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Diagnostic and Treatment Options for Skin and Soft Tissue Abscesses in Injecting Drug Users with Consideration of the Natural History and Concomitant Risk Factors

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Abstract

Objective: Skin and soft tissue abscesses are common findings in injecting drug users (IDUs) who present to the surgical emergency department for evaluation and treatment. Although most cases can be managed by incision and drainage, they do require special considerations as compared to abscesses which are not caused by intravenous drug abuse.

Methods: Skin and soft tissue abscesses treated in the emergency department between 2005 and 2007 were reviewed and a systematic literature search of skin and soft tissue abscesses in IDUs was conducted, including the etiology, occurrence, risk factors, and treatment options, thus providing the rationale for the treatment algorithm presented herein.

Results: The drugs injected, the technique by which they were injected, the attendant circumstances, as well as the immunological status of the IDUs were major factors for the development of abscesses. Skin and soft tissue abscesses in IDUs should be incised and drained under local or general anesthesia depending on the size, location, and association with neurovascular structures. Different factors have been taken into account when treating soft tissue abscesses in this population which predict their specific risks and therefore further therapy needs. The incidence of tetanus is high among IDUs compared to the general population, giving rise to the recommendation for a strict booster policy if the vaccination status is unclear when the patient presents to the emergency department. The presence of fever requires hospitalisation and evaluation for the presence of endocarditis. Foreign bodies, such as broken needles, should be ruled out by radiography, and duplex sonography should be performed to identify the presence of vascular complications. Prior to incision and drainage, prophylactic antimicrobial agents should be administered to every patient and as therapy for high-risk patients, such as immunocompromised patients and patients with fevers and chills.

Conclusions: IDUs presenting with skin and soft tissue abscesses can be managed safely if some special issues are taken in account. The presented algorithm may help facilitate the decision-making in this context.

Key words: Skin abscess; soft tissue abscess; cellulitis; injecting drug use; incision and drainage

1. Introduction

Skin and soft tissue abscesses are common reasons for evaluation in the emergency department, accounting for 1-2.5% of all visits [1-3]. In general, an abscess is defined as a collection of pus appearing as a tender and fluctuant mass located in the dermal or subdermal tissue. The surrounding area presents as hyperemia and inflammation, which can become fibrotic and tough [1, 3]. Soft tissue infections often begin as cellulitis, followed by loculation and walling off of the accumulated pus, resulting in an abscess formation. When lymph tissue is involved, lymphangitis and subsequent bacteremia may result [1, 3]. Antibiotic therapy may not always reach the center of an abscess in the concentration needed for bactericidal activity, and the bacterial and phagocytic breakdown products within the abscess inhibit many antimicrobial agents, hence the rationale for a primary surgical approach in soft tissue abscess formation with incision and drainage as the definitive therapy [1-3].

Soft tissue abscesses occur at numerous anatomic sites and vary in etiology and bacteriology [3-17]. Although most cases of soft tissue abscesses are managed by incision and drainage in the emergency department on an outpatient basis, the occasional case requires hospitalization and surgical therapy in the operating room [1,4,7,18-24]. There are different factors that determine the surgical treatment strategy for skin and soft tissue abscesses, depending in general on localisation, size, etiology, risk factors, the patient condition, as well as patient compliance [1-4, 21, 24].

Soft tissue infections, e.g., abscesses, infected ulcers, and cellulitides, are some of the most frequent medical complications of IDUs [1, 4, 6, 25-27]. The prevalence of soft tissue abscesses has been estimated at 21-31% among IDUs evaluated in emergency departments and needle-exchange programs in European studies [8, 29, 30]. Thus, about one-third of all IDUs develop a soft tissue infection within one year [25]. In addition, many IDUs self-treat abscesses and wounds before seeking professional health care providers, often resulting in substantial infections and other systemic complications [31]. Although the abscess can be located anywhere on the body, the common sites of injection are the upper and lower extremities [1, 4, 7, 8, 10, 21, 32]. The abscesses are caused by multiple factors, such as non-sterile punctures, syringe sharing, inadvertent subcutaneous injections, deposition of foreign bodies (e.g., talc), and broken needles [1, 33-43].

