Table V: Distribution of the type of dental trauma out of the total number of trauma (# 389).

# Figures

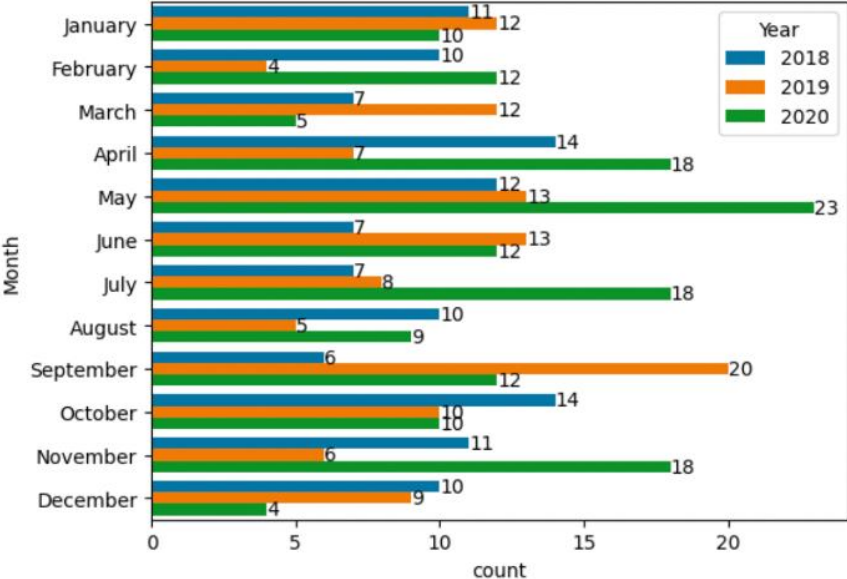


Figure 1: Distribution of dento-alveolar trauma by year and month.

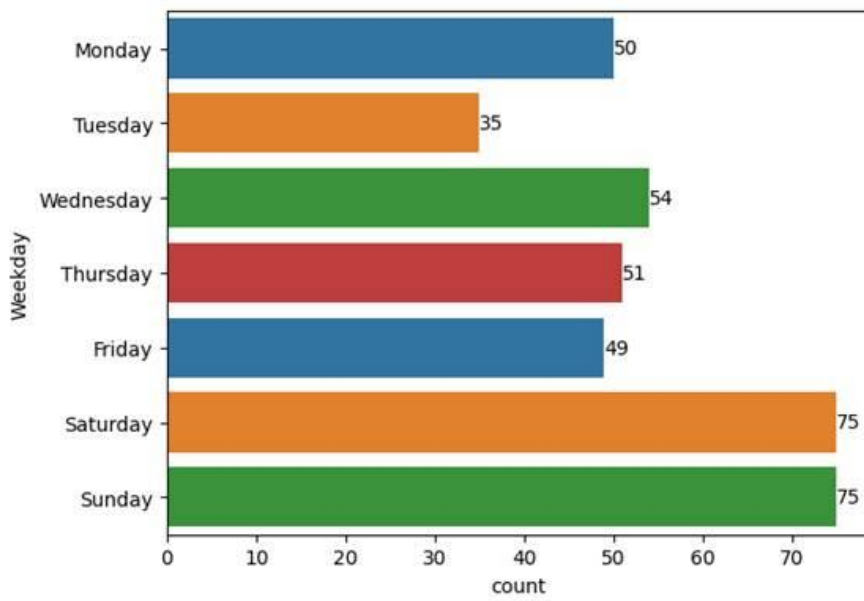


Figure 2: Distribution of tooth injuries by day of the week.

