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CHILDREN VS ELDERLY IN ORTHOPEDIC SURGERY SITE OF INFECTION. ARE THERE DIFFERENCE? EXPERIENCE OF A HIGH VOLUME PLASTIC SURGEON CONSULTANT

Raffaele Franzese[1], Michele Conte[1], Nicola Gagliardo[2], Gorizio Pieretti[3]

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Raffaele Franzese1, Michele Conte1, Nicola Gagliardo2, Gorizio Pieretti3

Afiliations:
1Section of Orthopedic and Traumatology, Multidisciplinary Department of Medico-Surgical and Dentistry Specialties, University "Campana Luigi Vanvitelli", Napoli, Italy, 2Unit of Orthopedic and Traumatology, "San Giuliano" Hospital, Giugliano(Napoli), Italy, 3Section of Plastic and Reconstruction Surgery, Multidisciplinary Department of Medico-Surgical and Dentistry Specialties, University "Campana Luigi Vanvitelli", Napoli, Italy

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Corresponding author:
Raffaele Franzese, MD
Section of Orthopedic and Traumatology, Multidisciplinary Department of Medico-Surgical and Dentistry Specialties, University "Campana Luigi Vanvitelli", Napoli, Italy
E-mail: ortoplastic@outlook.it
Phone: +393403443697

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ABSTRACT

Introduction: Prevention of surgical site infection in surgery and bone trauma has some hallmarks not shared with other surgical disciplines. The surgeon is not always able to open the pathogen and a key to correct therapy. The aim of our work is to verify if there are differences between pathogens, and treatment between the two groups most susceptible to skin infections by means of synthesis such as children and the elderly.

Materials and Methods: From January 2011 to December 2018, we perform 3189 consultancies in various departments of orthopedics and traumatology. From the exclusion criteria we recruited 168 patients with superficial infection of the surgical site after orthopedic surgery. A group represented by children (under 12 years old) and a group of older people over 65. The evaluation criteria between the two groups were: the infectious bacterial flora; the type of antibiotic, the duration of antibiotic therapy; the type of medications used in the post-operative period, the complications.

Results: The results showed that elderly patients are more likely to be bacterial superinfection due to poor hygiene. Therapy in children is shorter and has minor complications. Proper management of the surgical site showed a rapid resolution of the infection in both groups.

Conclusion: The correct management and hygiene of the surgical site allows its rapid recovery from infection. The plastic surgeon management of the fracture site infection can be a winning weapon in the treatment of this problem both in the child and in the elderly.

Key Words: Child; Granny; Skin; Infection; Orthopedic; Trauma.

INTRODUCTION

Orthopedic implants have become essential components of modern medicine[1].

The number of orthopedic and trauma performed in the United States each year continues to increase, as does the incidence of septic complications[2]. The changing profile of antibiotic resistant bacteria has made the prevention and the treatment of skin infection increasingly complex [3]. A correct and early diagnosis is essential in order to provide the most appropriate therapy. If a correct and timely microbiological diagnosis of infections is done within 4 weeks, it could be possible to follow a conservative approach on the prosthesis, since microorganisms are not yet organized in biofilms.

A delayed diagnosis (>4 weeks) of early and late infections involves the necessity of devices removal [2,4,5] due to the production of a structurated and mature microbial biofilm. Biofilm is an aggregate of microcolony of microbial cells adherent to a living or nonliving surface embedded in an extracellular polymeric matrix. Biofilm renders bacteria highly tolerant to antibiotics and host defenses [6-8]. Unfortunately, infections of the orthopedic-traumatological surgical site are very common in children [9] and in the elderly [10-20].The aim of our work is to verify if there are differences between pathogens, and treatment between the two groups most susceptible to skin infections by means of synthesis such as children and the elderly.

MATERIALS AND METHODS

From January 2011 to december 2018, we perform 3189 consultancies in various departments of orthopedics and traumatology.

From the inclusion and exclusion criteria we recruited 168 patients with superficial

infection of the surgical site after orthopedic surgery

Inclusion criteria: patients who sustained a single trauma or orthopedic surgery, patients under 12 years old or over 65 years old.

Exclusion criteria: hematological or oncological patients, presence of acute or chronic infections; age under 13 or over 64 years old, bone metabolism disorders, rheumatological diseases, polytrauma, no previous injury on ipsilateral lower legs.

We divide the 168 patient in two groups(Table 1). The first group of 68 patients was Child(under 12 years old). The second group of 100 patients was Eldery(Over 65 years old.)

All patients were informed in a clear and comprehensive way of the type of treatment and other possible surgical and conservative alternatives. Patients were treated according to the ethical standards of the Helsinki Declaration, and were invited to read, understand, and sign the informed consent form.

