MANAGEMENT OF COMPLEX DIABETIC FOOT CARE- A COMPARATIVE STUDY IN FIRST SURGICAL CLINIC SIBIU

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Abstract: *Diabetic foot complications are leading cause of lower extremity amputation and also represent a challenge to the health care centers. The aim of this study is to develop therapeutic principles that can be used in current practice. Material and Methods: This study is an analysis of the treatment program of the complicated diabetic foot in The First Clinic Surgery from Sibiu, and it studies two groups of patients in comparison: the "control" group, between January 2002 and October 2007, and "study" between November 2007 and January 2011. Patients included in the second group, need a more therapeutic approach, through the utilization of high standard dressings of the diabetical wounds and the healing of the necrotic-purulent source through successive surgical interventions. Results: The group studies are made up of 184 patients with diabetic foot complications, distributed in: 106 patients in the first group and 78 patients in the second group. There was no significant difference between the groups with regard to age and co morbidities. The main causes of hospitalization were limited gangrene of the fingers or the lower extremity of the foot (68 cases) and trophic ulcers (20 cases). High amputations have been effectuated in 35% in control group versus 21, 7% in the study group, identifying a consistent statistical difference (p=0, 05). Conclusion: Multidisciplinary therapeutic approach correlated with modern wound care management can lower the high amputation rate of the patients with complicated diabetic foot, which can improve the quality of life of these patients.*

Cuvinte cheie: *picior diabetic, îngrijirea plăgii, complicaţii diabetice*

Rezumat: *Complicaţiile piciorului diabetic sunt cauza ce conduce la amputarea extremităţii inferioare şi reprezintă, de asemenea, o provocare pentru centrele de îngrijire. Scopul acestui studiu este de a dezvolta principiile terapeutice ce pot fi utilizate în practica curentă. Material şi metodă. Acest studiu este o analiză a programul de îngrijire al piciorului diabetic complicat şi examinează comparativ 2 grupuri de pacienţi: grupul martor ian. 2002 - oct. 2007 şi grupul de studiu nov. 2007 - ian. 2011, pacienţii incluşi în cel de-al doilea grup beneficiind de o abordare terapeutică modernă, prin utilizarea pansamentelor de ultimă generaţie a plăgilor diabetice şi prelucrarea focarului necrotico-purulent, prin intervenţii chirurgicale successive. Rezultate. Sunt incluşi în studiu 184 de pacienţi cu complicaţii ale piciorului diabetic, distribuiţi astfel: 106 pacienţi în primul grup şi 78 în al doilea grup. Nu a existat nicio diferenţă semnificativă în ceea ce priveşte vârsta şi comorbidităţile. Principalele cauze de spitalizare au fost limitate de gangrena degetelor sau a extremităţii inferioare a piciorului (68 cazuri) şi ulcere trofice (28 cazuri). Amputaţii înalte au fost efectuate în 35% din cazuri în grupul de control faţă de 21,7% în grupul de studiu, identificând o diferenţă semnificativ statistic (p= 0,05). Concluzii. Abordarea terapeutică multdisciplinară, corelată cu gestionarea modernă de îngrijire a plăgilor, poate scădea rata mare de amputaţii la pacienţii cu picior diabetic complicat, îmbunătaţind calitatea vieţii acestora.*

INTRODUCTION

The association of several pathological conditions in the notion of "diabetic foot" was imposed by the necessity of a unitary management of multiple apparent manifestations: neurological, vascular, orthopedic or infectious. [1]The complications of the diabetic foot represent the most important long term issue of diabetes mellitus with considerable medical, social and economical implications. It is also the most invalidating complication. Lower limb amputation, a devastating consequence of diabetes, remains a common outcome of diabetic foot complication. Amputation is not only a costly outcome for the patient but also expensive for the health care system. [2] Patients who suffered major leg amputation despite, the interventions for infection treatment or leg reperfusion, necessitate longer period for rehabilitation. Non-amputated part presents a high risk of amputation in the absence of an adequate treatment. Plastic reconstructive surgery is necessary sometimes in repairing important tegument defects. As methods can be used autologous skin grafting or skin flaps mobilization.

Diabetes patients may develop many types of foot wounds, many of which can become infected. [3] Foot infections at patients with diabetes cause substantial morbidity and frequent visits to health care professionals. Limb salvage requires early prevention therapy, knowledgeable use of wound care technology and active approach management of the diabetic foot complication. [4]

THE AIM OF THE STUDY

This study wants to illustrate the concept of the diabetic foot through the associations and consequences it implies both subjective – patient sufferings and objective – applied treatment methods for different lesion type. It also wants

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to elaborate approach methods to improve treatment results by developing therapeutic methods and surgical principles.