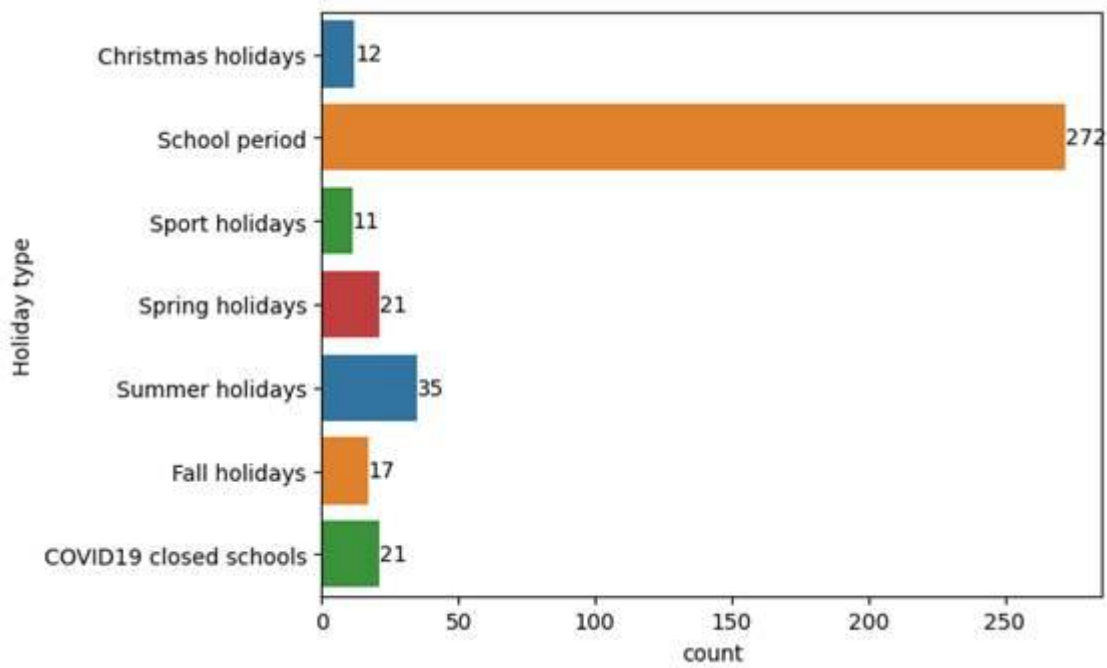


Figure 3: Distribution of tooth injuries during holidays or school period.

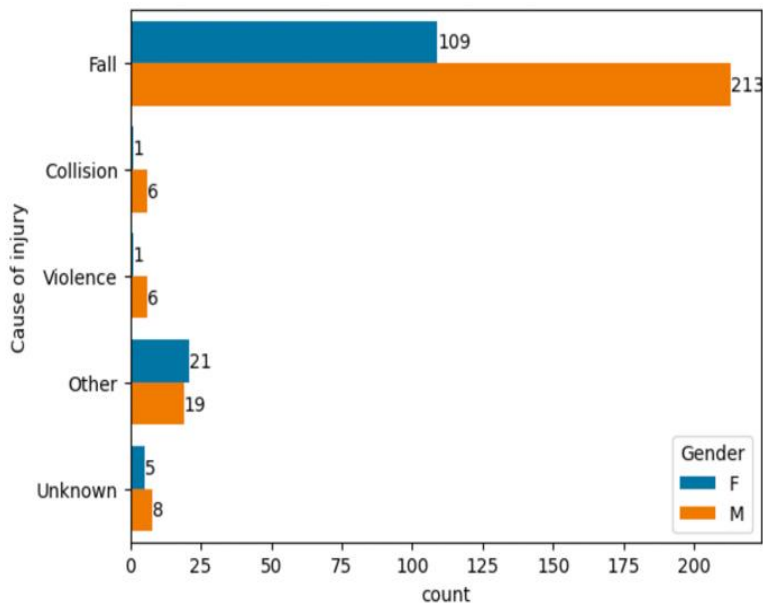


Figure 4: Main causes of dental trauma.

*Other\** includes: Ski (5x), Football (4x), Horse riding (3x), Knee strike (3x), Hockey (3x), Golf (3x), Narcosis (3x), Swing hit (2x), Toy hit (2x), Car door (2x), Baseball (1x), Billiard (1x), Handy hit (1x), Gaming (1x), Traffic accident (1x) Window handle (1x), Swimming (1x), Car crash (1x), Metal bar (1x), Bike hit (1x)

