

PREVENTION AND TREATMENT OF UNDESIRABLE SYMPTOMS CAUSED BY IRRADIATION IN THE ORAL CAVITY

Artur Stryjski, Maria Borysewicz-Lewicka

Greatpoland Cancer Centre, Garbary 15, 61-866 Poznań, Department of Intensive Care, Division of Child and Youth Stomatology, Institute of Stomatology, Karol Marcinkowski University of Medical Sciences in Poznań

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SUMMARY

Patients during radiotherapy for head and neck tumours show side effects in the oral cavity that might influence further treatment, or even cause temporary or total break in the irradiation. For this reason, prevention and treatment are essential to avoid or reduce the possibility of such complications. Sanitation of the oral cavity by a dentist is indispensable, and afterwards, regular screening of the teeth and the mucous membrane condition. Proper hygiene plays a particularly important role, leading to alleviation of symptoms and reduction in the discomfort, which in consequence, contributes to the increase in the living comfort of patients undergoing radiotherapy.

Key words:

Radiotherapy side effects, prevention and treatment of the oral cavity.

Epidemiological data show that tumours within the head and neck constitute 5% of all malignant changes [1]. Atkinson's et al. research reported in 1993 that only 50% of the total number of his patients had survived 5 years; this figure has not changed for over 20 years [2]. In 1995, in the United States 39,750 new cases of such tumours were recorded. A similar incidence was noted in Holland, where about 3,500 new cases of head and neck tumours are detected annually. Therefore, each year 23/100.000 people are afflicted by this disease [3].

Within the oral cavity, the leading malignant changes are those caused by the by cancer stemming from the lip, tongue, mucous membrane (of the cheek and gum), and the floor of the mouth. Other tumours, including melanoma, occur relatively seldom.

Among the most important causes of cancer, exposure to cigarette smoke and protracted alcohol consumption, play a dominant role [4,5,6,7,8]. Genetic factors, however, cannot be excluded, as pointed out by Schuster-Kolbe and Zheng and

Jahnke [4,9,10]. Early detection and a relatively prompt onset of the therapy are crucial for the prognosis. Radiotherapy combined with chemotherapy and surgical removal of the changes belong to the basic treatment methods. This method, however, may evoke a certain number of undesirable effects due to the fact that ionizing radiation not only affects the changed cells, but also the healthy ones [11,12,13]. Post-irradiation changes within the oral cavity are difficult to avoid. The effects of radiotherapy and possible complications depend on the age of the patient, conditions and intensity of radiation, extent and time limit of irradiation, the volume of the dose, the density of ionization, the radiated site, the patient's sensibility, and the distance from the radiation source during irradiation. During and after therapy the patients frequently complain of taste and feeling disorders, loss of appetite, dysphagy, dryness in the oral cavity and throat, difficulties in swallowing, chewing, the feeling of burning, hyper-sensibility to temperature, self-existent pain, pain at eating and swallowing (stomach

and intestine effects may appear), and sometimes lock-jaw and difficulties in speech [14,15,16,17].

The following symptoms and sign can also be detected clinically:

- changes in the mucous membrane of the oral cavity (inflammatory changes, congestion and bleeding from the mucous membrane are the first symptoms; erosions and ulceration may appear later),
- decrease in the secretion of saliva (as an effect of inflammatory and degenerative changes in the acidophilic and salivary glands canals),
- intensification of caries (indirect influence of irradiation, ionic movements within the enamel, decrease in the secretion of saliva, increase in the activity of proteolytic enzymes, decrease in the number of neutrocytes, increase in the bacterial flora including flora causing caries),
- increase in the mycosic bacterial flora connected with marrow suppression (agranulocytopenia, trombocytopenia), drop in the number of neutrocytes and the IgA immunoglobulins, decrease in the secretion of saliva, physical and chemical factors, and
- bone necrosis (a symptom that appears relatively late) [11,12,15,18,19].

