Analysis of the Treatment of Impacted Canines During a Twenty-Year Period

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Summary

In this study the treatment of impacted canines during a 20-year period was analysed. The purpose of the analysis was to determine which type of treatment was most frequently used according to the patient age, and to determine if there were any changes in approach and surgical technique during this period.

Six patient groups were formed according to their age. Data for each group was obtained, statistically analysed, and charts made.

Out of the total 44186 patients 1866 had impacted canines (4.22%). Alveolotomy was most often used, i.e. 1451 out of a total of 1903 operations (76.2%). Corticotomy was used in 436 (23%), and transplantation in 16 cases (0.8 %). Alveolotomies were mostly performed on patients older than 30 years, and corticotomy and replantation were mostly used in patients 15-19 years old.

Key words: *impacted canine, treatment, twenty year.*

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Introduction

When the secondary trend in the development of the jaws of contemporary man is analysed it can be seen that there has been a reduction in its bone mass. However, as the same number of teeth, whose dimensions have not significantly decreased, must have a place in the reduced jaw, it follows that some teeth will not have a place for normal eruption in the dental arch. Consequently they erupt dystopically or even remain impacted in the jaw.

Although any tooth can be impacted, the teeth most frequently affected are the lower and upper wisdom teeth, upper and lower canines, upper premolars, second lower premolars and the upper incisors. Impacted canines occur more frequently in the upper than in the lower jaw, and are more frequently found in females.

The causes of retention may be local, systematic or other, and not mechanical as in the case of impaction.

Rant (1) considers that because of the lengthy process of eruption and late eruption, the upper canine is exposed to effects which disrupt its growth more than other teeth, and consequently anomalies of its position are more frequent.

In the upper jaw the palatal position is more frequent (85%) than labial. With regard to etiology Adam (2) divided dystopia of the upper canine into primary and secondary, and reports of dystopic position, i.e. retention of the upper canine was confirmed by Proffit (3), Moyers (4) and Graber and Vanarsdall (5).

The permanent canine succeeds the milk tooth, whose mesiodistal diameter is smaller. Thus, because

of the aforementioned factors the canine is the second tooth according to the incidence of retention, immediately after the wisdom tooth. The majority of children show a uniform pattern of eruption of the canines of the upper jaw with a similar degree of development on both sides (6). However, an asymmetric pattern of tooth eruption can occur in approximately 10% of cases, when there is a time difference between eruptions of as much as one year (7). The distance the tooth moves from its place of development to the occlusal plane is greatest in the upper canine, and thus the possibility of deviation on the way is most frequent (8, 9). The top of the canine crown is most frequently turned towards the palatal surface of the lateral or medial incisor. Cases have been reported of resorption of the roots of these teeth by impacted canines (??) (10).

From the clinical viewpoint and experience it would appear that the majority of impacted canines are without symptoms (asymptomatic) or pathological changes. However, in some cases the development of a follicular cyst can occur, which may lead to serious shifting and repositioning, not only of the canine but also of adjacent teeth (11-13).

Many authors have proposed classifications of impacted canines. Thomas (14) and Archer (15) proposed good classifications, although they are without great practical value. Thoma based his classification on the position of the canine crown and Archer on the position of the whole canine. All classifications, including the classifications of the above authors, have three basic starting points: the labial position of the canine, palatal and medial position (labial-palatal). The lower canines are much less frequently impacted than the upper canines, and are usually located on the vestibular side and very rarely lingual. They may be vertical, angled or horizontal in relation to the (hrbat?) of the alveolar ridge of the lower jaw.

Clinical diagnosis

Because of the severity of problems connected with canine retention, careful examinations, regular check-ups and early diagnosis are very important. An annual clinical examination and palpation of the alveolar ridge in the area of the canine is recommended after the age of eight years (16).

The most reliable method for diagnosis of an impacted canine is a radiographic image (17).

Therapy for impacted canines may be surgical, orthodontic or combined. Opinions differ with regard to indications for removal of impacted teeth. However, there is no disagreement when the impacted teeth can be moved into their place in the dental arch by orthodontic-surgical therapy. In order to achieve this there must be a place in the dental arch, the tooth must be situated close to that place and its vertical axis must be in a satisfactory direction.

The authors agree with those who say that impacted teeth should be removed if they cause disturbance, although they would add that they should also be removed if there is a danger of them causing disturbance in the future.

Of the surgical techniques alveolotomy (odontomy) is most often used, followed by corticotomy and then transplantation. Alveolotomy is a surgical technique whereby the tooth is removed from the jaw and sacrificed??. Corticotomy is a surgical technique whereby part of the tooth crown is exposed by removing mucous membrane and bone above the crown. Corticotomy is occasionally sufficient to induce eruption of the impacted tooth, although more often retention elements are applied to the crown which, with the help of an orthodontic apparatus, draws out the tooth. The retention element most often used is ligature wire, a ring or crown or direct adhesion of an orthodontic bracket or button on the tooth crown. A mobile or fixed orthodontic apparatus can be used, although a fixed apparatus is recommended because of its permanent effect on the tooth. Transplantation of the canine is the method of choice when unsatisfactory tooth position obstructs the use of an orthodontic apparatus and when there is sufficient space in the dental arch for its transplantation. The technique consists of careful removal of the tooth from the jaw and construction of artificial alveoli. Satisfactory results can be achieved by transplantation if the growth and development of the tooth root to be transplanted has not been completed, and in the case that the growth and development of the root has been completed and the results are unsatisfactory because after transplantation the tooth root is resorbed within a certain period (18-22).

