Original Article

Quality of life in patients prescribed vitamin B1-6-12 for treatment of sensory impairment related-mandibular orthognathic surgery

Kamolratanakul Paksinee DDS., Ph.D[1]
Ruxwongkana Taya DDS.
Kraisittisirikul Gun DDS.
Trising Worawee DDS.
Subbalekha Keskanya DDS., Ph.D[1]

[1]Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand

Abstract

Background/objective: One of the most common complication in orthognathic surgery is inferior alveolar nerve injury, resulting in sensory impairment that affects patient's daily life. Many studies reported the potential of vitamin B on nerve regeneration. No clinical study showed the effect of vitamin B1-6-12 on the quality of life. Therefore, we aim to evaluate the effect of vitamin B on oral health related quality of life in post-orthognathic surgical nerve injury.

Materials and methods: A prospective, randomized, double blinded trial study were performed in thirty two patients who had undergone mandibular orthognathic surgery with Bilateral Sagittal Split Osteotomy procedure were enrolled in this study. Patients who developed inferior alveolar nerve dysfunction after surgery (Global sensitivity score less than 12) were randomly divided into 2 groups; eighteen patients took vitamin B1 300 mg, vitamin B6 15 mg and vitamin B12 165 μg per day as prescribed after surgery and the others (fourteen patients) were controlled group without vitamin B prescription). The quality of life were evaluated using condition specific OIDP or CS-OIDP with neurosensory disturbance as specific problem.

Results: OIDP scores were calculated into percentage of improvement using score at 1 week as baseline. At 3 and 6 months after surgery, the percentage of improvement of CS-OIDP score related to sensory impairment was significantly higher in vitamin B1-6-12 group (82.38% and 86.5% respectively) compared to control group (35.33% and 3.45% respectively).

Conclusion: Vitamin B1-6-12 improved quality of life in patients with sensory impairment of inferior alveolar nerve after mandibular orthognathic surgery.

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Keywords: inferior alveolar nerve injury, orthognathic surgery, quality of life, sensory impairment

Correspondence: Kamolratanakul Paksinee, Orepaksinee@yahoo.com

Introduction

One of themost common complication in postoperative in orthognathic surgery, especially Bilateral Sagittal Split Osteotomy (BSSO) in mandible is sensory impairment due to inferior alveolar nerve injury (D'Agostino et al., 2010; Essick et al., 2007; Geha et al., 2006) resulting in impact of daily lives (Azizzadeh and Mashkevich, 2009; Emadian Razvadi et al., 2017; Rustemeyer and Gregersen, 2012; Silva et al., 2016; Suksang S., 2016). Nerve injury usually affects patients' quality of life base on physical mental and social dimension such as biting, chewing, swallowing, speaking, sleeping, of pain or discomfort, concerning the person's appearance and smiling.

According to World Health Organization (WHO) reported in 1980, Oral impact daily performance index (OIDP) is a tool that uses to evaluate the ultimate impacts including the physical, psychological and social aspects and shows how oral health affects daily quality of life (Gherunpong et al., 2004; Sischo and Broder, 2011). OIDP was published by Adulyanon and Sheilham and further developed into Thai version which is widely used to examine quality of life in patients who underwent oral and maxillofacial surgery (Gherunpong et al., 2004; Krisdapong et al., 2012; Suksang S., 2016). The ultimate impact (Krisdapong et al., 2012) performs eight performance indexes referring to the ability to carry out eight daily life activities; 3 physical activities (eating, speaking, cleaning teeth), 3 psychological activities (relaxing, smiling, emotion) and 2 social activities (studying or working and social contact). In each performance indexes, perceived causes (which patients complained as their problems) are indicated. The specific cause that impacts patient's quality of life can be analyzed by selection of the perceived that related to specific condition (condition-specific Oral Impact on Daily Performance; CS-OIDP).

To restore the sensation of inferior alveolar nerve, the treatment modalities can be performed using surgical and nonsurgical management as criteria indicated. According to the nonsurgical modalities, various medications are recommended such as analgesics, antidepressant, antiepileptic, low-level laser and steroid (Azizzadeh and Mashkevich, 2009; Coulthard et al., 2014; Fuhrer-Valdivia et al., 2014; Leung et al., 2012; Miloro and Repasky, 2000; Misch and Resnik, 2010; Ozen et al., 2006; Seo et al., 2004). In addition, vitamin B is widely used as nutritional supplement and known as a choice for neuropathy management (Ang et al., 2008). which is somehow being prescribed clinically to restore sensation of inferior alveolar nerve damage owing to the less side effect and lower expense. Recently, there is no clinical study report a serious toxic or severe adverse effects of vitamin B when used as a supplement in therapeutic dose. Vitamin B complex including vitamin B_1 (Thiamine), vitamin B_6 (pyridoxine) and vitamin B_{12} (cyanocobalamin) play an important role in treatment of peripheral neuropathy. Vitamin B_1 plays a role in the transmission of nerve impulses. Vitamin B_6 is essential for myelin formation. Whereas vitamin B_{12} is involved in nerve cell growth and replication (Ang et al., 2008). Thus, vitamin B complex is a potential alternative treatment for sensory disturbance in oral and maxillofacial field. However, no study reports whether vitamin B rescues sensory impairment after orthognathic surgery or improves the quality of life in patients who are suffering from abnormal sensation. Therefore, we aim to evaluate the effect of vitamin B on oral health related quality of life (OHRQoL) related to sensory impairment as CS-OIDP in post-orthognathic surgical nerve injury.