The complications set in during irradiation lead to for intervals in the treatment, and can cause its early termination. Therefore, to limit the possibility of appearance and intensification of side effects, fractional doses are applied (at scheduled intervals). In order to prevent or reduce undesirable symptoms in patients undergoing radiotherapy for head and neck cancer, close co-operation among the radiotherapist, dentist and the patient is necessary. The patient under treatment suffers from depression, is concentrated on his or her treatment, on the existing disturbances and pain that accompany the disease and hospitalization, effects as a result, among others things, the oral cavity hygiene is often disregarded [6,20,21]. Prevention must be started before treatment is applied. The patient should be made aware of the possibility of complications and their symptoms, should be recommended a proper diet, and instructed on prosthetic fillings. Professional pre-

ventive measures should be started. The dentist should pay particular attention to caries treatment, reduction of tartar through professional teeth cleaning, application of anti-bacterial remedies, and increase of the immunity of the teeth hard tissue with fluorine preparations. In some particularly young patients the teeth furrows may be covered with a sealing-wax. Proper motivation and patient training in the oral cavity hygiene are equally important. It is also recommended to take a panoramic X-ray picture of the upper and lower jaws to assess the condition of the teeth and alveolar outgrowth, as well as to exclude morbid centers [3,22].

Prior to treatment, the risk of recurrent caries must be taken into account – this problem often appears in patients undergoing irradiation [23]. The preferred treatment method is prevention (eg. reconstruction of the teeth instead of denture implantation). Movable dentures must adhere properly, because pressure on a changed mucous membrane may quickly lead to sores, erosions and ulceration. When the development of caries cannot be stopped, the patient should be informed about it. Local fluorine application is essential to increase its content in the surface enamel layers. Billings' observation shows that in patients with a temporary decreased saliva flow, after the application of fluorine preparations higher fluorine levels in the oral cavity are sustained longer than in patients with normal secretion. It is recommended that caries decrements should be using glassiomers [24]. The treated or new caries centers should be at least filled with zinc oxide and eugenol [22]. It is important to pay attention to metal elements in the oral cavity, particularly to metal bridgeworks and amalgamate fillings. During irradiation X-rays emit secondary electrons, may increase the dose to, their neighborhood and lead to a local damage in the mucous membrane.

Supportive treatment of the cancer of the head and neck consists of the following stages:

- alleviation of suffering and symptoms connected with the cancer,
- prevention and alleviation of undesirable treatment results (particularly the effects

- of radiotherapy and the combined treatment with X-rays and cytotoxic drug),
- alleviation of physical and psychic effects of the disease and the treatment.

Among remedies applied in the treatment of complications in the oral cavity caused by irradiation, the following may be distinguished: drugs increasing saliva secretion (pilocarpine hydrochloride, bromohexidine, anethole-trithione, betanecol, guaifensine, neostygmine, potassium iodide, nicotine acid, apple acid, vitamin A, pills with xylitol, sorbitol, and saliva substitutes), anti-bacterial drugs (listerine, chlorhexidine, triclosan, chlorchinaldin, nystatine), anti-inflammatory drugs (salicylates, non-steroid anti-inflammatory remedies, sucralaphate), and alleviating drugs (Ems salt, camomile infusion, salt solution, aminothioli).

The oldest and the most popular medication applied to increase saliva secretion is pilocarpine (*Pilocarpinum hydrochloricum*), used in the 19th century (Backman applied it for the first time in patients with xerostomy), leading to an increase in saliva and sweat secretion by stimulating cholinergic muscarine receptors (particularly in parasympathic innervation of the outer secretion glands) [14,25,26,27]. The increase in the saliva secretion by the salivary glands appears 30-45 minutes after the application and is pilocarpine to maintained for about 2-3 hours. Overdosage may result in a decrease in the blood pressure, bradycardis, and bronchi cramp; if not treated, this may lead to death due to lungs swell and/or paralysis of the respiratory center. Usually, the dose is 2.5-5 mg taken once or twice daily [25,26,28].

