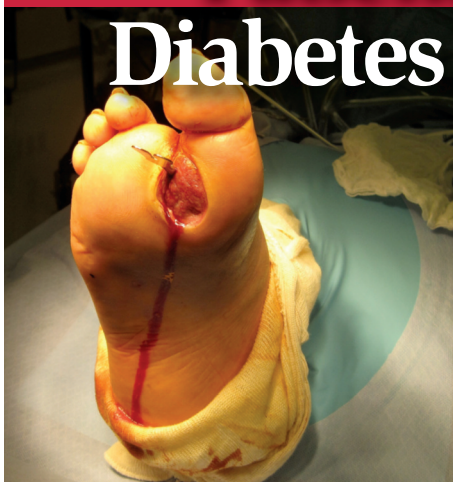


THE DIABETIC FOOT

Diagnosis and Treatment of Deep Space Infections in Patients with Diabetes Mellitus



Here's how to handle these dangerous conditions.

BY JOHN M. GIURINI, DPM AND SARAH ELDER, DPM

Goals & Objectives

After completing this CME:

- 1) The reader will become familiar with the signs and symptoms of deep space infections in patients with diabetes mellitus.
- 2) The reader will become familiar with the initial workup of patients presenting with signs and symptoms of deep space infections.
- 3) The reader will understand the urgency of diagnosing space infections and the importance of early surgical intervention.
- 4) The reader will become familiar with the likely causative agents of deep space infections.
- 5) The reader will become familiar with which diagnostic studies are appropriate in patients with deep space infections and when to utilize them.

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Following this article, an answer sheet and full set of instructions are provided (pg. 226).—Editor

Deep soft tissue abscesses are one of the predominant and most challenging soft tissue infections that a foot and ankle surgeon will encounter when treating diabetic patients. Diabetic patients have up to a 25% risk of developing a foot

ulceration during their lifetime,¹ and the presence of an ulceration is the biggest risk factor for a deep space infection.² Deep space infections can result in rapid morbidity and can result in the necessity for amputation. Infected diabetic ulcerations have a 15- to 30-fold increase of risk of lower ex-

tremity amputation, cost more than \$17,000 per episode³ to treat and account for 85% of all lower extremity amputations in people with diabetes.⁴ Prevention and rapid diagnosis and treatment are necessary to prevent further morbidity and limb loss.

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Etiology

Deep space abscesses in diabetic patients generally form following a break in the skin either from ulceration or a traumatic, penetrating wound. It is common knowledge that diabetic patients are more susceptible to foot infections because of the triad of sensory neuropathy, vascular disease, and longstanding hyperglycemia. Peripheral neuropathy occurs in 30% to 50% of patients with diabetes, and it diminishes the protective sensation to temperature, pain, blistering, or penetration of a foreign body.⁵ Neuropathic ulcerations are the leading cause of deep space infections in diabetics.⁶ Though many ulcerations remain superficial, approximately 25% of ulcerations will spread to deeper soft tissue or bone, and up to half of all patients who have a diabetic foot infection will develop another ulceration within a few years.⁷

Penetration by a foreign body can inoculate deep spaces of the foot depending on the depth of penetration. The inability to perceive this injury can lead to progression of an infection. Puncture wounds occur more than 50% of the time on the plantar foot, and more than 90% involve penetration from a nail.⁸ Other objects commonly encountered include insulin needles, glass, and wood splinters.

Physical Examination

Diabetic patients often do not mount a normal immune response to infection, and therefore have poor diagnostic indicators of infection. The classic signs of inflammation (erythema, edema, warmth, and pain) or purulence from a wound normally aid in the diagnosis of a foot infection. However, peripheral vascular disease and neuropathy may blunt much of the swelling, erythema, and pain commonly present. It is paramount that a physician performs a very thorough exam to obtain any possible clues of infection.⁹ Blistering, malodor, and necrosis are signs of infec-

tion. Fluctulance of the soft tissue may be noted, and in the case of an anaerobic infection, crepitus may be felt around the abscess. Through the wound's opening, one should use a sterile, blunt instrument to probe the area in all directions to appreciate

oped from diabetic foot ulcerations and infections in 15.2% of the reviewed cases.¹² The infection quickly spreads along tendon sheaths and fascial planes destroying fascia, fat, and muscle, and if left untreated, can threaten the patient's life.

