Evaluation of Therapeutic Effects of MLS® on the Outcomes of Flapless Dental Implant Surgery in Posterior Maxilla of Post Menopause Women.

N. Doan¹, Q.T. Duong²
¹ The University of Queensland, Brisbane, Queensland, Australia
² Queensland University of Technology, Brisbane, Queensland, Australia

ABSTRACT
The purpose of this study is to evaluate the therapeutic effects of MLS® on clinical outcomes of flapless dental implants using split mouth study in post menopause women age 50 years or over. This is a retrospective split mouth study involving the analysis of dental records of post-menopause patients undergoing bilateral implant surgery in the posterior maxilla. Sixty-five implants with no augmentative procedures were selected from 26 patients. Flapless implant technique was used for both sides of the jaw. The patients were divided into two groups: 32 implants in the sham group and, 33 implants in the MLS® group . Treatments were performed at day one, day 7 and day 28. Results were analyzed by: Satisfaction, Implant Survival, Visual Analogue Scale (VAS), Periotest, X-ray assessment. MLS® treatment had slightly better outcomes respect to the control side (survival rate: 100.0% and 96.9%), No statistical dissimilarity in Periotest Value (PTV). In flapless implant surgery, MLS® treatment is an adjunctive minimally invasive, and innovative method that can deliver a significantly superior early phase satisfaction, minimal bone loss, less pain, less complications, and similar PTV respect to the control side.

INTRODUCTION
Dental implants have become a household name in dentistry in the last twenty years [1]. Mentioning of dental implants one cannot ignore the term osseo-integration. Osseo-integration implies a series of events that happens directly after insertion of a dental implant into the jaw bone, comprises several steps that can be influenced by multiple elements such as patients’ health status, implant sites, surgical techniques, systemic and local conditions, and remedy employed [3, 4, 5]. There are many propositions that survival rates of implant practices significantly reduced with age and certain health conditions, for instance post menopause osteoporosis [6,7]. Poor bone quality and quantity, for example those found in post menopause females, may have a negative result on osseointegration [5,7]. Normally, in initial phase of osseointegration, radiographical imaging can detect a minute quantity of peripheral bone loss adjoining dental implants, and this is accepted as a norm [8].

Literature review of dental implants use in the posterior maxilla region illustrates that flapless surgery could be a practical and foreseeable therapy for dental implant insertion, showing both efficacy and clinical effectiveness with certain reserve [3,4]. Currently a novel technique is emerging for the management of post-operative complications in post-surgical dental implant placement, involving the use of Multwave-Locked System (MLS®) laser devices. The distinctive attribute of MLS® Laser Therapy is a patented technology based on two synchronized wavelengths, one emitted from continuous source (808 nm) and the other pulsed (905 nm), which produces an efficient laser for handling pain and inflammation, particularly, in post-operative dental implant placement pain [2]. MLS® laser has several therapeutic applications including sprains, muscle tears, tendinitis, brachial neuralgia, craniofacial pain, bursitis, lumbago, arthritis, articular pain, edema, and hematoma [11-17]. MLS® Laser Therapy exerts its effect via anti-inflammatory and analgesic action [2]. These biological effects are exceptionally valuable in managing of complications such as pain in post dental implant surgery. Implants survival is an essential parameter of evaluation and it was recorded as the existence of the implants at the end of the study [4]. To quantify patient satisfaction, the study used McGill questionnaire on a visual analogue scale (VAS) [9].

The Periotest machine was used to establish the firmness of implants (Periotest Values or PTV) at implant laying stage [8]. Digital
x-ray evaluation is the most frequent method for bone quantity or marginal bone height appraisal [4,10]. The purpose of this study was to evaluate the therapeutic effects of MLS® treatment on clinical outcomes of flapless dental implants placed using split mouth study and to measure patients’ satisfaction using visual analogue scale and implant survival status in post menopause women age 50 years or over.