Several issues must be taken into account when treating skin and soft tissue abscesses in IDUs as compared to a general and otherwise healthy population, and it is these issues that serve as the rationale for this manuscript [1, 23, 26, 30, 36, 39-56]. The present paper addresses these issues by reviewing the management of soft tissue abscesses in IDUs treated at our university medical centre and the current literature from a systematic PubMed database search with regard to the natural occurrence, pathophysiology, risk factors, and medical and surgical treatments. Although there are several references available regarding different aspects of abscesses in IDUs, there is a lack of information in the literature with respect to the method of handling of skin and soft tissue abscesses. We have therefore provided a treatment algorithm based on our own experience and the current literature for a better and faster approach to managing skin and soft tissue abscesses in IDUs

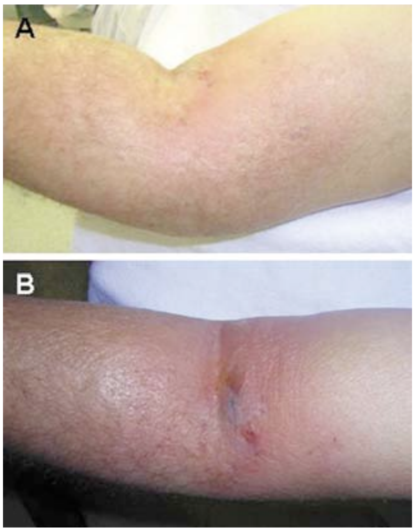

Fig. 1. Male addict presenting with a soft tissue infection of the left antecubital fossa without bone involvement after intravenous puncture and injection of a heroin-cocaine mixture. Preoperative findings (A and B): Local inflammatory signs with edematous swelling, rubor and calor.

2. Methods

The patient data base of the Division of Surgical Emergency Medicine, Department of Surgery, Ludwig-Maximilians University of Munich was searched for the diagnosis of soft tissue abscesses in IDUs between July 2005 and June 2007 and the patient records were reviewed. In addition to that, we searched both the PubMed database and the standard emergency textbooks for reports dealing with soft tissue abscesses in IDUs in conjunction with etiology, epidemiology, risk factors, therapy, and wound management to develop a treatment algorithm for soft tissue abscesses in IDUs. Moreover, we provide various photographs of common abscess locations, diagnostic findings, and surgical results.

3. Results

We identified 36 individuals treated for soft tissue abscesses due to IDU on an outpatient basis or during hospitalization. The charts of the identified patients were reviewed, building the experience base for the present treatment algorithm in conjunction with the literature search using the PubMed database. Figures 1-5 give typical findings of soft tissue abscesses in IDUs, including the surgical approach in some exemplary cases.

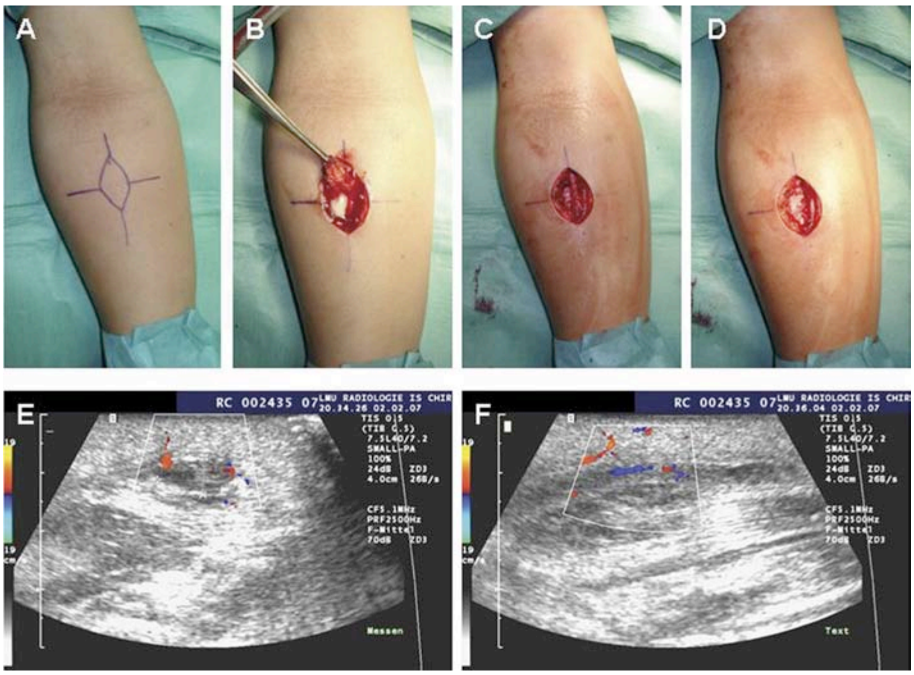

Fig. 2. Male addict presenting with a soft tissue infection of the right forearm after intravenous puncture of a epifascial vein. The IDU injected a heroin-cocaine mixture. The intraoperative bacteriology was sterile. Preoperative findings (A) Local inflammatory signs, visible abscess after abscess after ellipsoid incision of the skin (B), visible erosion of the vein before (C) and after (D). Corresponding sonographic findings of the abscess and involved vein (E and F).

