METHICILLIN RESISTANT STAPHYLOCOCCUS AUREUS INFECTIONS OF SOFT ISSUES OF THE ORAL CAVITY, FACE AND NECK IN PATIENTS HOSPITALIZED AT THE CRANIO-MAXILLOFACIAL SURGERY DEPARTMENT

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The aim of the study was to identify a group of patients at high risk of methicillin resistant Staphylococcus aureus (MRSA) infection following surgical procedures involving oral cavity, head and neck.

Material and methods. A retrospective analysis of demographic, clinical and laboratory data was performed. A manual search of laboratory records for a five years period (2005-2009) was performed for specimens submitted to the diagnostic microbiology laboratory from patients admitted to the Cranio-Maxillofacial and Oncologic Surgery Department.

Results. Methicillin resistant Staphylococcus aureus was identified in 26 cases. Most commonly it was isolated from tongue swabs in patients following extensive oncological surgical procedures involving oral cavity. Most common risk factors were: age above 65 years, neoplasms, multisite trauma with loss of consciousness, cigarette smoking, alcohol abuse, tobacco addiction, antibiotic therapy immediately before hospitalization. More than half of patients with MRSA infection required surgical treatment except for pharmacological treatment.

Conclusions. Monitoring of postoperative wounds is of great importance with regard to the risk of MRSA infection.

Key words: MRSA, wound infection, oral cavity, head and neck surgery

For the first time methicillin resistant Staphylococcus aureus (MRSA) was isolated in the United Kingdom in 1961. Initially MRSA were considered as nosocomial infections. However, currently methicillin resistant staphylococcus aureus is known to be widely present among certain populations. Nevertheless, no studies are available on the incidence of CA-MRSA carrier status and infection in Polish population. MRSA is suspected to occur in oral cavity more often than it was thought previously. This plus nasal carrier status among the staff of interventional departments may contribute to recolonization of other body parts as well and cross-infection among patients and healthcare professionals (1).

Staphylococcus aureus infections of postoperative wounds remain one of significant postoperative complications. According to studies conducted in the United States, the probability of rehospitalization in a group of patients with infections of hospital wounds increases by five-fold, while the risk of death by two-fold. Furthermore, patients infected with MRSA require more expensive therapy (2, 3).

The aim of this study was to indentify a group of patients at risk of soft tissue of oral cavity, face and neck infection caused by methicillin-resistant Staphylococcus aureus among patients hospitalized at a cranio-maxillofacial surgery department.

MATERIAL AND METHODS

Retrospective analysis included information contained in submission cards to a hospital
MRSA infections of soft tissues of the face, neck and oral cavity

register of infections: demographic, clinical and laboratory data of patients hospitalized at the Cranio-Maxillofacial and Oncologic Surgery Department between 2005 and 2009 in whom alerting pathogens were isolated from the oral cavity, face or neck as a result of bacteriological testing. A total of 3185 underwent study procedures within the study period. The material was collected at admission to the Clinic if a patient had been hospitalized during the previous 12 months, from anterior nostrils and/or throat, oozing wounds or lesions and during a hospitalization after incision and decompression of an abscess, in the event of symptoms of complicated healing of postoperative wounds.

RESULTS

Alerting pathogens were found in 30 patients (24 men and 6 women at the age of 19 o 80 years) on the basis of 674 microbiological material samples collected from patients hospitalized at the Cranio-Maxillofacial and Oncologic Surgery Department, Medical University in Łódź. Methicillin-resistant Staphylococcus aureus (MRSA) was isolated in 26 cases, Klebsiella pneumoniae ESBL in 2 cases, Enterobacter cloacae in 1 case ESBL, and Streptococcus pyogenes in 1 case, during the study period.

