

Gangrena u radu lekara opšte medicine

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Gangrene in the PCP setting

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Sažetak

Uvod. Gangrena je stanje koje se karakteriše nekrozom i odumiranjem tkiva, čiji je najčešći uzrok loša cirkulacija krvi. Neblagovremeno prepoznata i lečena, može imati fatalan ishod. Kod dijabetičara predstavlja jednu od najtežih komplikacija koja, u osnovi, ima hronično lošu glikoregulaciju. U razvijenim društvima predstavlja vodeći uzrok amputacija sa posledičnom invalidnošću i povećanom stopom mortaliteta. Takođe, utiče najpre na kvalitet života pacijenata, kao i na zdravstvene i socijalne sisteme.

Prikaz slučaja. Zapuštena vlažna gangrena desnog stopala kod pacijenta starosti 63 godine, dugogodišnjeg insulin-zavisnog dijabetičara poreklom iz ruralne oblasti. Na predlog izabranog lekara da se hospitalizuje, pacijent zahteva da se sprovede kućno lečenje. Debridman hronične rane započinje se alginatnim oblogama sa srebrom, uz peroralnu i lokalnu antibiotsku terapiju. Lečenje se nastavlja čišćenjem rane i primenom antibiotske masti, te odstranjivanjem kalusa oštirim debridmanom da bi se već u fazi značajnog povlačenja i zarastanja hronične rane upotrebile i hidrofilne obloge od poliuretanske pene. Nakon šesnaestomesečnog lečenja postiže se zarastanje hronične rane uzrokovane vlažnom gangrenom desnog stopala.

Zaključak. Pacijenta je lečio tim opšte medicine, pri čemu savremena sredstva za lečenje hroničnih rana značajno ubrzavaju zarastanje rana i mogu se primenjivati i u primarnoj zdravstvenoj zaštiti. Vremenski dugo i teško lečenje je bilo posledica pacijentovih nezadovoljavajućih socioepidemioloških i ekonomskih uslova i, najvažnije, odbijanja pacijenta da sa lekarom uspostavi potpunu saradnju koja je preduslov uspešnog lečenja. U sistemu zdravstvene zaštite primarna zdravstvena zaštita čini njen nezamenljiv deo ne samo u sprečavanju nastanka gangrene, već i u samom lečenju.

Ključne reči: vlažna gangrena, hronična rana, autolitički debridman, primarna zdravstvena zaštita.

Abstract

Introduction: Gangrene is a condition of necrosis and tissue death, mainly caused by poor circulation. If it's not recognized and treated early on it may end fatally. It's one of the most severe complications in diabetic patients and is caused by poor diabetes control. Gangrene is the leading cause of amputation in developed countries with a subsequent disability and an increased mortality rate. Most of all, it affects a patient's life quality but it also has a huge impact on health and social system.

Case report: Male, 63, presents with dilapidated, wet gangrene of the right foot. The patient is a long term diabetic, on insulin, and lives in the rural area. His PCP (primary care physician) suggested sending him to a hospital, but the patient refused and wanted to be treated at home. The treatment started with a local application of the alginate-argent compresses and oral and local antibiotic therapy. The wound was cleaned regularly and antibiotic ointment was applied. Sharp debridement of the callus was performed so we could use compressed hydrophilic polyurethane foams in the early phase of wound healing. After sixteen months of treatment, the wound healed completely.

Conclusion: The patient was treated by the PCP team and we used all the up-to-date equipment used for the treatment of the chronic wounds. They are easily used in the PCP setting. The treatment was long and hard, mostly due to the patient's unsatisfactory socio-epidemiological and economic conditions. Most importantly, the patient refused to cooperate fully with his PCP, which is the crucial precondition for successful treatment. The primary health care (PHC) is an irreplaceable part of every health system and it may play an important role not only in gangrene prevention but its treatment, as well.

