UNIVERSITA' DEGLI STUDI DI NAPOLI FEDERICO

II

FACOLTA' DI MEDICINA E CHIRURGIA

DOTTORATO DI RICERCA IN SCIENZE

ODONTOSTOMATOLOGICHE

XV ° CICLO

Piezosurgery Vs rotating drills: comparison of post operative complications after genioplasty.

Candidato | Relatore

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Genioplasty is the choice treatment for vertical lengthening of the chin or horizontal chin reduction [1]. The surgical technique implies bilateral bow shaped osteotomies from the canine - premolar area by means of rotating drills at the lower border of the mandible. The final separation of the bone is completed using an osteotome. The fractured bone segment is mobilized and fixation is gain by titanium nets or by wired osteosynthesis [1].

Several intraoperative and postoperative complications are reported. Mental nerve sensory alteration could occur, because of indirect (compression related to postoperative oedema or hoematoma) or direct surgical traumas (compression during soft tissue dissection, osteotomy, fixation, stretching) [2,3]

Since 1994, Piezosurgery as a technique has widely spread because of its ease of use and safety [4,5] . The selective ability of cut of the Piezosurgery device (Easy Surgery®) is useful in oral and maxillofacial surgery, especially when vital structures as sinus membrane, nerves, vessels or periosteum are involved in the surgical procedure. When correctly used, at a frequency range of 25-30 kHz, only bone is cut [5].

The aim of this article is to compare the postoperative morbidity (swelling, pain and mental nerve sensory impairment) following genioplasty performed by means of the piezosurgery technique and following surgery performed by means of rotating drills and oscillating saws.

Material and Methods

40 patients were referred to the Dept of Oral Surgery of the University of Naples Federico II and the SUN University of Naples to undergo genioplasty. The trial was approved by the Dept. of Oral Surgery, University of Naples Federico II and Dept. of Oral surgery University of Naples SUN.

In 22 cases, genioplasty was performed by means of Piezosurgery technique; in 18 cases, rotating burs were used.

The patients were followed after 24, 48, 72 hrs and 7, 14, 21, 28 days after surgery. Every patient signed a consent form. The evaluated postoperative complications were swelling, pain and mental nerve impairment. All objective measurements were performed by the same operator. Pain was examined by means of the NRS scale. The sensory impairment was detected by means of the two point discrimination test in the mental area bilaterally and by means of direct questioning about numbness or burning sensations.

A general linear model (repeated measures) was used to identify within-group and between group differences (PIEZO vs CTR) at different timepoints (24, 48, 72 hrs and 7, 14, 21, 28 days). Statistical significant differences were set at $p<0.05$. Tests were performed using SPSS statistical software package (Statistical Package for Social Science SPSS v.16.0 - IBM)

Surgical Technique

An incision was performed in the buccal vestibule extending from the right canine up to the left one. The incision was internally beveled in order to increase the contact surfaces of the soft tissue during suture. A full thickness flap was then reflected and the mental nerve was identified;

bow shaped osteotomies were made by rotating drills at the lower border of the mandible from the right canine to the left one in the control group; in the test group, piezosurgery allowed for the osteotomy. The final separation of the bone was performed by osteotome. The fractured bone was then mobilized and fixed by titanium nets and wired ostheosyntesis (fig. 1-6).

Results

40 patients underwent genioplasty. The Piezosurgery group reported less pain and swelling 24, 48 and 72 hrs after the surgery. The test group showed a lower incidence of postoperative mental nerve impairment (1 patient) and a full recovery in 2 weeks. In the control group, 1 patient referred postoperative mental nerve sensory alteration still 30 days after surgery (control group) (Fig.1).

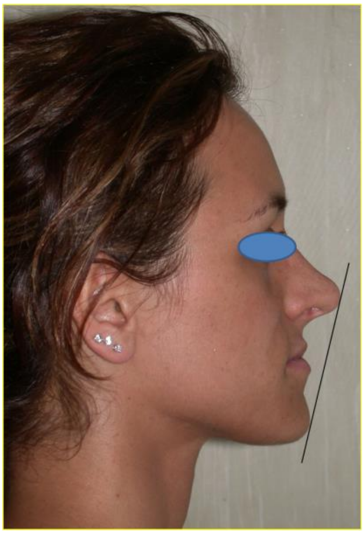
Pain rates as measured at different timepoints are reported in Fig. 2. The pain rate decreased in both groups from the first (24 hrs) to the last registration (28 days). No significant differences were found between 24 hrs and 48 hrs in both groups ($p>0.05$).The pain rate was higher in the control group at all time points (24 hrs $p=0.001$, 48 hrs $p<0.001$, 72 hrs $p=0.006$, 7 days $p<0.001$, 14 days $p<0.001$, 21 days $p<0.001$, 28 days $p=0.041$). DA MODIFICARE.

