

Original Research Article


A clinical study of ulcers of the leg

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Abstract

Background: Chronic ulceration of the lower leg is a frequent condition; incidence of ulceration is rising as a result of the ageing population and increased risk factors for atherosclerotic occlusion such as smoking, obesity and diabetes.

Aim: To compare and analyze the distribution of age, sex, systemic disease and location of the ulcer among the study group.

Materials and methods: Prospective study of 200 cases of chronic leg ulcers admitted with regular dressing, debridement, treating the underlying systemic disease, skin grafting and amputation were done.

Results: The highest age incidence of leg and foot ulcers in this study was in the age group of 51 years and above (45.5%). There was a marked male predominance of 86%. Foot was the most commonly affected region 88%. 87.5% of venous ulcers were situated in the gaiter zone. 88% of diabetic ulcers were situated in the foot. 100% of the arterial ulcers were situated in the foot. Of malignant and other ulcers 60% were situated in the foot and 40% in the leg. Staphylococcus was found to be the most common pathogen to be isolated from the ulcers i.e., 28.9%.

Conclusion: Underlying vascular disorders are the main etiological factors for leg and foot ulcers with diabetes forming a major risk factor. Diabetes was the commonest disease associated with chronic leg ulceration.

Key words

Leg, Ulcers, Diabetes, Obesity, Smoking, Atherosclerotic occlusion.

Introduction

Chronic ulceration of the lower leg and foot is frequent condition and wide in distribution they

may be associated with a number of Medical, Surgical and Dermatological condition the patient suffering is very immense, commonly seen in most of the surgical wards and OPD.

The incident of ulceration is more in aging population and increased risk factor for atherosclerotic occlusion such as smoking, obesity and Diabetics. Ulceration can be defined as wounds with "full thickness depth" and a "slow healing tendency" in general the slow healing tendency is not simply explained by depth and size but caused by underlying pathologic fact that needs to be removed to induce healing.

The problems of leg ulcer represent a wide spectrum of etiology, pathology, severity and morbidity. The main causes are venous valve insufficient, lower extremity arterial disease and diabetes. Less frequent conditions are infections, vasculitis, skin malignancies and ulcerating skin diseases such as pyoderma gangrenosum. But even rare condition exists such as recently discovered combination of vasculitis and hypercoagulability. For a proper treatment of patients with leg ulcers, it is important to be aware of the large differential diagnosis of leg ulceration. The causes may be various but the anatomical situation of ulcers in the leg by itself can give rise to problems that can at times test the ingenuity and patience of the surgeons [1].

During the past three decades considerable knowledge has been gained regarding the physiology, anatomy, pathology and management of chronic leg ulcers. Despite all this the management of chronic leg ulcers is a fertile field for experimentation. Various studies have been conducted and a number of procedures and techniques have evolved with varying degree of success. It is common to see patients with different types of ulcers due to various etiology and underlying systemic diseases. Moreover, leg and foot ulcers form a good bulk of patients in our hospital.

Treatment of these ulcers forms a challenging task as well. So we therefore in present study attempted to analyze the ulcers of the leg and foot.

Materials and methods

The material for this study was drawn patients admitted to the Surgical Department a total number of 200 cases were considered.

Inclusion criteria: Both sexes and of all ages from 12 years and above, all religion and economic strata with stasis ulcers, diabetics with leg ulcers, traumatic ulcers, arterial ulcers and others.

A detailed history was collected with particular reference to onset, duration and type of lesion, socioeconomic strata and occupational factors and systemic diseases. Any histories of similar ulcers were also noted. A thorough systemic and local examination was carried out. The morphological features of ulcers i.e. - number, distribution of ulcer on leg or foot site and associated diseases like varicose veins, eczema or patches were noted. But while presenting only relevant positive and some important negative findings were shown to make the study brief and to avoid unnecessary repetitions.