Keywords: Wet gangrene, chronic wound, autolytic debridement, primary health care

Uvod

Gangrena je potencijalno smrtonosno stanje koje se karakteriše nekrozom dela tela usled loše cirkulacije krvi. Najčešći uzrok okluzije arterijskih krvnih sudova sa posledičnom ishemijom a potom i nekrozom tkiva, pogotovu u dijabetičara, jeste ateroskleroza, zatim povrede, promrzline, opekotine, bakterijske infekcije. Pušenje takođe predstavlja značajan uzrok koji vodi narušavanju cirkulacije. Javlja se i u hematološkim poremećajima, kao što je policitemija¹. Deli se na suhu, vlažnu i gasnu gangrenu¹, od kojih je vlažna gangrena najčešći oblik. Patofiziološki mehanizmi uključeni u nastanak vlažne gangrene, imaju osnovu u složenim neuroishemijskim promenama, sa gubitkom protektivnog senzibiliteta. Osim toga, nastaju i povrede i ulceracija na koži, koje predstavljaju *ulazna vrata* mikroorganizmima i razvoju infekcije. Može nastati i infekcijom već postojeće suve gangrene^{2,3}. Tkivo zahvaćeno vlažnom gangrenom je edematozno, macerisano, sa prodornim neprijatnim mirisom, bolno, sa znacima gnojenja i prati je porast telesne temperature. Razvoj vlažne i gasne gangrene je veoma brz usled cirkulišućih toksina, uzrokujući sepsu sa fatalnim ishodom, za razliku od suve gangrene čije je napredovanje sporo. Ukoliko se blagovremeno ne primeni adekvatno lečenje, amputacija obolelog ekstremiteta u takvim slučajevima se često nameće kao jedino terapijsko rešenje. Gangrenozni proces je najčešće lokalizovan na distalnim delovima ekstremiteta, međutim, lokalizacija gangrenoznog procesa može biti i na unutrašnjim organima. Za sve zdravstvene sisteme čak i razvijenih zemalja, troškovi lečenja i posledične invalidnosti usled amputacija obolelog ekstremiteta, predstavljaju značajno finansijsko opterećenje. Savremene obloge za lečenje hroničnih rana svojom strukturom omogućavaju autolitički debridman rane konceptom vlažnog zarastanja rane. Time se ubrzava epitelizacija, angiogeneza i sinteza vezivnog tkiva, adekvatna razmena gasova između rane i okruženja, sprečavaju penetraciju mikroorganizama u ranu. Njihovo uklanjanje je atraumatsko i bezbolno⁴.

U širok spektar ovih obloga ubrajaju se i alginati sa srebrom, kao i hidrofilne poliuretanske obloge, koje se po svom mehanizmu dejstva u odnosu na ranu ubrajaju u interaktivne obloge. Alginati sa srebrom se dobijaju od morskih algi i u svojoj strukturi sadrže manuronsku kiselinu i anjonske polisaharide i impregnirane su jonima srebra. U kontaktu sa ranom, formira se gel koji omogućava autolitički debridman rane, dok joni srebra imaju snažan antimikrobni efekat.

Hidrofilne poliuretanske obloge su višeslojne obloge. Njihova unutrašnja komponenta ima veliku upijajuću moć eksudata iz rane, dok je spoljašnja nepropusna za tečnost i bakterije, ali omogućava razmenu gasova⁴. Svojom koncepcijom i prednostima koje donose, mogu se primeniti i na osnovnom nivou zdravstvene zaštite. Pri tome, članovi porodica pacijenata mogu biti obučeni za njihovu primenu, pogotovu u ruralnim oblastima i okolnostima bez patronažnih službi uko-

Introduction

Gangrene is a potentially deathly condition and its most distinctive feature is necrosis of the body part with poor circulation. The most common cause of the artery occlusion, with subsequent ischemia and then necrosis, especially in diabetics, are atherosclerosis, injuries, frostbites, burns, bacterial infections. Smoking is also an important risk factor for poor circulation. Gangrene may also appear in some hematologic diseases, such as polycitemia.¹ Gangrene may be dry, wet, and gas¹, and among them, wet form is the most common one. Pathophysiology of the wet gangrene is explained by complex neuro-ischemic processes, followed by the loss of protective sensibility. Skin injuries and ulcerations are the infection entry points. It may also develop if the dry gangrene gets infected.^{2,3} The wet gangrene causes the affected tissue to be edematous, macerated, foul smelling, painful, putrid, and is often followed by high fever. The development of the wet and gas gangrene is very rapid due to the circulating toxins which may cause sepsis with a fatal outcome. On the other hand, dry gangrene develops rather slowly. If the treatment isn't timely, the amputation of the affected extremity may be the only therapeutic solution. The gangrenous process usually affects distal extremity parts, but it may also affect internal organs. The costs of treatment and subsequent disability due to amputation are a huge financial burden for all health systems, even those in developed countries. The modern compresses, used for the treatment of chronic wounds, enable autolytic debridement of the wound based on the concept of wet wound healing. They speed up the epithelization, angiogenesis, and synthesis of the connective tissue, provide adequate gas exchange between the wound and its surrounding, prevent the penetration of the microorganisms into the wound. Their removal is atraumatic and painless⁴. A part of the wide range of these compresses is alginate-argent ones, as well as hydrophilic polyurethane compresses. They interact with the wound.