One should use a sterile, blunt instrument to probe the area in all directions to appreciate any sinus tracts, undermining, or bone involvement.

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Diabetics can mask systemic signs of infection and may not exhibit fevers, leukocytosis, or changes in blood pressure or heart rate that will indicate the presence of an infection. A retrospective study of 223 consecutive diabetic patients with deep foot

Over 90% of necrotizing fasciitis cases are caused by anaerobic organisms—gas-producing bacteria that are killed or inhibited in the presence of oxygen. Upon initial presentation, the skin of the patient will appear to have a violaceous discoloration with vesicles present. The patient may have pain out of proportion and crepitus

with palpation of the soft tissue may be noted. Radiographs and CT will often reveal the presence of gas in the soft tissue. However, while these modalities may aid in assessing the extent of the infection, expedited surgical debridement in a patient with necrotizing fasciitis should not be delayed for radiologic testing.

Gas Gangrene

Gas gangrene has a very rapid course with potentially severe tissue destruction. *Clostridium perfringens* is the most common organism responsible for gas gangrene, which requires a decreased oxygen level in the tissues to flourish. Systemic illness is more severe in patients with gas gangrene than necrotizing fasciitis. Depending on time of presentation, a patient may have shiny, tense skin, or may have developed hemorrhagic bullae with malodorous discharge. Similar to the treatment of patients with necrotizing fasciitis, patients with gas gangrene will need emergent

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TABLE I
Limb and Life-Threatening Symptoms Requiring Emergent Debridement

Febrile	Confusion
Hypotensive (SBP < 80/d)	Vomiting
Azotemia	Acidosis
Tachycardia	Severe Hyperglycemia
Leukocytosis	Presence of Gas on Imaging Exam

infections found that 50% of patients lacked clinical signs of infection, including body temperature greater than 37.8 centigrade or an elevated white blood cell count.¹⁰

Necrotizing Fasciitis

Necrotizing fasciitis is a limb- and life-threatening infection of subcutaneous tissue that requires a quick and accurate diagnosis. Joshi, et al. reported a mortality rate of 40% in diabetic patients who had developed necrotizing fasciitis.¹¹ Elliott, et al. found that necrotizing fasciitis devel-

surgery and broad spectrum intravenous antibiotics (Figure 1).

Laboratory Tests

A complete blood count with differential, Chemistry-7, blood cultures, and coagulation studies should all be part of the initial laboratory workup. Leukocytosis with shift to the left will likely be found in deep space infections. However, diabetics may not show an elevated white blood cell count, and the absence of it should not alter a physician's treatment. In fact, in severe infections, patients may present with a low white count due to the fact that the bone marrow may not be able to keep up with destruction of white cells as they are consumed in fighting off the infection. In a large, multicenter study, 56% of 189 patients admitted for a diabetic foot infection did not have an elevated white blood cell count, and neutrophil counts were normal in 84% of the patients.¹³

Erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) are often drawn as baseline inflammatory markers, but may also be within normal limits in an infected diabetic foot. Elevated creatinine and BUN may also be present, as severe acute infection causes muscle destruction and often places increased stress on kidney function.