Basing on swabs taken at admission of the Clinic, MRSA was found in 2 patients in the posttraumatic skin face wounds, in the conjunctivae in 1 patient, in the nose in 1 patient. MRSA was isolated from a swab of postoperative tongue wounds in 13 patients, from postoperative wounds from the other regional of oral mucosa in 8 patients. Most commonly these were patients after extensive oncological procedures involving oral cavity: in 13 cases after resection of carcinoma of the bottom of oral cavity and tongue, in 4 cases of the bottom of oral cavity, in 2 cases carcinoma of the hard palate, in 1 case after surgical treatment of carcinoma of the cheek, in case carcinoma of the retromolar trigone; one of these patients later went on to develop bacteriemia. Furthermore MRSA was cultured from swabs collected from postprocedural skin wounds in 1 patient after a reconstruction of postresection mandibular defect with an avascular autologous bone graft taken from the iliac bone, in 2 patients after orthognatic operations, in 2 patients with a multi-fragment maxilla fractures – with translocation of the upper face massif.

The most common risk factors among 24 evaluated factors at admission to the hospital (age > 65 years, immobilization, previous hospitalization and invasive procedures within the last 6 months, antibiotic therapy immediately before the hospitalization, trauma with loss of consciousness, multisite trauma, trauma with tissue crushing, alcohol abuse, drug addiction, cigarette smoking, malnutrition, obesity, immunosuppression, COLD, malignancy, blood vessel insufficiency of the lower extremities, a catheter in the urinary bladder, diabetes mellitus, arterial hypertension, coronary artery disease, drainage of body cavities, tracheotomy/intubation tube, vascular catheters): age > 65 years, malignancy, multisite trauma with loss of consciousness, cigarette smoking, alcohol abuse, antibiotic therapy immediately before the hospitalization. Routine antibiotic therapy (beta lactam antibiotics, most commonly Cefuroxime) was used before and after the procedures. Patients were isolated after being diagnosed with MRSA infection. Basing on antibiograms, intravenous vancomycin therapy was started in 14 patients, intravenous or oral ciprofloxacin in 6 patients, intravenous doxacyclin in 4 patients, erythromycin in 1 patient and clindamycin in 1 patient. Surgical treatment – decompression and drainage – was used in 14 patients as addition to pharmacotherapy.

DISCUSSION

Until 1990’s, MRSA infections were attributable only to patients using health care system services: undergoing long-term hospitalizations, subjected to prolonged antibiotic therapy, hospitalized in departments of intensive care or departments of burn treatment, with extensive postprocedural wounds or being in the direct neighborhood of patients infected with MRSA. However, later MRSA was started to being identified in primary skin and soft tissues infections in patients without the above mentioned risk factors (4). Community MRSA infections are estimated to occur in as much as 70% in some cities in the United States (5).

Currently one of the criteria of nosocomial MRSA infection requires its establishment
basing on a study conducted more than 48 hours after hospital admission (6).

In a study conducted in Scotland over 3 years, as much as 51% of patients among subjects in whom MRSA was isolated from oral cavity or from the face used primary care services during the previous 12 months: in dentists’ offices, within home-based care or in hospices. Similarly to our study, MRSA most commonly was isolated from the tongue swabs (28%) and the infection was most commonly accompanied by: redness, edema, pain or burning of the oral mucosa (1).

Therapeutic problems with these infections depend, among other, on methicillin-resistance of Staphylococcus aureus strains. A mechanism of methicillin-resistance involves lack of affinity for penicillin-binding proteins (PBP) which means loss of target site for the whole class of currently available β-lactam antibiotics. Many MRSA species also have resistance genes to other antibiotic classes, such as macrolides (erythromycin, clarithromycin, azithromycin), fluoroquinolones (ciprofloxacin, levofloxacin, gatifloxacin, moxifloxacin) and lincosamines (clinadamicin).

