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Osteomyelitis After Orthognathic Surgery – a Very Rare Case Report After Bilateral Sagittal Split Osteotomy in the Mandible

Zapalenie kości po zabiegu chirurgii ortognatycznej – rzadkie powikłanie po strzałkowym rozszczepieniu trzonu żuchwy

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A – research concept and design; **B** – collection and/or assembly of data; **C** – data analysis and interpretation; **D** – writing the article; **E** – critical revision of the article; **F** – final approval of article

Abstract

Many complications are well known after orthognathic surgery. Osteomyelitis (OM) present in the facial bone skeleton is a somewhat uncommon finding; however its occurrence might vary because of many co-existing disorders and diseases. The early and late outcomes of most known surgical complications are predictable and mostly easy to treat. Often the multidisciplinary treatment and diagnosis of rare complications is important. Osteomyelitis (OM) is a very rare complication after surgery. In a very short time just after surgery the first symptoms start to occur. Quite often without any direct symptoms, it might be misdiagnosed as other postsurgical complications. After a short period of time when the bone starts to be affected, a quick, direct therapeutic approach needs to be performed. Accurate microbiological scrubs are very important and should be repeated in order to improve direct antibiotic usage. Intravenous antibiotics and long-term hyperbaric oxygen therapy seems to be the treatment of choice in the treatment of this condition.

We present a rare case of osteomyelitis in a 46-year-old patient after two jaw orthognathic surgery in the left mandible basis after bilateral sagittal split osteotomy (BSSO) **(Dent. Med. Probl. 2015, 52, 3, 351–355).**

Key words: orthognathic surgery, osteomyelitis, bilateral sagittal split osteotomy.

Słowa kluczowe: chirurgia ortognatyczna, zapalenie kości szczęk, strzałkowe rozszczepienie trzonu i gałęzi żuchwy.

Osteomyelitis after orthognathic surgery is a very rare finding. Thus far, few cases worldwide have been reported. Mostly the mandible is affected, with a higher occurrence rate on the left side. Anatomical cadaver studies have emphasized that some anatomical differences are present between the left and right mandibular arterio-venous systems, which results in different blood supply levels. Perhaps anatomical variations or co-existing general or local conditions have a greater impact on OM occurrence. A direct and detailed etiology and pathogenesis is still under discussion [1]. In most cases, it is discovered on radiographs as a bony reaction with osteolytic and osteosclerotic areas with not quite adequately defined borders with sequestra and periosteal reactions. Radiologically, in most cases an area with poorly defined borders and a radiolucent-radiopaque structure of differing shape and size occurs in various stages of OM. Osteomyelitis is an inflammatory disease that spreads through entire bone structures. Over time and with OM advancement, local radiological granulation tissue and new bone depositions might also be visible. We present a case where the left mandibular basis along the osteotomy line after BSSO (bilateral sagittal split osteotomy) is occupied by the bony sequestra.

Case Report

46-year-old women reported with wound dehiscence two weeks after orthognathic surgery consisting of LeFort I and BSSO osteotomies. Routinely performed post-operative panoramic radiograph revealed stable positions of osteotomy fragments (Fig. 1). Surgery went without complications, however patient medical history revealed Hepatitis B infection after pregnancy 20 years before. Because of a low antibody count (< 50 iuL), additional revaccination was scheduled. Wound dehiscence (Fig. 2.) about 20 mm at the left mandibular region next to adjacent 36 teeth treated endodontically was diagnosed after two weeks. Careful wound cleaning was performed and microbiological findings revealed *Escherichia coli* and *Enterococcus faecalis* invasion. After six weeks, when osteotomy bone fragments were healed, a second procedure took place. Zinnat® 1500 mg (Cefuroxime) and Metronidazole® 300 mg were prescribed before the planned surgical wound cleaning, titanium plate removal at the left mandibular BSSO site and wound re-suturing under local anesthesia. The rest of the titanium plates were left without any intervention in order to minimize potential infectious bacterial spread. After the first wound care, bacteria such as *Prevotella oralis* were found. Cipronex® 500 mg (Ciprofloxacin) and 500 mg Unasyn® (Sultamicillin) were administered. Four months later, the patient again reported the presence of a dehiscenting wound without any general symptoms. Microbiological examination revealed no pathogenic flora, so that routine mouth cleaning was carried out. CRP and fibrinogen levels decreased. Two months later, a routine segment cone-beam tomographic scan of the mandible revealed osteomyelitis of the left mandibular side (Fig. 3) with still present wound dehiscence. Radiograph showed an irregular sclerotic bone with radiolucency in close proximity to osteotomy lines.

