

Influence of canine impaction on the patient's quality of life

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Abstract. The aim of this study was to determine the degree of influence of canine impaction and of the surgical-orthodontic correction treatment on the patient's quality of life. The study was performed in a group of 55 patients aged between 18 and 65 years, in various private and state dental offices in Cluj-Napoca, Cluj County. The method used for the collection of data was the completion of a questionnaire by each patient. The questionnaire included questions related to the evolution of an impacted canine from diagnosis to therapeutic results. The results of our study demonstrated that impacted canine causes a general discomfort for 38 patients (69.1%) out of all patients included in our study. Women felt more discomfort associated with impacted canine. Out of all the patients included in our study limitation of social life occurred in a percentage of 69.1%, due to modified facial appearance. The professional life of our patients (40%) was weakly affected by canine impaction. The most frequent treatment applied was surgical-orthodontic correction (69.1%). After completion of the treatment the quality of life of our patients was improved. Our study evidences the fact that the effect of canine impaction is higher in women. The mean age of diagnosis is 22 years, which demonstrates the concern of adolescents about aesthetic appearance and good functionality. Canine impaction is a disorder that can be considered as having a greater effect on the women's quality of life when speaking about the discomfort felt. Our study shows a correlation between the age at which treatment was initiated and the improvement in the quality of life at the completion of treatment.

Key Words: impacted canine, quality of life, surgical orthodontic correction.

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Introduction

Canine impaction is a dental anomaly consisting of the retention of the completely formed tooth inside the bone, long after the normal age of eruption.

Canine impaction is second in frequency after wisdom molar impaction and has a frequency of approximately 1-3% in Caucasians. A canine is impacted if it has failed to erupt naturally in the dental arch 2-3 years after the normal age of eruption (11-12 years). Consequently, if at the age of 13-14 years the canines are not present, a visit to the dentist is necessary.

The canines are indispensable teeth in the dental arch and play a multifunctional role in mastication, phonation and physiognomy. Canines are extremely important, particularly for people with a wide smile, due to their position in the dental arch. An impacted or ectopic canine is immediately noticed during the functioning of the dentomaxillary system. These dentomaxillary abnormalities may cause feelings of inferiority in children, changing their behavior within the group.

During speech and smile, a variable portion of the height of the anterior teeth and implicitly, of the canines is uncovered, which is larger in young female persons than in men and elderly subjects.

The importance of the curve formed by the incisal margin of the anterior teeth for dental aesthetics is recognized. This should be convex and confers good spirits and cheerfulness to the patient. The lack of a canine determines the loss of this convexity, which conveys an appearance of distress, severity, sadness (Borzea et al 1994).

Canine impaction is an anomaly that interferes with the patient's mood through its negative effects related to dentofacial aesthetics, masticatory function or phonation. Speech and communication are affected because dental and alveolar consonants such as t, d, l, r, n, z might suffer distortions. But the main reason for which patients ask for orthodontic treatment is aesthetics (Manea 2004). This anomaly influences the patients' attitude towards their own body. Interpersonal relations are marked by self-acceptance, and the awareness of an orthodontic defect induces low self-esteem and social isolation.

Beautiful people are considered to be good, independent, sociable, sensitive, strong and successful. The best looking people are perceived as having successful marriages, good jobs and positive social interactions. People are uncomfortable with the idea that physical appearance makes the difference. It is considered

that real social consequences are acquired through physical morphology: a wide and beautiful smile, height and other facial aspects according to aesthetic standards.

Physical appearance can be the variable with the highest impact on self-esteem and successful relations with the surrounding people (William 1992).

Many studies have discovered in our society a high acceptance level for evaluating physical attractiveness in an individual. It has been proved that both children and adults focus their eyes on a face that they consider attractive for a longer time than on an unattractive face. The preference for portraits of attractive women determined based on the duration of attention focused on them was demonstrated in children aged only 2 months by Langlois (Langlois *et al* 1991).