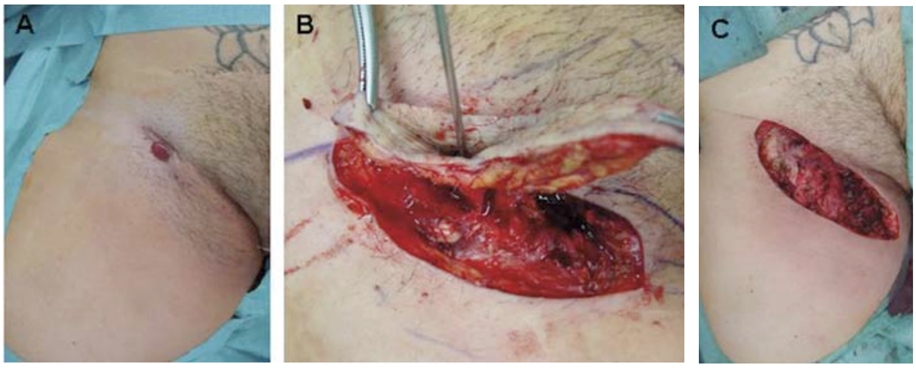

Fig. 3. Female addict presenting with a huge left sided groin abscess, spontaneous drainage of pus and fever after injecting heroin into the groin. Preoperative findings including swelling, rubor and calor (A). Deroofing of the abscess and excision of the abscess fistula (B). Completion of the abscess incision and drainage (C). Corresponding sonographic findings of the abscess cavity and involved vascular structures (D and E). The bacteriology revealed polymicrobial growth.

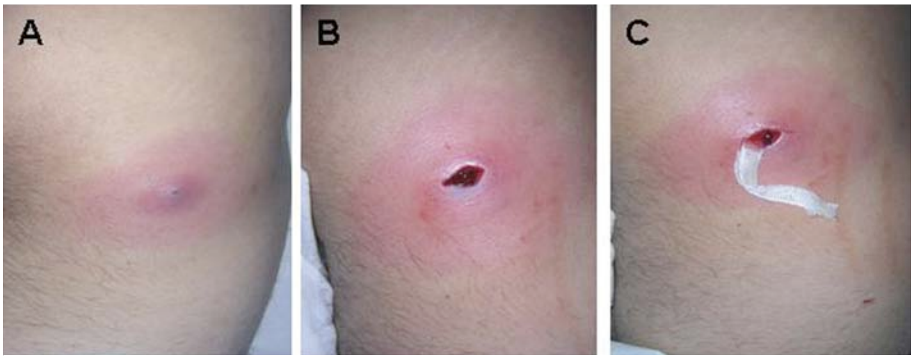

Fig. 4. Male addict after cutaneous injection of heroin presenting with a gluteal abscess including the typical signs of local infection (fluctuation, erythema and calor) before (A) and after incision and drainage using local anesthesia (B and C).

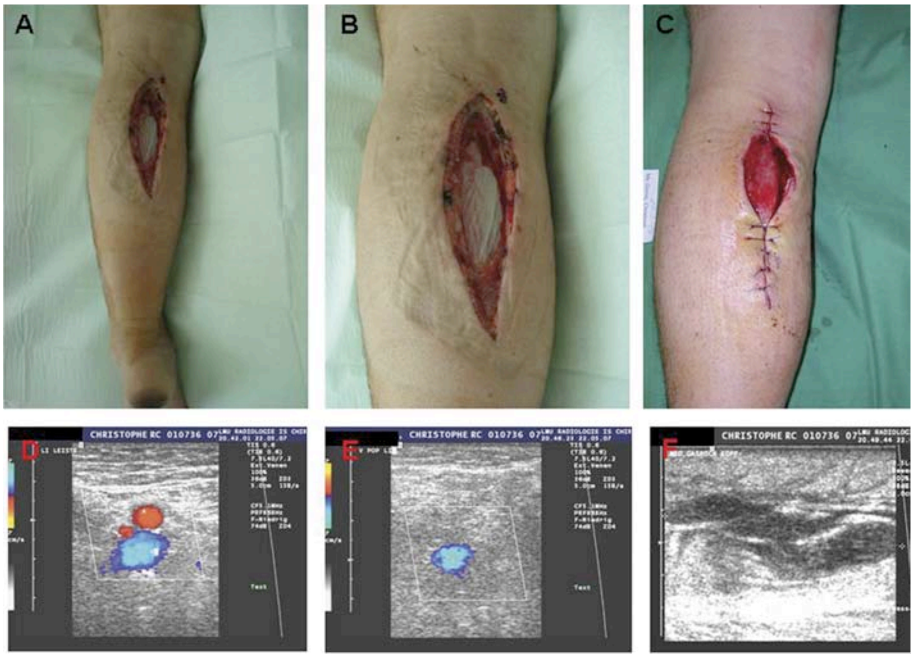

Fig. 5. Male addict injecting heroin into the left lover leg after incision, excision and drainage (A and B (magnification of A)) Please note that the vena parva was ligated and resected (B). Partial secondary wound closure 1 week postoperatively (C). Preoperative sonographic findings showing no arterial or venous thrombosis (D and E). The abscess size and location is given in F.

