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Case Report

Mycobacterium Fortuitum infection after abdominoplasty and breast reduction: case report, diagnostic tips and tricks, and overview of the current therapeutic consensus.

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ABSTRACT

Background: Surgical site infections caused by non-tuberculous mycobacteria (NTM) are increasingly reported in the literature. Mycobacterium Fortuitum is the one that is most frequently associated with surgical site infections.

Case Presentation: We present our first case of Mycobacterium Fortuitum infection after combined abdominoplasty and bilateral breast reduction.

Discussion and Conclusions: Diagnosis of NTM-infections remains difficult. Typical symptoms are minor wound dehiscences with the evacuation of clear, odorless fluid collections. The onset can vary between one week to two years postoperatively. A wound dehiscence of a previously closed wound or slow healing of a wound must encourage a prompt diagnosis. A proper amount of fluid collection and/or tissue biopsy are necessary for an accurate diagnosis. Acid-fast or fluorochrome staining are also preferred over classic Gram staining.

Treatment consists of proper surgical debridement and long-term, targeted, antibiotic combination therapy. Surgical debridement involves surgical drainage and removal of any infected foreign material. With regards to the antibiotic treatment, a dual antibiotic therapy, consisting of an oral Macrolide with initial parental therapy of Amikacin, is recommended. However, other combinations have been reported and also seem efficacious. An antibiotic treatment of four to six months is advised. The prognosis is usually favorable, although complete healing can sometimes be annoyingly long.

Introduction

Surgical site infections (SSI) are typically caused by bacterial skin flora, introduced at the time of surgery [1]. Most frequently, Staphylococci and Streptococci are the causative organisms [1]. However, infections caused by non-tuberculous mycobacteria (NTM) are increasingly reported in the literature, both after aesthetic surgery as well as minor surgical procedures, such as nipple piercing, tattoos, and fillers [2-7]. The difficulty with these organisms lies in the fact that they cannot be identified using the standard gram staining laboratory techniques and are often insensitive to the typical antibacterial agents used in case of classic SSI [2]. They usually take several weeks to grow in vitro, but the Rapidly Growing Mycobacteria (RGM) are a type of NTM that typically grow within seven days after being cultured [8]. In case of infection, diagnosis and treatment must therefore be prompt and without delay. RGM typically breed in contaminated water sources, such as soil, tap water, and even hospital water systems. The most common disease associated with these pathogens is chronic pulmonary infection, but they are a well-reported cause of skin and soft tissue infections as well [9-11]. Although NTM-infections more commonly occur in immunodeficient patients (e.g. HIV-positive, under chemotherapy or corticosteroid treatment), several plastic surgeons have reported cases of SSI with RGM after cosmetic operations, such as abdominoplasty, liposuction, breast augmentation, breast reduction, buttock lift, and facelift [12-17]. Of all

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the RGM's, Mycobacterium Fortuitum (MF) is the one that is most frequently associated with aesthetic surgery infections [6, 7, 16, 18]. The all-round incidence of MF-infection is not reported, but some estimate it to be between four and six cases per one million people [19].

In this report, we describe a case of MF-infection at the level of the abdomen and both breasts after combined abdominoplasty and breast reduction. In fact, this was the first case we ever witnessed at our department of Plastic and Reconstructive Surgery. We also will give some diagnose- and treatment-related tips and compare our case with the reported literature.

Case report

A 35-year old woman was planned for an abdominoplasty and bilateral breast reduction. She lost 45 kilograms after undergoing laparoscopic bypass surgery four years prior. At the time of consultation, her weight was stable at 90 kilograms with a BMI of 33.5. She quit smoking a year before her planned surgery and had no other risk factors or significant medical history. The operation was performed following the standard aseptic principles. The breast reduction was performed first and was a classic wise-pattern breast reduction with inverted T, based on a superomedial pedicle. 330 grams were removed from the right breast and 308 grams from the left breast, with an additional 150cc of lipo-aspiration. Closure was achieved using Vicryl 2.0 for the deep planes, Vicryl 3.0 deep dermal, and Monocryl 3.0 and 4.0 intradermally. The abdominoplasty was performed using the standard technique with undermining until the xyphoid, rectus plication and umbilical transposition. A total mass of two kilograms was removed. No liposuction was performed in the abdominal region. Closure was similar to the breast reduction, with Vicryl 2.0 for the Scarpa fascia, Vicryl 3.0 deep dermal, and Monocryl 3.0 intradermally. A drain was left behind in each breast as well as two in de abdomen, which were removed after 48 hours. Aseptic dressings were applied for two weeks postoperatively.