Alginates with silver come from sea algae and they are made of mannuronic acid and anion polysaccharides and impregnated with argent ions. In contact with the wound the gel is being formed and it enables autolytic debridement of the wound, while the argent ions have a strong antimicrobial effect.

Hydrophilic polyurethane compresses are multilayered. Their inner component is very absorbent and it sucks up the wound exudate. Its out layer is water and bacteria resistant but it permeates gas exchange.⁴ These compresses may be easily used in the primary care setting. Besides, family members may be trained for their application, if the wound is superficial, without bone tissue being affected. This is very useful, especially in rural and areas without public health nursing.

liko je lezija lokalizovana na površnom tkivu bez zahvatanja koštanih struktura.

Njihovom upotrebom značajno se skraćuje vreme potrebno za lečenje, jednostavne su za upotrebu, te donose značajne uštede zdravstvenom sistemu kao i pacijentima, čineći proces zarastanja znatno bržim^{5,6,7}.

Prikaz slučaja

Pacijent starosti 63 godinae iz ruralne sredine, od izabranog lekara traži kućnu posetu zbog vlažne gangrene desnog stopala. Pacijent je dugogodišnji insulinzavisni dijabetičar i na kombinovanoj terapiji humanim insulinom brzodelujućeg i dugodelujućeg dejstva i metforminom.

Objektivni nalaz: bolesnik svestan, orijentisan u prostoru, vremenu i prema ličnostima, afebrilan, eupnoičan, pokretan samo na nivou postelje, normalne osteomuskularne građe; koža i vidljive sluznice bleđe prebojene, odaje utisak teškog bolesnika.

Glava normalne konfiguracije, palpatorno i perkutano neosetljiva, vrat cilindričan aktivno i pasivno pokretan u svim pravcima; ne zapaža se prepunjenost velikih krvnih sudova vrata, karotidni puls se obostrano palpira, štitasta žlezda u svojoj loži i neuvećana.

Grudni koš cilindričan, bez deformiteta, obostrano simetrično respiratorno pokretan, auskultatorno normalan disajni šum.

Srčana akcija ritmična, tonovi jasni bez šumova, iktus normalne lokalizacije bez titraja, TA 220/120 mmHg, puls 80/min. Abdomen u ravni sa grudnim košem, mek, neosetljiv na površnu i duboku palpaciju, jetra i slezina se ne palpiraju, lumbalne lože neosetljive na grubu perkusiju, ekstremiteti normalno konfigurisani.

Godine 2012. učinjena amputacija palca levog stopala zbog gangrene; desno stopalo i lateralna strana desne distalne potkolenice zahvaćeni vlažnom gangrenom iz koje se širi prodoran i neprijatan miris. Glikemija izmerena u kućnoj poseti je 13,4 mmol/l. Donji ekstremiteti su teško pokretni. Pacijentu se odmah predočava potreba za hitnim transportom u nadležni zdravstveni centar radi daljeg lečenja, što pacijent odbija i zahteva da se sprovede kućno lečenje koje započinje početkom oktobra 2018. godine. Zbog visokih vrednosti glikemije predlaže se korekcija antidijabetesne terapije, što pacijent odbija; prihvata promenu antihipertenzivne terapije. U terapiju se uvode antagonisti angiotenzin 2 receptora dva puta dnevno, sa diuretikom, selektivni beta blokatori, acetil salicilna i alfalipoinjska kiselina. Sa novouvedenom antihipertenzivnom terapijom postižu se ciljne vrednosti krvnog pritiska. Pacijent na sledećem pregledu opisuje da je imao napad gušenja u večernjim satima, koje je doveo u vezu sa antihipertenzivnom terapijom antagonistima angiotenzin 2 receptora, te prestaje da ih koristi. Ponovo se u terapiju uvode novi antihipertenzivi, fiksna kombinacija perindopрила i inda-