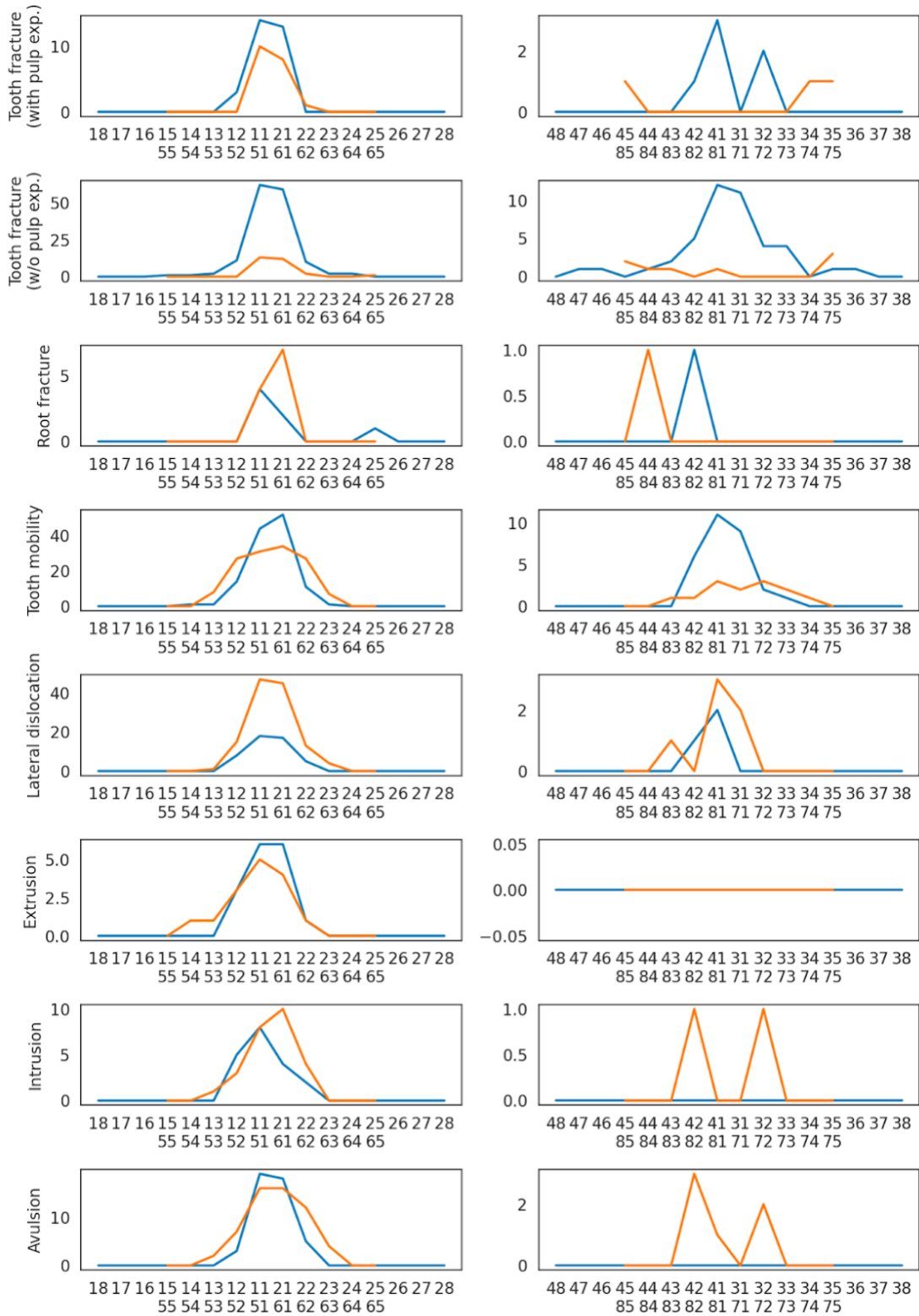


Figure 5: Distribution of the types of traumas by tooth. Left side: upper jaw, right side: lower jaw; Permanent teeth (blue) and deciduous teeth (orange).