If possible, tissue samples from the base of the wound should be obtained in the office or emergency room setting and sent to microbiology for expedited analysis to help with antibiotic therapy. The samples should be sent for gram stain, and aerobic and anaerobic culture analysis. Tissue samples of a wound are superior to superficial swabs for analysis.¹⁴

Epidemiology

Diabetic foot infections are typically polymicrobial, and until a culture is finalized, empiric intravenous broad-spectrum antibiotic therapy should be initiated. Usually, gram-positive bacteria, particularly Staphy-



Figure 1: Presence of gas on plain x-rays or MRIs is an ominous sign and should be addressed by urgent incision and drainage.

lococcus aureus and Group A Streptococci are the prevalent organisms in diabetic foot infections. One should always suspect methicillin resistant *S. aureus* [MRSA] in diabetic patients who have had longstanding wounds, have been previously hospitalized, or have received prior prolonged antibiotic therapy.⁵

Group B Streptococci, typically not found in healthy hosts, are not uncommon in diabetic foot infections.¹⁵

Gram-negative rods (*Pseudomonas*, *Proteus*, *Escherichia coli*) are often present in patients with chronic wounds as well and are particularly difficult to treat. *Pseudomonas* is the most likely organism found in puncture wounds where the foreign object has penetrated through socks and shoes. Gram-negative microorganisms are common in wounds that have been exposed to water or wounds stemming from sinus tracts or deep ulcerations. Anaerobic bacte-

as well as any cortical irregularities that may denote the presence of osteomyelitis in a long-standing infection. While plain film radiographs are relatively inexpensive and do assist in the workup for infection, x-rays do not enable the practitioner to focus on any soft-tissue abnormalities and may miss foreign objects that are not radiopaque.

Ultrasonography

Ultrasonography may be helpful for the physician to determine if a deep space infection is present. It is inexpensive and very often readily available. Waveforms generated differentiate fluid from solid structures, and this difference in echogenicity helps to indicate the presence of an abscess. An ultrasound may also help to determine the location of a foreign body if present. However, utility of ultrasound to detect foreign bodies is dependent on the equipment and the experience of the ultrasonographer.

Computed Tomography

Computed Tomography [CT] allows for three-dimensional imaging with high sensitivity for cortical ero-

**Abscesses and foreign bodies
can be diagnosed quickly and inexpensively
by ultrasound.**

ria (*Clostridium*, *Peptococcus*) may be present in patients with ischemia or gangrene.¹⁶ The surgeon must also be aware of *Pasteurella multocida* if a wound is the result of a recent animal bite, especially cat or canine.

Imaging Modalities

Plain Film Radiographs

Plain film radiographs are typically the first imaging modality used in an infection workup. Swelling of a limb is appreciated in an infection, and the presence of gas indicates a serious, limb-threatening soft tissue infection. X-ray analysis should include a search for any foreign body

sions, gas, and foreign bodies. Abscesses with an intact surrounding wall are able to be differentiated from the less focal gross swelling that may be found in a more superficial cellulitis. CT scanners are able to provide high detailed cross-sections as narrow as 1mm sections that allow for high specificity and sensitivity of cortical disruptions that may be seen in osteomyelitis.

Magnetic Resonance Imaging

Magnetic resonance imaging is the most useful radiologic study for deep space tissue infections. It allows for more accurate viewing of deep space

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infections as it shows enhanced signal intensity in the various soft tissue planes. In contrast to CT scans, MRI better delineates the surrounding soft tissue changes. In addition, an MRI with contrast will differentiate between a necrotizing soft tissue infection and a non-necrotizing soft tissue infection due to failure of the necrotic fascia to enhance with contrast.¹⁷ Deep abscesses have a distinguishing characteristic on MRI as having a complete hypo-intense ring around a fluid-like signal.¹⁸ This finding helps to differentiate between an abscess and cellulitis, which on MRI contains more diffuse swelling among fascial planes, with no focal fluid collection (Figure 2).