The evaluation criteria between the two groups were: the infectious bacterial flora; the type of antibiotic, the duration of antibiotic therapy; the type of medications used in the post-operative period, the complications

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STATISTIC ANALYSIS

Descriptive statistics were used to summarize the characteristics of the study group and subgroups, including means and standard deviations of all continuous variables. The t-test was used to compare continuous outcomes. The Chi-square test or Fisher's exact test (in subgroups smaller than 10 patients) were used to compare categorical variables. The statistical significance was defined as $P < 0.05$. We used Pearson correlation coefficient (r) was used to compare the predictive score of outcomes and quality of life. Mean ages (and their range) of the patients were rounded at the closest year. The predictive score of outcomes and quality of life and their ranges were approximated at the first decimal while at the second decimal was approximated Pearson correlation coefficient (r).

RESULTS

Statistically significant differences exist between the two populations by age difference in sex distribution to the benefit of the child population (Table 1).

Table 1. Description of the populations.

Description of population	Child	Elderly
Number of Patients	68	100
Average age, years (standard deviation)	9.67(±2.29)	73.56(±7.82)
Range of age. years	3-12	65-102
Gender Ratio (male:female)	1.27(38:30)	0.67(40:60)
Type of surgery	Orthopedic: 28(46.67%) Trauma: 40(53.33%)	Orthopedic: 52(52%) Trauma: 48(48%)
Site of Infection	Spine: 2(2.94%) Shoulder: 4(5.88%) Humerus: 4(5.88%) Elbow: 5(7.35%) Forearm: 55(7.35%) Wrist: 2(2.94%) Hand: 3(4.41%) Pelvis: 1(1.47%) Hip: 55 (7.35%) Femurus: 6(8.82%) Knee: 3(4.41%) Leg: 12(17.65%) Ankle: 6(8.82%) Foot: 6(8.82%)	Spine: 7(7%) Shoulder: 9 (9%) Humerus: 5(5%) Elbow: 5(5%) Forearm: 7(7%) Wrist: 5(5%) Hand: 5(5%) Pelvis: 6(6%) Hip: 5(15%) Femurus: 8(8%) Knee: 15(15%) Leg: 4(4%) Ankle: 5(5%) Foot: 4(4%)

Regarding the only hip and knee surgical sites there is a statistically significant difference for the Child group, as less affected.

In the patients of the Child group we found that the infection is monoagent, to the three tampons made on wound or surgical wounds there were never overlaps of bacterial colonies, however we also found multi-resistant pathogens (Fig.1).

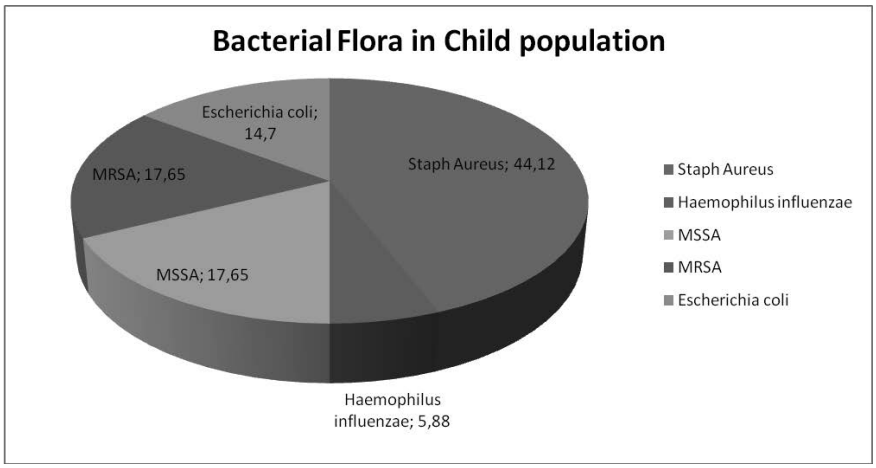

Figure 1: The infection in children has always been monoagent.

In the Elderly group we found 173 patients with surgical site infection with the most infectious beating being E.

Coli in 30 cases. In 5 cases we had 4 contaminants, in 15 cases three contaminants, in 4 cases 2 contaminants(Fig.2).

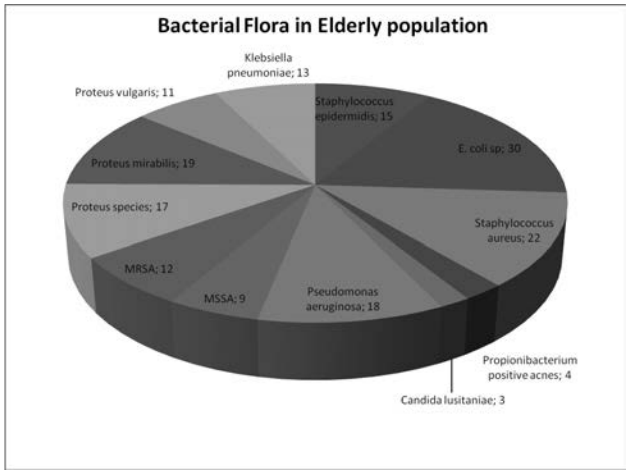

Figure 2: The infection in eldery has a high incidence of infections of 2, 3 or 4 bacteria in the same surgical site.

