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### *The use of HA-Biocer in the complex treatment of aggressive periodontal diseases*

Treatment of the periodontium is the activity engaging specialists from different fields of dentistry and sometimes even medical specialists. In the aggressive periodontal diseases, in which vertical bone loss occurs, after the application of all possibilities of the conservative treatment, we can offer our patients surgical methods with the use of osseous implants or bone substitutes. Auto and allogenous implants are transplantats of the bone tissue with living cells. The substitutes of the osseous implants belong to the category of bio-materials that do not contain living cells. Implant materials differ in their bio-activity which is expressed by osteogenesis, osteoinduction and osteoconduction (8). Although autogenous implant remains the best implantological material so far, the alternative, heterogenous or alloplastic material is being searched for (8, 9). Calcium and phosphorous ceramics belong to alloplastic implants and their representative in Polish production is HA-Biocer – hydroxyapatite having the form of porous granules 0.35–0.65mm and 0.65–1mm in diameter. It is produced by Chema-Elektromet Company in Rzeszów (1,2,3,4). This synthetic material resembling natural bones and teeth component reveals bio-compatibility with hard tissues and reveals high ability of remineralization (8).

The surgical procedure must be preceded by conservative treatment in the course of which hygiene parameters will be improved (modified bleeding SBI index below 10% and API below 25%), which is OHE demand (5). It is also preceded by a detailed clinical examination as the choice of surgical technique will depend on the morphology of periodontal tissue defects. However, the most important and the last determinant of surgical technique will be intra-surgical diagnosis regarding defect topography and the number of the pockets walls, the best if they are two- or three-wall pockets (3,7). It is extremely important to prepare the patient before the surgery in respect of traumatic lymph nodes elimination and accomplishing the improvement of bite conditions.

The aim of this work was clinical and radiological evaluation of the complex periodontological treatment of patients with the aggressive periodontitis using HA- Biocer preparation.

## MATERIAL AND METHODS

Complex and conservative surgical treatment was applied in 25 patients aged 17–57 with aggressive forms of periodontitis. Totally, 94 bone pockets were operated. In the pre-operative examination periodontal pockets depth index PPD and the loss of the attachment CAL were determined using periodontological probe OHE in artificial lighting. The measurements were performed in 6 points at each tooth and the highest value at a given tooth was noted in a patient's records. Patients also had panoramic radiograms performed as well as local radiograms or radio-imaging before and 8–12 months after the surgery. The surgeries were performed in local anaesthesia with 2% lignocaine. In each case it was a flap operation in the course of which bone loss and the root were completely cleaned off the remaining deposits and the inflammatory granulation. Then, the Ha-Biocer implant material was used according to the producer's recommendations. The flap was reponated and the wound was tightly sutured. No antibiotic therapy was applied after the surgical procedures.

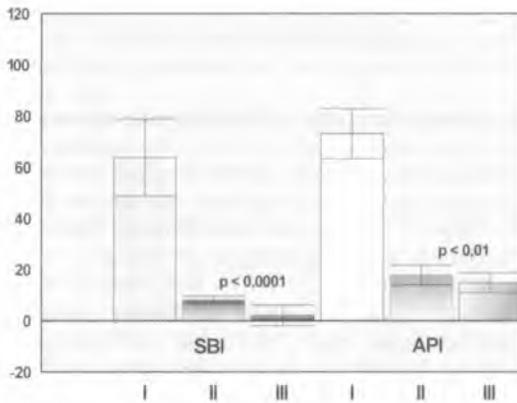


Fig. 1. The API and SBI indices in the preliminary examination, before and after the surgical treatment using HA-Biocer

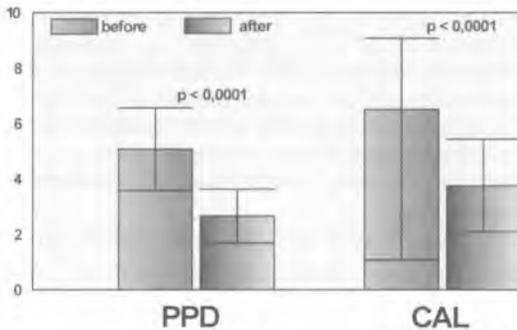


Fig. 2. Pockets depth (PPD) and the attachment loss (CAL) in the preliminary examination, before and after the surgical treatment with the use of HA-Biocer

The sutures were removed 14 days after the surgery. In the post-operative period Solcoseryl Dental dressings were used as well as rinsing with 0.1% solution of Chlorhexidine twice a day for 1 minute. Patients were advised to use cold compresses and soft diet directly after the surgery and after the removal of sutures they were advised to brush teeth with a soft brush with the roll method. Control studies were performed in the first twenty-four hours and on the 7<sup>th</sup> and the 14<sup>th</sup> day.

The results of the conservative and surgical treatments were evaluated after 8–12 months by means of clinical and radiological examinations. Values of the examined features were submitted to statistic analysis with the use of Shapiro-Wilks, Wicoxon's tests. The results were specified in the table and illustrated graphically in figures 1 and 2.