Another medication worth noting in this group of drugs bromohexine (*Bisolvan*, *Bromhexin*, *Flegamina*), used mainly in an obstructive lung disease. By depolymerizing the slime mucoproteins, it causes liquefaction of the discharge and makes removal easier [26]. The application of bromohexidine may cause a decrease in IgA, IgM, which may have an impact on the caries. The average dose of bromohexidine is 4 mg three times daily [26]. Another drug of this group is anethole-trithione (*Sialor*, *Sulfarlem S 25 Anetholetridone*). The mechanism leading to an increase in saliva secretion (74% of patients show an incre-

ase in saliva secretion after 2 weeks) is unknown. The usual dose is 25 mg three times daily. Sometimes however, anethole-trithione may cause stomach and intestine disorders [26]. The effects of betanecol are similar to those of polycarpine (stimulation of cholinergic muscarine receptors). The dose is 5 mg three times daily [26]. Additionally, cold tea with lemon, flax-seed infusion or chewing gum are recommended to stimulate saliva secretion [3,15]. Apart from mechanical effects, chewing gum may contain components increasing saliva secretion, e.g. Biotene – dry mouth gum. Sometimes saliva substitutes may bring relief, e.g. Glandosane by Fresenius or Artisial by Holphar. These substances are applied if necessary several times daily through sprinkling the mucous membrane of the oral cavity and throat [29].

Among anti-bacterial drugs, Listerin, Chlorhexidine, Triclosan and Chlorchinaldin are recommended. Listerin consists of thymol, menthol, eucalyptus extract in 20% ethanol solution. It is characterized by strong anti-bacterial, anti-viral (herpes simplex, HIV), and anti-mycosal (*Candida albicans*) action [28,30,31].

Chlorhexidine is a wide-range anti-bacterial and bacteriostatic drug (mainly Gram-positive bacteria). Being anti-bacterial and anti-inflammatory it may be applied as pills or a 0.05-0.1% gargling solution (4-5 times a day) [3,32]. Triclosan (*Sicorten*, *Irgasan DP 300*), diluted at 0.8-6.3 microgram/ml. The application of Chlorchinaldin (anti-bacterial both for Gram-positive and Gram-negative bacteria and anti-mycosal remedy) is also recommended. The dose is to 2 mg 4-7 times daily [3].

Ionizing radiation significantly affects the composition of the oral cavity microflora. A characteristic symptom of a possible disorder is an increase in the mycosal flora, particularly of the *Candida* type [16]. Thus, it is necessary to apply an anti-mycosal drug, such as Nystatine (anti-mycosal and mycostatic). Nystatine is used as an aqueous solution in the concentration of 100,000 j. in 1 g, fluconazole (*Diflucan*) – 0.05 g daily for 7-14 days, miconazol (*Daktarin*) – oral gel – 10ml (250 g) every six hours, or Amphotericine B – suspension – 1 ml (100 mg) every six hours for 2-3 weeks (Heim Dahl 1999). These

drugs should be applied prior to radiotherapy.

The anti-inflammatory medication is applied include salicylates, benzdamine (non-steroid anti-inflammatory drugs), sucralfat – Ancrusal, Sucralfat ratio (protects and regenerates the mucous membrane) [33]. Additionally, Ems salt, camomile infusion, and a salt solution are used to prevent inflammation; they contract and alleviate the mucous membrane [3,33].

When the treatment of patients with head and neck tumours is started, the co-operation between the patient and the treatment team is important. Prior to the occurrence of undesirable side effects of radiotherapy in the oral cavity the dentist should initiate professional preventive action and encourage the patient to pay attention to the possibility complications. The hygiene of the oral cavity, performed by the patient according the dentist's instruction, plays an extremely important role. It should be emphasized that despite the discomfort connected with the basic treatment, the patient should remember of his or her oral cavity sanitation, and of a regular screening of the mucous membrane and teeth condition. The patient himself or herself is not able to prevent side effects of radiotherapy. Frequent screening and professional intervention, leading to alleviation of adverse symptoms and reduction of suffering, offer a possibility of a greater comfort by limiting the painful effects of the therapy applied.

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