

Prosthetic obturators used in the treatment of cystic jaw bones

Obturatory protetyczne stosowane w leczeniu torbieli kości szczęk

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Abstract

Patients diagnosed with cystic lesions of the jaw bones undergo surgical treatment consisting in decompression and curettage due to the extent of lesions. Prosthetic obturator is used between stages of treatment. **Aim of the study.** To analyse a group of patients and to present the prosthetic procedure with the use of obturators. **Material and methods.** The analysis covered a group of patients treated from 01.07.2011 to 31.12.2012. The data included demographic data, location of lesion, histopathological diagnosis, the type of obturator and the duration of treatment. **Results.** The analysis covered 102 subjects. In 68 patients the lesions were located in the mandible. Histopathological diagnosis was dominated by odontogenic and dentigerous cysts (in 38 cases). In all the cases, a prosthetic obturator was used. The second stage of surgical therapy was performed in 75 cases. **Conclusion.** The application of obturator in the treatment of patients with cysts plays an important role.

Streszczenie

Pacjenci, u których rozpoznawane są zmiany o charakterze torbieli kości szczękowych ze względu na rozległość zmian, kierowani są do leczenia chirurgicznego, polegającego na odbarczeniu i usunięciu tych nieprawidłowości. Pomiędzy etapami leczenia chirurgicznego stosowany jest obturator protetyczny. **Cel pracy.** Analiza grupy chorych i przedstawienie procedury leczenia protetycznego z zastosowaniem obturatorów. **Materiał i metoda.** Analizą objęto grupę pacjentów leczonych w okresie od 01.07.2011 do 31.12.2012. Ocenie poddano dane demograficzne, lokalizację zmiany, rozpoznanie histopatologiczne, rodzaj obturatora oraz czas leczenia. **Wyniki.** W analizie uwzględniono 102 osoby. U 68 chorych zmiany umiejscowione były w żuchwie. W rozpoznaniu histopatologicznym dominowały torbiele zębopochodne i zawiązkowe (38 chorych). We wszystkich przypadkach zastosowano obturator protetyczny. Drugi etap leczenia chirurgicznego przeprowadzono w 75 przypadkach. **Wnioski.** W leczeniu chorych z torbielami istotną rolę odgrywa zastosowanie obturatora.

KEYWORDS:

odontogenic cysts, cystic lesions, prosthetic treatment, obturator.

HASŁA INDEKSOWE:

torbiele zębopochodne, zmiany torbielowate, leczenie protetyczne, obturator

Introduction

At present, it is recommended that analysis of orthopantomographic image (OPG) be performed during examination of patients prior to prosthetic treatment.¹ Many times, through routine monitoring, it has been possible to identify asymptomatic lesions in the bones of the jaw and to initiate effective

treatment, thus preventing pathological processes occurring as a result of neglecting treatment.²⁻⁵ Identified abnormalities include cystic lesions, displaying a clear loss of bone structure within the body or the ramus of the mandible and the jaw bones in the radiographic image. Tumours of this type are most often odontogenic cysts.^{2,6} The



development of these lesions is usually devoid of any pain, so patients are not aware of the ongoing pathological process.^{4,5,7,8} When lesions become visible clinically, for example in the form of facial asymmetry, the tumours have reached a large size.² From the point of view of prosthetic treatment, multi-disciplinary collaboration with specialists in dental surgery is necessary in these cases. Targeted prosthetic treatment is only possible after the surgical procedure is completed. However, patients diagnosed with cystic lesions and benign cystic tumours of the maxillary bones undergo two-stage surgical treatment due to the extent of the lesions, the proximity of important anatomical structures and the age.^{8,9} The first stage involves decompression of the lesion by dissecting the connection of tumour cavity with the environment of the oral cavity, and the second involves curettage of the lesion. A prosthetic obturator is used between the two stages of surgical treatment to prevent closure of the surgically made opening, allow the seepage of fluid produced by cystic epithelium, and thereby create conditions for gradual reduction of the bone defect.^{2,3,5,10} Different types of obturators are described in the literature. According to *Pogrel et al.*,¹¹ they can be made from a piece of intubation tube sewn in at the place of decompression of the cyst or, according to *Enislidis et al.*,¹² from a polyethylene decompression stent.¹⁰⁻¹⁴ When acrylic obturators are used, they are custom-made for patients in the form of the so-called "plugs".^{5,9,15,16} Therapeutic treatment requiring the use of such devices takes an average of about two years.¹²

Aim of the study

The aim of this study was to perform retrospective analysis of a group of patients undergoing prosthetic treatment with the use of obturators in the course of surgical treatment of cystic lesions of jaw bones.