Results

Among the 200 cases studied the commonest was found to be diabetic ulcer accounting for 68 cases (34%) as per **Figure - 1**. Incidences of leg ulcers in this study group were found to be maximum in the age group of 51 and above. The youngest patient was 19 years old and the oldest were 80 years old. Chronic leg ulcers were more common in males than in females – males accounting for 86% (**Table – 1**).

Out of 200 cases studied ulcers associated with diabetes mellitus accounted for 68 cases. It was noted that diabetic ulcers were relatively common in the left limb accounting for 50% of cases. Diabetic ulcers were relatively common in males accounting for 76.48% and less common in females accounting for only 23.52%. The maximum no of patients suffering from diabetic ulcers were in the age group of above 50 years accounting for about 73.5% of the cases (**Table – 2**).

Figure - 1: Distribution of various types of chronic leg ulcers.

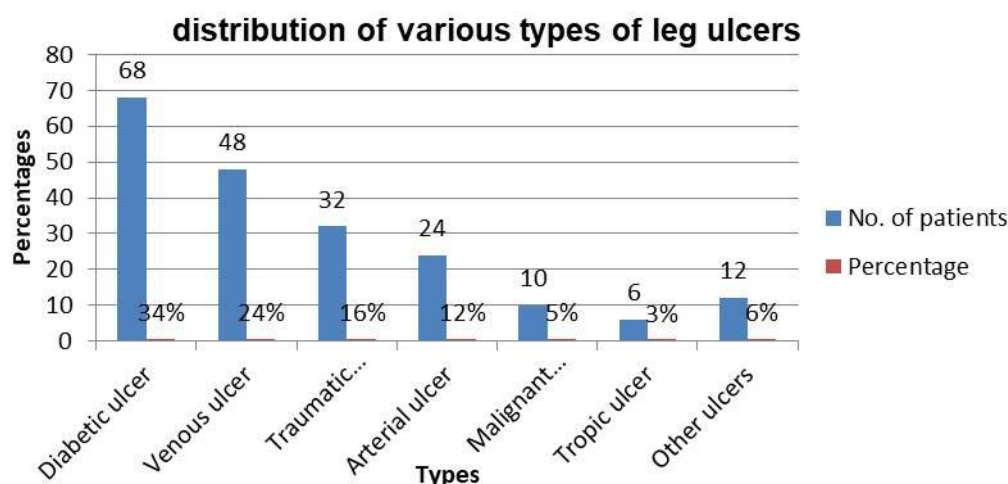
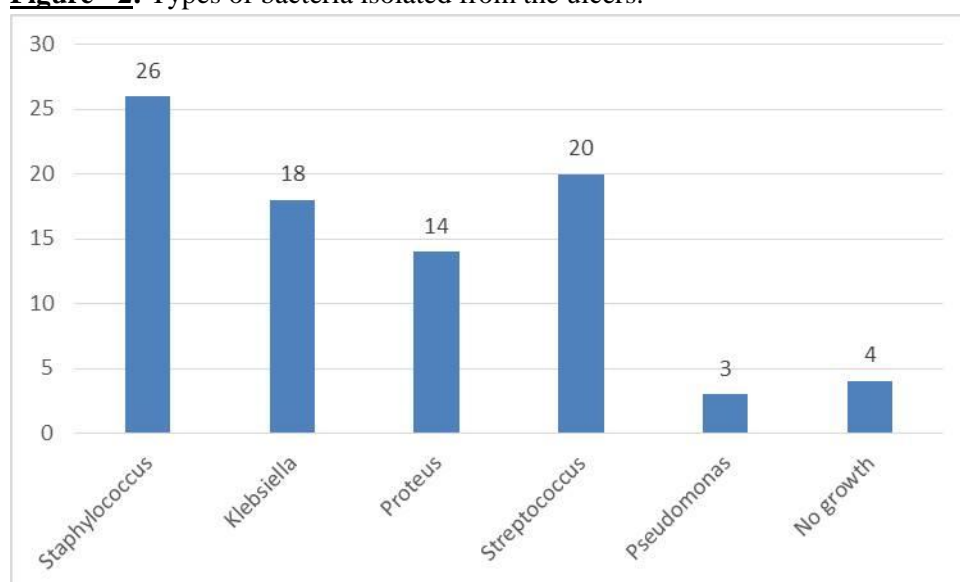


Figure - 2: Types of bacteria isolated from the ulcers.