Local corticotomies with wound debridement under general anesthesia were performed in order to remove necrotizing bone fragments and 36 tooth extraction. Nylon 5.0 sutures were used to cover the wound and the gentamicin sponge inside the bony defect. Microbiological findings revealed infection of *Enterococcus faecalis* and *Streptococcus constellatus*. The patient started antibiotic therapy consisting of Unasyn® 500 mg, Metronidazole® 500 mg and intravenous appliance of Vancomycin® 1 g. Hyperbaric oxygen therapy (HOT) sessions were scheduled. Histological findings included necrotizing sequestra tissue fragments

Fig. 2. Intraoral wound dehiscence

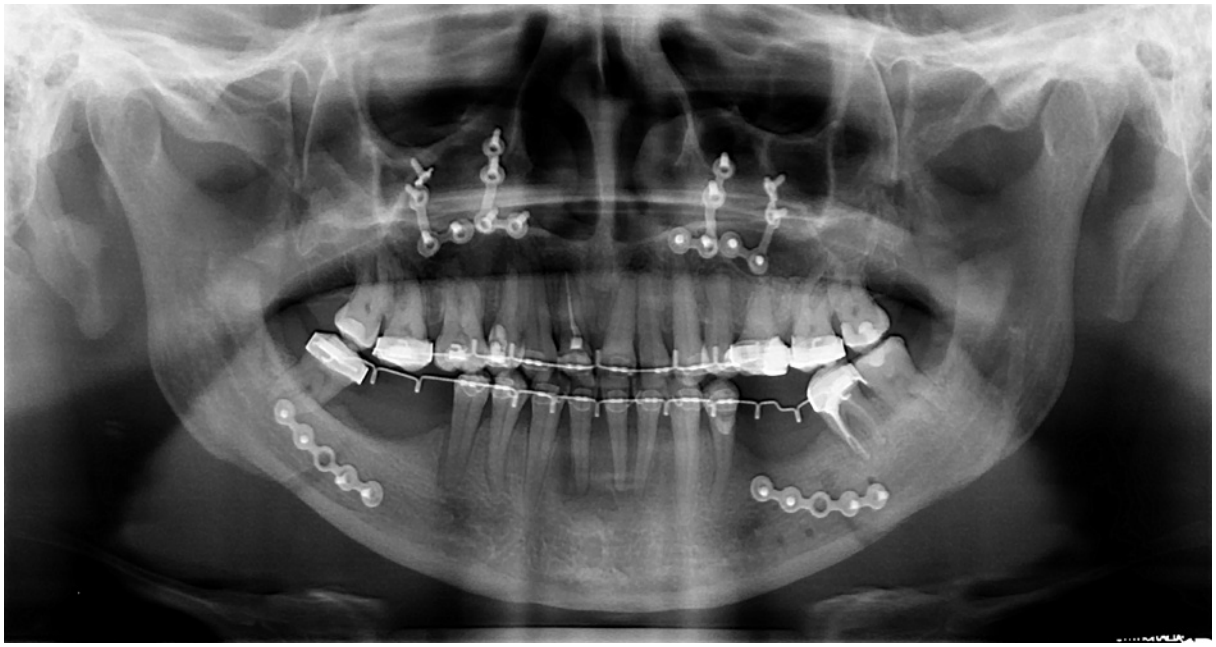

Fig. 1. Post-operative panoramic radiograph

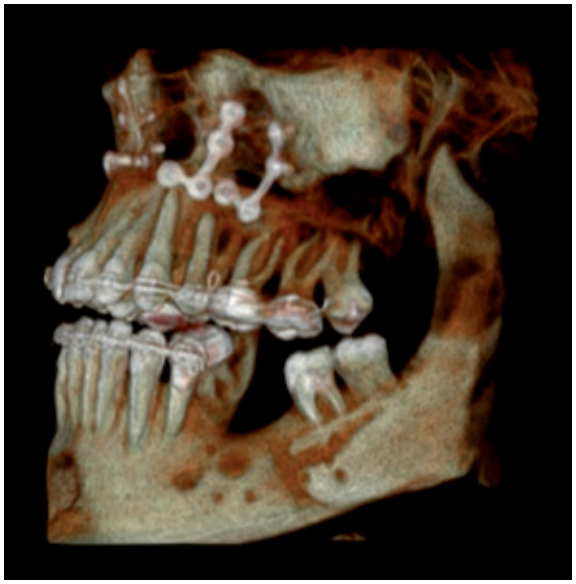

Fig. 3. Cone-beam computer tomographic 3D reconstruction revealing osteomyelitis

Fig. 4. Cone-beam computer tomographic 3D reconstruction after debridement

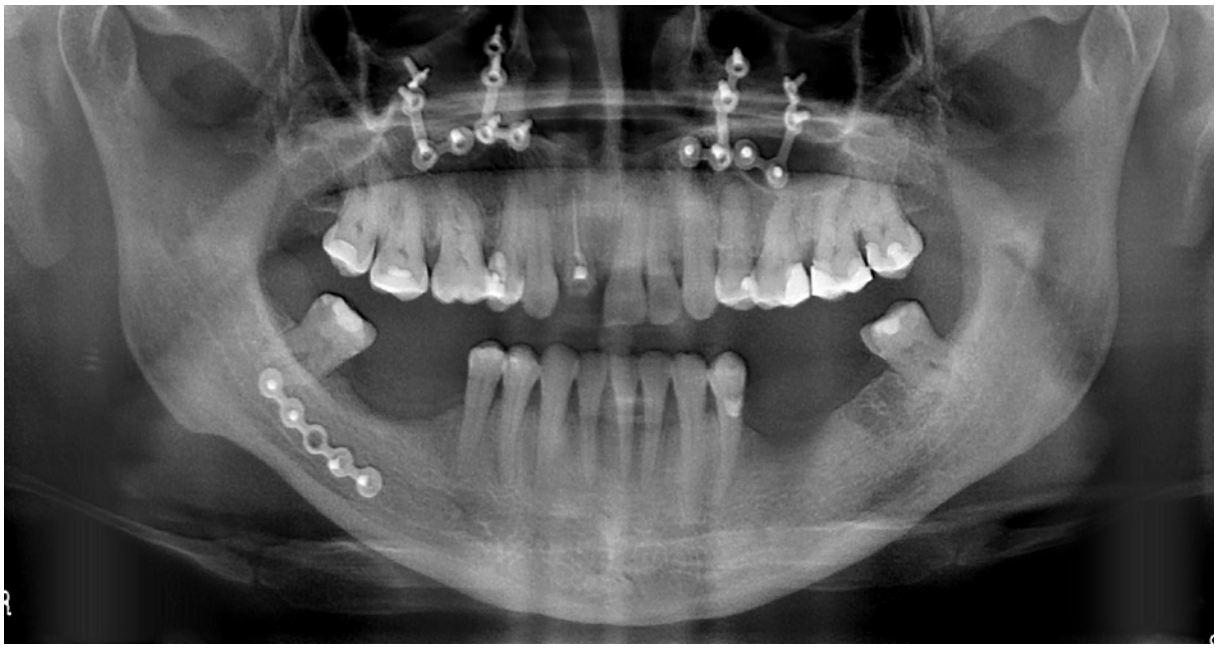

Fig. 5. Panoramic radiograph with almost entirely healed mandibular bone

with neutrophils and lymphocyte along with bony fragments. After fifty sessions of HOT at 2.5 ATA and 60 compression volume, a routine CBCT mandibular scan was performed along with a microbiological scrub (Fig. 4). Radiological findings showed quadrilateral bone loss with a slightly visible mandibular canal that had not been afflicted by the OM. Lower labium numbness was not present. Additional microbiological findings revealed *Enterococcus faecalis* with coexisting *Streptococcus oralis, Streptococcus salivarius* and *Streptococcus constellatus*. Another dosage of Unasyn® therapy for 14 days was administered and another round of wound debridement was scheduled. The proper time for surgery in OM is most often related to the insulation of a necrotizing "bony coffin" fragment. After six months and additional antibiotic and hyperbaric therapy under general anesthesia, final debridement and suturing was performed. So far, three months after the final surgery, the patient has no wound dehiscence or any symptoms of OM. Panoramic radiograph confirmed an almost full proper bony healing process without any worrisome symptoms (Fig. 5.). The patient is scheduled for routine clinical and radiographic check-ups for at least a 5 year time frame.