Material and method

The retrospective analysis covered a group of patients treated prosthetically with obturators in the Department of Prosthodontics of the University Dental Clinic (UDC) in Cracow in the

course of surgical treatment of cystic lesions in the period from 01.07.2011 to 31.12.2012. Therapy of patients with diagnosed lesions consisted of: decompression of the cyst at the first stage (in the Department of Oral Surgery of UDC in Cracow), submitting the excised tissues for histopathological examination (at the Department of Clinical and Experimental Pathology of the Jagiellonian University Collegium Medicum), application of a gauze and iodoform dressing, taking a prosthetic impression in the method depending on the type of missing teeth, making an obturator in a laboratory, and handing over the obturator to the patient. The patient would continue to use the obturator, which was gradually adjusted, until the cavity became small enough and the decision was made to completely remove the cyst epithelium surgically.

The final evaluation of the data was carried out between 7th and 14th January 2015. The analysis was based on information collected in medical documentation electronic database KS-SOMED from KAMSOFT (Katowice, Poland). The analysed information included gender, patient's demographic data, histopathological diagnosis, type of obturator, and duration of treatment. OPG images taken of patients prior to surgery were also evaluated. All the images were taken using the ProMax device from Planmeca (Finland, 2005). On this basis, the location of lesions was identified, distinguishing the front section in the range between the lower or upper canines, and lateral sections arranged distally. In addition, the location of cystic lesions in the mandible was identified, within the angle and the ramus, the body and in the front section, in accordance with the study by *Anavi et al.*¹⁰ The criterion for exclusion from analysis was patients with missing information in the evaluated part of medical documentation.

Our retrospective study obtained approval of the Bioethics Committee. All the treatment procedures were performed in accordance with the rules of the Declaration of Helsinki and Good Clinical Practice (GCP).

Statistical analysis

The results were processed with computer programme Statistica version 10 (StatSoft, Inc.,

2011; www.statsoft.com) and presented in the form of tables and a figure. Assessment of the normal distribution of the variables was performed using the Shapiro-Wilk's test and Kolmogorov-Smirnov's test. Kruskal-Wallis's test and Pearson's chi-squared test were used to assess the variables. Significance was set at $p < 0.05$.

Results

Criteria for inclusion in the assessment were met by 102 people aged 12 to 80 years (mean age 40 years), including 37 women (36%) aged

Table 1. Location of cystic lesions in the bones of the jaws in the examined group of patients

Location of cyst	Number of patients/Percentage
Maxilla – lateral section	7 (7%)
Maxilla – anterior section	27 (26%)
Mandible – angle, ramus	23 (23%)
Mandible – anterior section	9 (9%)
Mandible – body	36 (35%)
Total	102 (100%)

Table 2. Results of pathological examination of cystic changes in the examined group, by gender of subjects

Pathology of lesions	Number/percentage	Female	Male
Odontogenic (including dentigerous) cyst	38 (37%)	12 (32%)	26 (40%)
Radicular cyst	29 (28%)	14 (38%)	15 (23%)
KCOT (keratocystic odontogenic tumours)	18 (18%)	7 (19%)	11 (17%)
OOC (orthokeratotic keratinized cyst)	2 (2%)	1 (3%)	1 (2%)
SBC (single bone cyst)	1 (1%)	0	1 (2%)
Pseudocyst (no epithelium)	7 (7%)	3 (8%)	4 (5%)
Cyst (with epithelium of the upper respiratory tract)	1 (1%)	0	1 (2%)
Cyst of the nasopalatine duct	5 (5%)	0	5 (7%)
Residual cyst	1 (1%)	0	1 (2%)
Total	102 (100%)	37 (100%)	65 (100%)