Treatment

Immediate surgical incision and drainage with debridement is always

the debridement is completed and prior to applying a dressing. This is necessary in order to determine the adequacy of the debridement. If a tourniquet is used, it is important not to exsanguinate the extremity with an Esmarch bandage before inflating the tourniquet. This standard technique can spread purulent material proximally along tissue planes or along tendon sheaths. A blunt, grooved obturator is inserted into the ulceration as a guide to identify any sinus tracts and may assist in surgical incision planning (Figure 3). Linear incisions along the grooved obturator allow for exploration of the sinus tract

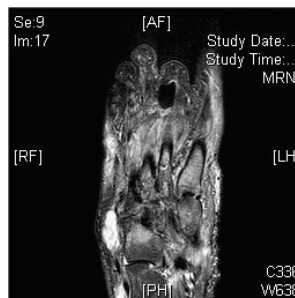


Figure 2: Advanced imaging can be useful in identifying abscesses that may require incision and drainage.

is best to remove the tendon as proximally as the incision will allow, even extending the incision if necessary. Deep swab cultures should be taken for analysis of gram stain, and aerobic and anaerobic wound analysis.

Resection of necrotic or infected bone should be performed and sent separately to microbiology

and pathology for analysis. After the area of necrosis has been removed, a pulse lavage of at least three liters of normal saline or orthopedic solution containing bacitracin should be used to provide additional mechanical debridement of the area. If a tourniquet was used, it should be released following the lavage. Any remaining areas of necrosis should be removed with a clean instrument not used previously in the case. The wound should be packed open to ensure adequate drainage with saline wet-to-dry gauze and a dry, sterile dressing.

The packing should be changed at least once daily for close monitoring. Additional incision and debridement procedures may be necessary over the ensuing 24 to 72 hours to assure complete control of the infection.

There are circumstances when an open amputation may be the best or only option in a severe infection that has led to widespread necrosis or a life-threatening emergency.² In pre-operative planning, a surgeon should remain cognizant of a patient's rehabilitative status post-operatively and try to maintain a viable weight-bearing foot when determining the level of amputation.

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If a tourniquet is used, it is important not to exsanguinate the extremity with an Esmarch bandage before inflating the tourniquet.

indicated in deep space infections. A morbidity and mortality rate of 35% has been found in severe diabetic foot infections, even when managed appropriately.¹⁹ Delay in surgical treatment of severe diabetic foot infections can lead to further harm. Even in the setting of ischemia, it is paramount to perform an adequate incision and drainage initially and then consult a vascular surgeon for workup and possible intervention. Faglia, et al. reviewed 106 patients with deep foot space abscess. They found that patients who underwent immediate incision and drainage procedures had more favorable distal amputation levels when amputation was required than patients who experienced a surgical delay for initial debridement.²⁰ These patients had no statistical difference in levels of peripheral vascular disease.

The initial incision and debridement procedure may be performed with a tourniquet in patients with adequate perfusion. However, the tourniquet should be released once

with good exposure. Additionally, all incisions should be made in a longitudinal direction that promotes dependent drainage (Figure 4).

Transverse incisions should be avoided at all cost so as to avoid damage to neurovascular structures. All areas should be explored methodically, making sure to appreciate any tracking, abscesses, or areas of necrotic soft tissue or bone. Exposed tendons often provide a nidus for tracking of infection or for recurrent infections, and should be carefully analyzed intra-operatively. If an infection appears to be tracking proximally within a tendon, it



Figure 3: A grooved director is inserted into the ulcer site which can identify the depth and direction of a sinus tract and can assist with placement of the incision.

tion. However, the primary goal should be complete removal of all necrotic tissue, and the eradication of infection should dictate the level of amputation.

A vascular surgery consultation should be placed if the foot appears ischemic during the initial incision and debridement, or if there is a history of vascular insufficiency. Pulse volume recordings and a vascular ultrasound should be ordered for vascular assessment. When necessary, revascularization performed within days of the initial debridement provides the best chance of successful treatment and limb preservation.²⁰

In large vessel disease, a vascular surgeon may be able to perform an angioplasty and stent large vessels. When stenting is not possible, a peripheral bypass procedure using in-situ saphenous vein may be indicated. However, in some diabetic patients, smaller vessels may be affected by peripheral arterial disease. In these circumstances, the microcirculation can affect healing and can result in a more proximal amputation if adequate circulation is not present. This is especially the case in diabetic patients with chronic renal disease or on dialysis.²¹

Closure Methods

Closure methods depend on the location, size, and depth of the final wound. Careful analysis to ensure that all infection has been removed should be performed before implementing any closure method. Primary closure with non-absorbable, full-thickness sutures is possible in a clean, more superficial wound that is void of drainage. Sutures on the dorsum of the foot should remain for two to three weeks while plantar sutures should remain in place for a minimum of three to four weeks. Strict non-weight-bearing should be enforced for plantar wounds to minimize risk of wound dehiscence.