Aim of the investigation

The aim of this investigation was to analyse all the techniques used in the treatment of impacted canines over a twenty-year period from 1977 to 1996. The object was to determine the treatment which predominated in practice, with regard to the age of the patient and whether during the twenty years any change had occurred in approach and method of treatment.

Materials and methods

The following served as the source of all data:

- Archive (book of operative protocol) of the Department of Oral Surgery Clinic of Dental Medicine, Gundulićeva 5, Zagreb, from 1977 to 1996.
- Archive (book of operative protocol) of the Clinic of Oral and Maxillofacial Surgery, Clinical Hospital Dubrava, Zagreb, from 1985 to 1996.

From the above books of operative protocol data on sex, age, diagnoses, types of operations and remarks were analysed. The data obtained were recorded in tables. Table 1 shows the type of operations performed according to the age of the patients. Table 2 shows the type of operations performed according to years. Table 3 shows the orthodontic elements used during corticotomy according to the age of the patient. Table 4 shows the frequency of some impacted canines during each year of the examined period.

All the above tables were analysed statistically and graphs made by means of computer programme support. Procedures for analysis of time series were applied in the analysis and the procedure for analysis of tables contingency χ^2. The analysis was performed by means of programme support Statistica Ver. 5 (23).

Results

Results are presented in tables and graphs.

Discussion

Analysis of data from Table 1 shows the following:

Most patients were aged 30 years and more (32%), and the least were aged 3-9 years (0.4%).

Most alveolotomies were performed in patients aged 30 years and more (97.9%), and the least in patients aged 15-19 years (68.4%).

Most corticotomies were performed in patients aged 15-19 years (37.8%), and the least in patients aged 30 years and more (5.8%).

Analysis of data from Table 2 shows the following:

The ratio alveolotomy to corticotomy was almost double.

During the 20 years the first time the number of corticotomies performed amounted to more than alveolotomies was in 1982.

The number of replantations performed was negligible in comparison to the number of alveolotomies and corticotomies. Most replantations were performed in patients aged 15-19 years, amounting to 50%.

The frequency of operations during the 20 years, expressed in percentages, is as follows:

- Alveolotomy - 76.2%
- Corticotomy - 23%
- Replantation - 0.8%

Analysis of data from Table 3 shows that the total number of wire ligatures amounted to 96 (22.01%) and the total number of brackets 25 (5.7%). In other words, the total number of orthodontic elements used during corticotomy amounted to 121 which is 27.5% of the total number of corticotomies performed (436 cases). The number of corticotomies without wire ligatures or brackets amounted to 315, (72.24%).

Analysis of data from Table 4 shows the frequency of impacted canines in the upper and lower jaw for each year. For all 20 years it was found that the upper right canine was impacted in 48.7% of cases, upper left canine in 47.8% of cases, lower left canine in 2.05% of cases and the lower right canine in 1.5% of cases. Bilateral retention in the upper jaw amounted to 129 cases (6.8%) while in the lower jaw it amounted to 3 cases (0.16%).

Figure 1 shows that the percentage share of alveolotomy as the intervention of choice fell in proportion to the growth of the share of corticotomy up

until 1982. From that year the share of alveolotomy increased and oscillated at around 80%, while corticotomy fell and oscillated at around 20%.

Figure 2 reviews the dynamics of developments/events. In relation to 1982, the "crucial" year, alveolotomy was 3.5 times more frequent in some years, while corticotomy was performed half as frequently as in 1982, with a tendency to increase in the late 1980s.

Dausch-Neumann (24) reported that the number of impacted canines ranged from 0.9-2% of patients, and was more frequent in females, while bilateral retention was found in 11-23% of cases.

In this investigation it was found that impacted canines amounted to 4.22% of operations. Female patients amounted to 69.6% and male 30.4% of the cases. Bilateral retention in the upper jaw amounted to 6.8%, while in the lower jaw it was 0.16%, which is in agreement with the reports of other authors.

Rant (1) concludes that because of the lengthy process of eruption and late eruption (9-12 years) the upper canine, more than other teeth, is subjected to various effects which disturb its growth, which is the reason why anomalies of its position are more frequent. In the present investigation it was found that the upper canines were impacted in 96.5% of cases.

Reports in world literature consider that retention of the canine in the lower jaw is very rare and amounts to 0.05-0.4%. In the present investigation the lower canines were impacted in 3.5% of cases.

Andreasen (18), Schatz, Bernhard and Joho (25) recommend that replantation of the canine should be planned as early as possible, i.e. between the ages of 11 and 12 years, because of the great chance of preserving the periodontum.

Nordenram (26), Mourshed (12) and Brown (11) consider that the exact risk of pathological changes developing in the case of a lack of treatment of an impacted canine is unknown, although a follicular cyst appears to be the most frequent complication.

According to the reports of Giansanti et al (27) and Monteil and Terestri (28) the development of odontogenic tumours from a tooth follicle is rare.

Conclusion

Analysis of the data showed that impacted canines amounted to 4.22% of all operations. Female patients comprised 69.6% and male patients 30.4%. The upper canines were impacted in 96.5% and the lower in 3.5% of cases.

According to the frequency of operations it was found that alveolotomy was the most frequently used technique, amounting to 76.2%, followed by corticotomy with 23% and replantation with 0.8%. Most alveolotomies were performed in patients aged 30 years and more, and the least were performed in patients aged between 15 and 19 years. Most corticotomies were performed in patients aged between 25 to 19 years, and the least in patients aged 30 years and more. Most replantations were performed in patients aged between 15 and 19 years.