Arndt *et al.* studied the relationship between surgical corrections of dentofacial anomalies and self-esteem, assessed using the Piers-Harris Self-Concept Scale (Arndt *et al* 1986). Following a study carried out on a group of 22 children with moderate and severe dentofacial anomalies, improvements in self-esteem were found 6 and 24 months after surgery.

Orthodontic surgery reinforces the balance between the aesthetics and the normality of facial appearance. These positive changes are assessed in terms of physical attractiveness, self-concept and mental health (Modern Practice in Orthognathic and Reconstructive Surgery).

The quality of life is defined as “the individuals’ perceptions of their social situations, in the context of cultural value systems and depending on their needs, standards and aspirations” (Romanian Academy, National Institute of Economic Research 2006). Thus, the quality of life in dental medicine is physical, mental and social welfare, as well as the patients’ ability to achieve their daily tasks.

The aim of this study was to determine the degree of influence of canine impaction and of the surgical-orthodontic correction treatment on the patient’s quality of life. Thus, we monitored the quality of life in terms of functionality, aesthetics and social integration of patients diagnosed with impacted canines.

Material and method

The study was performed in a group of 55 patients aged between 18 and 65 years, in various private and state dental offices in Cluj-Napoca, Cluj county. All patients signed an informed consent for their inclusion in this study. Of all 55 patients, 27 were women and 28 were men. The study was carried out over a period of 11 months, between May 2013 and March 2014.

The method used for the collection of data was the completion of a questionnaire by each patient. The questionnaire included questions related to the evolution of an impacted canine from diagnosis to therapeutic results.

The questions of the questionnaire were aimed at three aspects: the influence of canine impaction on the patient, therapeutic approach and the degree of satisfaction after treatment.

The results obtained from the questionnaires were introduced into a Microsoft Excel database. Data were statistically processed using the SPSS (Statistical Package for the Social Sciences) software.

Questionnaire for the evaluation of patients with an impacted canine

First name initial:

Surname initial:

Age:

Sex: F / M

Field of activity: - pupils/students

- art and culture

- economy

- medicine

- IT

1. How did you discover the dental anomaly you suffer from?

By myself • By talking to people with similar problems•

At the dentist’s office• During investigations for another disorder•

2. At what age were you diagnosed with this dental anomaly?

3. Did you have a general discomfort caused by this disorder?

Yes • No •

If yes:

To what extent did you feel discomfort/pain?

Not at all• To a small extent• To a large extent• To a very large extent•

To what extent did you notice the bulging of the gingiva towards the cheek/palate?

Not at all• To a small extent• To a large extent• To a very large extent•

To what extent did you have feeding difficulties?

Not at all• To a small extent• To a large extent• To a very large extent•

To what extent did you have cleaning difficulties?

Not at all• To a small extent• To a large extent• To a very large extent•

4. Was your social life limited by the appearance of the upper dental arch (due to an impacted canine)?

Yes • No •

If yes:

To what extent was your facial appearance affected?

Not at all• To a small extent• To a large extent• To a very large extent•

To what extent was speech affected?

Not at all• To a small extent• To a large extent• To a very large extent•

To what extent was your social integration (school/workplace/entourage) affected?

Not at all• To a small extent• To a large extent• To a very large extent•

5. Did the appearance of your upper dental arch (due to canine impaction) have an impact on your professional life?

Yes • No •

If yes:

To what extent did it affect you finding a job?

Not at all• To a small extent• To a large extent• To a very large extent•

To what extent was your workplace activity affected?