Materials and methods

Study design

A prospective, randomized, double blinded trial studywas performed in thirty two patients who were subjected to mandibular orthognathic surgery with Bilateral Sagittal Split Osteotomy procedure. Operators and examiner were blinded to the prescription of vitamin B 1-6-12. Randomization was performed using simple random sampling technique. An Inclusion criteria for this study was a healthy patient between 18-40 years old who developed sensory impairment after orthognathic surgery with Global sensitivity score less than 12. Exclusion criteria were patients who had surgical complication including unfavorable fracture, excessive bleeding, infection, nerve disruption, internal device failure, temporomandibular joint complication or taking other medication. Patients with sensory impairment were randomly divided into two groups. In the first group, eighteen patients were prescribed vitamin B1-6-12 containing vitamin B1 300mg, vitamin B6 15mg and vitamin B12 165 mcg three time a day until the sensation returned to normal or up to 6 months after surgery. The second group was the control group (fourteen patients) without vitamin B prescription. The studywas approved based on ethical considerations by the Ethics Committee of the Faculty of Dentistry, Chulalongkorn University.

Global sensitivity score

All patients were subjected to neurosensory test using to global sensitivity score. Briefly, the global sensitivity score is the summary score assigned for static-2 point discrimination, moving-2 point discrimination, light touch sensation, pinprick sensation (D'Agostino et al., 2010; Geha et al., 2006). Patients who had global sensitivity score less than 12 were defined as sensory impairment and were enrolled to the study.

Oral Impact on Daily Performance (OIDP)

The OIDP index was performed as previously described elsewhere (Suksang S., 2016). Briefly, the data of eight daily performance indexes (including eating, speaking, cleaning teeth, relaxing, smiling, emotion, studying or working and social contact) were scored according to the frequency (scale from 0 to 5) and severity (scale from 0 to 5) of each index. If no impact was indicated, then zero score was assigned. Total score was calculated by multiplying the corresponding frequency and severity scores in each index and summarized the score of eight performance indexes (ranging from 0 to 200). Then, the total scores were multiplied by 100 and divided by 200 in order to make a total score as 100. The OIPD interview was performed at 1 week, 1 month, 3 months and 6 months after surgery. The percentage of improvement was calculated using the score at 1 week as baseline compared to the score at 1, 3 and 6 months after surgery in each patient. The problems that affected each performance indexes were recorded as perceived causes.

Condition specific OIDP or CS-OIDP in this study was focused on neurosensory disturbance. Perceived causes that related to sensory impairment were recorded as specific problem and reported separately as CS-OIDP.

Statistic analysis

The percentage of improvement of OIPD was analyzed using Wilcoxon signed rank test due to the distribution of the data. The p-value less than 0.05, based on 95% confidence intervals, was considered statistically significant.

