**Background and aims**

The inclusion of one or more teeth is a frequent pathology in the clinical practice.

After the third molar, the canine is the most affected tooth (frequency between 0.92% and 4.3%).

It is palatal in 54% of the cases, vestibular in 32% and median in 12% and, to know exactly its localisation, it is necessary to make several examinations going from the simple Panoramic Radiograph to TAC and RMN.

While in the case of third molar the indication is the extraction, the importance of canines, premolars and incisors is so great that effort of the clinician must be finalized to preserve their integrity and to replace them into the dental arch.

This procedure needs a strong cooperation between orthodontist and oral surgeon because the therapy comprises, after the period of the preparation of the space required and before the orthodontic alignment, also the surgical intervention.

The periodontal outcome of surgically exposed and orthodontically extruded impacted teeth compared with the spontaneously erupted controlateral teeth indicates that orthodontic extrusion of impacted front teeth does not jeopardize their periodontal health and so the procedure appears to be a satisfactory alternative to extraction and/or transplantation, results indicating that the technique of surgical exposure and orthodontic alignment of ectopic teeth provides a satisfactory method of treatment.

In particular, important deteriorative changes were observed only where the surgery had been more radical and where the tooth movement involved active alteration of root position suggesting that, in these cases, surgical procedures must be limited in scope and that the exposure of the cement enamel junction must be avoided.

Use of laser technique in the treatment of this pathology gives several advantages.

It allows making a very selective intervention, minimally invasive and respecting the periodontal tissue, and this is very positive related to the success of the therapy, particularly by the point of view of the soft tissues.

The pain control is generally very good and, sometimes, anaesthetics injection is not required.

Due to the biostimulating effect of laser, the healing process is fast and without discomfort.

The greatest advantage is the complete absence of bleeding, which gives the possibility to immediately bond the bracket in dry enamel, so preventing the possibility of detach and reducing the risk of a further re-intervention.

While in the case of partial bone inclusion different wavelengths such CO2 (10600 nm), Nd:YAG (1064 nm), Diode (810 nm) and KTP (532 nm) may be utilised, when the tooth is totally retained in the bone, Er:YAG (2940 nm) is required, in order to ablate the hard tissue.

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**Subjects and Methods**

The subjects were 32 patients with retained teeth, with age from 13 to 24 years (Fig.1), the males were 12, the females 20 (Fig.2).

The localisation of the retained teeth was upper vestibular (9), upper palatal (20) and mandibular (3), (Fig.3) while in 27 cases retained tooth was canine, in 3 was incisor and in 2 was bicuspid (Fig.4). In 29 cases the inclusion was only partially in the bone, while 3 teeth were totally bone-included (Fig.5); a local anaesthetic (2% Lidocaine+Epinephrine 1/80,000) was infiltrated in 10 interventions, in the other 22 it was used only a topical anaesthetic (Emla, Astratech, Sweden). (Fig.6)

In 6 cases the intervention was performed by KTP, in 10 by Diode, in 8 by Nd:YAG, in 5 by CO2 and in 3 by Er:YAG. (Fig.7)
Representative Case Report

Patient M. T, 14 years old female, with upper permanent left canine (23) in inclusion (Fig.8).

A fixed appliance was applied to the upper arch to make the alignment of the teeth and to obtain the space necessary to put the canine into arch. (Fig.9-10)

After three months a laser-assisted intervention was done to expose the crown of the canine and to bond a bracket for the traction (Fig.11) with these parameters:

- Type of laser: Diode Jet 20 (Oralia, Germany)
- Wavelength: 810 nm
- Power: 20 W
- Mode: Chopped (1:7)
- Fiber: 400 micron, used in contact mode
- Theorical PD : 15923,56 W/cm²
- Theorical Fluence : 2627,38 J/cm²

Fig. 7: Cases where anaesthetic injection was used (31.25%)

Fig. 8: Panoramic radiograph with 23 retained

Fig. 9: Orthodontic appliance to open the space for 23

Fig. 10: Intervention by diode laser to expose the crown of 23

Fig. 11: The bracket bonded to the crown of 23, two weeks after intervention

Fig. 12: The tooth inserted into the upper arch
It was used only a topic anaesthetic (EMLA, Astratech, Sweden) and it was not necessary, due to the haemostasis obtained by laser, the sutures application.

After ten months the canine was completely aligned into the arch (Fig.12).

After twelve years the appliance was removed, with a good situation of the hard and soft tissues (Fig.13).

**Conclusion**

The use of laser in the surgical intervention of retained teeth exposition during orthodontic treatment is full of advantages, in terms of patient compliance (pain and discomfort reduced or absent), fast healing process with a good quality of the periodontal tissues, bleeding absence even without sutures utilisation and disinfection of the operative field without the necessity to assume antibiotics.

The haemostasis control increases the success of the bracket bonding, due to the possibility to maintain the enamel dry, reducing so the risk of its detaching.