MATERIAL AND METHODS

We made the retrospective analysis of the treatment on 106 patients which presented various foot lesions secondary to diabetes mellitus complications during January 2002 - October 2007 (control group) and the prospective analysis of therapeutic efficiency applied on a number of 78 patients with diabetic foot complications during November 2007 - January 2011(study group), hospitalized in the Surgery Clinic I in Sibiu. While treating the patients of the control group, there were used traditional methods to care for the wound: sterile gauze dressings, used in the epitalisation stage but also as a secondary, absorbent wrapping and non stick dressings, or with small adhesion , used in the case of less exudative wounds. The patients in the study group benefitted of a more modern treatment by using modern dressings of the wounds: alginate, dressings with silver, polyurethanes, hydrocolloids, hydro gels, and films as well as processing outbreak of necrotic purulent surgery in successive stages and the help of plastic and reconstructive surgery in successive stages and the help of plastic and reconstructive surgery. The evaluation of the therapy was possible by observing the ledgers and operatory protocols, as well as the observation sheets during hospitalization.

Main diagnosis for patients with diabetic foot complication at hospitalization shows an increased number of gangrene (wet and dry) on towels and foot, distributed on both groups. (Table I). In order to evaluate the expand degree of damage on peripheral vessels and their alteration character the results of Doppler ultrasound examination of peripheral vessels were analyzed. It is the most commonly used technique in peripheral arterial disease screening and is an imaging method with the best cost - efficiency report. In the study were examined with this method a number of 12 patients of the control group and 57 patients of the study group. The patients were distributed by the forms of clinic manifestation in two subgroups: first subgroup: neuropathic form and the second subgroup: neuroischemic form. (Table II)

RESULTS

We analyzed the type of treatment of diabetic foot complication for patients included in the two groups. Our analysis found that disarticulation of the fingers was made at 74 cases with wet or dry gangrene of the fingers and those with infected neuropathic ulcers. The frequency of minor amputations and disarticulation of the fingers in both groups were distributed as follows: 46, 2% in the control group and 44, 8% in the study group. High amputations were done on 35, 8% of cases in the control group versus 21, 7% cases in the study group, identifying a big statistic difference between the two groups ($p = 0.05$).The efficient caring of the wounds of the diabetic foot, involves the implementation of a therapeutic schedule adapted to the local human and material resources. In order to evaluate the degree of spreading of the peripheral blood vessels and the degree of alteration, the results of the Doppler ultrasounds were analyzed. In this study there was examined a number of 12 patients from the first lot, and 57 from the study lot. (Table III). There was no significant difference between the groups with regard to age and co morbidities. In the control group were 69 men and 37 women and in the study group were 52 men and 26 women with an average age of 62, 4 years. The analysis of patients evolutions from the study group has attached a high impact of the surgical debridement of wound (removal of necrotic cellular material, foreign bodies and atonal tissue) and of the role of the hydro active dressing in wound healing. Surgical treatment of the purulent necrotic outbreak at the patients from the study group took place in several surgical stages. 78 numbers of patients have undergone 165surgeries with an average of 2, 1 intervention per patient. In the control group there were 148 surgeries with an average of 1, 4 interventions per patient.

Table no. I. Diagnosis for patients with diabetic foot complication

Diagnosis	Control group-frequency	Control group-percentage	Study group-frequency	Study group-percentage
wet gangrene towes	14	13,20%	11	14,10%
wet gangrene foot	16	15,09%	9	11,53%
dry gangrene towes	9	8,49%	7	8,97%
dry gangrene foot	8	7,54%	6	7,69%
osteitis/ osteoarthritis	9	8,49%	7	8,97%
foot cellulite	11	10,37%	8	10,25%
trophic ulceration	18	16,98%	15	19,23%
necrotizing fasceiitis	2	1,88%	3	3,84%
phlegmon in the back of the leg	6	5,66%	3	3,84%
deep abcess of the foot	13	12,26%	9	11,53%