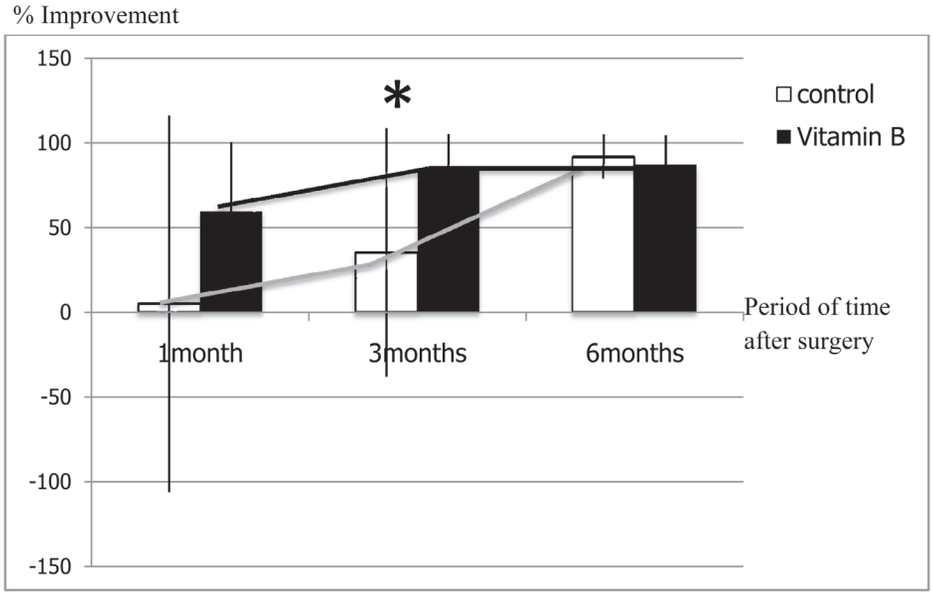

Figure 1: Percentage of the improvement in overall OIDP score compared to 1 week as baseline

No significant difference of percentage improvement between control and vitamin B group in 1 month and 6 months after surgery. In 3 months after surgery, vitamin B showed better improvement of overall OIDP score compared to control with *p=0.04.*

Grey line shows trend of improvement of quality of life in control group and black line shows trend of improvement of quality of life in vitamin B group.

Results

In thirty two patients, the improvement of overall OIDP in vitamin B1-6-12 group (83.94%±21.39) was higher significantly only in 3 months after surgery compared to control group (35.33%±73.33) with *p=0.04.* No significant difference of percentage improvement between control and vitamin B group in 1 month (5.06 ±111.26 in control group and 59.88±40.6 in vitamin B group) and 6 months after surgery (92.05±13.06 in control group and 87.2±17.4 in vitamin B group) with *p=0.31* and *p=0.7* respectively (Figure 1).

The improvement of CS-OIDP score was evaluated in the time series at 1, 3 and 6 months after surgery compared to the score at 1 week after surgery as baseline for each patient. From thirty-two patients, nineteen patients who mainly suffered from sensory impairment due to inferior alveolar nerve injury were included to CS-OIDP evaluation. No significant difference was found in the percentage of improvement of CS-OIDP in control (-162.62% ± 111.29) compared to vitamin B1-6-12 group (57.35%±43.07) at 1 month after surgery (Figure 2). However, the percentage of improvement was higher in vitamin B 1-6-12 group compared to control group at 3 months (82.38%±21.92 improvement in vitamin B1-6-12 group and 35.33% ± 77.3 in control group with *p=0.03*) (figure 2). Moreover, vitamin B1-6-12 group showed better improvement in CS-OIDP score (86.5%±18.7) in 6 months after surgery compared to control group (3.45%±4.38) with *p=0.003* (Figure 2).