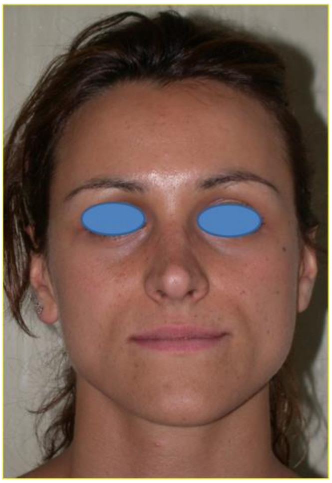
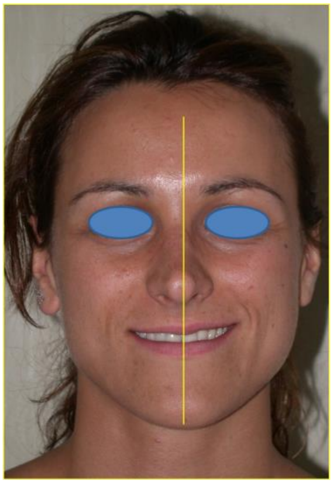
Discussion

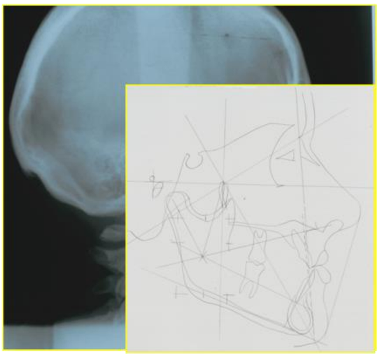
Several postoperative complications are reported to be related to genioplasty [1]. Mental nerve could be damaged during surgery. Trauma may be indirect, such as compression related to postoperative oedema or haematoma, or direct, including strain and compression during soft tissue dissection, osteotomy, repositioning of fractured bone or fixation [6]. The degree of mental nerve impairment and the persistence of sensory alteration seems to be related to patient's age and surgeon experience [6,7]. Several methods have been reported in order to evaluate the mental nerve impairment [6,7]. Most of these include subjective clinical neurologic tests, such as

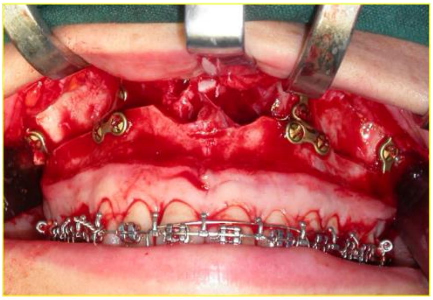
2-point discrimination test, static light touch, brush directional stroke, pin-prick; other objective methods include electrical sensimetry, vibratory threshold measurements, blink reflex, trigeminal evoked potential recording. In this trial, the two point discrimination test was associated to direct questioning about numbness or burning. These are simple methods and correspond to patient's perception, that is the most important factor to evaluate [(2)]. A 12 months follow up was reported to be needed to verify the complete resolution of the mental nerve's sensory alteration, particularly when genioplasty is associated to sagittal split osteotomy in the same surgery [(6)]. In the present study, only 6 patients reported mental nerve impairment. In all cases, the sensory alteration complete recovery occurred within 4 weeks. Nevertheless, in the control group only 1 patient reported postoperative sensory alteration. This could be related to the more conservative approach needed to achieve osteotomy by means of piezosurgery. In these cases, the surgical field is more clear and soft tissues are protected by the selective action of cut of piezosurgery.