3.1 Etiology, Epidemiology, and Pathogenesis of Skin and Soft Tissue Abscesses in IDUs

Skin and soft tissue abscesses occur with an increased frequency in IDUs, as well as in insulin-dependent diabetics, cancer or transplant patients, or those patients suffering from acute leukaemia, when compared to a normal population [1, 7, 25, 57, 58]. In IDUs, soft tissue infections, especially abscesses, represent the most frequent reason for emergency department visits and hospitalization leading to substantial morbidity, mortality, and health care expenditures when coupled with poor access to health care [1, 19, 25, 26, 29, 45, 57-63]. A high prevalence of self-treatment may be a causal correlation in this context [25, 30, 31]. Evidence has been provided from European studies that HIV infection may be an independent risk factor for developing skin abscesses in IDUs, as well as being female gender, female prostitutes, or IDUs of a foreign nationality [64]. However, other studies have shown that HIV is not an independent risk factor [52].

The prevalence rates for skin and soft tissue infections in Europe have been estimated between 21 and 31% among IDUs evaluated in emergency departments and by interviews at needle-exchange programs, respectively [8, 29, 30]. On presentation, approximately

40% of IDUs with a soft tissue abscess are febrile (> 37.5 °C), 55% have leukocytosis, and 50% exhibit wound fluctuance [11]. In general, the normal skin is highly resistant to bacterial invasion. However, when favourable factors of the host are present, the skin can be infected more easily [1]. This higher incidence is caused by multiple factors, including intrinsic immune deficiency [64]. Important reasons for abscess formation in IDUs have been identified in recent years, including the type of injection. Thus, subcutaneous "skin popping" or intramuscular injection is associated with a higher risk when compared to intravenous injection [7, 25, 52, 65]. Moreover, the agent injected has also been found to be a relevant risk factor. Injecting a cocaine and heroin mixture (i.e., a speedball) may predispose patients to develop skin and soft tissue abscesses [7, 25, 41, 52, 64]. IDUs skin-pop most often because they are unable to gain access to a vein [25]. A positive correlation is also seen in patients using a "booting" technique for drug abuse [7, 52]. Booting is the injection technique whereby blood is drawn into the syringe prior to injection [7]. In addition, the prevalence of skin and soft tissue infections increases with the frequency of injections [64, 66]. Moreover, "black tar," a kind of heroin from Mexico, has been shown to be involved in severe infections associated with a high mortality, like necrotizing fasciitis and tetanus infections [7, 19, 46, 48]. Using used needles after someone else or dirty needles (i.e., a dirty hit) for drug abuse is also found to be associated with a higher risk for skin and soft tissue infections [7, 40, 52]. On the other hand, cleaning the puncture side with alcohol before drug injection prevents the development of abscesses [42, 52].

In recent years, various investigations have found the most common microbial organisms in the abscesses of IDUs differ [1, 14-16, 46]. However, in a majority of abscesses, a polymicrobial growth exists [16]. Therefore, it is thought that the particular bacteriology in this population varies based on the patient's lifestyle, drug use practices, the specific flora in that particular addict, and the geographic location [1, 16, 52, 67]. Thus, for instance, the bacterial organisms of the oral flora are found commonly in those addicts who solubilize their drugs in their saliva. The most common single bacterial organisms isolated from abscesses caused by IDU are aerobic Staphylococcus spp. and group A Streptococcus spp. [11, 14, 15, 67, 68]. However, there are not few abscesses found to be sterile in IDUs, most likely the result of injecting necrotizing chemical irritants or by exacerbation of an underlying systemic disease [1].

In principle skin and soft tissue infections may develop on any part of the body, although the upper extremities are most commonly affected [1, 7, 8, 11]. Any abscess located near a vein of the antecubital fossa or dorsum of the hand should be suspicious for possible intravenous drug use [1]. In general, it has been estimated that the arm is affected in about 50% of IDUs, followed by the leg in 20%, and the buttocks and deltoid by about 15% each [1, 3, 7, 8, 11]. Infections located in the neck or torso are rare, accounting for < 2% [1]. Deeper occurring abscesses or cutaneous abscesses away from the veins follow attempts at deeper veins and direct skin injections, respectively, in addicts who have exhausted superficial peripheral venous access [1, 2, 69].

An abscess often begins as a cellulitis followed by loculation and walling off of pus, resulting in the formation of an abscess [1-3, 69]. While staphylococcal stains produce a rapid necrosis, early suppuration, and a localized infection with creamy, yellow pus, group A ß-hemolytic streptococcal infections are more generalized and characterized by edema and erythema with serous exudation and minimal necrosis, with dissemination through the tissue [1]. Lymphangitis and subsequent bacteremia may result if lymphatic tissue is involved [1-3].