Pharmacological therapy was always selective in children, instead in the elderly it was in 43 monopharmaceutical cases in the remaining 57 combined.

Furthermore, in Child patients we had 4 delays of healing of the surgical wound. While in the elderly we had in the 23 recovery delays of the surgical erita, 10 treated with vac theraphy, 10 with advanced medications and 7 with surgical wound revision.

We did not have any complications due to treatment for the infected surgical wound in both groups.

DISCUSSION

The incidence of skin surgical infection in the general population ranges widely, from 0.1% for minor surgery up to 50% for tumor related and transplant surgery[21-42].

Signs of wound infection include pus, spreading redness, increased pain or swelling, and fever a break in the skin (a wound) shows signs of infection. They includes: infected cuts, scrapes, sutured wounds, puncture wounds and animal bites; most dirty wounds become infected 24 to 72 hours later[21].Caring for child's wound is important to promote healing, avoid infection and minimise scarring. Different types of wounds require different dressing products and care. Your doctor or nurse will provide specific instructions, organize follow-up and discuss a home dressing management plan[22].To prevent your child's wound from getting infected, hold the area under cool water for a couple of minutes. Avoid using rubbing alcohol, hydrogen peroxide and similar agents to disinfect the wound, as they can lead to irritation and pain. Methicillin-resistant Staphylococcus aureus (MRSA) is staph that can't be killed with common antibiotics, such as penicillin and amoxicillin.

MRSA can be life-threatening if it spreads from the skin to the lungs, the bloodstream, or other organs. MRSA infection can be hard to treat. But other oral or intravenous (IV) antibiotics can successfully treat the infection. The infection can be easier to treat if caught early. When the child has a mild MRSA skin infection, the healthcare provider will likely treat it by opening the infected sore and draining out the fluid (pus)[23]. Most MSSA infections are easily treated with antibiotics or by draining the infection of pus or fluid. Many such infections can be prevented by washing hands well and often, keeping cuts and scrapes clean and covered with a bandage, not sharing personal items (like razors, towels, or uniforms), and making sure to take the full

amount of any antibiotics as prescribed[24].Skin and soft tissue infections are among the most common infections in children and are nearly always caused by S. aureus or S. pyogenes, which are sensitive to first-line antibacterials. A few localized lesions may be treated with topical antibacterials such as mupirocin or fusidic acid, but multiple and/or extensive lesions require systemic antibacterials. The treatment of choice remains the penicillinase-resistant penicillins such as cloxacillin and flucloxacillin. In adults, current treatment recommendations are cefazolin or ocloxacillin[25]. Il the elderly many factors may influence the probability of developing an surgical skin infection after a surgical intervention. Risk factors for the occurrence of surgical skin infection in the general population have been well described in several reports and include variables related to the surgical procedure (increased duration, blood loss and transfusion, wound class , factors related to the operative environment, use of medical devices, duration of hospitalization before surgery)[26]. The most frequent agents responsible for SSI in the elderly are S. aureus (51.6%), followed by coagulasenegative staphylococci (8.3%), and Enterococcus spp. (6.4%). Other commonly isolated pathogens include Escherichia coli (5.6%), Pseudomonas aeruginosa (3.0%), Proteus spp. (2.3%), and Streptococcus spp. (1.9%)[27]. Guidelines on antibiotic prophylaxis provide recommendations for selection of the appropriate antimicrobial for each surgical intervention [28]. However, the antibiotic is not always enough to reduce the virulence for bacterial (very often polymicrobial) in infecting the surgical sites very often it is necessary to resort to advanced medications such as vac, silver dressings and etc [21,29]. Without a doubt the difference in results between children and the elderly in skin healing is due to a biological-anatomical factor. Indeed the changes in skin quality over one's lifetime can be attributed to internal and external influences to its cellular and molecular structure. For example, it's clear to most people that baby skin is generally smoother and more supple than adult skin. One reason is because baby skin generally contains slightly higher water content. While an infant is estimated to be roughly 75% water, adults are closer to 65% water and the elderly are closer to 55% water. You can think of baby skin like a sponge that has absorbed more water and thus feels softer and more flexible than a drier sponge. Furthermore, the collagen, other connective proteins, and fat content in the skin change as we age, which can explain some of the laxity and loss of volume that naturally occurs over time[30-51].

CONCLUSIONS

From the data in the literature and from our experience, we can say that the two age groups most affected by children and elderly infections are susceptible to surgical site infections due to poor hygiene. When dealing with these infections, a reasoned therapy must always be done. The plastic surgeon management of the fracture site infection can be a winning weapon in the treatment of this problem both in the child and in the elderly.

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