Discussion

Both diagnosis and treatment are a great challenge for clinicians and surgeons. First of all, radiological assessment of the bony structure suffering from OM should be performed. Cone-beam computed tomography (CBCT) seems to be a great alternative to classical CT, mostly because of it's advanced possibilities of 3D tissue reconstruction. After confirming the diagnosis, surgical excision with tissue debridement combined with long term antibiotics and other additional therapies should be used. Therapy might not only be focused on the bone, because sometimes soft tissues might also be involved in OM [2]. In most cases, bony sequestra are surrounded by scattered infiltrating lymphocytes, plasma cells and histiocytes. Expression of CD8(+) and CD20(+) might also be present.

CBCT is a very valuable diagnostic tool for describing any changes in facial skeleton bones [3]. In different stages of OM, visible sequestrum, involucrum or cloaca might be diagnosed on CT scans, depending on the OM stage and type. Balouri et al. evaluated and compared possible diagnostic approaches including panoramic radiograph, single photon emission CT (SPECT) or planar bone scintigraphy (PS) [4]. SPECT/CT seems to be a quite accurate method, however further study needs to be performed in order to evaluate its diagnostic value. Also bone scintigraphy combined with CBCT is useful, where osteoblastic activity regions would be visible as increased radio absorption areas [5]. Because of a need to perform many comparable radiographs during patient treatment, a low dose CT examination or segment CBCT radiographs could also influence and decrease the negative effects of radiation. PET-CT systems are relatively novel techniques, however they might have the highest diagnostic accuracy in OM identification and evaluation. MRI imaging should be used in any cases of OM spreading to soft tissues and muscles.