Not at all• To a small extent• To a large extent• To a very large extent•

6. What imaging methods were used for diagnosis?

OPT• Occlusal film x-ray• Profile telerradiography• CT•

7. What type of treatment did you receive?
Surgical-orthodontic correction treatment• Surgical extraction•
8. Treatment started at the age of..... and was completed at the age of..... / is about to be completed.
9. To what extent did you understand the information received from the medical staff?
Not at all• To a small extent• To a large extent• To a very large extent•
10. Do you consider that you were given enough time to understand the information?
Not enough time• Less than enough time• Enough time• More than enough time•
11. To what extent was the treatment period respected?
Not at all• To a small extent• To a large extent• To a very large extent•
12. Do you consider that the treatment was too expensive given the result obtained?
Not too expensive• Slightly too expensive• Much too expensive• Very much too expensive•
13. The improvement of the quality of life after the completion of treatment:
No improvement• A slight improvement• A significant improvement• A very significant improvement•
- To what extent was physiognomic appearance improved?
Not at all• To a small extent• To a large extent• To a very large extent•
- To what extent was feeding facilitated?
Not at all• To a small extent• To a large extent• To a very large extent•
- To what extent was oral cleaning improved?
Not at all• To a small extent• To a large extent• To a very large extent•
- To what extent was speech improved?
Not at all• To a small extent• To a large extent• To a very large extent•

Results

The mean age at which the patients from our study were diagnosed with impacted canines was 22 years, and the mean age at which treatment was initiated was 23 years. Of all 55 patients included in the study, 27 representing 49.1% were females and 28 representing 50.9% were males. Regarding occupation, 13 patients (23.6%) were students, 31 patients (56.4%) worked in the field of art and culture, 7 patients (12.7%) worked in the economic field, 2 patients (3.6%) were doctors, and 2 patients (3.6%) worked in the field of IT. Of all patients included in the study, 6 patients (10.9%) discovered canine impaction by themselves, 31 patients (56.4%) detected it due to an acquaintance having the same problem; in the case of 4 patients (7.3%) the disorder was discovered by the dentist, and in the case of 14 patients (25.5%), it was found following investigations for other dental disorders.

The answers to the questionnaire regarding the discomfort caused by the impacted canine revealed that canine impaction was not associated with pain symptoms in 2 patients (3.6%), while pain was of low intensity in 24 patients (43.6%), of high intensity in 22 patients (40%), and of very high intensity in 7 patients (12.7%). Canine impaction was felt as a bulging of the palatal/ vestibular gingiva as follows: not at all by 15 patients (27.3%),

to a small extent by 30 patients (54.5%), to a large extent by 6 patients (10.9%) and to a very large extent by 4 patients (7.3%). Feeding difficulties were felt to a small extent by 24 patients (43.6%), to a large extent by 21 patients (38.2%), and to a very large extent by 10 patients (18.2%). Cleaning difficulties were experienced as follows: not at all by 23 patients (41.8%), to a small extent by 24 patients (43.6%), to a large extent by 6 patients (10.9%) and to a very large extent by 2 patients (3.6%). The question related to the limitation of social life due to the changed aesthetic appearance as a result of the absence of the canine (impacted canine) was answered affirmatively by 38 patients (69.1%). Facial appearance was not affected in the case of 2 patients (3.6%), while it was affected to a small extent for 11 patients (20%), to a large extent for 14 patients (25.5%), and to a very large extent for 28 patients (50.9%). Speech was affected to a small extent for 23 patients (41.8%), to a large extent for 20 patients (36.8%), and to a very large extent for 12 patients (21.8%). Social integration was affected to a small extent for 35 patients (63.6%), to a large extent for 14 patients (25.5%), and to a very large extent for 6 patients (10.9%). Canine impaction had an influence on the professional life of 22 patients (40%), while it had no influence in the case of 33 patients (60%). Finding a job was affected by canine impaction to a small extent for 37 patients (67.3%), to a large extent for 10 patients (18.2%), and to a very large extent for 8 patients (14.5%). The workplace activity of the patients included in the study was affected to a small extent for 39 patients (70.9%), to a large extent for 6 patients (10.9%), and to a very large extent for 10 patients (18.2%). Of all patients included in the study, 38 patients (69.1) underwent surgical orthodontic correction of the impacted canine and 17 patients (30.9%) underwent the extraction of the impacted canine.