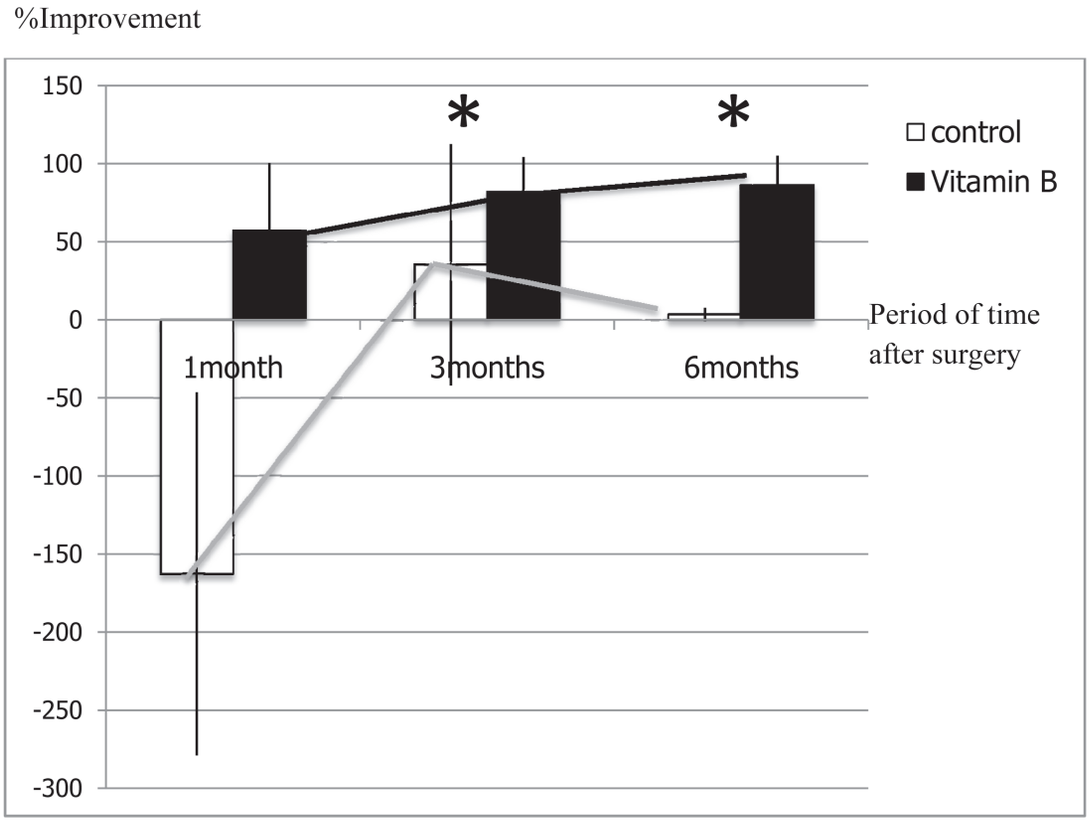

Figure 2: Percentage of the improvement in CS-OIDP score compared to 1 week as baseline

No significant difference of percentage improvement between control and vitamin B group in 1 month. In 3 months after surgery, vitamin B showed better improvement of CS-OIDP score compared to control with $p=0.03$. Consistently, vitamin B showed better improvement of CS-OIDP score compared to control with $p=0.003$.

Grey line shows trend of improvement of quality of life in control group and black line shows trend of improvement of quality of life in vitamin B group.

Both overall OIDP and CS-OIDP score was decreased during the passing of time. This data indicated that the quality of life was improved in both control and vitamin B group. Vitamin B administration improved a higher score of overall OIDP and especially higher CS-OIDP score in the late period after surgery (at 3,6 months after surgery). However, we found the increment of OIDP score in the first month after surgery compared to OIDP score at first week after surgery especially CS-OIDP score in control group, resulting in negative in percentage of improvement (Figure 2). This data indicated worse quality of life in some patients in control group.

Discussion

Recently, the study reported that 24 cases from total 38 patients showed sensory impairment-related quality of life (63.15%) (Suksang S., 2016). Consistently, almost two-third of our cases (59.37% or 19 cases out of 32 cases) showed that sensory impairment affected quality of life (CS-OIDP score).

In this study, we compared CS-OIDP score and calculated the improvement in each patient. We paired the data in 1 week and calculated the improvement using OIDP score at 1 week compared to each data of 1, 3 and 6 months after surgery. CS-OIDP score was compared the improvement in each patient in order to eliminate the variation among patients. Interestingly, the increment of CS-OIDP score in the first month after surgery compared to CS-OIDP score at first week after surgery was observed especially in control group. Hence, the negative percentage of the improvement showed worse in quality of life in the first month in control group (figure 2). High standard variation in each group was also noted especially in control group due to worse CS-OIDP score. Previous study also showed a high standard variation with abnormal distribution of CS-OIDP score in orthognathic patient. In addition, CS-OIDP score was not improved during the passing time of 3months compared to 6 months postoperatively in patients who did not take vitamin B supplement (Suksang S., 2016). Our study showed the improvement of CS-OIDP score after vitamin B1-6 12 supplement at 3 months and 6 months when compared to control group.

Both overall OIDP and CS-OIDP score was decreased during the passing of time. Vitamin B improved higher range of score compared to control group. In addition, percentage of improvement increased dramatically in 3 and 6 months after surgery (over than 80%). This data indicated that vitamin B improved quality of life through the passing of time and vitamin B may be prescribed over 3 to 6 months after surgery to improve quality of life over than 80%.

Vitamin B 1-6-12 is widely used as nutrition supplementary without serious side effect. Daily dosage required for thiamine (B1) is 1-1.5 mg, dosage for pyridoxine (B6) is 1.4-2 mg and dosage for cobalamin (B12) is 1.8-2.4 mcg (Ang et al., 2008). Normally, vitamin B is in daily dietary. However, we added more vitamin B to achieve the therapeutic dose and we succeeded to improve quality of life in patients who suffered from sensory impairment.

Due to the limitation of sample size, further study is suggested. Another limitation was the fact that placebo was notused in this study which may affect the data analysis. Recently, no study confirms whether vitamin B improves inferior alveolar nerve sensation after orthognathic surgery. Clinical study that shows how vitamin B affects sensory recovery is also suggested in further study.

Conclusion

Sensory impairment due to postoperative orthognathic surgery affected quality of life. Vitamin B1-6-12 medication improved quality of life in patients with sensory impairment of inferior alveolar nerve after mandibular orthognathic surgery. Vitamin B prescription is economized and noninvasive treatment which can be usedin patients with sensory impairment of inferior alveolar nerve after mandibular orthognathic surgery.

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