Combined antibiotic therapy, radical surgical excision and hyperbaric oxygen therapy is necessary [6]. Antibiotics from 8 to 12 weeks prior to surgical removal of OM after bacteriological evaluation are necessary. Other features might involve bone grafts, free flaps, stem-cell usage and others [7].

In the presented case, osteomyelitis with an unknown origin was present. The patient's age and general condition in planning surgery and avoiding OM was important. Perhaps if an increased dosage and higher spectrum of antibiotics for both G+ and G– bacteria were used, this case wouldn't have happened. Factors such as odontogenic infections, teeth threatened endodontically and inadequate water cooling while bone cutting during BSSO surgery might be the main factors causing OM in this case. Also, due to performing the osteotomy of the left mandible basis as the fourth and last step of the bimaxillary surgery, tiredness and a lack of concentration by the surgeon might also have influenced OM occurrence. Perhaps in some cases, general health and overall immunity could be related to the occurrence of OM. The importance of antibiotic usage and adequate radiographic evaluation of bony fragments after surgery cannot be overstated.

Conclusions

Osteomyelitis is a very rare complication after orthognathic surgery. Still, many causative factors must be taken under consideration. Radiographic imaging should be focused on detailed imaging of the surrounding bone and borders of OM. It seems that CBCT is a good, detailed imaging tool because of its visualization and reconstructive techniques. Combined antibiotics and hyperbaric oxygen therapy are the method of choice, however no further evidence of its positive influence on long-term patient condition is known. Every dentist, surgeon and clinician should be aware of OM symptoms and both clinical and radiological manifestations.

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