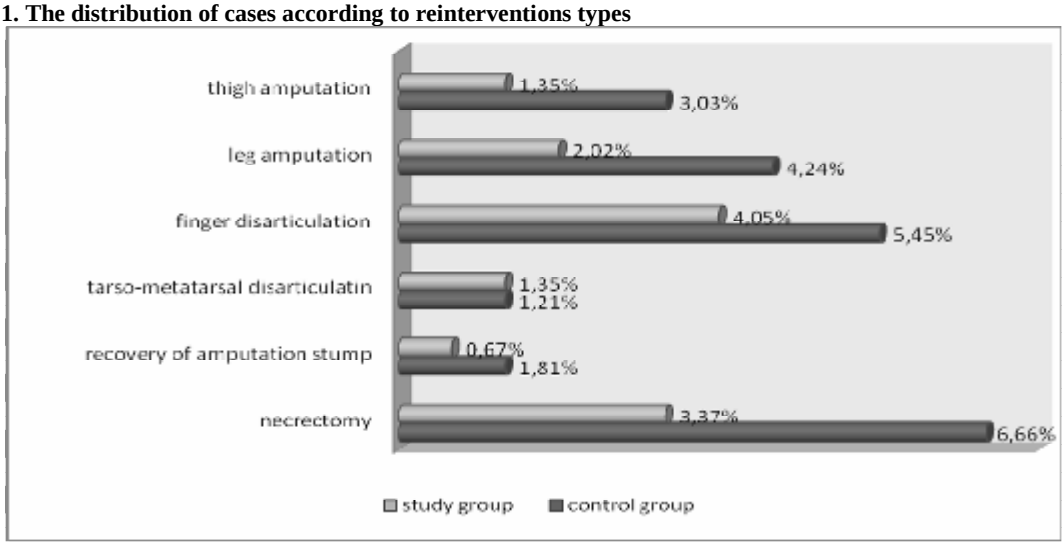
Table no. II: The distribution of patients according to clinical form

Clinical forms	Control group	Study group	Total number
neuropathic form	54 (50,94%)	42 (53,84%)	96
neuroischemic form	52 (49,06%)	36 (46,16%)	88

Table no. III: Types of interventions for diabetic foot complications

	control group frequency(percentage)	study group frequency(percentage)
Necrectomy	9 (8,49%)	16(20,51%)
finger disarticulation	43(40,56%)	31(39,74%)
thigh amputation	38(35,84%)	17(21,8%)
leg amputation	6(5,66%)	4(5,13%)
exhaust phlegmon incision	2(1,88%)	4(5,13%)
tarso- metatarsal disarticulation	4(3,77%)	3(3,85%)
lobar sympathectomy	3(2,83%)	1(1,28%)
periarterial sympathectomy	1(0,95%)	2(2,56%)

Figure no. 1. The distribution of cases according to reinterventions types



The hydro active treatment helps healing the wound by preventing infection and necrosis and by reducing the number of bacteria. The proportion of reinterventions for the post operatory complications in the control group were 34.9%, and for the study group 24.3%. Most common causes of reintervention are: infection or suppurative wound (21 cases in control group versus 3 cases in study group), amputation stump necrosis (9 cases versus 4 cases in study group), post operatory atonal wound (17 cases versus 7 cases). (Figure 1)

The impact of new kinds of dressings used in the local management of the diabetic wounds helps lowering the number of hospitalization days of the patients with complicated diabetic foot and the return to physical activities in a shorter time. Medium hospitalization days were of 32 days in the control group and 24 days in the study group.

Treatment of patients in the study group also included diabetes therapy, antibiotics, treatment of associated pathology, correction of ischemic phenomena and therapy of diabetic neuropathy and plantar pressure reduction in the affected limb by using different kinds of planting sustainers.

DISCUSSIONS

Principles of surgical treatment of diabetic foot complicated by vascular and soft tissue injuries include: radical surgical purulent outbreak processing, correction of critical limb ischemia and early surgical reparatory interventions. We found that the complex treatment of diabetic foot complications must be correlated with the severity of the infectious process and the etiopathogenic form of the diabetic foot. The final stage of the surgical treatment, local hydro active bandages applied after proper debridation prepare for closing the wound by plastic reconstruction.

Patient's awareness of the importance of optimal glucose control is essential as well as using appropriate footwear at all time, avoiding foot trauma, performing daily self-examination of the foot and reporting any changes to health care professionals. [5]. Risk factors for amputation include age, male sex, poor glucose control , having diabetes for a longer period, and practicing or receiving poor preventive health care . [2, 6]

By implementing a new strategy of care that combines prevention with multidisciplinary treatment of foot ulcers, careful monitoring and education of people with diabetes some authors believe it is possible to reduce amputation rates by up to 85%. [4, 7] In some cases amputation is the best or only option. Urgent amputation is usually required only when there is extensive necrosis or life threatening infection. [7, 8]

CONCLUSIONS

Small plantar amputations, multiple surgical interventions and a modern management of the wound are treatment principles that can help keeping the support function of lower limbs compared to the traditional primary high and invalidating amputation.

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