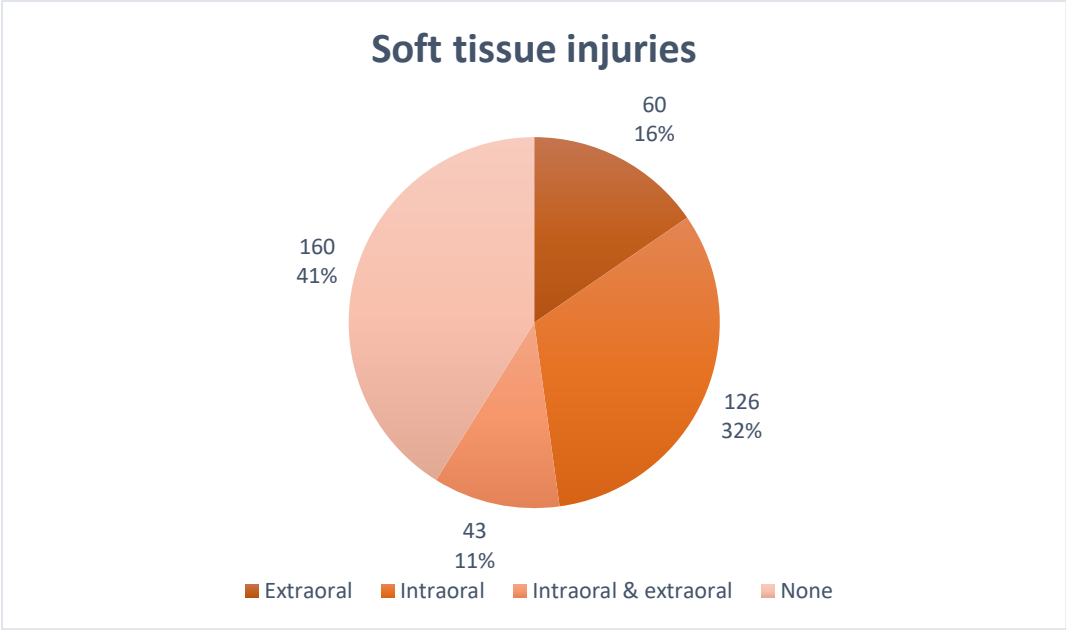


Figure 6: Soft tissue injuries associated with the dental trauma.

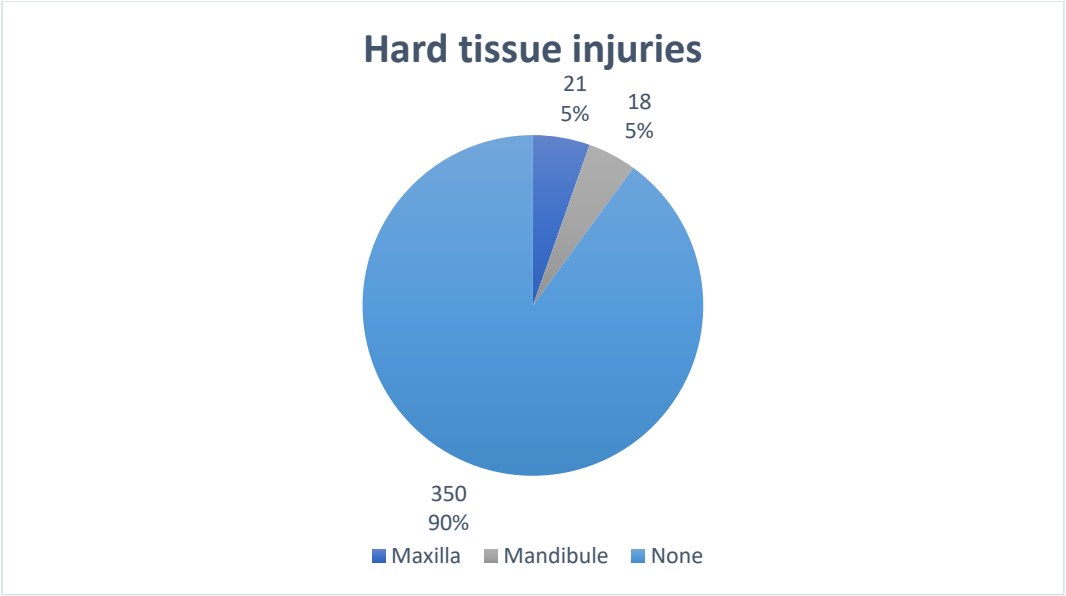


Figure 7: Fractures associated with the dental trauma.