Venous ulcers

Out of the 200 cases studied ulcers associated with venous causes accounted of 48 cases. In this study, long saphenous system was found to be by far the commonest system affected in case of venous ulcers accounting for 64.5%. Males were more commonly affected accounting for 91.6%. In other published studies it is noted that females have a slightly more preponderance over males. Venous ulcers were found to be the commonest between the age group 31 – 50 years (**Table – 3**).

Arterial Ulcers

Out of 200 cases, 24 were arterial ulcers. Arterial ulcers were found to be the most common ulcers in the age group of 41 to 50 years. Peripheral

vascular diseases are 7 times more frequent in 60-year-old when compared to 70 years olds according to Hanson Carita.

Table - 1: Demographic distribution in present study.

Sex	No. of cases	Percentage
Male	172	86%
Female	28	14%
Age group		
12– 20	2	1%
21– 30 years	11	5.5%
31– 40 years	48	24%
41– 50 years	48	24%
51 & Above	91	45.5%

Table - 2: Distribution of diabetic ulcers in the limbs.

Side	No. of cases	Percentage
Right limb	32	47.6%
Left limb	34	50%
Bilateral	2	2.94%
Sex		
Male	52	76.48%
Female	16	23.52%
Age group		
12– 30 years	0	0%
31– 40 years	6	8.9%
41– 50 years	12	17.6%
51 & above	50	73.5%
Total	68	100%

Table - 3: Distribution in venous leg ulcers.

System	No. of cases	Percentage
Long saphenous	31	64.5%
Short saphenous	3	6.2%
Both	10	21%
Deep veins	4	8.3%
Sex		
Male	44	91.67%
Female	4	8.4%
Age group		
12– 30 years	6	12.6%
31– 40 years	23	47.9%
41– 50 years	11	22.9%
51 & above	8	16.6%

Table - 4: Distribution of various types of arterial ulcers.

Pathology	No of cases	Percentage
TAO	10	41.6%
Atherosclerosis	14	58.4%
Age group		
12 – 30 years	0	0
31 – 40 years	5	20.83%
41 – 50 years	11	45.83%
51 - 70 years	8	33.33%

Atherosclerosis was found to be the commoner association with arterial ulcers constituting 58.4%. The only other association with arterial

ulcers was TAO accounting for 41.6% (**Table – 4**).

Traumatic Ulcers

A total no. of 32 traumatic ulcers was noted in the study group out of which 6 were associated with anemia. One of these ulcers was present on the joint surface. One of these ulcers was result of secondary infection following primary closure by suturing. The rest of the ulcers were that of avulsive type with some degree of skin loss.

The venous ulcers occurred more commonly in the gaiter zone (87.5%) whereas arterial and diabetic ulcers occurred mainly in the foot i.e., 100% and 88.37% respectively. About 60% of malignant ulcers occurred in the foot and rest of 40% in the leg (**Table – 5**).

Only 90 cases were sent for culture and sensitivity tests. Staphylococcus was found to be the most common pathogen accounting for 28.9% of the bacteriological isolates. This was followed by proteus, which accounted for 15.5%, Klebsiella which accounted for 20%, streptococcus and pseudomonas accounting for 22.5% and 3.3% each. Staphylococcal infection was the most common infection of diabetic foot (**Figure – 2**).

Most foot infections are polymicrobial, staphylococcus is recovered from 33 to 50% of the cases (Norman Weinszweig and Raymond M. Dunn). Most of the patients in this study group belong to the lower socio-economic status.

11 patients with leg ulceration had infective gangrene of deeper tissues and they underwent amputation as a life-saving procedure and 2 patients with malignant leg ulceration also underwent amputation.