Negative Pressure Wound Therapy

Negative pressure wound therapy [NPWT] has proven to be advantageous to increase healing and granulation tissue following partial foot amputations, and is a valid alternative for wounds that are deeper or that continue to exhibit drainage.²² The use of NPWT can lead to smaller, more superficial and granular wounds that may be amenable to eventual skin grafting or primary closure. Local flaps may also be used once the foot is void of all infection in order to obtain epithelial coverage.



Figure 4: Dependent drainage promoting drainage of purulent material.

Antibiotic Therapy

Deep space diabetic foot infections are typically polymicrobial. Broad-spectrum empiric intravenous antibiotic therapy is indicated, especially in the early stages of sepsis as final culture results and antibiotic susceptibility may not be available for 48-72 hours.¹⁶ Gram stain results are often obtainable

therapy in deep space infections should include anaerobic coverage, at least until final culture results and sensitivities are available. At the Beth Israel Deaconess Medical Center, most patients with severe diabetic foot infections are empirically started on vancomycin, ciprofloxacin, and metronidazole, which are later tapered according to sensitivity reports.

The duration of antibiotic therapy depends on the magnitude of infection, the adequacy of debridement, vascular status, and the definitive surgical procedure. For mild soft tissue infections, a 10 to 14 day course of oral antibiotics beyond the initial inpatient intravenous regimen may suffice.

In more serious soft tissue infections, or in cases where all suspected osteomyelitis has been removed, at least two weeks of intravenous antibiotics followed by two weeks of oral antibiotics may be sufficient. If there is concomitant osteomyelitis and there is concern that residual osteomyelitis may exist, six weeks of intravenous antibiotics is the recommended therapy when limb salvage surgery is contemplated. A formal in-

Formal vascular evaluation with pulse volume recording and/or angiography should be performed only when the health and safety of the patient is not compromised.

within hours and are found to be consistent with final wound cultures in approximately 95% of cases.²³

Gram positive therapy to cover *Staphylococcus aureus* and *Streptococci* should always be present and the physician should be cognizant of the likelihood of MRSA. Studies have shown that diabetic foot infections with MRSA as a pathogen have a higher rate of amputation and longer wound healing rates compared to infections with methicillin sensitive *Staph aureus* [MSSA].²⁴

Severe cases will often involve gram-negative bacilli or rods producing gas and foul-odors. Antibiotic

fectious disease consult is most often helpful for determining the most appropriate antibiotic regimen, especially in patients with multiple comorbidities or with resistant organisms.

Prognosis

Diabetic foot infections have a high recurrence rate. The primary goal for a physician and patient should be prevention of foot ulceration. Strict glucose monitoring should be performed by the patient and should be closely watched by a primary care physician or an endocrinologist. Regular podiatric visits should

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be performed, and diabetic foot education should be stressed. Proper shoe gear and appropriate orthotic therapy is paramount to prevention of ulcerations and should be discussed as part of the overall management following deep space infections. If ulcerations do occur, off-loading and monitoring for any signs of infection should be performed. Antibiotics are often not needed for an uninfected ulceration.²⁵

A collaborative effort between the patient and healthcare providers is extremely important as the monitoring the diabetic foot is a life-long commitment.