The first post-operative consultation six days after the operation showed good initial wound healing without any sign of infection. Four weeks after the operation, the right side of the abdominal scar showed redness, for which the family doctor start antibiotics (Augmentin). One day later, she presented herself at the emergency department because of a liquid evacuation through the scar at that side. A treatment with a sterile gauze was started, which initially showed good evolution. However, one week later, the patient started suffering from recidivating wound dehiscences with evacuation of a clear liquid. Initial wound swabs were negative for fungi and bacteria and her blood sample showed a slightly elevated CRP of 40, with a normal white blood count. Gauze-treatment was continued, but no antibiotics were started, as no bacteria could be found. However, complete wound healing was unachievable. At three months postoperatively, a puncture was performed of a supra-areolar swelling in the left breast, diagnosed on sonography. Microbiological investigation showed Mycobacterium Fortuitum, a rare type of non-tuberculous mycobacteria (NTM). The same microbiological testings were performed on swabs of some wound dehiscences and showed the same results. The antibiogram showed a 100% sensitivity to Ciprofloxacin and Sulfonamides. Thus, a combination treatment of Ciproxine with Bactrim was started, in conjunction with the continuation of the gauze-treatment. Complete closure of all the wounds was achieved at five months postoperatively and the antibiotics were continued for four months in total. After that, the patient did not suffer from any new wound problems.

Discussion

After experiencing this particular case, one thing is clear: infection with MF (or any RGM for that matter) calls for an adequate and prompt diagnosis and treatment. But this is not self-evident. Not only do the diagnostic tests differ from the standard ones, the treatment is also not straight-forward, compared to the classic Staphylococci and Streptococci skin infections. Typical symptoms for MF-infections are the development of small liquid collections with a clear, odorless fluid drainage when evacuated. Minor wound dehiscences also occur at the infection sites. There is no pus, nor any form of severe infection [17]. There might be some irritation, local erythema, or tenderness to palpation.[16] General symptoms, such as fever, are usually absent [16]. Although mostly found in contaminated tap water, MF can also be a skin commensal and, therefore, render the patient's own skin as a source of infection [20]. Consequently, inadequate skin disinfection or sterilization techniques prior to surgery may also be responsible for these SSI [10, 13, 21, 22]. Other reported sources of MF are animals, vegetable matter, and birds [23]. There are no documented cases of human-to-human or animal-to-human transmission [2].

Immunodeficient people are most at risk, but NTM-infections can also occur in post-traumatic or heavily scarred patients (post-operative or post-burn). In case of a previous operation, the onset of symptoms may vary between one week and two years postoperatively [3, 20]. A wound dehiscence of a previously closed wound (as in our case) or slow healing of a wound should warn the treating physician of a possible MF-infection and the proper diagnostic measures should be applied. This also applies for SSI that do not respond to the classic antibiotic therapies. Unlike typical skin infections, simple swab cultures will not suffice, nor will Gram stain reliably detect RGM-infections. A proper amount of fluid collection (through needle aspiration) and/or tissue biopsy (on consultation or during surgical debridement) is necessary for an accurate diagnosis [2]. Acid-fast (Ziehl-Neelsen) or fluorochrome staining are the recommended staining methods for adequate detection of NTM, but the RGM-species often require a histopathological investigation (through tissue biopsy), as they will sometimes not stain with fluorochrome stains [2, 24]. This makes the diagnosis of MF even more difficult. Granulomatous formation is typically noted on histology, but caseation and inflammatory response can be muted or absent [7]. One should also be aware of the fact that cultures may take more than one month before a diagnosis can be set [17]. Besides MF, other relevant RGM's that are associated with SSI after aesthetic surgery are Mycobacterium Abcessus and Mycobacterium Chelonae [18]. Their treatment is similar and based on two pillars: proper surgical debridement and long-term, targeted, sensitivity-based antibiotic combination therapy [2, 24-27]. Surgical debridement is the first step of any kind of infection and is based on one main principle: source control. The source has to be controlled (or eliminated, for that matter) for the antibiotic treatment to work properly. This involves a thorough and aggressive surgical drainage and removal of any infected foreign materials, such as breast or buttock implants, prosthetic devices, percutaneous catheters, and sutures [28]. A limited debridement or drainage will often lead to prolonged clinical courses with frequent readmissions. This might explain the two-months period it took for our patient to heal completely. Although restricted debridements were frequently performed on consultation (with curettage, suture

removal, and continued gauze-treatment), a more thorough debridement in the operating room may have speeded up the healing process. However, the multiple wound dehiscences were always quite small (less than 1 cm), and therefore not a clear indication for an extensive debridement. Boettcher et al. describes a similar case with multiple small wound dehiscences were antibiotic treatment only, without surgical debridement, seemed sufficient [17].