The use of these compresses shortens the treatment duration, they are easy to use, and therefore they save up both for the health system and the patient, making the healing process much faster.^{5,6,7}

Case report

A male patient, 63, asks for a home visit from his GP (general physician) due to the wet gangrene of his right foot. He is a diabetic, on insulin therapy for quite a long time. His diabetes therapy includes human insulin (with fast and slow-acting component) and metformin.

Physical examination: the patient is alert, oriented in time, space and person, afebrile, eupnoeic, moves only within the confines of his bed, with the normal musculoskeletal constitution; the skin and mucose are a bit paler and he looks very sick.

His head is of normal configuration, non-tender to palpation and percussion; the neck is cylindric and moves actively and passively in all directions; no noticeable overload of the big neck blood vessels, carotid puls palpable, on both sides; thyroid gland is in its place and shows no signs of enlargement.

His chest is cylindric, no deformities, moves symmetrically during breathing and lungs are clear to auscultation.

Regular heart rhythm, no murmurs, ictus cordis in its regular position, BP 220/120 mmHg, HR 80 bpm. Abdomen flat, soft, non-tender to palpitation, liver edge and spleen not felt, kidney percussion non-tender; extremities are of normal configuration.

The big toe of his left foot was amputated in 2012, due to gangrene. At the moment, his right foot and the lateral side of the distal part of the right lower leg are affected by the wet gangrene, with a very foul smell. His blood sugar level, on this home visit, is 13.4 mmol/l. His lower legs are hardly moveable. The patient was informed of the urgency of being transported to the regional hospital for further evaluation and treatment, The patient refused the suggestion and asked to be treated at home. His at-home treatment started at the beginning of October 2018. His diabetes was poorly regulated and the correction of antidiabetic therapy was suggested, which he also refused, but was willing to correct his antihypertensive therapy. The angiotensin 2 receptor blockers (ARBs) were introduced twice daily, diuretic, selective beta-blocker, acetylsalicylic acid, and alpha-lipoic acid. The newly introduced antihypertensive therapy led to the regulation of his blood pressure. During the following visit, the patient complained of dyspnoea attacks in the evening hours. He felt they were connected to the use of ARBs, so he stopped using them. So the new antihypertensive drugs were introduced – the fixed combination of perindopril and indapamide (maximum dose) in the morning, and calcium channel blocker,

pamida ujutru u maksimalnoj dozi i antagonist kalcijumovih kanala 20 mg uveče. Ovu terapiju pacijent prihvata, navodi da je dobro toleriše i redovno koristi. U daljim kontrolama krvni pritisak postepeno dostiže normalne vrednosti. Pacijent uvedene selektivne betablokatore i acetilsalicilnu kiselinu smatra za nepotrebne i samoinicijativno ih isključuje iz terapije. Uprkos hronično lošoj glikoregulaciji i na kontrolama konstantno visokim vrednostima glikemije koja se kretala između 13 i 14 mmol/l, pacijent za sve vreme lečenja nije dozvolio korekciju antidiabetesne terapije. Pristupa se i lečenju vlažne gangrene desnog stopala najpre čišćenjem rane dostupnim sredstvima, fiziološkim rastvorom i povidon jodom. Predloženo da se debridman vlažne gangrene započne alginatnim oblogama sa srebrom, što pacijent prihvata. Zbog raširene infekcije idesnog stopala, započeta je peroralna antibiotska terapija klindamicinom 600 mg dva puta dnevno na dvanaest sati i u trajanju od dve nedelje. Debridmanom hronične gangrenozne rane alginatnim oblogama sa srebrom od sredine oktobra do sredine novembra 2018. godine, postiže se uklanjanje nekrotičnog i macerisanog tkiva. Sredinom novembra 2018. lečenje rane se nastavlja topikalnom antibiotskom terapijom, najpre ciprofloksacinom a zatim fusidin-skom kiselinom uz redovno čišćenje i previjanje rane.