The information received from the treating doctor was not understood by 2 patients (3.6%), while it was understood to a small extent by 4 patients (7.3%), to a large extent by 18 patients (32.7%), and to a very large extent by 31 patients (56.4%). The time allocated to understanding the information related to the therapeutic approach was not enough for 2 patients (3.6%), less than enough for 8 patients (14.5%), enough for 18 patients (32.7%), and more than enough for 27 patients (49.1%). The initially presented treatment period was not respected for 4 patients (7.3%), while it was respected to a small extent for 8 patients (14.5%), to a large extent for 22 patients (40%), and to a very large extent for 21 patients (38.2%). The treatment for canine impaction was considered not too expensive by 31 patients (56.4%), slightly too expensive by 10 patients (18.2%), much too expensive by 12 patients (21.8%), and very much too expensive by 2 patients (3.6%).

After the completion of treatment, the quality of life of the studied patients was not improved in the case of 4 patients (7.3%), while there was a slight improvement for 8 patients (14.5%), a significant improvement for 23 patients (41.8%), and a very significant improvement for 20 patients (36.4%). After treatment completion, the physiognomic appearance was not improved for 9 patients (16.4%), was improved to a small extent for 10 patients (18.2%), to a large extent for 18 patients (32.7%), and to a very large extent for 18 patients (32.7%). After treatment completion, feeding was not facilitated for 10 patients (18.2%),

was facilitated to a small extent for 18 patients (32.7%), to a large extent for 25 patients (45.5%), and to a very large extent for 2 patients (3.6). Oral cleaning was not improved after treatment completion for 12 patients (21.8%), was improved to a small extent for 24 patients (43.6%), to a large extent for 16 patients (29.1%), and to a very large extent for 3 patients (5.5%). Speech was not improved after treatment completion for 26 patients (47.3%), was improved to a small extent for 19 patients (34.5%), to a large extent for 4 patients (7.3%), and to a very large extent for 5 patients (9.1).

The question regarding the discomfort caused by canine impaction was answered affirmatively by 25 female patients (92.6%), while only 13 male patients (46.4%) gave an affirmative answer. The differences regarding the answer to this question were statistically significant at a *p* value of 0.001.

Concerning pain induced by canine impaction, for the majority of the female patients this was felt to a small extent in 12 cases (44.4%) and to a large extent in 12 cases (44.4%), while male patients reported to feel pain to a small extent in 12 cases (42.9%) and to a large extent in 10 cases (35.7%). The differences of pain perception between male and female patients were statistically significant at a *p* value of 0.359. The differences between male and female patients were also statistically significant at a *p* value of 0.001 when assessing discomfort caused by the bulging of the gingiva. 22 female patients (81.5%) answered that they were affected to a small extent, while the majority of the male patients, 12 (42.9%), felt no discomfort. While female patients experienced feeding difficulties to a large extent – 15 (55.6%), male patients felt them to a small extent – 14 (50%). The differences were statistically significant at a *p* value of 0.017. Cleaning difficulties were encountered to a small extent by 16 female patients (59.3%), while men encountered no difficulties - 14 patients (50.0%). All values were statistically significant at a *p* value of 0.094.

The improvement of the quality of life after the completion of treatment was felt to a large extent by 17 female patients (63%) compared with 6 male patients (21.4%), while 8 female patients (29.6%) compared with 12 male patients (42.9%) felt to a very large extent an improvement of their quality of life (*p*=0.007). The differences were obvious in the answers to the question assessing the improvement of physiognomic appearance (*p*=0.005). Women felt an improvement to a large extent in 12 cases (44.4%), and to a very large extent in 12 cases (44.4%), while men felt no improvement in 8 cases (28.6%) and an improvement to a small extent in another 8 cases (28.6%). Feeding was facilitated to a large extent both for men and women. The data were statistically significant at a *p* of 0.054 – representing 13 female patients (48.1%) and 12 male patients (42.9%). Oral cleaning was improved to a small extent both for 12 female patients (44.4%) and for 12 male patients (42.9%); results were statistically significant at *p*=0.025. No statistically significant differences between female and male patients were obtained for the speech improvement item.