3.2 Patient-related Risk Factors in Association with Skin and Soft Tissue Abscesses in IDUs

Evidence has been provided that in IDUs, a high incidence of undiagnosed bacterial endocarditis is present which is estimated to be about 1.1% in Western countries [22, 50, 64, 70-72]. This incidence increases with the presence of fever. Thus, patients presenting with temperature should be highly suspicious for having bacterial endocarditis as evident from a previous analysis of 87 IDUs presenting with a body temperature of > 38.1 °C and having been diagnosed with the presence of endocarditis in almost 15%, whereas 40% had pneumonia, 25% had trivial infections (i.e., pharyngitis), and other anatomic sites accounted for by 20% [23]. It has been shown by Manoff and co-workers [50] that HIV-related immunodeficiency may independently increase the risk of infective endocarditis among IDUs.

It also has been reported that septic emboli occur from endocarditis in IDUs that causes abscess formation by bacteremic migration [1, 3]. Parenteral drug abuse is associated with a high incidence of HIV-related disease and, like other immunocompromised patients, are at high risk for septicemia secondary to a brief bacteremia [50, 51, 64].

Vascular complications, including the venous and arterial sites, are other known risk factors in IDUs [21, 34, 36, 65, 73-76]. These complications most often affect the upper and lower extremities, apart from the thrombophlebitis which can occur at every injection site of the body [1, 76]. Vascular complications involving the neck are very are since it represents a rare injection site [1, 4, 8, 9]. Vascular complications include the risk for deep vein thrombosis first. Thus, addicts injecting in the groin (i.e., a groin hit) or lower leg are at high risk for ileofemoral venous thrombosis which is the most common phenomenon in groin hitters due to its ease of access [36, 47, 49]. However, upper extremity deep venous thrombosis has had an increased incidence due to cocaine abuse in recent years. It has been suggested that ileofemoral venous thrombosis occurs after many years of IDU when superficial veins have become thrombosed [1, 36, 49, 66]. Other vascular complications include pseudoaneurysm formation as a serious consequence of intravenous drug abuse and intra-arterial injections, which can result in limb-threatening ischemia due to vasospasm [36, 73, 74, 76]. Thus, a high proportion of patients have symptoms of claudication after years of intravenous groin drug injection, especially if cocaine is injected, which do not only have effects on the myocardium, but also on the vascular bed. Further described complications include arteriovenous fistula mycotic aneurysm and arterial dissection, which require special surgical considerations [36, 73, 75, 76].

An overall rare, but severe risk is related to tetanus in IDUs [45, 55, 78]. Thus, at least 24 cases of tetanus occurred within 6 months over the years 2003-2004, leading to the recommendation that clinicians should consider the systemic effects of apparently trivial wound infections in IDUs, presenting with unexplained collapse, sepsis, or odd neurologic symptoms, which might otherwise be dismissed as the direct result of drug intoxication [55]. The Centers of Disease Control and Prevention (CDC) reported 67 cases of tetanus in California between 1987 and 1997, with 27 patients being IDUs [45].

Foreign bodies, such as broken needles, represent a further risk factor, as they frequently exist in IDUs. Broken needles are a nidus of infections and result in severe risks and complications [1, 33-36, 38, 53, 79-82]. Further, it has been reported that broken needles cause vocal cord paralysis and emboli at different sites. Norfolk and Gray [53] interviewed 70 drug addicts and reported that 14 IDUs had experienced 23 needles breaking while injecting drugs, of which 14 were recovered, 4 by surgical intervention and the remaining needles by direct manipulation of the individual.

Septic arthritis or osteomyelitis may occur in IDUs [22, 36, 83-86]. Necrotizing fasciitis represents the severe end of the spectrum of soft tissue infections in IDUs and is associated with a high morbidity and mortality [19, 44, 46, 48, 69, 87].

3.3 Patient Assessment and Diagnosis of Skin and Soft Tissue Abscesses in IDUs

There is a high coincidence between IDUs and the presence of infectious diseases, such as hepatitis C and HIV, thus it is important to exercise caution if a patient presents with an abscess in an atypical location, e.g., in the cubital fossa or near a cubital vein, the dorsum of the hand, or in the groin [1, 51, 52, 64]. In this context, it is important to note that skin and soft tissue abscesses in IDUs may also be the result of a foreign body within the abscess, such as broken needles, which may perpetuate the infection even after incision and drainage, lead to severe systemic and organic complications if not harvested, or even cause injuries and thereby infections to the treating physician during examination and surgical therapy [1, 35, 53].