Most patients with varicose veins underwent some form of operation i.e., ligation and stripping and or Trendelenburg’s operation and sub-fascial ligation following healing of ulcers. No recurrences of ulcers were noted.

Table - 5: Location of the ulcer according to its types.

Type of ulcer	Gaiter Zone	Foot	Leg	Total
Diabetic	0 (0%)	60 (88.3%)	8 (11.7%)	68
Venous	42(87.5%)	1 (2.1%)	5 (10.4%)	48
Arterial	0 (0%)	24(100%)	0	24
Malignant	0 (0%)	6 (60%)	4 (40%)	10
Others	1(8.33%)	8(66.66%)	3 (25%)	12

9 out of 32 patients with traumatic ulcers underwent skin grafting. The mean time for the ulcer to heal in patients who were grafted was noted to be 10.25 days as against 17.6 days of those who did not undergo skin grafting. Photographs of various ulcers were as per **Figure – 3 to 7**.

90% of the cases [2, 3]. Arterial diseases account for 5% to 10%, most others are due to neuropathy or a combination of both [4].

Figure - 3: Venous ulcer.



Figure - 4: Diabetic ulcer.



Discussion

The prevalence of leg ulcers is probably between 0.18% and 1% [5]. 95% of leg ulcers are due to vascular etiology [6], and among all chronic wounds lower extremity venous ulcer dominates the differential diagnosis accounting for up to

Figure - 5: Traumatic ulcer.



Figure - 6: Arterial ulcer (TAO).



Figure - 7: Tropic ulcer.



In this study chronic ulcer with vascular etiology accounted for only 36% of all chronic ulcers. Out of this venous ulcers accounted for 24% and arterial ulcers accounted for 12%. Chronic ulcers

associated with diabetes accounted for nearly 34%. Traumatic ulcers accounted for 16% of the cases. Malignant ulcers accounted for 5% and other ulcers for 6%.

As observed above the present study was not comparable with the published studies mentioned probably because of following reasons:-

The study group of 200 patients was too small a number to draw any comparative conclusions. The other published studies were population based, controlled randomized or a group-based study which included different specialties whereas this study was a non-randomized and uncontrolled study.

Some investigators have classified diabetic ulcers as metabolic. The most important factors responsible for causation of ulcer in diabetes are the arterio-sclerotic lesions in large leg arteries and or neuropathy resulting in decreased sensation. If diabetic ulcers in our study are considered vascular disorders rather than metabolic, the percentage of vascular ulcers in our study is about 66% - somewhat comparable to the above study. However, this is controversial and in diabetes it is a combination of factors that are to be considered in causation of leg ulcers. Also according to Yound J. R. [4] and Boyd A. M., et al. [7], the distribution of different type of ulcers in different studies varies – 70% to 90% for venous ulcer, 5% to 15% for arterial ulcers and 1% to 5% for other ulcers.

As per studies done by Hansson Carita [8] on leg and foot ulcers, ulcers below the line of shoe and feet are considered mostly to be caused by arterial insufficiency and or diabetes. Ulcers on the medial aspect of the ankle in the gaiter zone are mostly caused by venous insufficiency. In the present study, ulcers had the same site of distribution i.e., ulcers in the gaiter zone were mostly caused by venous insufficiency and ulcers in the foot below the line of shoes were mostly caused by arterial insufficiency and or diabetes.

About 42% of patients in our study had ulcers in the foot only. This is rather high figure in comparison to Hansson's study which showed

about only 30% of the ulcers in the foot. This is probably due to more number of diabetic and arterial ulcers in our study.

Cornwall, et al. [9] in his study had 70% of patients over the age of 70 years. The median age of all patients in this study was 45 years and 44% of the patients over the age of 45 years and had 70% of the patient over the age of 70 years. But according to study done by Callam M.J., et al. [3] the elderly are not the only population at risk: In his study ulceration began before the age of 40 years in 22% of the population studied. In our study, ulceration began before the age of 40 years in 47.9% of the patients.