Krajem decembra 2018. primetno je povlačenje gangrene te formiranje kalusa na ivicama hronične rane, te je postignuta potpuna pokretljivost pacijenta. U nastavku lečenja, tokom 2019 godine. sprovodi se oštri debridman u kućnim uslovima radi uklanjanja kalusa sve do postizanja zarastanja i epitelizacije. Nezadovoljavajući socioepidemiološki uslovi i higijena stopala doprinose jako sporom i otežanom zarastanju. Krajem jula 2019. godine zbog znakova infekcije, lokalno se primenjuje betalaktamski antibiotik i ordinira peroralna antibiotska terapija Clindamicinom 600 mg dva puta dnevno. Radi bržeg zarastanja, krajem septembra 2019. godine debridman rane se sprovodi hidrofilnom poliuretanskom oblogom, dok se potpuno zarastanje hroničnog ulkusa-rane postiže početkom februara 2020. godine. Koža zadnjeg dela plantarne strane desnog stopala je suva i hiperkeratotična, te se pacijentu predočava potreba za prevencijom povređivanja i upotrebom sredstava za regeneraciju kože.

20 mg, in the evening. Over time, the patient accepted the therapy, tolerated it well, and used it regularly. Further BP measurements showed normal BP values. The patient found selective beta-blocker and acetylsalicylic acid unnecessary, so he discontinued them by himself. Despite poor glycemic control, and values between 13-14 mmol/l he refused to make any changes in his antidiabetic therapy. Simultaneously, the treatment of the wet gangrene of the right foot was conducted. Initially, the wound was treated with saline solution and iodine. We also suggested the use of alginate-argent compresses for the debridement's sake, which the patient gladly accepted. Due to the widespread infection of the right foot, we initiated the course of antibiotics orally (clindamycin, 600 mg, twice daily, for 14 days). The wound debridement, with the use of alginate-argent compresses, from mid October to mid November 2018, led to the removal of the necrotic and macerated tissue. Since mid November, the wound treatment was continued with the topical antibiotic application, using ciprofloxacin and then fusidic acid afterwards, with regular wound cleaning.

Since the end of December 2018, there was a noticeable withdrawal of the gangrenous tissue and callus started forming on the edges which enabled the patient to move with no difficulties. During 2019, in our home visits, we used the sharp debridement of the wound, constantly removing callous tissue until the wound started to heal. The unsatisfactory socio-epidemiologic conditions and foot hygiene contributed to the slow and difficult foot healing. By the end of July 2019, there was a new wound infection and we started the treatment with the topical use of beta-lactam antibiotics and peroral use of Clindamycin, 600mg, twice daily. In order to speed up the healing, we started the application of hydrophilic polyurethane compresses by the end of September 2019. The complete healing was achieved by the beginning of February 2020. The skin on the posterior part of the plantar side of the right foot was dry and hyperkeratose, so the patient was instructed to prevent skin damaging and use skin regeneration products.



Slika 1. Zapuštena gangrena desnog stopala pacijenta starosti 63 godine, insulinskog dijabetičara. 09.10.2018. prvi pregled u kućnoj poseti; pacijent odbija hospitalno lečenje.

Figure 1. Neglected right foot gangrene in a diabetic patient, 63 years. On October 9th 2018 the first home visit; the patient refused hospital treatment.



Slika 2. Proliferativna faza zarastanja hronične rane i lokalno primenjen antibiotik. 13.11.2018. stopalo nakon dvonedeljnog debridmana alginatnim oblogama sa srebrom i stvaranjem granulacionog tkiva sa delimičnim fibrinskim naslagama.

Figure 2. The proliferative phase of the wound healing and a local application of an antibiotic. On November 13th, 2019. The foot after a two week debridement with alginate-argent dressings and appearance of the granulation tissue with partial fibrine deposits.



Slika 3. Lateralna strana distalnog dela desne potkolenice i granulacijama ispunjeno dno rane. 25.12.2018. povlačenje gangrenoznog procesa i zarastanje hronične rane na lateralnoj strani distalnog dela desne potkolenice i granulaciono tkivo koje ispunjava dno rane na plantarnoj strani desnog stopala. Rubovi rane su blago zaobljeni i izmenjenog koloriteta.

