

# Clinical Use of a New Polymer in Complete Dentures Fabrication I

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*Because cyanocobalamin deficiency is commonly treated with parenteral administration, the present study aims to make a comparison between the effectiveness of parenteral vitamin B12 treatment and the effectiveness of local treatment achieved by complete dentures improved by crosslinked polymerization using as template vitamin B12 (cyanocobalamin).*

*Keywords: vitamin B12, crosslinked polymerization, complete dentures, elderly, acrylic polymer*

Acrylic polymers were introduced in dentistry since 1937 and yet acrylic resins in dentistry are still important, and they continued to be used in realizing denture bases, artificial teeth, orthodontic appliances, etc. [1-7]. In the treatment of the complete edentation, there are a variety of prosthetic means capable of artificially reconstituting the disappeared teeth, in a more individualized manner, depending on the clinical situation, the objectives and the treatment criteria [8-13]. Because cyanocobalamin deficiency is commonly treated by parenteral administration, the present study aims to compare the effectiveness of systemic treatment with vitamin B12 and the effectiveness of local treatment by complete dentures [14-20].

## Experimental part

### Materials and methods

The study was conducted on 252 patients whom were submitted to prosthetic treatment. The group of patients was aged 55-85 years, of whom 128 were men and 124 women. Selected patients had complete edentulous arches and all patients were informed and agreed on the study. From the initial group of 252 patients, patients with psychiatric disorders with repercussions on the degree of collaboration and understanding of both prosthetic and parenteral treatment were excluded.

Each patient was given a complete observation sheet, during the clinical examination, by a thorough examination of the prosthetic field, both the maxillary and the mandibular, in order to determine the clinical and biological indicators of bone and mucosa, both positive and negative, and then the classification of prosthetic fields of the study group according to the Sangiuolo classification. Sangiuolo class III patients were excluded from the study, where the stability and maintenance of dentures were influenced by prosthetic field changes, in order not to influence local treatment by the impossibility of wearing the dentures or by applying adhesives to the mucous faces of the dentures and impairing the release of vitamin B12. Following the application of these elimination criteria, the final study group consisted of 31 men and 33 women aged 55-64, 56 men and 61 women aged 65-74 years and 23 men, and 6 women aged 75-85 years.

To the intermediate group, a new selection was performed based on the blood count that provided important data on the type and number of blood cells of the homocysteine and methyl malonic acid test, the level of these substances increasing with the decrease in vitamin B12. Patients with vitamin B12 deficiency anemia were selected. These were 3 men and 8 women in the 55-64 age group, 7 men and 10 women in the 65-74 age group and 5 males and 9 females in the last age group of 75-85 years. In all age group, the haematological analyzes had the values for vitamin B12, methylmalonic acid and homocysteine between value ranges that demonstrated their diagnosis of vitamin B12 deficiency anemia, the normal values for vitamin B12 ranging from 200-900 pg/mL, methylmalonic acid ranging from 73-271 nmol/L and homocysteine in the range of 5.1-13.9  $\mu$ mol/L.

The treatment schedule applied for parenteral treatment was as follows: 1 mg i.m. on days 3<sup>rd</sup>, 7<sup>th</sup>, 10<sup>th</sup>, 14<sup>th</sup>, 21<sup>st</sup>, 30<sup>th</sup>, 60<sup>th</sup>, 90<sup>th</sup> - locally via complete dentures, in which the template polymerization method described in the previous paper was used, the template being cyanocobalamin-vitamin B12. Patients were advised for treatment to keep the dentures in a glass of water and vitamin B12 for 8 hours a day to be able to accumulate the needed 2mg daily for 120 days.

## Results and discussions

Following the treatment applied to the randomized batch of patients, some with parenteral administration and others with oral administration following the above scheme were resumed and the results were summarized in the tables below, by age group, in this paper we chose to analyze only the group of 55-64 years old. The data is shown below in table 1.

The results demonstrate an increase in B12 levels and decreases in the levels of methylmalonic acid and homocysteine following parenteral therapy. We are interested in whether these differences are statistically significant and the results are shown in tables 2 and 3.