Conclusion

Diabetic foot infections pose a significant threat for lower extremity amputation, and should be treated quickly and aggressively. Physicians should be aware that diabetic patients may not exhibit the classic local and systemic signs of infection, and must perform a highly detailed history and physical when diagnosing deep space infections. The combination of proper antibiotic therapy and expedited surgical debridement is necessary to control infection, and a collaborative effort among many specialties may be necessary for proper care, including vascular testing and tight glucose control.

It is important to stress that early and aggressive incision and drainage with debridement in patients showing signs of sepsis should not be delayed for imaging studies or vascular studies. Patient safety dictates that these cases should be taken to the operating room sooner rather than later. Once the infection and signs and symptoms of sepsis have been controlled, further studies and evaluations along with the choice of antibiotics can be determined in a multidisciplinary team approach. It is very important to closely monitor patients post-operatively for resolution of infections and in the office setting to help prevent future ulcerations and infections. **PM**

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SEE ANSWER SHEET ON PAGE 227.

- 1) Diabetic patients are susceptible to deep space infections because of:
 - A) decreased blood flow
 - B) elevated blood sugars
 - C) loss of protective sensation
 - D) all of the above
- 2) Deep space infections from puncture wounds
 - A) commonly occur on the top of the foot
 - B) are painful
 - C) do not penetrate deep enough to cause deep space infections
 - D) can result from insulin needles or small wooden splinters
- 3) Absence of signs of inflammation (edema, erythema, warmth)
 - A) indicate no evidence of infection
 - B) is unusual in patients with deep space infections
 - C) can result from PVD and neuropathy
 - D) are good prognostic indicators
- 4) A quick, simple way of determining depth and extent of infection is
 - A) probing the wound with a sterile, blunt probe.
 - B) injecting dye into the ulcer and taking an x-ray
 - C) obtaining an MRI
 - D) reviewing prior medical records
- 5) Although sometimes absent, common symptoms of systemic sepsis may include:
 - A) hypotension
 - B) tachycardia
 - C) fevers
 - D) all of the above
- 6) The most important aspect of treating necrotizing fasciitis is
 - A) identifying the causative agent
 - B) determining the extent of the infection
 - C) obtaining the appropriate diagnostic studies
 - D) a quick, accurate diagnosis and immediate incision and drainage
- 7) Necrotizing fasciitis:
 - A) can quickly spread unimpeded along fascial planes.
 - B) can result in osteomyelitis.
 - C) can result in recurring ulcerations.
 - D) can take weeks to develop.
- 8) Crepitus in the soft tissue of patients with a deep space infection indicates:
 - A) possible Charcot arthropathy.
 - B) presence of gas in the soft tissue.
 - C) lack of joint mobility.
 - D) possible gout.
- 9) Gas gangrene is most commonly associated with
 - A) *Pasturella multocida*
 - B) *Staphylococcus epidermidis*
 - C) *Clostridium perfringens*
 - D) *Pseudomonas aeruginosa*
- 10) White blood cell counts (WBC) in diabetic patients with deep space infections:
 - A) are always diagnostic of deep space infections
 - B) do not need to be repeated following surgical intervention
 - C) will show a high eosinophil count
 - D) may be normal or only slightly elevated and not indicative of the severity of the infection.
- 11) In deep space infections, abnormalities of the BUN and creatinine can occur:
 - A) with certain bacteria
 - B) in necrotizing fasciitis from muscle destruction
 - C) when blood sugars are out of control in necrotizing fasciitis
 - D) from fluid overload during resuscitative efforts.
- 12) Samples for identification of causative bacteria are best obtained
 - A) after antibiotics have been administered in the emergency room
 - B) from any purulent material drainage from the wound
 - C) intra-operatively from actual tissue samples deep in the bed of the wound
 - D) at the end of any debridement and pulse lavage with antibacterial solution.
- 13) The most common organism seen in puncture wounds through socks and shoes is
 - A) MRSA
 - B) *Streptococcus Group B*
 - C) *Clostridium perfringens*
 - D) *Pseudomonas aeruginosa*
- 14) Animal bites are carriers and can cause infections by
 - A) *Peptococcus*
 - B) *Escherichia coli*
 - C) *Pasteurella multocida*
 - D) MRSA
- 15) Abscesses and foreign bodies can be diagnosed quickly and inexpensively by
 - A) Plain x-rays
 - B) Ultrasound
 - C) MRI
 - D) Probing the wound
- 16) Necrotizing soft tissue infections are best differentiated from non-necrotizing soft tissue infections by
 - A) CT scan
 - B) MRI with contrast
 - C) Plain x-rays
 - D) CT scan with 3D reconstruction