Prior to initiating a specific surgical therapy, the patient's medical history should be elicited, including a history of fever, intravenous drug abuse, as well as the infection state (HIV or hepatitis), and further abscesses queried. In addition to that, the current tetanus status should be confirmed and a booster dose provided as required. A brief directed physical examination of the function and, if appropriate, neurovascular status of the extremity or part of the body involved is required. A routine laboratory study should be obtained in every patient with fever, chills, or those who require exploration of the abscess in the operating room, including a blood count, electrolytes, C-reactive protein, creatinine, and coagulation status. The patient should be questioned regarding a history of fever or chills and the rectal temperature taken because IDUs are more likely to have bacterial endocarditis when compared to the general population [23, 50, 64, 70, 72]. In addicts presenting with fever aerobic and anaerobic blood cultures should be taken and as well as a chest radiography performed to evaluate the possibility for pneumonia.

The diagnosis of a skin or soft tissue infection is usually straightforward. The presence of cellulitis or a fluctuant mass in an area of erythema and induaration is clinical evidence for infection. However, if the abscess is located deep in the tissue, a fluctuant mass or the erythema may be missed and the diagnosis may be difficult [1]. In cases of deep abscesses, soft tissue abscesses located within the area of a joint, or on the dorsum of the hand, further radiographic evaluation is required to exclude bone or joint involvement or foreign bodies, such as broken needles. A computed tomogram may be helpful to clarify the anatomic relationship to the neurovascular structures if the abscess is located in the neck. However, at least a sonographic evaluation is recommended in all soft tissue abscesses, except superficial skin abscesses. This non-invasive diagnostic tool may be helpful in estimating the extent and depth of soft tissue abscesses and also identify the relationship to relevant vessels since soft tissue abscesses are often found to be larger and deeper than thought by clinical examination.

In uncomplicated cutaneous abscesses, a routine culture of the purulent drainage is unnecessary and does not offer any advantage because of the prompt response to the surgical incision and drainage as well as the often present polymicrobial nature of the abscess.

3.4 Primary Therapy of Skin and Soft Tissue Abscesses in IDUs

There are different factors that determine the medical and surgical approach of skin and soft tissue abscesses in IDUs, as noted before. Relevant factors are the location and size of the abscess, the presence of fever or chills, high inflammatory blood biomarker values, as well as the degree of patient cooperation. In this context, it must be stressed that if fever and or chills is present in IDUs presenting with a skin or soft tissue abscess, the patient should be hospitalized, blood cultures taken, and intravenous antibiotics started because physicians are unable to predict who will ultimately develop an endocarditis. Pre-existing heart valve disease and a history of endocarditis is frequently present in IDUs given the rationale for prophylactic antibiotic dosage prior to incision and drainage, as well as a subsequent therapeutic antimicrobial therapy. For prophylaxis of bacterial endocarditis, an anti-staphylococcal penicillin, a first generation cephalosporin, or clindamycin in patients allergic to penicillin, are the antibiotics of choice [1, 11-16].

In patients presenting with cellulitis, no incision need be performed primarily, but the affected extremity should be immobilized and cooled. In the absence of fever, chills, and high inflammatory blood biomarker values, the patient need not be hospitalized; initiation of oral antimicrobial therapy and close follow-up after 48 hours, or earlier if the patient's condition gets worse, is sufficient. On the other hand, skin and soft tissue abscesses need to be incised and drained. The first decision to make in this context is whether or not an abscess incision and drainage can be performed in the emergency department under local anesthesia. This depends mainly on the size and location of the abscess, as well as on the degree of cooperation of the patient. When local anesthetics do not archive sufficient analgesia or the patient is uncooperative, general anesthesia is preferred [1, 88, 89]. Patients with an abscess located in the cubital fossa, groin, neck, or near neurovascular structures should be taken to the operating room and surgical therapy performed under general anesthesia. Smaller and more superficial abscesses, such as abscesses resulting from skin popping, may be adequately treated in the emergency department under local anesthesia. Because of the concern of inducing bacteriemia by manipulation of the infected tissue, parenteral antibiotics should be routinely given prior to incision and drainage of a soft tissue abscess [1]. Thus, it has been reported previously that bacteremia occurs with an incidence ranging up to 60% following simple incision of cutaneous abscesses which could be significantly reduced by antibiotic prophylaxis [90]. When oral prophylactic antibiotic regimens are preferred, it should be administered one hour prior to surgical intervention or within 30 minutes in case of intravenous therapy. In contrast to the antimicrobial prophylaxis prior to incision and drainage, the routine use of antibiotics following surgical drainage of cutaneous abscesses in otherwise healthy patients does not appear to be of significant value [1]. However, this does not include those with concomitant disease, such as immunocompromised patients [1].