According to the Wilcoxon test, there are statistically significant differences between the final scores of the two values as follows: Initial B12 - B12 after 120 days (Wilcoxon: N = 5, z = 2.023, two-tailed = 0.043 ss-

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	B12 initial	Methylmalonic acid initial	Homocysteine initial	B12 after 120days	Methylmalonic acid after 120days	Homocysteine after 120days
N Valid	5	5	5	5	5	5
Missing	0	0	0	0	0	0
Mean	157.8	339.4	15.766	478.8	143.6	10.56
Std. Error of Mean	5.59821	6.45446	.20405	16.76126	6.60757	.28914
Std. Deviation	12.51799	14.43260	.45627	37.47933	14.77498	.64653

**Table 1**  
STATISTIC VALUES IN 55-64 YEARS OLD GROUP FOR PARENTERAL TREATMENT

	N	Mean Rank	Sum of Ranks
B12after120days - B12initial	Negative Ranks	0	.00
	Positive Ranks	5	3.00
	Ties	0	
	Total	5	
.methylmalonic after120days methylmalonic initial	Negative Ranks	5	3.00
	Positive Ranks	0	.00
	Ties	0	
	Total	5	
Homocysteine 120 days initial Homocysteine	Negative Ranks	5	3.00
	Positive Ranks	0	.00
	Ties	0	
	Total	5	

**Table 2**  
TEST WILCOXON FOR PARENTERAL TREATMENT

	B12after120days - B12initial	Methylmalonicafter120days methylmalonicinitial	Homocysteine 120 days - initial Homocysteine
Z	-2.023 <sup>a</sup>	-2.023 <sup>b</sup>	-2.023 <sup>b</sup>
Asymp. Sig. (2-tailed)	.043	.043	.043

**Table 3**  
TEST STATISTICS

- a. Based on negative ranks.  
b. Based on positive ranks.

	B12 initial	Methylmalonic Acid	homocysteine	B12 120days	Methylmalonic Acid 120 Days	Homocysteine 120 days
N Valid	6	6	6	6	6	6
Missing	0	0	0	0	0	0
Mean	145.0000	352.3333	14.4367	573.6667	93.8333	9.6333
Std. Error of Mean	8.04570	9.16030	1.67076	28.67015	5.65342	.16055
Std. Deviation	19.70787	22.43806	4.09251	70.22725	13.84798	.39328

**Table 4**  
STATISTIC VALUES IN 55-64 YEARS OLD GROUP FOR LOCAL TREATMENT

	N	Mean Rank	Sum of Ranks
B12after120days - B12initial	Negative Ranks	0	.00
	Positive Ranks	6	3.50
	Ties	0	
	Total	6	
Methylmalonic after120days methylmalonic initial Acmetilmaloniinitial	Negative Ranks	6	3.50
	Positive Ranks	0	.00
	Ties	0	
	Total	6	
Homocysteine after120 days Homocysteine initial	Negative Ranks	5	4.00
	Positive Ranks	1	1.00
	Ties	0	
	Total	6	

**Table 5**  
TEST WILCOXON FOR LOCAL TREATMENT

statistically significant). Initial Methylmalonic Acid - Methylmalonic Acid 120 Days (Wilcoxon: N = 5, z = 2.032, two-tailed = 0.042 ss). Initial homocysteine - Homocysteine 120 days (Wilcoxon: N = 5, z = 2.023, two-tailed = 0.043 ss).

For local treatment the results are in table 4.

There is an increase in B12 levels and decreases in the levels of methylmalonic acid and homocysteine. We are interested in whether these differences are statistically significant. Given the above distributions, we will apply the

Wilcoxon test, the nonparametric equivalent of the t test and we have the results presented in tables 5 and 6.

According to the Wilcoxon test, there are statistically significant differences between the final scores of the two groups as follows:

Initial B12 - B12 after 120 days (Wilcoxon: N = 5, z = 2.201, two-tailed = 0.028 ss - statistically significant).

Initial Methylmalonic Acid - Methylmalonic Acid 120 Days (Wilcoxon: N = 5, z = 2.201, two-tailed = 0.028 ss).

Initial homocysteine - Homocysteine 120 days (Wilcoxon: N = 5, z = 1.992, two-tailed = 0.046 ss).

	B12after120days - B12initial	methylmalonicafter120days methylmalonicinitial	Homocysteine 120 days - initial Homocysteine
Z	-2.201 <sup>a</sup>	-2.201 <sup>b</sup>	-1.992 <sup>b</sup>
Asymp. Sig. (2-tailed)	.028	.028	.046

a. Based on negative ranks.

b. Based on positive ranks.

**Table 6**  
TEST STATISTICS

## Conclusions

Since cyanocobalamin deficiency is usually treated with parenteral administration, the present study sought to demonstrate the superiority of topical treatment with complete dentures obtained by the crosslinked polymerization method as well as the much easier and cheaper way of doing the same treatment over the same period of time.

Treatment may not be as effective in certain categories of patients with general psychiatric, digestive or bone resorption illnesses that do not provide the stability of dentures and therefore do not ensure wearing them all the time.

The results of the statistical studies performed on the patient group proved to be significantly different in terms of obtaining results both from parenteral and local treatment, the latter being superior to the parenteral and also much easier to apply.

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