Peripheral vascular diseases increase with age and are 7 times more frequent in 60 years old patients when compared to 20 years old. (Hansson Carita) [8]. In this study, arterial and venous diseases were found to be maximum in the age group of 31 to 50 years. This discrepancy may be due to the fact that, our study group patients in the above age group belong to the working class and the ulcers they suffer from hamper their working capacity making them seek medical help early. And also venous ulcers were found to be most common in the age group of 31 to 50 years which is rather early when compared to western studies as most of our patients belong to the working class which involved long hours of standing.

Arterial were found to be more common in the age group of 31 to 50 years which again is rather too early as compared to western studies, since we have in our study a significantly high number of TAO cases which are common in young adults. Most of them are smokers. In our study, there were more men 86% than women 14% with leg and foot ulcers. However, no differences between sexes were found when age specific relative frequencies for all ulcers were compared.

Elastic crepe bandages are the most important forms of treatment for venous ulcer patients [7]. In our study all the 48 patients who had venous ulcers wore elastic crepe bandages stretched to

50% providing of around 14 mmHg compression pressure under one layer. These patients were also subjected to local dressings and Bisgaard's line of management. Once the ulcers healed they were taken up for surgery.

Out of the 48 patients, 44 were due to varicose veins and 4 due to deep vein thrombosis. Out of 48 patients with varicose veins, 44 underwent surgery in form of ligation and or Trendelenburg's operation and sub fascial ligation. 4 patients with deep vein thrombosis underwent skin grafting. The mean time for ulcer healing was 17.2 days. The patient who underwent skin graft had his ulcer healed in 7 days only. A study of recurrences of venous ulcers could not be made due to inadequate time follow up.

Appropriate anti-diabetic therapy informs of plain insulin (Bovine), antibiotics, the debridement and regular dressings were the important methods of treatment for diabetic ulcers in our study. Out of the 68 patients, 60 patients were managed with regular dressings; antibiotics slough excision and or debridement along with anti-diabetic therapy. Three patients underwent amputation as a life saving measure and one patient expired due to Medical causes. 6 patients underwent skin grafting and had his ulcer healed in 10 days. However, +the mean healing time was 26.43 days in overall diabetic ulcers.

Skin is the best dressing (Lister). It can be applied as a partial thickness graft or numerous pinch grafts. It is best reserved for large ulcers or those, which will not heal, by conservative management [8]. In this study, ulcers secondary to trauma were noted in 32 patients. Out of the 16 patients, 3 of them were found to be anemic, 2 had associated osteomyelitis of the calcaneum and one had an ulcer following a primarily sutured wound, which got infected. The rest of the 4 patients had avulsive injury with some degree of skin loss. One patient had an ulcer which was placed directly over the ankle joint. 9 patients out of the 32 underwent skin grafting.

The mean healing time of these traumatic ulcers were 14.33 days. Those managed conservatively had a mean healing time of 17.6 days and those who had undergone skin grafts had a mean healing time of 10.25 days.

Out of 200 cases 5% (10 cases) were found to be of malignant origin. Three of them were following burn scar called Marjolin's ulcer. This finding is similar to marjolin's ulcers described in burn scar by Soto-Douclos BA, et al. [10] study. These ulcers should be suspected in a non-healing chronic ulcer in a burn scar. These ulcers are treated by early grafting of the burn site.

Two out of ten cases were malignant melanoma. Diagnosis is confirmed by biopsy. They were treated with wide local excision with tumor free margin of 2 cm around the lesion. One tumor has involved the little toe for which disarticulation was done. Superficial radiotherapy was considered for these cases.

Rest of the five cases which were diagnosed to have malignant ulcers involving secondary lymph nodes were referred to oncology center for further management. Chronic venous insufficiency can be treated in several ways such as compression therapy, sclerotherapy, or with surgery or with supportive measures [11]. In the present study we have done sclerotherapy, subfacial ligation and trendelenberg operation according to the requirement. Supportive measures like compression therapy along with medication were used. Medication we used in the study is Tab Diosmin 500 mg twice daily which is a venotonic agent along with compression therapy.