## DISCUSSION

Generally, there were no complications in the healing process, however, cases of slight swellings were observed in 10 patients and complaints of varied intensity were reported by 5 patients. The effects of the conservative preparation for surgeries on the selected pockets were evaluated through the control of the hygiene indices API and the gingival pocket bleeding SBI (Fig.1). The results of the periodontal pockets treatment were described by the comparison of their depths PPD and the loss of the attachment CAL before surgical treatment and 8-12 months after it (Tab.1). With the use of HA-Biocer implant material the average shallowing of pockets depth was 2.41mm, which constituted 48% and the growth of the attachment was 2.75mm (Tab.1), which was extremely significant statistically. The use of the described surgical method with the application of HA-Biocer preparation in the examined cases allowed to achieve significant improvement of the clinical status of the operated sites, that was confirmed also radiologically.

Table 1. The results obtained after the surgeries with the use of HA-Biocer

	M ± SD	Δ	p
Age	43.18 ± 8.86		
PPD – II	5.07 ± 1.49	- 2.41	< 0.0001
PPD – III	2.66 ± 0.97		
CAL – II	6.50 ± 2.57	- 2.75	< 0.0001
CAL – III	3.75 ± 1.67		
SBI – I	63.72 ± 15.02		
SBI – II	8.20 ± 1.50	- 6.08	< 0.0001
SBI – III	2.12 ± 4.04		
API – I	73.08 ± 9.81		
API – II	17.92 ± 3.86	- 3.04	< 0.01
API – III	14.88 ± 3.86		

I – preliminary, II – before surgical treatment, III – after surgical treatment

After the application of hydroxyapatite granules bone defects of the periodontium are eliminated up to 70–80% (4). Yukna, while examining the effect of hydroxyapatite in 56 patients obtained their shallowing which on average was 2.3mm (quoted. after 5) which corresponds to 37% of their initial depth, however Knychalska-Karwan and associates (quot after 10) obtained pockets shallowing which on average was 1.7mm (38%), Ziętek et al. (10) the shallowing of 3.22mm (47%). Thus, our own studies and the studies of other authors (2, 3, 4,

10) revealed a significant benefit of hydroxyapatite to fill bone defects of the periodontium, post-operative defects, atrophy, where the bonding agent in all these cases was the patient's blood. Granules clearly proved to be the nuclei for bone regeneration, so they acted osteo-inductively in the surrounding tissue (4,8,9). Hydroxyapatite constitutes the base which imitates the structure of natural bone, it forms the framework promoting the growth in of the mineralized bone (4). However, new bone formation is limited to the formation of osseous trabeculae only at granules of hydroxyapatite adjacent to the walls of bone loss. Trabeculae which form inside the implant structure are separated from hydroxyapatite particles with a layer of connective tissue. Healing processes after the application of hydroxyapatite lead to the formation of ceramic and osseous conglomerate consisting partly of the osseous tissue and hydroxyapatite ceramics. Therefore, the tissue healing after its implantation is a reconstruction process in nature with the formation of long epithelial attachment (10). Very slow bio-degradation of HA-Biocer (10) or even its non-absorbability (4,8) makes it perform the role of osseous filler. The advantage of HA-Biocer is also its good tolerance by the surrounding tissues, which was observed in a self study. It confirms the bio-compatibility of the used material underlined by many authors (2, 4, 8). The condition of permanent remission of the periodontal disease is the patient's co-operation in the maintenance phase. Permanent activity that motivates the patient is necessary to maintain hygiene regime as well as frequent control and the evaluation of the performed hygiene procedures. The authors suggest calculating and noting the SBI and API indices as well as informing the patient about the efficiency degree of his hygienic procedures into the everyday periodontological procedures.

#### CONCLUSIONS

1. The use of HA-Biocer as an implant material in surgical treatment of the periodontal pockets leads to highly essential improvement of the investigated PPD and CAL parameters.
2. HA-Biocer in the form of porous granules sized 0.35–0.65mm is easy to insert and condense in the bone loss.
3. HA-Biocer used by us is a cheaper alternative of surgical treatment of the periodontium bone defects in comparison to other available implant material.

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#### SUMMARY

The aim of the work was clinical and radiological evaluation of the HA-Biocer implant material in the complex conservative and surgical treatment of the advanced changes in marginal periodontium. Highly statistically important reduction of the attachment loss CAL and pockets depth PPD were obtained.

#### Zastosowanie HA-Biocer w kompleksowym leczeniu agresywnych zapaleń przyzębia

Celem pracy była kliniczna i radiologiczna ocena materiału wszczepowego HA-Biocer w kompleksowym zachowawczo-chirurgicznym leczeniu zaawansowanych zmian w przyzębiu brzożnym. Uzyskano wysoce statystycznie istotną redukcję utraty przyczepu CAL i głębokości kieszonek PPD.