Figure 3. Lateral side of the distal part of the right lower leg and granulation tissue that fills the bottom of the wound. On December 25th, 2018.

The withdrawal of the gangrenous process and wound healing, the edges of the wound are slightly rounded and show the change in coloring the wound.



Slika 4. Formiranje kalusa na rubovima rane. 12.02.2019. Usled formiranja kalusa na rubovima rane, primenjuje se oštri debridman radi uklanjanja kalusa i nesmetanog zarastanja rane da bi se od kraja septembra 2019. debridman rane nastavio upotrebom hidrofilne poliuretanske obloge.

Figure 4. Callus formation on wound edges. On February 12th, 2019. Due to the callus formation on the wound edges the sharp debridement was used to remove the callus and enable unobstructed wound healing; since the end of September 2019 the debridement was performed by using hydrophilic polyurethane compresses.



Slika 5. Debridman rane hidrofilnom poliuretanskom oblogom. 24.09.2019. Obloga se oblikuje u odnosu na veličinu rane uz prethodni oštri debridman rane koja je primetno manjeg volumena usled stvaranja granulacionog tkiva koje sazrevanjem postaje ožiljno tkivo otporno na mehanički stres⁸.
Figure 5. Hydrophilic polyurethane coating accelerates the healing process. On September 24th, 2019. The coating is molded to the wound and matches its shape; sharp wound debridement is performed prior to the coating; the wound is noticeably smaller due to the formation of the granulation tissue which in time transforms into the scar which is mechanically stress proof⁸.



Slika 6. Postepeno zarastanje hronične rane 29.10.2019., 22.11.2019., 27.12.2019. Hronična rana usled vlažne gangrene sve manjeg volumena sa približavanjem ivica koje su nepravilnog oblika karakteristične za neuropatsku ulceraciju.
Figure 6. The gradual healing of a chronic wound. On October 29th, November 22nd, December 27th. The chronic wound, due to the wet gangrene is reducing with its edges nearing, the edges are of an irregular shape which is the characteristics of the neuropathic ulceration.



Slika 7. Zarastanje hronične rane. 28.01.2020, 11.02.2020. Hiperkeratotična koža na periferiji sa atrofičnim centralnim delom “Locus minoris resistentiae” novonastalog tkiva i ulaznim vratima eventualne infekcije.

Figure 7. Wound healing. On January 28th, February 11th 2020. Hyperkeratotic and dry skin on the periphery, with atrophic central part “Locus minoris resistentiae” of the new tissue and a possible infection front entrance.

Diskusija

Lečenje hemodinamski dekompenzovanog pacijenta dugogodišnjeg insulinizavisnog dijabetičara sa zapuštenom gangrenom desnog stopala, sprovedeno je na primarnom nivou zdravstvene zaštite. Iako je sveukupno zdravstveno stanje pacijenta zahtevalo da se uputi na viši nivo zdravstvene zaštite, pacijent odbija. Posebno otežavajuće okolnosti su bile i teška saradnja sa pacijentom, neprihvatanje celokupne predložene terapije, kao i nezadovoljavajući socioepidemiološki uslovi pacijenta poreklom iz ruralne sredine, koji doprinose niskoj prosvetčenosti i neadekvatnom odnosu pacijenta prema samoj bolesti iako je dugogodišnji dijabetičar na insulinoterapiji sa već izvedenom parcijalnom amputacijom levog stopala. Zapuštena gangrena, odnosno hronična rana je pored teško narušenog zdravstvenog stanja nametnula i socijalnu izolaciju sa posledičnom depresijom.

Discussion

The treatment of the hemodynamically decompensated patient, a long term diabetic on insulin, with a neglected, gangrenous wound on his right foot was performed in the primary care setting. Although a grave state of the patient's health required hospital treatment, the patient refused it. The patient's lack of cooperation, refusal of some medications, and unsatisfactory socio-epidemiologic conditions aggravated the situation even more. The patient lived in a rural area and was more likely to be undereducated and therefore have an inadequate attitude towards his illness. He was a long term diabetic on insulin and he had already undergone a partial amputation of his left foot. The neglected gangrenous wound, along with the bad overall health led to social isolation and consequent depression.