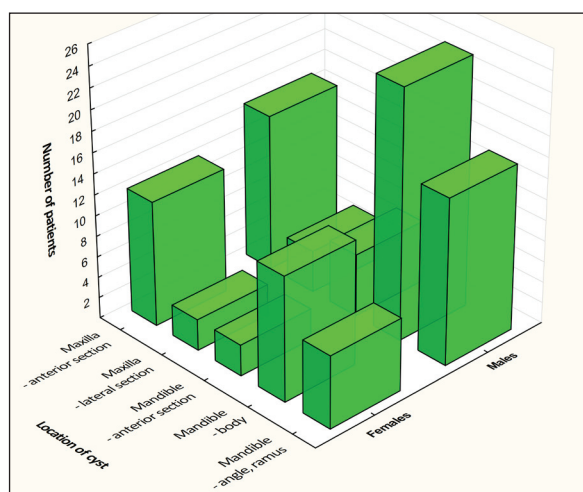


Fig. 1. Distribution of cystic lesions in the jaw bones in women and men.

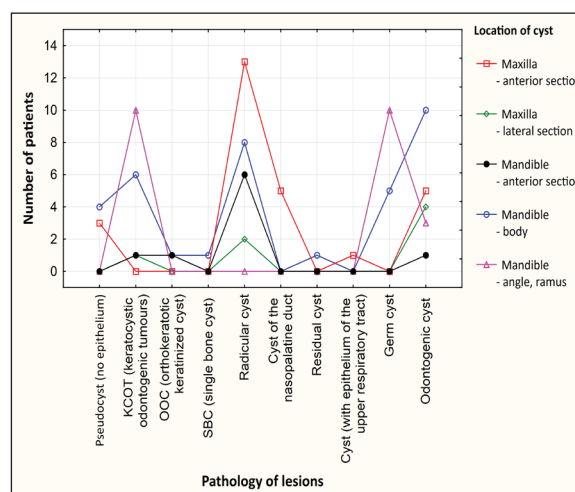


Fig. 2. Diagram of the location of lesions depending on the pathological image.



Fig. 3. OPG image of patient N.G., aged 20, before surgery – a cyst of the mandibular angle on the left. Cystic lesion indicated by the arrow.



Fig. 4. Patient N.G., aged 20, status after surgical decompression of the cyst.



Fig. 5. Patient N.G., aged 20, an impression reproducing the clinical situation – silicone C heavy body impression material (Zeta Plus, Zhermack, Italy) and alginate impression material (Kromopan, Lascod, Italy).



Fig. 6. Acrylic obturator for patient N.G., aged 20.



Fig. 7. Obturator in the mouth of patient N.G., aged 20.



12 to 80 years and 65 men (64%) aged 15 to 77 years, with mean of the subjects 39 and 40 years, respectively.

In 34 patients lesions were located in the maxilla (33%), in 68 – in the mandible (67%). 26% of the lesions (27 cases) were found in the anterior section of the maxilla, and 9% of the lesions (9 cases) in the anterior section of the mandible. Table 1 shows the total number of lesions in the various areas of jaw bones.

Distribution of lesions in the jaw bones in men and women is shown in Figure 1. In men, most tumours were diagnosed in the mandible – in 2/3 of cases, and the dominant location was the ramus and the body of the mandible – more than 60% of subjects. In women, similarly, lesions in the mandible were dominant. More cases of tumours in women were observed in the anterior section of the maxilla. Evaluation of the location of lesions and gender showed no statistical relationship ($p=0.8409$ Pearson's chi-squared test).

In the histopathological diagnosis, odontogenic (including dentigerous) cysts predominated – 38 cases (37%), radicular cysts were found in 29 patients, which accounted for 28%, and keratocystic odontogenic tumours (KCOT) occurred in 18 patients – 18% (Fig. 2). The remaining pathologic

diagnoses in the evaluated group, including a division of the results of the study into men and women, are shown in Table 2.

Significantly more frequent occurrence of radicular cyst lesions in the anterior section of the maxilla was observed, and that difference was statistically significant ($p=0.000$ Pearson's chi-squared test).