In abscesses with significant surrounding cellulitis or lymphangitis, therapeutic antibiotics may be of benefit, although this is controversial in literature [1]. The therapeutic use of intravenous antibiotic therapy should also be considered in every immunocompronised patient, such as those with AIDS, fever and chills, possible endocarditis, and a history of endocarditis until endocarditis has been ruled out [1, 23, 54, 71, 72]. In general, antibiotic therapy should be administered in accordance to the clinical response for 5-7 days in immunocompromised patients, while immunocompetent patients should receive therapy for 3-5 days [1].

The skin is usually incised the total length of the abscess cavity to afford a more complete drainage of the abscess and to reduce later difficulties and painful changes of the packing during follow-up [1-3, 69]. If necessary, the skin can be excised in an elliptical manner; however, this will cause scar formation. An abscess should never be exposed by the surgeon's fingers, unless foreign bodies like broken needles are ruled out. Sharp curettage of the abscess cavity is usually not required and may produce bacteremia [1-3].

3.5 Secondary Therapy of Skin and Soft Tissue Abscesses in IDUs

In general, the procedure performed should be kept simple and definitive. The technique of packing the wound cavity depends on the surgeon's personal preference. Packing changes should be performed initially on the first postoperative day and thereafter in accordance with the clinical course, but in general, every other day [1-3]. Prior to changing the wound packing, the patient may require analgesia. The packing should be soaked with saline before removal and the wound flushed with saline after inspection for residual purulent drainage or necrotic debris. Once the wound is conditioned and granulation tissue has developed, the packing may be discontinued and the patient instructed to clean the wound with warm water showers and the patient can then be seen at longer intervals for follow-up. In case of large defects, there may also be an indication for wound closure by split-skin grafting; however, a high grade of patient cooperation is warranted. Other therapeutic options may include the use of a vacuum-assisted closure technique of the wound cavity in large defects.

3.6 Treatment Algorithm of Skin and Soft Tissue Abscesses in IDUs

Our own experiences, as well as results of the review of the current literature, have served as the basis for the rationale for the treatment algorithm of skin and soft tissue abscesses detailed in Figure 6.

4. Discussion

Numerous surgical complications can arise from intravenous drug use. When interviewing IDUs at needle exchanges in Glasgow, Morrisson and co-workers [30] found that the respondent's accounts of their current injecting-related problems were consistent with the clinician's findings, suggesting that IDUs are able to self-diagnose injecting-related harm. However, nearly three-quarters of IDUs do not seek professional help for these problems [30]. It is obvious that most injecting-related complications, such as skin and soft tissue infections, are preventable through education and prevention efforts that encourage and enable sterile injection practice.

We have provided comprehensive data on the etiology, risk factors, and surgical management of skin and soft tissue abscesses in IDUs and illustrated the most common types of abscesses as well as their locations by various clinical features. Moreover, we have created a treatment algorithm for better and faster management of skin and soft tissue abscesses. The question could be raised whether there is a need for such an algorithm. To our knowledge, this is the first report providing a comprehensive algorithm despite general recommendations for the treatment of skin and soft tissue abscesses in IDUs and, as stated before, soft tissue infections in IDUs is a relevant urban problem in Western countries. The frequent use of the emergency department by IDUs has been attributed to the lack of access to primary care and barriers to health services. It has also been stated previously that IDUs seeking care in emergency departments will often have serious infections that result in hospitalization and an operating room procedure [30, 60-62, 91-98].

