

Republic of Iraq  
Ministry of Higher Education  
& Scientific Research  
University of Baghdad  
College of Dentistry



# **Lateral Ridge Splitting (Expansion) with Immediate Placement of Endosseous Dental Implant Using Piezoelectric Device**

**(Clinical Study)**

A thesis submitted to the council of the College of Dentistry at the University of Baghdad, in partial fulfillment of requirements for the Degree of Master of Science in Oral and Maxillofacial Surgery

Submitted by

**Firas A. Jamil**

B.D.S.

Supervised by

**Assist. Prof. Dr. Sahar Shakir Al-Adili**

B.D.S., M.Sc.

Oral and Maxillofacial Surgery

2016 A.D.

1437 A.H.

## *Abstract*

**Background:** The patterns of ridge resorption after long standing period following teeth extraction are commonly severe and progressive leading to various extents of bony defects especially in the horizontal direction ending with a narrow alveolus. Consequently, the placement of endosseous dental implants will be limited in such areas as there is a great loss of bone width. Ridge augmentation by grafting procedures can considerably increase the treatment time, patient morbidity and cost in addition to the high possibility of graft failure. Alternatively, many different techniques have been introduced for correction of the deficient ridge width through ridge splitting and expansion. However, conventional procedures are usually associated with many limitations and complications. This necessitates the use of new techniques in order to overcome these problems and to facilitate the surgical procedure. Among these procedures, the piezosurgical ridge splitting technique has been developed.

**Aims:** To evaluate the effectiveness of the piezoelectric ridge splitting technique using single stage procedure and to assess the complications and survival rate of inserted implants during a period of 16 weeks (nearly 4 months) after surgery in a challenge to minimize the duration of treatment.

**Materials and methods:** Over a period of 1 year from November 2014 to November 2015, 25 patients aged in range between 18-60 years with insufficient ridge width (less than 4 mm) underwent ridge split procedure with immediate insertion of dental implants using piezosurgical technique. Preoperative panoramic view was obtained for general overview concerning assessment of vertical bony height, anatomical landmarks and pathologies. Preoperative clinical assessment of the ridge width was performed using sharp beaks osteometer. The surgical complications were observed and recorded. The measurements of bone gain were achieved by the direct caliper method during surgery using blunt beaks osteometer.

Implants stability was measured at the time of surgery using Osstell implant stability quotient (ISQ) device. At the 8<sup>th</sup> week after surgery, the patients were followed-up for any sign or symptom of clinical complications. The final follow-up was at the end of the 16<sup>th</sup> week postoperatively where all the implants were uncovered and evaluated regarding clinical, radiographic and resonance frequency analysis outcomes.

**Results:** Among the 25 patients, 2 patients experienced a fracture of buccal bony plate during surgery resulting in their exclusion from the whole study. The remaining 23 patients (5 males and 18 females) were successfully treated by ridge splitting procedure either alone or in combination with guided bone regeneration technique. Twenty patients underwent single operation and 3 patients had a bilateral surgery yielding 26 cases of ridge split procedures with a total of 57 implants inserted immediately at the time of surgery. The initial ridge width varied between 1 and 3.5 mm while the final width ranged from 5.5 to 8 mm. The minimum bone gain in the alveolar ridge width was 2.5 mm and the maximum value reached up to 7 mm. The mean ISQ values showed a high significant difference between implants primary and secondary stability which improved over all the jaw regions. Few and insignificant clinical complications were recorded during the whole study. After a healing period of 16 weeks, all the implants were stable and successfully osseointegrated resulting in a 100% survival rate.

**Conclusions:** The results of this clinical study indicated that the piezoelectric ridge splitting technique is an effective and minimally invasive procedure for ridge expansion even in cases with severe resorption. With the aid of precise osteotomy and efficient cooling system, high rates of successful treatment are predictable. In addition, this technique effectively reduced the overall treatment time.