Sprovedena antibiotska terapija je zbog već navedenih okolnosti bila zasnovana na iskustvu^{9,10}. Obuka pacijenata sa rizikom nastanka gangrene, kao i rad terenskih i patронаžnih službi koje su sve u domenu primarne zdravstvene zaštite, predstavlja veoma važan korak u rasterećenju zdravstvenog sistema u smislu prevencije i ranog otkrivanja gangrenoznih promena, kao i daljeg lečenja¹¹. Kod dijabetičara optimalna glikoregulacija predstavlja najbolji način prevencije ove teške komplikacije šećerne bolesti¹². Srednji medicinski kadar ima značajnu ulogu u prosleđivanju informacija o promenama na koži pacijenata lekaru, pogotovu u ruralnim oblastima i okolnostima gde ordiniranje lekara nije svakodnevno^{13,14}. Uvođenje savremenih obloga za debridman hronične rane, inicijalno alginata sa srebrom i poliuretanskih obloga u fazama zarastanja rane, sa oskudnom sekrecijom uz sistemsku i topikalnu antibiotsku empirijsku terapiju, najpre je dovelo do sprečavanja daljeg napredovanja gangrenoznog procesa i mogućeg razvoja sepse a potom i postizanja epitalizacije. U lečenju su korišćene i standardne pamučne gaze mada bi mogućnost kontinuiranog korišćenja savremenih obloga i sredstava za zarastanje hroničnih rana značajno ubrzalo zarastanje. Alfa lipoinjska kiselina, koja je kao peroralna terapija pacijentu uvedena u terapiju od samog početka lečenja, jedan je od najpotentnijih antioksidanasa sa dokazanim antiinflamatornim dejstvom^{15,16}. Ne može se sa sigurnošću tvrditi u kojoj meri je ovaj preparat doprineo zarastanju rane jer je pacijent koristio neredovno, što je lečenje učinilo još dužim.

Zaključak

Lečenje hronične rane u uznapredovalom stadijumu nastale gangrenom, nameće holistički pristup pacijentu, odnosno lečenje osnovne bolesti i komorbiditeta. Pri tome, spremnost pacijenta na saradnju preduslov je uspešnog lečenja. I u okolnostima ograničenih terapijskih mogućnosti, nezadovoljavajućih socioepidemioloških uslova i ruralne sredine, potpuna saradnja pacijenta sa lekarom samo lečenje bi učinilo znatno kraćim. Iako jako složeno i teško lekari opšte medicine su nadležni za suočavanje sa ovako ozbiljno narušenim zdravstvenim stanjem usled gangrene i dijabetesa koje je uspešno lečeno na nivou primarne zdravstvene zaštite.

The antibiotic therapy we used was mostly empiric due to the reasons we mentioned before.^{9,10} The education of the patients with high gangrene risk and the engagement of public health nursing are all part of the primary care services. The prevention and early spotting of the gangrenous wounds could hugely unburden the health system and ease the treatment.¹¹ Optimal glycemic control in diabetic patients is the best form of preventing complications.¹² The nurses' role is also very important because they could easily pass the information to a doctor on any skin changes in diabetic patients. It's especially important for the rural areas where very often the physicians are not attainable on a daily bases.^{13,14} The introduction of the modern compresses for the debridement of the chronic wounds (alginate-argent ones at the beginning and polyurethane ones during the healing process) with the systemic and topical use of antibiotics stopped the further gangrene spread and eventually led to the wound healing. During the treatment, we also used the standard cotton gauze, but the possibility of continuous use of modern compresses and healing wound products could significantly speed up the healing process. The alpha-lipoic acid, which was introduced from the very beginning of the treatment, is one of the most potent antioxidants and has got an anti-inflammatory effect.^{15,16} We are not really sure how much it contributed to wound healing, because the patient used it irregularly, which probably prolonged the treatment.

Conclusion

Treating chronic wounds with an advanced gangrene entails a holistic approach towards the patient, which includes the treatment of the main disease as well as the comorbidities. A patient's willingness to cooperate is one of the most important prerequisites for the successful treatment. Even with the limited therapeutic possibilities, unsatisfactory socio-epidemiologic conditions, rural environment, a full cooperation with the physician could significantly shorten the treatment process. Although the gangrene treatment is very difficult and complex we proved that PCPs are quite capable to treat patients with gangrene and diabetes successfully.

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