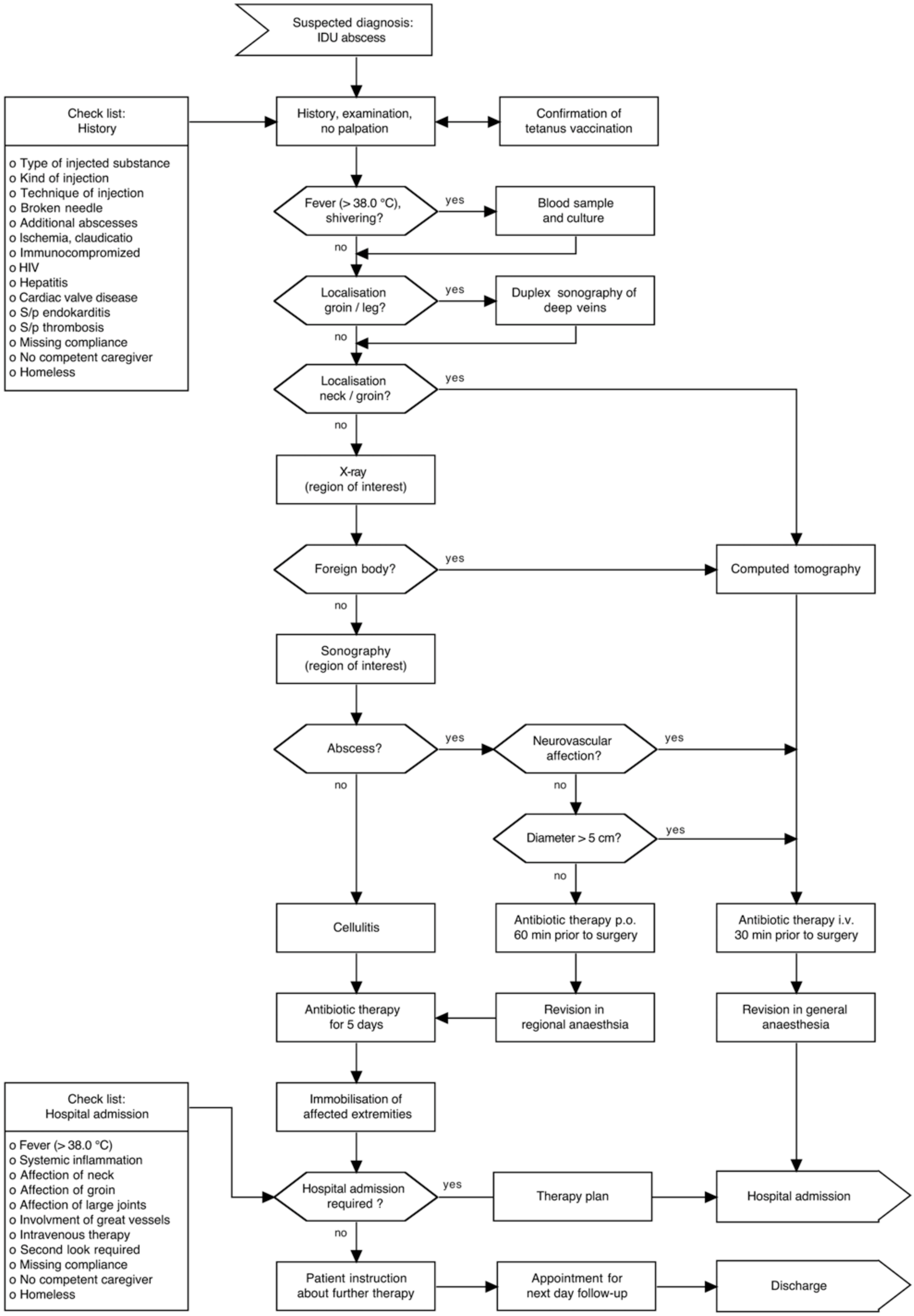

Fig. 6. Treatment algorithm of skin and soft tissue infections in injecting drug users.

Although the diagnosis of a skin and soft tissue abscess is most often straightforward, some special issues need to be taken into account when treating IDUs compared to the general population. In our hands, the knowledge of the injected drug, as well as the type of injection, is important to know. Thus, as mentioned before, a heroin-cocaine mixture often causes more severe injections and is associated with a higher rate of complications. It is known that immunocompromised patients, such as HIV infections, are susceptible for a more severe course of skin and soft tissue infection. Therefore, when eliciting the patient' medical history, one should query the immunological status and determine the infections disease exposure as well as if the patient has already suffered from bacterial endocarditis because here determination of low and high risk dictates whether or not the patient needs therapeutic antibiotics. In this context, the presence of fever is important to establish and requires hospitalization for further evaluation. In contrast to that, laboratory tests often do not offer specific guidelines for further therapy in cutaneous abscesses [1]. When reviewing the literature, almost 50% of abscesses and cellulitis require hospitalization. Thus, Takahashi and co-workers [4] found cellulitis to be a strong predictor for hospitalisation. However, this as well as the length of hospitalization varies widely when reviewing the literature and is most likely attributed to major differences in health care systems.

A duplex sonographic evaluation of abscesses located in the lower leg is warranted to detect vascular complications which may require further therapy. The most common accompanied disease found in this context is the presence of deep femoral vein thrombosis. A radiographic evaluation of the abscess region should be performed in every IDU presenting with a skin and soft tissue infection to detect foreign bodies and possible bone involvement. Thus, possible foreign bodies which may causes complications can be harvested and the surgeon can exercise caution. The additional diagnostic use of computed tomagraphic scans should be used as indicated. Thus, it may be helpful in determine the extent of abscesses located in the groin or neck, to confirm the exact location of foreign bodies by x-ray, although there is no evidence to support this in the literature.

In our hands, abscesses involving neurovascular structures or the bone, a size >5 cm, or a foreign body in situ should undergo surgical evaluation under general anesthesia. In this context, neurovascular structures imply the location at the neck and groin as well other locations where large epifascial vessels are involved.

In conclusion, we have presented an algorithm for the treatment of skin and soft tissue abscesses in IDUs, including extended information on etiology, risk factors, and complications, by reviewing the current literature. Physicians must always maintain vigilance when evaluating IDUs with medical complaints presenting to the emergency department.

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