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17) 65 year old diabetic male presents to the emergency room with an open, draining plantar foot ulceration. He has chills, rigors, and fevers to 102.5 with a WBC count of 18,500 and a blood sugar of 565. Appropriate management of this patient dictates that:

- A) IV antibiotics are started and the WBC count is allowed to come back to normal before proceeding with surgery.
- B) IV insulin is given and you wait until the blood sugar comes back to normal before planning any intervention.
- C) vascular studies are performed to assess the patient's ability to heal any surgical intervention.
- D) the patient is made NPO and plans are made to take the patient to surgery emergently for an incision and drainage procedure.

18) The use of a tourniquet in patients with a deep space infection:

- A) is never appropriate
- B) should be deflated once the incision and drainage with debridement is performed but before the final dressing is applied.
- C) should only be deflated once the final dressing is applied in order to control bleeding.
- D) is appropriate following standard exsanguination with an Esmarch bandage.

19) Final closure of a wound following an incision and drainage procedure can be performed by:

- A) Primary closure using full thickness nonabsorbable sutures.
- B) Rotational or advancement flaps
- C) Negative pressure wound therapy
- D) All of the above.

20) Formal vascular evaluation with pulse volume recording and/or angiography should be performed:

- A) on all patients prior to any surgical intervention.
- B) only when the health and safety of the patient is not compromised.
- C) vascular studies are not necessary in patient with deep space infections as they have adequate blood flow.
- D) as soon as the patient arrives to the emergency room.

See answer sheet on page 227.

PM's CPME Program

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Now it's even easier and more convenient to enroll in PM's CE program!

You can now enroll at any time during the year and submit eligible exams at any time during your enrollment period.

PM enrollees are entitled to submit ten exams published during their consecutive, twelve-month enrollment period. Your enrollment period begins with the month payment is received. For example, if your payment is received on September 1, 2006, your enrollment is valid through August 31, 2007.

If you're not enrolled, you may also submit any exam(s) published in PM magazine within the past twelve months. **CME articles and examination questions from past issues of *Podiatry Management* can be found on the Internet at <http://www.podiatrym.com/cme>.** Each lesson is approved for 1.5 hours continuing education contact hours. Please read the testing, grading and payment instructions to decide which method of participation is best for you.

Please call (631) 563-1604 if you have any questions. A personal operator will be happy to assist you.

Each of the 10 lessons will count as 1.5 credits; thus a maximum of 15 CME credits may be earned during any 12-month period. You may select any 10 in a 24-month period.

The Podiatry Management Magazine CME program is approved by the Council on Podiatric Education in all states where credits in instructional media are accepted. This article is approved for 1.5 Continuing Education Contact Hours (or 0.15 CEU's) for each examination successfully completed.

**Home Study CME credits now
accepted in Pennsylvania**

Enrollment/Testing Information and Answer Sheet

Note: If you are mailing your answer sheet, you must complete all info. on the front and back of this page and mail with your credit card information to: **Podiatry Management, P.O. Box 490, East Islip, NY 11730.**

TESTING, GRADING AND PAYMENT INSTRUCTIONS

(1) Each participant achieving a passing grade of 70% or higher on any examination will receive an official computer form stating the number of CE credits earned. This form should be safeguarded and may be used as documentation of credits earned.

(2) Participants receiving a failing grade on any exam will be notified and permitted to take one re-examination at no extra cost.

