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Dental trauma in adults in Switzerland

Flavio Brunner[1], Gabriel Krastl[2], Andreas Filippi[1]

Departments of [1]Oral Surgery, Oral Radiology and Oral Medicine and [2]Periodontology, Endodontology and Cariology, Center of Dental Traumatology, University of Basle, Basle, Switzerland

Correspondence to: Prof. Dr. Andreas Filippi, Department of Oral Surgery, Oral Radiology and Oral Medicine, Center of Dental Traumatology, University of Basle, Hebelstr. 3, CH-4056 Basel, Switzerland
Tel.: +41612672609
Fax: +41612672607
e-mail: andreas.filippi@unibas.ch

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Abstract – Most epidemiologic studies of dental trauma are restricted to children and sports. The goal of the present study was to collect information on dental trauma in as many Swiss adults as possible. For that purpose data of the largest insurance company of Switzerland (SUVA) were evaluated and compared for the years 1992 and 2002. In these 2 years 23 000 dental injuries were reported to all insurance companies in Switzerland. Most often the upper central incisors were injured. However, in 20% posterior teeth were also affected. In 1992 most of the dental trauma was experienced by 30–39 year olds, in 2002 by 40–49 year olds. Regardless of the year, most of the injuries occurred at home; more than one-fifth of the injuries were sports related. Most common injuries were crown fractures without pulp involvement. In less than 10% of all cases more complicated injuries like avulsions or crown-root fractures occurred. Most traumatic injuries were treated by direct fillings and custom-made crowns; more involved treatments were required less often. Comparison of the years 1992 and 2002 showed that the numbers of and causes for injuries had hardly changed in these 10 years. However, the choice of therapy was related to the general development of dental medicine, which became especially apparent in the fields of adhesive dentistry and implantology.

Tooth trauma in children and adolescents are epidemiologically well examined. On the other hand, there are only a few publications on tooth injuries in adults (1). There is just one study about the frequency of dental trauma occurring in Switzerland, and it is restricted to children with a maximum age of 16 (2).

What is known about dental injuries in adults is that at least one-third of all dental trauma involves adults (1, 3).

About one-fourth of the adults in the US (28%) incur dental trauma before the age of 50 (4). Of these accidents 20% occur at home or at the workplace (5). In contrast to children, more teeth per accident are injured in adults (6). The upper central incisors are primarily affected in children due to their exposed position (4, 6–8). Crown fractures without pulp involvement and concussions are the most frequent injuries (5, 9). Serious injuries like crown fractures with pulp involvement and severe dislocations are comparatively rare (10). The aim of the present study was to record data about tooth trauma and its therapy in as many adults as possible in Switzerland, and to evaluate possible changes in a 10-year interval.

Material and methods

Over 23 000 dental injuries are annually recorded by all insurance companies in Switzerland (11) (Fig. 1). The Swiss Accident Insurance Fund (SUVA) as largest insurance company insures the majority of all working persons against consequences of occupational and home accidents (12). The SUVA is split into several divisions, of which Central Switzerland is the third largest one. In 1992 and again in 2002 about 1.8 million adults were covered by SUVA; 150 000 of them from the division Central Switzerland (12). For the present study all dental injuries registered by SUVA, division Central Switzerland, were evaluated and compared for the years 1992 and 2002. Based on the population figures received by the Federal Statistical Office of Switzerland, the surveyed data from Central Switzerland were extrapolated to all of Switzerland.

In Switzerland for every accident a notification of claim is made by the employer to the insurance company, regardless of whether it occurred at the workplace or in free time, and for doing so a special form is available. Subsequently the consulted dentist also needs to fill out a claim form for the SUVA. From these documents related to the accident not only the basis data of the patients were extracted, but also information as to the place of accident, the doctor conducting the initial treatment, the type of injury and the estimated costs for treatment of the dental trauma.

To detect associations between categorical variables, cross-tables were calculated and Fisher's exact test was performed. To explore differences in means for continuous variables between two groups, *t*-tests were calculated. In case of more than two groups, one-way analysis of variance was modeled. The level of significance was set to 0.05 (two-sided). All analyses and descriptive statistics were performed using SPSS v. 11.5.

Results

Being the largest insurance company in Switzerland, SUVA received 14 507 claims as a result of dental trauma in 1992 and 12 602 in 2002. In 1992 the age of the injured persons was between 14 and 72 years, in 2002 between 15 and 72 years. Only a number of isolated cases

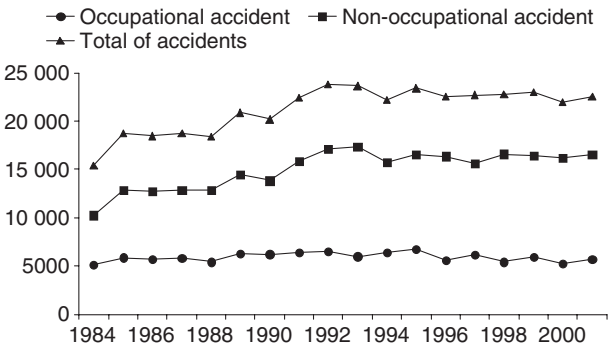

Fig. 1. Total amount of registered tooth injuries of all insurance companies in all of Switzerland between 1984 and 2001.

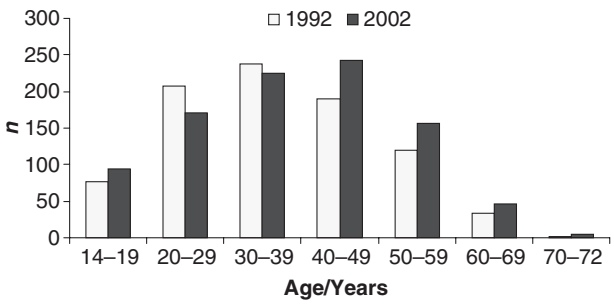

Fig. 2. Age distribution of persons experiencing tooth injuries in 1992 and in 2002 (data derived from SUVA, Central Switzerland).

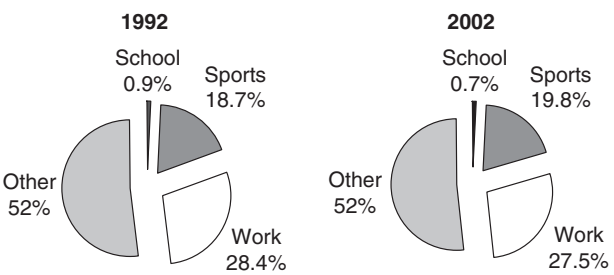

Fig. 3. Distribution of place of accident in percent in 1992 and 2002 (data derived from SUVA, Central Switzerland).

were reported to SUVA of working people in training and thus below the age of 18 (1992 $n = 12$, 2002 $n = 22$). The mean age of the people experiencing trauma was 36 years in 1992 and 38 years in 2002. In 1992 mostly 30–39 year olds were affected, while in 2002, 40–49 year olds were most often injured (Fig. 2). Between the years 1992 and 2002 no evidence of statistical differences was shown in this regard ($P = 0.124$).

In 1992 and in 2002 most accidents occurred at home. About one-fourths of all accidents happened at work, one-fifths of all accidents during sports (Fig. 3). Sport accidents happened first and foremost when playing soccer and ice hockey. In both the years 1992 and 2002 most tooth trauma was caused by blows to the orofacial

Table 1. Distribution of injured teeth in 1992 and in 2002 in percent (data derived from SUVA, Central Switzerland)

Tooth	1992	2002
Upper right central incisor	19.9	19.2
Upper left central incisor	18.8	18.7
Lower left central incisor	3.7	4.9
Lower right central incisor	3.8	4.8
Upper right lateral incisor	8.2	8.9
Upper left lateral incisor	9.5	8.7
Lower left lateral incisor	2.2	3.9
Lower right lateral incisor	2.3	3.5
Cuspids	9.5	9.6
Premolars	10.2	8.6
Molars	11.9	9.2

Values are expressed in percentage.

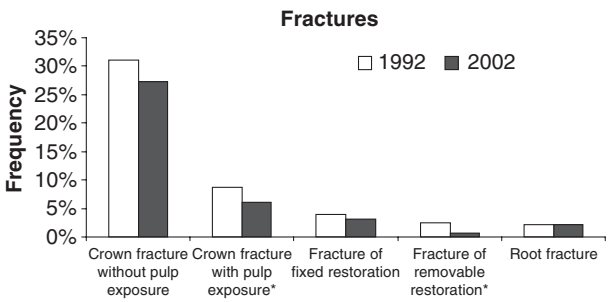

Fig. 4. Distribution of tooth fractures in percent in 1992 and in 2002 (*$P < 0.05$) (data derived from SUVA, Central Switzerland).

area (1992: 48.9%; 2002: 51.9%; $P = 0.277$). Falling down was the second most common cause for tooth trauma (1992: 28.5%; 2002: 29.8%; $P = 0.633$). Other incidences that led to trauma were traffic accidents (1992: 4.7%; 2002: 1.7%; $P = 0.002$), collision with another person (1992: 5%; 2002: 4.6%; $P = 0.705$), violence (1992: 1.2%; 2002: 0.9%; $P = 0.596$), accidents with sports or recreational equipment (1992: 2.3%; 2002: 4.6%; $P = 0.025$), and accidents while drinking from bottles and glasses (1992: 2.3%; 2002: 4.6%; $P = 0.025$).

The upper central incisors were most often affected in both years. In about 20% of dental injuries, premolars and molars were affected (Table 1). In 1992 about 1.8 teeth were injured on average per accident, in 2002 two teeth per accident.

Both in 1992 and 2002 the most common injury was crown fracture without pulp involvement (Fig. 4). In both years concussions were the most frequent luxation injuries (Fig. 5). Teeth, which had experienced several injuries, were included in the category combination injuries. All in all this happened second to most (1992: 18.4%; 2002: 20.1%; $P = 0.040$). Jaw fractures occurred in less than one percent of all cases (1992: 0.6%; 2002: 0.2%; $P = 0.678$). In 1992 0.4% of all teeth showed no apparent damage at the dental follow-up appointment after having experienced dental trauma, in 2002 it was 0.7%.

Most of the injured teeth ($n = 1430$ teeth) in Central Switzerland in 1992 were treated with fixed crown and

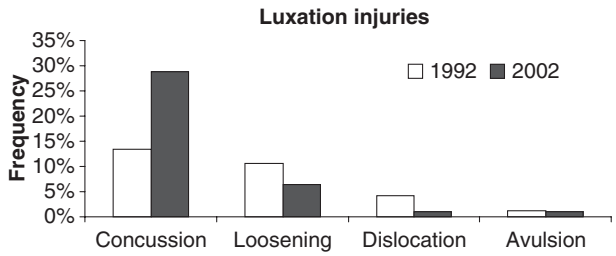

Fig. 5. Distribution of luxation injuries in percent in 1992 and in 2002 (data derived from SUVA, Central Switzerland).

Table 2. Therapy following dental trauma in 1992 and in 2002 (data derived from SUVA, Central Switzerland)

Therapy after trauma	1992	2002
Crowns and bridges	31.8*	20.3*
Tooth-colored fillings	18.6*	24.9*
Amalgam fillings	2.1*	0.3*
Reconstructions with implants	0.5	0.8
Polishing of fracture facets	15*	6.2*
Denture fabrication	1.8	0.8
Repairing existing denture	2.5	1.4
Splinting	2.4	1.3
Extraction without prosthetic treatment	1.5*	0.9*
Extraction with prosthetic treatment	5.8*	4.3*
No therapy	16.4*	36.6*
No information	1.6	2.2

Values are expressed in percentage.
*$P < 0.05$.

bridgework and second most by tooth colored fillings (Table 2). In 2002 a distinct shift in favor of direct composite fillings came about. In 2002 36% of the injured teeth (1679 teeth) in Central Switzerland did not require any therapy. When comparing the years 1992 and 2002 an increase in implants placed after trauma was seen ($P = 0.017$).

The rounded off estimate for all of Switzerland based on the data determined by SUVA, Central Switzerland, showed that annually over 6000 adults experienced dental trauma at their workplace in Switzerland (1992: 6600; 2002: 6100). Additionally another 4000 incurred dental trauma during sports (1992: 4400; 2002: 4500). Based on all persons insured by SUVA in Switzerland this means that in 1992 as well as in 2002 less than 1% suffered dental trauma. The same was true when observing all adults in Switzerland. The estimates also showed that the most common causes for accidents in adults had not changed when comparing the years 1992 and 2002 (1992: 11 600 in adults by blows, 2002: 11 700; 1992: 6700 in adults by falls, 2002: 6600). Furthermore, the estimates showed that in all of Switzerland 42 000 teeth were injured during accidents (29 000 anterior teeth, 4000 cuspids, 4300 premolars, 5000 molars). In 2002, 45 000 teeth were injured (32 800 anterior teeth, 4000 cuspids, 3800 premolars, 4100 molars). The estimates showed further that in 1992, 14 800 teeth were treated by crowns and bridges. In 2002, 16 400 examined teeth did not need any further therapy (Table 3). When an adult experienced dental trauma the SUVA had to