In all cases, a prosthetic obturator was made after the first stage of surgical treatment. Its coverage was gradually reduced, which led to a reduction in the size of the primary lesion to the extent allowing for safe performance of the second stage of surgical treatment in 75 patients (74%); in 24 cases the treatment was a one-stage treatment, and in 3 patients the treatment was not completed.

An example of a prosthetic procedure in an edentate patient is illustrated in Figures 3-7, showing the use of a self-operated obturator.

In the case of missing teeth and indications for the use of a prosthesis, an obturator was combined with a denture baseplate, as shown in Figures 8-13.

The duration of treatment ranged from 2 to 42 months, and in 3 cases it was not completed by the date of the evaluation (14 January 2015). On average, treatment with an obturator lasted 13

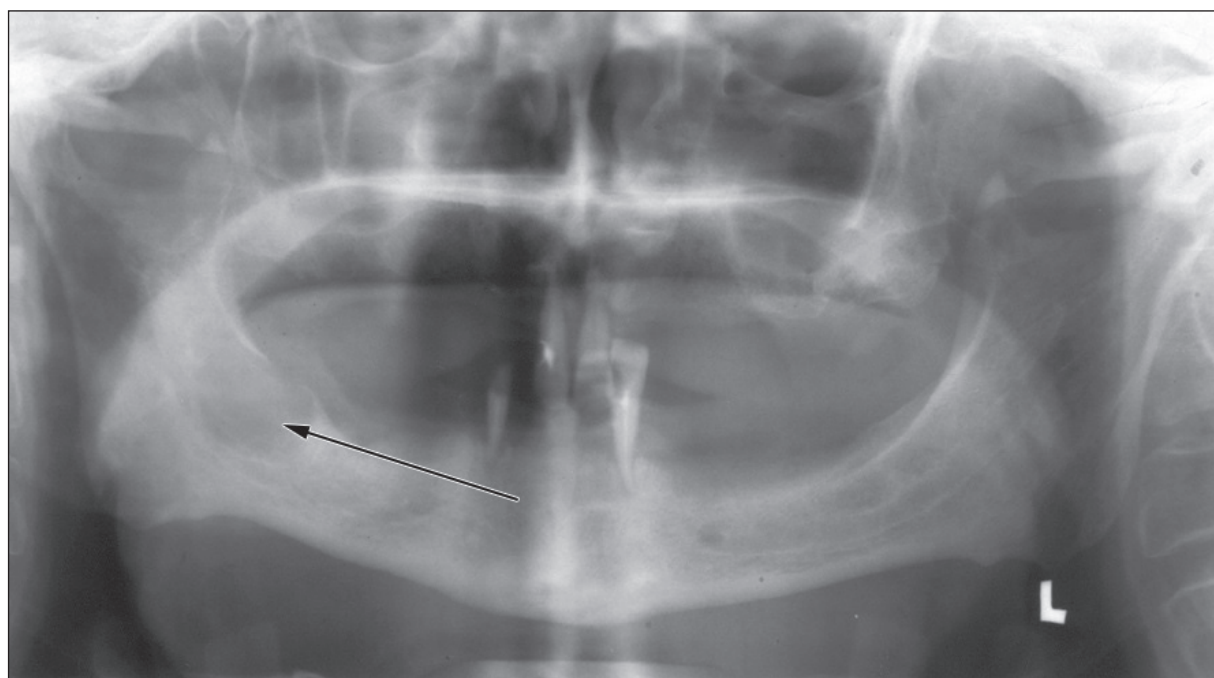


Fig. 8. Patient K.J., aged 76, a cyst of the right mandibular angle – OPG before surgical treatment. Cyst indicated by the arrow.

months, including 12 months for women and 13 months for men. The difference in the duration of treatment between men and women was not statistically significant ($p=0.3532$ ANOVA Kruskal-Wallis's test). No statistically significant difference in the duration of treatment depending

on the location of the lesion in the jaw bones was found ($p=0.6297$ ANOVA, Kruskal-Wallis's test).



Fig. 9. Patient K.J., aged 76, status after surgical decompression of the cyst.



Fig. 10. Alginate impression (Kromopan, Lascod, Italy) made in order to produce a custom impression tray for patient K.J., aged 76.