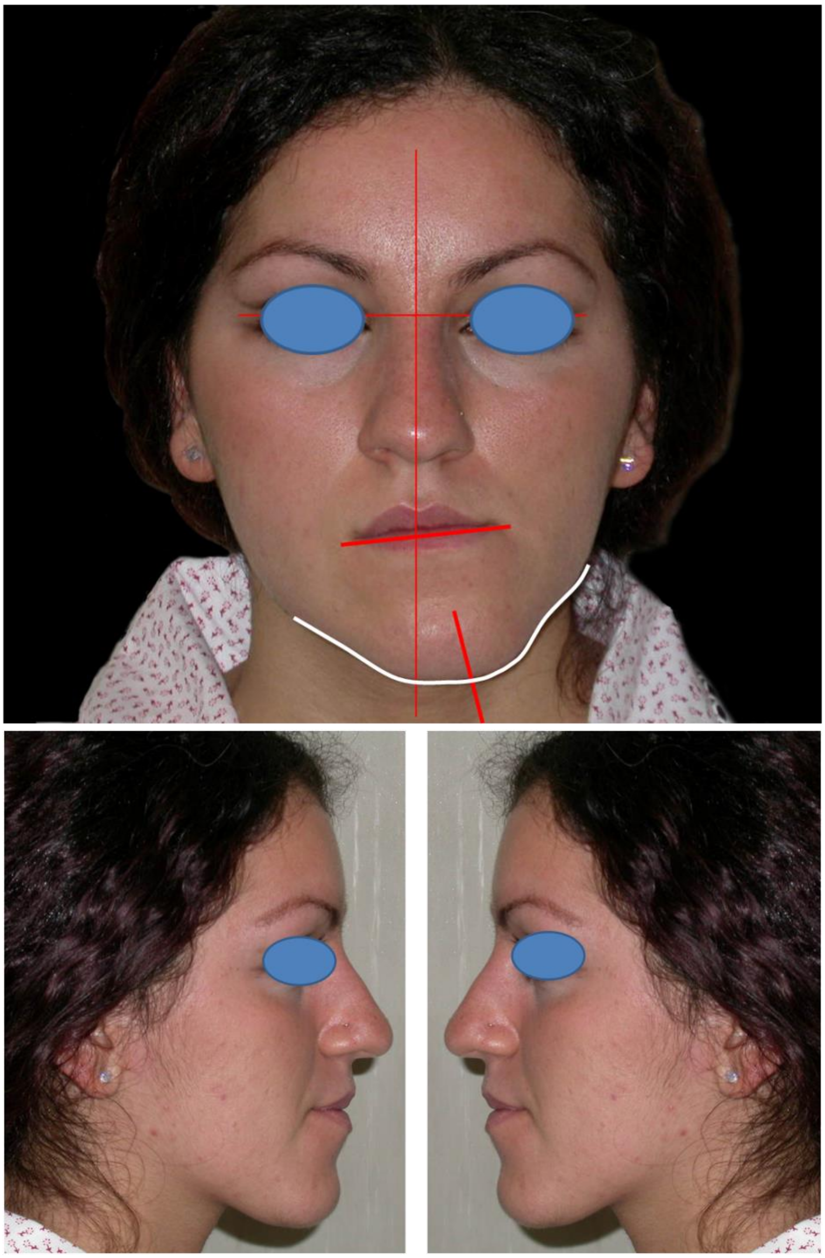
Piezosurgery device was created by Vercellotti in 1994. Since 1994, piezosurgery as a technique has widely spread because of its ease of use and safety [4,5]. The surgical use range (*25-30 kHz*) assures that only bone is cut, thus avoiding soft tissue damage, especially when important structures are involved (inferior alveolar nerve, sinus membrane, periosteum) [4]. Such advantages reduce the surgical risks, notably in complex procedures or in surgical complication management. Piezosurgery has been successfully used in intraoral and extraoral bone grafting, in bone expansion procedures and implant dentistry [8,9,10,11]. Piezosurgery technique appears to assure a better surgical visibility and a smaller osteotomy area compared to the traditional osteotomy approach; because of the cavitation effect, blood is spread out and the bone access is clear [12]. Nevertheless, the time required to the surgical approach is longer [13]. Moreover, a more favorable osseous response with piezosurgery when compared with diamond or carbide burs has been reported and lower bone damage is assured [14,15,16]. In this trial, piezosurgery technique assured a low risk procedure and a conservative approach. Pain and discomfort were minimal and only 1 patient reported transient sensory impairment. This could be related to the selective property of cut of the piezosurgery device with no damage of the soft tissue.