(3) All answers should be recorded on the answer form below. For each question, decide which choice is the best answer, and circle the letter representing your choice.

(4) Complete all other information on the front and back of this page.

(5) Choose one out of the 3 options for testgrading: mail-in, fax, or phone. To select the type of service that best suits your needs, please read the following section, "Test Grading Options".

TEST GRADING OPTIONS

Mail-In Grading

To receive your CME certificate, complete all information and mail with your credit card information to:

**Podiatry Management
P.O. Box 490, East Islip, NY 11730**

There is **no charge** for the mail-in service if you have already enrolled in the annual exam CPME program, and we receive this exam

during your current enrollment period. If you are not enrolled, please send \$20.00 per exam, or \$149 to cover all 10 exams (thus saving \$51* over the cost of 10 individual exam fees).

Facsimile Grading

To receive your CPME certificate, complete all information and fax 24 hours a day to 1-631-563-1907. Your CPME certificate will be dated and mailed within 48 hours. This service is available for \$2.50 per exam if you are currently enrolled in the annual 10-exam CPME program (and this exam falls within your enrollment period), and can be charged to your Visa, MasterCard, or American Express.

If you are *not* enrolled in the annual 10-exam CPME program, the fee is \$20 per exam.

Phone-In Grading

You may also complete your exam by using the toll-free service. Call 1-800-232-4422 from 10 a.m. to 5 p.m. EST, Monday through Friday. Your CPME certificate will be dated the same day you call and mailed within 48 hours. There is a \$2.50 charge for this service if you are currently enrolled in the annual 10-exam CPME program (and this exam falls within your enrollment period), and this fee can be charged to your Visa, Mastercard, American Express, or Discover. If you are not currently enrolled, the fee is \$20 per exam. When you call, please have ready:

1. Program number (Month and Year)
2. The answers to the test
3. Your social security number
4. Credit card information

In the event you require additional CPME information, please contact PMS, Inc., at **1-631-563-1604**.

ENROLLMENT FORM & ANSWER SHEET

Please print clearly...Certificate will be issued from information below.

Name _____ Soc. Sec. # _____
Please Print: FIRST MI LAST

Address _____

City _____ State _____ Zip _____

Charge to: Visa MasterCard American Express

Card # _____ Exp. Date _____

Note: Credit card is the only method of payment. Checks are no longer accepted.

Signature _____ Soc. Sec.# _____ Daytime Phone _____

State License(s) _____ Is this a new address? Yes _____ No _____

Check one: I am currently enrolled. (If faxing or phoning in your answer form please note that \$2.50 will be charged to your credit card.)

I am not enrolled. Enclosed is my credit card information. Please charge my credit card \$20.00 for each exam submitted. (plus \$2.50 for each exam if submitting by fax or phone).

I am not enrolled and I wish to enroll for 10 courses at \$139.00 (thus saving me \$61 over the cost of 10 individual exam fees). I understand there will be an additional fee of \$2.50 for any exam I wish to submit via fax or phone.



EXAM #9/11
Diagnosis and Treatment of Deep Space Infections in Patients with Diabetes Mellitus (Giurini and Elder)

Circle:

- | | |
|-------------|-------------|
| 1. A B C D | 11. A B C D |
| 2. A B C D | 12. A B C D |
| 3. A B C D | 13. A B C D |
| 4. A B C D | 14. A B C D |
| 5. A B C D | 15. A B C D |
| 6. A B C D | 16. A B C D |
| 7. A B C D | 17. A B C D |
| 8. A B C D | 18. A B C D |
| 9. A B C D | 19. A B C D |
| 10. A B C D | 20. A B C D |

LESSON EVALUATION

Please indicate the date you completed this exam

How much time did it take you to complete the lesson?

_____ hours _____ minutes

How well did this lesson achieve its educational objectives?

_____ Very well _____ Well

_____ Somewhat _____ Not at all

What overall grade would you assign this lesson?

A B C D

Degree _____

Additional comments and suggestions for future exams:

