Piezotome Genioplasty Reduces Postsurgical Morbidity and Enhances Patient Satisfaction: A Randomized Clinical Trial

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Purpose: Recent clinical studies have shown piezotomes might establish the new "state of the art" for osteotomies in maxillofacial surgery. The author hypothesized genioplasty surgery with piezotomes might decrease postsurgical morbidity and increase overall patient satisfaction compared with genioplasty with traditional instruments.

Materials and Methods: The author implemented a randomized clinical trial. The sample was composed of patients undergoing reductive genioplasty. The predictor variable was genioplasty performed with traditional instruments and a traditional sliding genioplasty protocol (control group) or ultrasonic surgical devices (Piezotome II and Piezotome SOLO M+) with a piezotome-adapted 3-dimensional curved osteotomy surgical protocol (test group). The primary outcome variable was overall long-term patient satisfaction determined by the Genioplasty Outcome Evaluation. Other study variables were postsurgical morbidity assessed by the Universal Pain Assessment Scale, analgesic intake, neurosensory 2-point discrimination test of the lip and chin, and surgery duration. Descriptive and bivariate statistics were computed by SPSS 22.0 and the *P* value was set at .05.

Results: The sample was composed of 48 patients undergoing reductive genioplasty with a piezotome (10 men and 13 women; age, 24 to 56 yr) or traditional sliding genioplasty (11 men and 14 women; age, 26 to 54 yr). No statistically relevant difference was found for surgery duration between the test and control groups. There was a statistically significant association between decreased postsurgical morbidity ($P < .05$) and higher overall long-term patient satisfaction with genioplasty outcome ($P < .05$) when piezotomes were used for performing the genioplasty.

Conclusion: The results of this study suggest the use of piezotomes and piezotome-adapted surgical protocols is advantageous in genioplasty surgery compared with traditional surgical instruments and traditional surgical protocols.

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Piezoelectric devices for cutting bone provide superior features compared with classic rotary or slow oscillating devices: a more precise micrometric cut without bone loss, considerably lower likelihood of accidently injuring critical soft tissue formations such as nerves, faster bone healing, and less

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postsurgical morbidity.[1] This suggests the use of piezotomes could establish a new "state of the art" of cutting bone in oral and maxillofacial surgery.[2]

Nevertheless, piezotomes are mostly used to replace traditional rotary or slow oscillating instruments to decrease postsurgical morbidity without adaptation of the surgical protocols,[3-5] although this new class of instruments would allow even more refined surgical procedures, provided their full potential is used to perform curved cuts and micrometric sculpting of bone.[6]

Considering the ever-growing demand[7] for corrections of objective and nonobjective "body dysmorphic disorders"[8,9] and possible dissatisfaction with the results of surgical corrections of cosmetic shortcomings,[10] especially in the face, more individualized surgical protocols must be implemented to meet patients' expectations. This has the same importance in genioplasty procedures as in rhinoplasty surgery, because piezotomes were introduced for genioplasty surgery more recently[3] but were investigated only for postsurgical morbidity. However, there no clinical studies on genioplasty investigating long-term outcome patient satisfaction as for piezotome rhinoplasties.[6]

The purpose and specific aims of this study were to investigate differences in postsurgical morbidity and long-term patient satisfaction when reductive genioplasty was performed with traditional instruments and traditional sliding genioplasty protocols compared with piezotome devices with a piezotome-specific surgical protocol. The author hypothesized that ultrasonic surgical tools might enhance results for postsurgical morbidity as established for other craniomaxillofacial surgical procedures[1,11] and overall long-term subjective patient satisfaction.

Materials and Methods

To address the research purpose, the author designed and implemented a randomized clinical trial from January 2011 through March 2016 with a study population composed of all patients presenting for evaluation and management of cosmetic reductive genioplasty at the Specialty Ambulance of Cosmetic and Reconstructive Surgery and Center for Facial Aesthetics Vienna (Vienna, Austria).

To be included in the study sample, patients had to request cosmetic reduction of a vertically or horizontally prominent chin. Patients were excluded as study subjects if *1)* general medical conditions precluded the possibility of surgery, *2)* a skeletal Class III malocclusion was not dentally compensated naturally or by prior orthodontic treatment with correction of an inverted dental overbite in the front, *3)* a maxillary hypoplasia was associated with functional impairment of nose breathing or mastication or dysfunction of the temporomandibular joint, *4)* an indication for orthognathic surgery was given,[12] and *5)* the angle of the A point, nasion, and B point did not exceed −3° on the mandatory cephalogram obtained for diagnostic utility and a base for possible surgical planning.

STUDY VARIABLES

After approval of the study by the hospital's institutional review board and the patient's signature on the informed consent agreement according to the guidelines of the Declaration of Helsinki, all included patients had to complete the German translation of the Genioplasty Outcome Evaluation (GOE) questionnaire, which was derived from the Rhinoplasty Outcome Evaluation[13] and adapted to genioplasty procedures, to define a baseline value for analysis of patient satisfaction.

The GOE provides 6 questions to be answered by the patient before surgery and during the follow-up period:

Question 1: Do you like how your chin looks? (0, absolutely not; 1, a little; 2, more or less; 3, very much; 4, absolutely yes)
Question 2: Is your masticatory function satisfactory? (0, absolutely not; 1, a little; 2, more or less; 3, very much; 4, absolutely yes)
Question 3: Do you believe your friends and people who are dear to you like your chin? (0, absolutely not; 1, a little; 2, more or less; 3, very much; 4, absolutely yes)
Question 4: Do you think the current appearance of your chin hampers your social or professional activities? (0, always; 1, frequently; 2, sometimes; 3, rarely; 4, never)
Question 5: Do you think your chin looks as good as it could be? (0, absolutely not; 1, a little; 2, more or less; 3, very much; 4, absolutely yes)
Question 6: Would you undergo surgery to change the appearance of your chin or to improve a possible functional impairment? (0, certainly yes; 1, very likely yes; 2, possibly yes; 3, probably no; 4, certainly no)

PREDICTOR VARIABLES

All included patients were randomly assigned to the test or control group and underwent reductive genioplasty by the traditional sliding genioplasty protocol with a rotary with or without oscillating instruments (control group) or piezotomes (test group) under general anesthesia under sterile conditions.

Osteotomies in the control group were performed with oscillating or reciprocating saws from Stryker