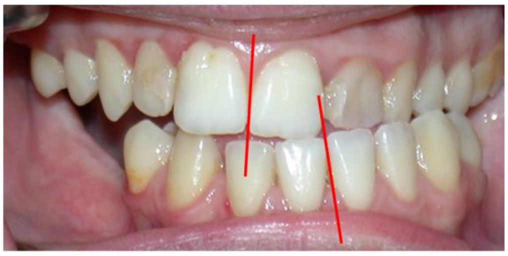


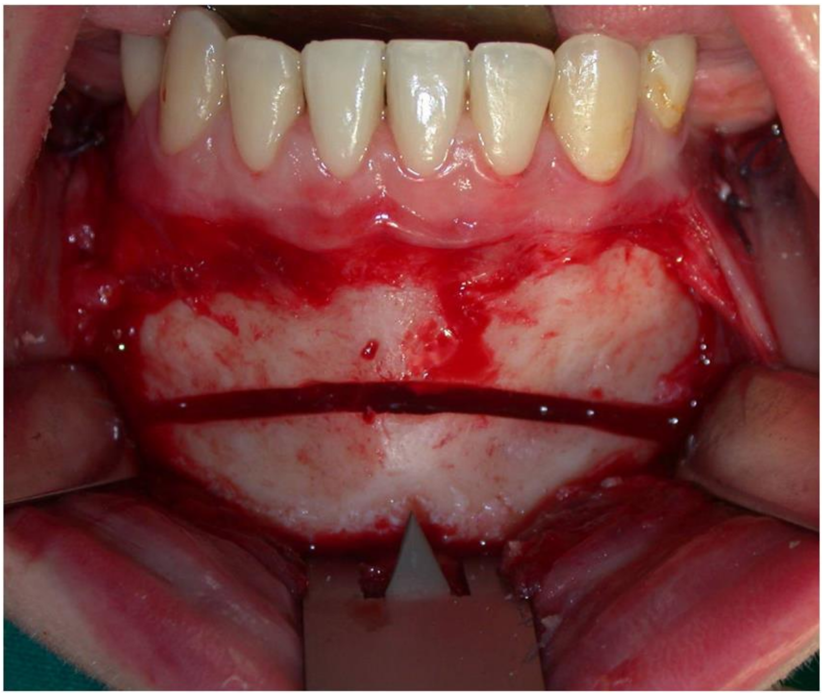



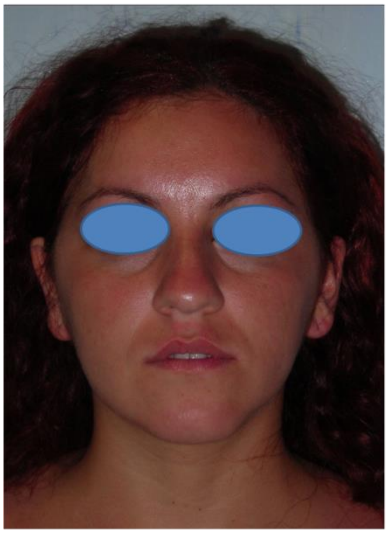


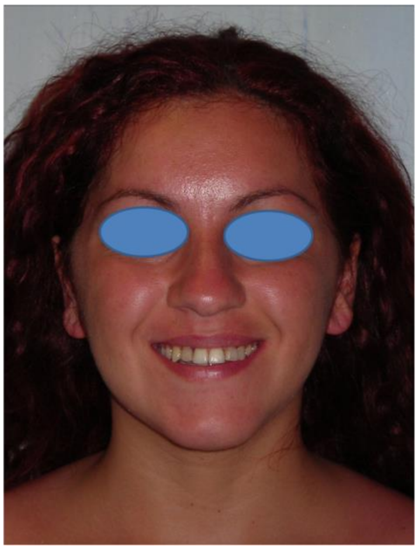


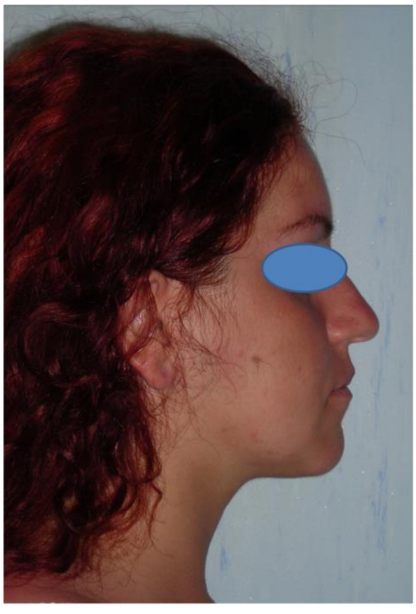












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Legend

Fig.1 Chin surgery performed by piezosurgery technique

Fig.2 Preoperative and postoperative view

Fig.3 pre operative and postoperative X ray.

Fig.4 Genioplasty performed by means of reciprocating saw.

Fig.5 Bone fixation by titanium osteosynthesis.

Fig.6 Preoperative and postoperative xray

Fig.7 Incidence of MN impairment among control and test group

Fig.8 Pain rates as measured at different timepoints. A statistically significant between-groups difference (PIEZO vs CTR) was found at all timepoints (24 hrs $p=0.001$, 48 hrs $p<0.001$, 72 hrs $p=0.006$, 7 days $p<0.001$, 14 days $p<0.001$, 21 days $p<0.001$, 28 days $p=0.041$).