Compression hosiery reduces rates of reulceration of venous ulcers compared with no compression [12]. Out of 44 cases of venous ulceration 22 patients followed our advice sincerely and used compression therapy in which only 4 patients had recurrence of ulcers. Rest 20 patients had no recurrence and relieved symptomatically. In remaining 20 cases who didn't use compression therapy due to personal

reasons such as economical issues, non-compliance with compression therapy had come for follow up with increased severity of symptoms and recurrences in 10 of them.

Diabetes is fast gaining status of a potential epidemic in India with more than 62 million diabetic individuals currently diagnosed with disease. In 2000, India topped the world (31.7 million) with highest number of people with diabetes mellitus followed by china (20.8 million) U.S.A (17.7 million). It is predicted that by 2030 diabetes mellitus may afflict up to 79.4 million individuals in India.

The etiology of Diabetes Mellitus in India is multifactorial such as genetic factors coupled with environmental influences such as obesity, rising living standards, steady urban migration and life style changes. Yet despite increased incidence of Diabetes Mellitus within India, there are no national wide studies and few multicentric studies conducted on prevalence of Diabetes Mellitus and its complications.

In the present study because of high incidence of diabetes mellitus diabetic ulcers were taken as a separate group and not included in vascular or metabolic causes of ulcers.

In present study out of 200 cases 34% (68 cases) were diagnosed to have diabetic ulcers. Diabetic ulcers were compared based on age, sex, pattern of distribution. They were found to be more common in people > 50 years of age (73.5%) and more in males (76.48%) and there is no significant difference in distribution in each limb.

Diabetic ulcers in this study were treated with regular dressings with normal saline and insulin therapy was given according to sliding scale. Antibiotic prophylaxis was started based on culture and sensitivity report.

Large ulcers were treated with split thickness skin grafting after satisfactory granulation tissue has been achieved. Cil N, et al. [12] concluded effects of umbilical cord blood stem cells in

healing factors for diabetic foot injuries and mentioned the use of stem or progenitor cells from bone marrow or peripheral or umbilical cord blood is becoming more common for treatment of diabetic foot problems. In the present study I could not use stem cell or progenitor cells from bone marrow due to cost issue but used placental extract gel which is useful and beneficial in wound healing after achieving healthy granulation. Further study is recommended for stem cells or progenitor cells from bone marrow and umbilical cord blood in treating leg ulcers.

In the present study Only 90 cases were sent for culture and sensitivity tests. Staphylococcus was found to be the most common pathogen accounting for 28.9% of the bacteriological isolates. This was followed by proteus, which accounted for 15.5%, Klebsiella which accounted for 20%, streptococcus and pseudomonas accounting for 22.5% and 3.3% each. Staphylococcal infection is the most common infection is diabetic foot. Most of them are sensitive to third generation cephalosporins.

Conclusion

Diabetic ulcer being more common in males, more prevalent in patients above the age of 51 years and above, more often seen in left limb, venous ulcer was very commonly seen in patients who were presenting with venous valve incompetence resulting in venous congestion commonly seen saphenofemoral junction incompetence and perforator incompetence predominantly seen in males patients between 31-40 years of age in the gaiter zone. Atherosclerosis was found to be the common cause of arterial ulcer due to arterial occlusion with high cholesterol levels. The only other arterial ulcer was due to TAO predominantly seen in middle-aged individuals only in the foot.

Though the causative factors are varied, diabetes mellitus and venous insufficiency were by far the more common factors. Underlying vascular disorders are the main etiological factors for leg

and foot ulcers with diabetes forming a major risk factor. Diabetes was the commonest disease associated with chronic leg ulceration. Thus, the study of various cases of leg ulcers arouses lot of interest and is mind bogging as far as the treatment of these cases are concerned. What with the availability of arsenal of investigation wide range of antibiotics and with ever improving dressing material, there is certainly a great improvement in treatment of chronic leg ulcers. Skin grafting when it becomes a choice for chronic ulcers with wide defects is indeed the right one.

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