The quality of life was significantly improved in the case of 23 patients, in correlation with age at the diagnosis of impacted canine and age at treatment onset (*p*=0.003). The physiognomic appearance was improved to a large and very large extent for 18 patients, in correlation with the age at which canine impaction was diagnosed and age of treatment onset (*p*=0.018).

Feeding was facilitated to a large extent for 25 patients, in correlation with the age of diagnosis and the age of treatment onset (*p*=0.062). Oral cleaning was improved only to a small extent for 24 patients, in correlation with the age of diagnosis and the age of treatment onset (*p*=0.244). No improvement in speech was observed in the majority – 26 patients, in correlation with the age of diagnosis and the age of treatment onset (*p*=0.163).

Discussions

Following a clinical study carried out in Beijing on a group of 215 patients with the diagnosis of an impacted maxillary canine (Kuroi J, 1997), in which the sex distribution of this disorder was investigated, the following results were obtained: the female male ratio was 1.8:1. Canine impaction in the group studied by us was almost equal – 1:1, this might be because of the size of the group. Although the gender distribution was equal, the authors consider that the final results were not influenced by this. According to international studies (Kramer 1970), compared to the general population, this disorder is two times more frequent in females than males.

The higher frequency in women is also due to the fact that their interest in aesthetics is higher compared to men and they present to the dentist in higher numbers when they are not satisfied with the appearance of their smile (Becker 2007). These studies are in accordance with our results. Women were more affected by the aesthetic appearance induced by the bulging of the gingiva compared with male patients. After treatment completion, most female patients included in our research felt a significant improvement of their quality of life, physiognomic appearance improving to a large and a very large extent. These results are correlated with the studies of Kokich *et al.* who established that women manifested a stronger wish to improve their aesthetic appearance compared to men (Kokich *et al* 2006). Thus, the wish “to look good” has been extensively explored in social psychology. One of the reference works in orthodontics was “The Social Psychology of Facial Appearance” by Bull and Rumsey. In reports of the research performed through the 1960s and the 1970s, the authors concluded that facial appearance (Bull *et al* 1988) is a determining factor for a person to be considered attractive. Certainly, the dentofacial appearance of a person may have a significant effect on their quality of life. The higher frequency of canine impaction in women might be correlated with the absence of diagnosis in men, who do not ask for specialized help as they are not disturbed by their aesthetic appearance.

The reason why women were more content with their physiognomic appearance after treatment completion and more sensitive to aesthetic factors than men is not just because a good looking and beautiful appearance confers them self-confidence, but also because success regardless of its nature is tangible.

In 69.1% of all patients included in the study, canine impaction influenced the quality of life, causing discomfort during mastication and speech, or affecting aesthetic appearance.

According to a study carried out by Caovilla (2005), the detection of an impacted canine is more frequent in the second decade of life (Cury *et al* 2005; Caovilla 2005). Results are similar to the study performed by us, where the mean age of the canine impaction diagnosis was 22 years and the mean age of treatment onset was 23 years. We can associate this high incidence

of the diagnosis of impacted canines in the second decade of life with the fact that there is a higher concern for aesthetics and an increase of orthodontic treatment demand.

However, the results are in accordance with those of a study performed on 50 patients by Al-Omiri *et al*, who maintain that the absence of a tooth has a measurable impact on the patients' daily living and satisfaction regarding the discomfort level and feeding ability ($p=0.000$) (Al-Omiri *et al* 2009). Pain was observed to a small extent in 43.6% of the patients included in our study, feeding and oral cleaning difficulties were encountered to a small extent by 43.6% patients. The social life of our patients was affected in a high proportion, 69.1%. The cause was the changed aesthetic appearance to a very large extent (50.9%) and also, speech was affected to a small extent (41.8%). Canine impaction did not affect the professional life of our patients. Among the patients included in the study, canine impaction had an influence on social life, causing its limitation. The problems related to the appearance of patients become obvious through their behavior, socio-psychological topics being treated with hesitation and reserve. The awareness of a physical defect leads to isolation despite socialization, from fear of being judged.