MATERIALS AND METHODS
This study is a retrospective split mouth study on the therapeutic effects of MLS® laser on the outcomes of flapless dental implant involving the study of dental records of 26 post-menopause patients undergoing bilateral implant surgery in the posterior maxilla. A total of 65 implants with no augmentative procedures were selected from 26 patients for the study. Flapless implant technique was used for both sides of the jaw. The patients were divided into two groups: the control group had 32 implants and had sham MLS® laser treatment, and the test group consisted of 33 implants treated with MLS® laser at day one, day 7 and day 28. Only those patients with complete dental record were involved in this study. The treatment results were assessed as follows: Satisfaction, Implant Survival, Visual Analogue Scale (VAS), Periotest, X-ray assessment.

MLS® laser therapy was applied with a Mphi D device (ASA S.r.l., Arcugnano (VI) Italy) and using the following protocols: upper posterior teeth region- 24 seconds for each implant site at an intensity of 50% and frequency of 1500 Hz, time used for each application is 6 seconds, and dosage of 3.25 J/cm² at 4 locations (buccal, lingual, distal and occlusal aspect of the implant sites). Total energy applied was 6.5 J (Fig. 1). The control group had sham laser treatment and standard management. The degree of postoperative pain and swelling, was recorded for both groups at day one, day 7 (one week) and day 28 (4 weeks).

A. Implant survival
Implants survival was registered as the existence of the implants at the conclusion of the studied interval (28 days).

B. Visual Analogue Scale (VAS) assessment
To determine patient satisfaction, the study used McGill questionnaire on a visual analogue scale (VAS) spans from 1 to 10 of which 1 as having no pain and 10 is the worst pain (Fig. 2). The patients were questioned to register their total satisfaction on sensation of discomfort on a visual-analogue-scale with 0% being totally unsatisfied and 100% being completely satisfied (Fig.3). The total satisfaction VAS scores were recorded for both sides at one day, one week, one month and three months follow up. The VAS scores obtained were analyzed for statistical significance.

C. Periotest values (PTV)
The Periotest device was employed to determine the stability of implants at implant placement stage as well as at subsequent recall appointments at one month and three months. The Periotest’s scale varies from -8 to +50. The lesser the Periotest value, the greater is the stability / hampering effect of the test object (tooth or implant). At these assessing visits, healing abutments were connected to those implants which had no
healing posts, and the patient was placed so that the maxilla is in a horizontal position. The Periotest tip was pressed flat right angle to the implant post, and it was positioned as near to the alveolar crest as possible. The implants included in the study were appraised in lateral directions. Acceptable readings were attained only when the device recorded comparable results in three successive readings.

D. X-ray assessment for bone level
A digital periapical X-ray was performed for each implant by means of same holders to measure marginal bone height at the time of surgery, at one month, three months, and six months. The digital X-rays were calibrated to compute the changes in bone height and bone loss. The pertinent implant features such as: site, sizes, design, and other relevant characteristics were recorded. The X-rays were appraised by two experienced and unbiased assessors by means of a grid to determine the dimension of the implant and the proportion of bone loss in millimeters.

E. Statistical analysis
One-way analysis of variance was performed for statistical significance.

RESULTS
The results of this study are found in Table 1. The findings illustrated that MLS® treatment had a slightly better outcome in terms of survival rate (100.0% and 96.9%), respect to the control MLS® treated group reported less pain and swelling [*P<0.05] but no difference in bleeding and speech impairment [P>0.05]. Additionally, MLS® treated group had better overall satisfaction at one day and one week than the control side [*P<0.05]. No significant difference in bone resorption was observed at 3 months [P>0.05]. While, after 6 months, bone change in the control group vs the test group was statistically significant [0.56 (±0.05) vs +0.12 (±0.02), **P<0.05]. No statistical dissimilarity in Periotest Value (PTV) [P>0.05] was observed.