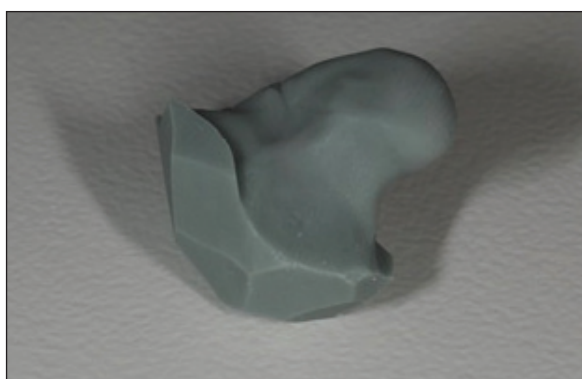


Fig. 11 A. Heavy body silicone C impression (Zeta Plus, Zhermack, Italy) reproducing the entrance to cystic cavity.



Fig. 11 B. Custom tray prepared for taking an impression from patient K.J., aged 76.



Fig. 12. Functional impression of the lower arch made using zinc-oxide-eugenol impression material (Neogenate, Septodont, France) connected to the reproduction of the entrance to cystic cavity (Zeta Plus, Zhermack, Italy) in patient K.J., aged 76.



Fig. 13. Complete lower denture with an obturator for patient K.J., aged 76.



In 11 cases, re-treatment was necessary due to the obstruction of entry to the cystic cavity. In the evaluated documentation there was no information on the relationship between that condition and the obturator used. There was no case of a broken bone or any serious complications resulting from the use of the obturator.

Discussion

In the analysed period of 1.5 years a group of 102 patients was examined, among which adult patients (mean age 40 years) were predominant, with male predominance (64%). A study to assess a similar group of patients carried out in the Department of Oral Surgery of the Dental Institute at the Jagiellonian University's Collegium Medicum in Cracow in the years 1997-2002 (6 years) comprised 133 patients, with a slightly lower mean age (36 years), with male predominance (56%).⁹ In a fifteen-year retrospective study by *Anavi et al.*, 67 patients were evaluated, with a mean age of 31 years, with male predominance (58%).¹⁰ The number of patients in the group covered by the present study shows a significant increase in their number, a somewhat older age and an increase in the percentage of males. The significant increase in the number of patients may be due to the dissemination of diagnostic radiology in the form of OPG images, and thus an increase in the number of detected lesions.

The mandible was the predominant location of cystic changes in the analyzed group of patients – 67% of cases. It was similar in studies by *Smólka et al.*, but on a smaller group of patients – 55% of cases.⁹ *Anavi et al.* found the occurrence of lesions in the mandible in 60% of patients.¹⁰

In the histopathological image of lesions, odontogenic cysts including dentigerous cysts

were predominant – 37% of cases, with the second highest incidence for radicular cysts – 29% of patients, and keratocystic odontogenic tumours (KCOT) – 18% of patients. In women, there was the highest percentage of radicular cysts (in 38% of cases) and in men there was the highest percentage of odontogenic lesions including dentigerous ones (in 40% of patients). Studies by *Smólka et al.* showed the most frequent incidence of inflammatory – radicular cysts, in 61% of cases, followed by developmental cysts (including odontogenic and dentigerous) in 35%.⁹ In studies by *Anavi et al.* odontogenic lesions were predominant – in 38% of cases, followed by KCOT – 30%, and radicular cysts occurred in 23% of patients.¹⁰

In the national literature, individually made acrylic obturators are usually used between the stages of surgical treatment.^{5,8,9} Foreign authors use individual acrylic obturators as described by *Nakamura et al.*¹⁵ or they sew in different kinds of tubes.¹¹⁻¹⁴ Proponents of this second method emphasize its effectiveness in maintaining a surgically formed opening, not affected by cooperation from the patient required to insert and remove an acrylic obturator. However, the patient does not need to visit the outpatients' clinic to adjust the size of the obturator. The authors draw attention to the fact that a tube needs to stay unobstructed, which forces patients to regularly wash the cystic cavity. In older people with limited manual dexterity this method is not recommended.

Conclusions

- 1 It is advisable to carry out prospective studies in this growing group of patients.
2. The application of an obturator in the treatment of patients with cysts and benign cystic tumours of jaw bones plays an important role.

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