So, it is possible that an impacted canine may generate some discomfort before the initiation of treatment. The results of the study are in agreement with those of other studies showing that women feel pain more intensely than men, according to scientists from Stanford University School of Medicine – USA. The scientists found that women were more sensitive to pain than men, after evaluating 11,000 persons, men and women, who suffered from various disorders. Consequently, we may consider that canine impaction has a stronger influence on the quality of life of women regarding the discomfort felt. In our study, female patients felt pain to a small, large and very large extent in a higher percentage than men. No female patient reported pain while 7.1% of male patients declared no pain.

The mean values of the age at which treatment for canine impaction was initiated (23 years) and the fact that the majority of the patients (69.1%) had surgical orthodontic correction of the impacted canines demonstrate the positive effects on the quality of life. The results show that early treatment induces the restoration of the physiognomic, masticatory and phonetic functions. In our study, the quality of life was significantly improved for 23 patients, in correlation with the age of canine impaction diagnosis and the age of treatment onset. Also, the physiognomic appearance was improved to a large and very large extent for 18 patients, in correlation with the age of diagnosis and the age of treatment onset. Feeding was facilitated to a large extent for 25 patients in correlation with the age of diagnosis and the age of treatment onset. Speech and oral cleaning were the least important dimensions for the patients included in our study. These evaluated items had the lowest values.

A prolonged treatment may prolong the discomfort of a patient with an impacted canine, having a negative effect on the quality of life. Studies show that patients with surgical orthodontic interventions may experience mild depression at 6 months postoperatively, when the device has not yet been removed, but this depression is not an abnormal psychological response to treatment (Raymond 2000). Thus, the shorter the treatment period, the sooner the patient can benefit from an improvement in the quality of life. In our study, the majority of patients (40%)

reported that the treatment period of two years was respected to a large extent.

According to our study, the alignment of the canine in the dental arch restores all the functions of the dentomaxillary system. The aesthetic appearance and the important role in mastication are the greatest benefits of treatment for canine impaction. In our study, the aesthetic appearance was improved to a large and very large extent for 32.7% of patients in both items. Feeding was facilitated to a large extent for 45.5% of our patients. We consider this as an important aspect for evaluating the quality of life and treatment success.

The studies of Flanary, Jacobson (1984) and Kokich *et al* (2006) regarding the patients' expectations and satisfaction indicated that 79% up to 89% of the patients who were subjected to orthodontic treatment combined with maxillofacial surgery were satisfied with functionality and particularly, physiognomic appearance. The same authors showed that women were more satisfied than men, similarly to our study. However, the difference regarding the degree of satisfaction after treatment was not statistically significant (Leena *et al* 1999) in a study carried out by Leena Nurminen, Terttu Pietilä and Heli Vinkka-Puhakka entitled "Motivation and satisfaction following surgical-orthodontic treatment: a retrospective study on 28 patients". Contrary to this, our study reveals a higher satisfaction degree in female patients (92.6%) than in men (64.3%).

William *et al* (1992) consider that success in life or business is often influenced by physical appearance, which is a happy addition to the qualities of a person. Our study revealed that canine impaction has an influence on the social life of our patients but does not influence professional life.

Conclusions

Our study evidences the fact that the effect of canine impaction is higher in women, who are more concerned about aesthetics, more sensitive to and more interested in their facial appearance than men. The most frequent age of diagnosis is 22 years, which demonstrates the concern of young people about aesthetic appearance and good functionality.

Canine impaction is a disorder that creates discomfort and has a greater effect on the women's quality of life when speaking about the discomfort felt. The problems related to the appearance of the dental arch become obvious through the hesitation and reserve of the patient, who communicates verbally with other persons. The study shows that the professional life of patients with an impacted canine is not significantly affected, but social life is.

Our study shows a correlation between the age at which treatment was initiated and the improvement in the quality of life at the completion of treatment, because early treatment allows for a more rapid restoration of the functions of the dentomaxillary system. A shorter duration of treatment has a positive impact on the improvement of the quality of life.

This study demonstrates that post-treatment satisfaction is high, and women are almost two times more satisfied than men.

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