<table>
<thead>
<tr>
<th>Table I - Overall results</th>
<th>Control group</th>
<th>Test group</th>
<th>Overall results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of implants placed</td>
<td>32</td>
<td>33</td>
<td>65</td>
</tr>
<tr>
<td>Number of implants failed</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Survival rate (6 months)</td>
<td>96.9%</td>
<td>100.0%</td>
<td>98.5%</td>
</tr>
<tr>
<td>Pain</td>
<td>3.5 (±1.85)*</td>
<td>1.6 (±1.75)*</td>
<td>2.6 (±1.80)</td>
</tr>
<tr>
<td>Swelling</td>
<td>4.8 (±1.86)*</td>
<td>1.6 (±1.48)*</td>
<td>3.2 (±1.88)</td>
</tr>
<tr>
<td>Bleeding</td>
<td>1.8 (±1.80)</td>
<td>1.4 (±1.74)</td>
<td>1.6 (±1.77)</td>
</tr>
<tr>
<td>Speech impairment</td>
<td>2.7 (±1.30)</td>
<td>2.1 (±1.24)</td>
<td>2.4 (±1.27)</td>
</tr>
<tr>
<td>Day 1</td>
<td>71.6 (±7.53)*</td>
<td>95.0 (±8.68)*</td>
<td>83.3 (±8.1)</td>
</tr>
<tr>
<td>Day 7</td>
<td>76.6 (±8.6)*</td>
<td>96.8 (±9.18)*</td>
<td>86.7 (±8.9)</td>
</tr>
<tr>
<td>Day 28</td>
<td>82.2 (±7.4)</td>
<td>97.4 (±8.28)</td>
<td>89.8 (±7.84)</td>
</tr>
<tr>
<td>Day 54 (3 months)</td>
<td>93.6 (±16.4)</td>
<td>98.8 (±17.8)</td>
<td>96.2 (±17.1)</td>
</tr>
<tr>
<td>Bone resorption at 3 months in mm (+ = gain and - = loss)</td>
<td>-0.69 (±0.10)</td>
<td>-0.56 (±0.08)</td>
<td>-0.63mm (±0.08)</td>
</tr>
<tr>
<td>Bone changes (6 months in mm (+ = gain and - = loss)</td>
<td>-0.56 (±0.05)**</td>
<td>+0.12 (±0.02)**</td>
<td>-0.22mm (±0.04)</td>
</tr>
<tr>
<td>Periotest value [8 (least mobile) to +20 (most mobile)]</td>
<td>Day 1</td>
<td>-3.40 (±0.84)</td>
<td>-3.68 (± 0.89)</td>
</tr>
<tr>
<td></td>
<td>Day 28</td>
<td>-3.40 (±1.18)</td>
<td>-3.62 (±1.54)</td>
</tr>
<tr>
<td></td>
<td>Day 54 (3 months)</td>
<td>-5.18 (±1.46)</td>
<td>-5.48 (±1.56)</td>
</tr>
</tbody>
</table>

Statistical significance: *P<0.05 and **P<0.005
DISCUSSION
This study showed that the application of MLS® treatment after flapless dental implant surgery is a minimal invasive novel technique that can help to reduce pain and swelling after flapless implant placement. This is in line with MLS® laser anti-inflammatory, anti-edema and analgesic effects. Though implant survival rate was better in the laser group as compared to the control counterpart the sample size should be bigger to achieve better power of the study. The outcome of the study also confirmed that MLS® laser can offer an anticipated outcome with greater efficiency and efficacy even in poor quality bone, such as that found in post menopause women. Visual analogue scale (VAS) is employed extensively for pain measurement, though it is subjective, but continue to be a valuable means for quantifying subjective data, if it is utilized correctly. In this study, it illustrated the greater satisfaction of study group as compared to the control group.

Periotest is useful in calculating the rigidity level of an implant. Though Periotest can identify terminal or unsuccessful implants, it has fundamental disadvantage in recognizing bone quantity in typical osseointegration. Thus, digital imaging seems to be a more reliable method of substantiating periapical radiographs along with Periotest. An innovative method that can deliver safety and clinical efficacy in joint disease, preliminarily data. Energy For Health, 2012;14 (6):537-44

CONCLUSION
The application of therapeutic MLS® Laser in dental implant flapless surgery in posterior maxilla of post menopause women, is an adjunctive minimal invasive, efficacious, and innovative method that can deliver a significantly superior early phase satisfaction, minimal bone loss, less pain, less complications, and similar PTV respect to the control.

REFERENCES