Community-acquired MRSA has a smaller resistance spectrum that nosocomial MRSA. However, increased pathogenicity of community-acquired MRSA may be related to some virulence factors: Panton-Valentine and enterotoxin x genes and H genes. Risk factors of community-acquired MRSA include at least one of the following: hospitalization within 24 months before the hospitalization or MRSA colonization, visit at an outpatient department within the past 12 months, staying at a residential care house, prolonged antibiotic therapy and chronic diseases (end-stage kidney disease, diabetes mellitus, neoplasms), drug addiction and close contact with a person at risk of MRSA infection (7).

Significance of personal hygiene is emphasized in prevention of community-acquired MRSA infections as well as cautious use of antibiotics (4). It is important to limit use of wide spectrum antibiotics, in particular 3rd generation cephalosporines and fluoroquinolones to clinically justified cases, avoid chronic use of glycopeptides since there is a growing resistance of community-acquired MRSA to these agents (8). Skin infections where MRSA etiology is not suspected, should be treated with empiric β-lactam antibiotics, e.g. cefalexine or macrolides, e.g. doxycycline. Oral clindamycin, TMP-SMX, tetracyclines (doxycycline) or minocycline and linezolid should be used in more serious infections or in confirmed community-acquired MRSA infections. First line vancomycin should not be used, but rather be left to treat life threatening community-acquired MRSA infections (9, 10, 11).

TMP-SMX has not been approved by FDA for the treatment of staphylococcal infections but due to high MRSA sensitivity in vitro, may be an alternative to be used in an outpatient treatment of soft tissue infections, with the exception of deep CA-MRSA in children and the elderly (12).

Patients with open wounds resulting from intended or posttraumatic loss of continuity of the skin, with various catheters, are at particular risk of MRSA infection. The risk of MRSA transmission from the procedural room via hands and gloves of the staff to patients, a potential source of nosocomial infection, should be emphasized. Studies indicate that use of disposable equipment and covers is more effective in limitation of MRSA infections than chemical disinfection of surfaces (13, 14). Management of MRSA infection of the wound region should depend on potential presence of accompanying clinical signs and symptoms: redness, edema, elevated temperature. In inpatients with complicated wound healing: with deeper infections of soft tissues, infections of surgical/posttraumatic wounds, large abscesses, connective tissue infections, except for their surgical management and wide spectrum antibiotic, empiric MRSA therapy should also be considered: intravenous vancomycin, oral or intravenous linezolid 600 mg twice daily, daptomycin 4 mg/kg b.wt./day, clindamycin 600 mg, intravenously or 3 times daily orally.

Quinpristin, despite its proven efficacy in the treatment of soft tissue MRSA infections, is of limited utility due to its toxicity. Rifampicin is not recommended as monotherapy due to rapidly developing resistance.

Vancomycin remains the basic intravenous antibiotic for the treatment of MRSA infections, despite slow progression of bactericidal efficacy, posing a risk of resistance and variable degree of tissue penetration related to severity of inflammation, limited penetration to bones and cerebrospinal fluid (12, 15). Currently routine use of mupirocin ointment on wounds is not recommended (16).
A study that compared costs and efficacy of intravenous vancomycin and linezolid and oral linezolid in the treatment of nosocomial MRSA infections, demonstrated that although linezolid was more expensive, it was the most effective and therefore cost effective (11). Majority of patients in whom medical treatment (pharmacotherapy) was ineffective, required hospital admission and surgical treatment: abscess incision and decompression, resulting in a marked increase of treatment costs, prolonging the treatment and hospitalization.

Very good bioavailability and lack of requirement for monitoring of hematology during the treatment are significant advantages of oral linezolid therapy (600 mg every 12 hours).

However, in routine medical practice, linezolid is used most commonly in the treatment of MRSA infections only when vancomycin is ineffective.

Another issue is treatment of the elderly or subjects with chronic diseases who require effective oral therapeutic agents, characterized by low toxicity. Pristinamycin, with or without doxycyline is recommended in these cases (17).

CONCLUSIONS

Monitoring of postoperative wound healing, with consideration of possible MRSA infection, in particular in the elderly after extensive oncological procedures, is an important issue.

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