Table 3. Therapy following dental trauma in 1992 and in 2002 (extrapolation to all of Switzerland)

Therapy after trauma (extrapolation)	1992	2002
Crowns and bridges	14 800	9600
Composite fillings	7900	11 200
Amalgam fillings	900	130
Implants	470	950
Extractions	2800	2400
No therapy	6900	16 400

cover an amount of 1200 Swiss francs on average (considering an exchange rate of 1:1.20 this is 1000 US$), whereas the costs varied strongly depending on the type of injury and therapy. Thus, in 2002 the costs were somewhere between 68 Swiss francs (58 US$) and more than 12 000 Swiss francs (10 000 US$). Hence, in all of Switzerland the costs accruing to insurance companies by dental trauma in adults amounted to an annual 25 million francs (21 million US$) for dental care not counting dental laboratory costs.

Discussion

For the present study all dental injuries registered by SUVA, division Central Switzerland, in the years 1992 and 2002 were evaluated. Based on the population figures received by the Federal Statistical Office of Switzerland, the surveyed data were extrapolated to all of Switzerland. Comparison with other studies was limited, because most studies are based on specific groups or age groups.

The SUVA only insures working adults, which means that children, students, non-working housewives and househusbands as well as retirees are not represented in the data. However, among the examined persons there are some trainees which explains the age being less than 18 years in individual cases. The SUVA insures mostly undertakings from agriculture and industry. The largest part of the service sector is covered by other insurance companies. Nevertheless, the data from SUVA allow identification of a mixed population with relatively high case numbers. In contrast to studies involving children and adolescents, there are only limited epidemiologic data about dental trauma in adults (1, 3).

In Switzerland a record is kept of all reported dental accidents regardless of treatment needs, subsequent treatment and place of initial examination. The dossiers, with which accidents were recorded, provide standardized dental diagnostics of all dental accidents. Thus, one does not have to rely on subjective reports from patients. Likewise, accidents without treatment need could also be included in the present study.

As in most studies the upper central incisors were most often affected (4, 6–8). Nevertheless, in 20% of the cases premolars and molars were also affected. A possible cause might have been the larger number of teeth in adults having extensive reconstruction already, which increased their risk of fracture as opposed to teeth in children. Comparison of accident notifications the SUVA, Central Switzerland, received in the years 1992

and 2002 yielded statistical evidence about the cause of accidents ($P < 0.05$), type of injury ($P < 0.01$), and administered therapy ($P < 0.01$). It was a surprise that the concussions recorded doubled in number. It might have been that an increase in continuing education courses in the field of dental trauma in recent years enabled the treating dentists to recognize less apparent injuries, which were then reported. This assumption may also be an explanation for the observation that in the year 2002 an apparent higher percentage of traumatized teeth did not need therapy.

A low prevalence of dislocation injuries was predictable due to the adult population in this study. This is in accordance with findings from the literature showing that in permanent dentition dislocation injuries are less likely to occur than in primary dentition (13, 14).

With over 20 000 tooth injuries in adults per year, the number of reported accidents is relatively constant since 1989 in Switzerland. The same is true for the place of accident. In both years 1992 and 2002 most accidents occurred at home or at work.

Progress has been made in dental medicine and was noticeable in the therapy chosen for injured teeth. Replacement of dental hard tissue was more and more often achieved by direct adhesive restorations. On the other hand, a decrease was noted in amalgam fillings, crowns and bridges. Lost and non-restorable teeth were much more often replaced by implants in 2002 than in 1992. Within the 10 observed years tooth replacement by implants has changed from a luxury to being economically feasible. The annual costs for dental treatment arising from accidents were comparable to other examinations in Switzerland (3).

Contrary to common opinion, the amount of dental accidents registered by insurance companies suggests that there had been no increase of accidents in the 10 years from 1990 to 2000 (Fig. 1). This might be the result of an adult population being possibly less affected by high-risk modern trend sports.

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