With regards to the antibiotic treatment, classic antibiotics (penicillin, clindamycin, quinolones) targeted towards the common bacterial pathogens (Staphylococci and Streptococci) are usually started. As mentioned above, these are often ineffective in case of RGM-infections. The fact that we initially did not start an antibiotic treatment – reason being the fact that the patient did not show any form of infectious abcedation – will therefore not have influenced the healing process, we assume. As soon as the causative bacteria is known, the American Thoracic Society/Infectious Diseases Society of America (ATS/IDSA) guidelines on the treatment of cutaneous RGM-infections recommend a dual antibiotic therapy, consisting of an oral Macrolide with initial parental therapy of Cefoxitin, Amikacin, or Imipenem–Cilastatin [28]. Amikacin seems to be the most effective parenteral agent and most active agent in vitro [3, 24]. In case of clinical improvement after a few weeks, the parenteral therapy can be stopped and antibiotic oral monotherapy (macrolide) may be continued for four months in total. When bone is involved, a duration of therapy of six months is advised [28].

Different macrolides are available, such as Azithromycin, Clarithromycin, Erythromycin, and Fidaxomicin. It seems that Clarithromycin and Azithromycin remain the cornerstones of antimicrobial therapy against RGM's.[2,17,24] However, increasing development of resistance to Clarithromycin monotherapy has been reported, so other therapeutic schemes or antibiotic classes are also possible [6, 7, 16, 28-30]. In our specific case, a combination of Ciproxine and Bactrim (a Sulfonamide) was given for a total of four months with good results. Other authors describe combinations such as Doxycyclin with Ciprofloxacin, Amikacin with Ciprofloxacin, Trimethoprim-Sulfamethoxazole with Azithromycin, or Minocycline with Ciprofloxacin [6, 7, 16, 17]. MF is known to be less resistant to antimicrobial agents than other RGM's, and therefor easier to treat. Previous reports show that a variety of antimicrobial agents can be used (though best given as a combination therapy), including Amikacin, Imipenem, Fluoroquinolones, Cefotixin, Sulfonamides, Linezolid, and Tigecycline, with a variable sensitivity to Doxycyclin and Clarithromycin [3, 31-33]. Some combinations can work synergistic, such as Tigecycline with Clarithromycine, whereas other regimens create an antagonistic effect, such as Tigecycline with Amikacin [34]. Overall, a combination therapy – whether it be parenteral and oral or twice oral – seems to be a general consensus to minimize the risk of developing resistance [28, 35]. Possible adverse effect must also be taken into account [32, 36]. Previously described cases show Cefotixin-associated leukopenie, Amikacin-related ototoxicity, and gastrointestinal intolerance of Tigecycline [24].

Conclusion

MF-infections are unlike any other routine surgical site infection. They can occur up to two years after the initial operation and there is often no more than a clear serous drainage, without any obvious infectious sign. More advanced diagnostic measures are needed, and a prolonged antibiotic treatment therapy is usually recommended. The surgeon should be aware of a risk for MF-infection in case of slow wound healing, dehiscence of a previous closed wound, or lack of improvement with the classic antibiotic treatment. Rapid diagnosis by means of tissue biopsy should then be performed. In case of positive MF-detection, thorough surgical debridement is often necessary, together with a long-term, targeted, sensitivity-based antibiotic combination therapy of four to six months. Clarithromycine or Azithromycine remain the cornerstones, but other agents, such as Amikacin, Fluoroquinolones, and Sulfonamides, are often equally effective, depending on the antibiogram. Prognosis is usually favorable, although complete healing can sometimes be annoyingly long.

Conflict of interest

The authors have nothing to disclose. No funding was provided for this article.

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent

For this type of study formal consent is not required.

Author's Contributions

The article was written by the first author and reviewed by the contributing authors.

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