A CLINICO-PATHOLOGICAL STUDY OF ULCERS OF LEG

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ABSTRACT

BACKGROUND

About 95% of the leg ulcers are due to vascular aetiology¹ and venous ulcers account for up to 90% of cases.^{2,3} Arterial disease accounts for 5% - 10%, others are due to neuropathy, usually diabetic or a combination of these diseases.⁴ Diabetic ulcers are common on the toe and the heel.⁵

Aims and Objectives-

- To compare and analyse the distribution of age, sex, systemic disease and location of the ulcer among the study group.
- To study the clinical features of various types of leg ulcers.
- To study the usefulness of applied investigations for the effective management.
- To study the order of aetiological prevalence of various leg ulcers in India, particularly in Sri Venkateshwarra Medical College Hospital and Research Centre, Ariyur, Puducherry.

MATERIALS AND METHODS

Department of General Surgery, Sri Venkateshwarra Medical College Hospital and Research Centre, Ariyur, Puducherry.

Method of Collection of Data- A retrospective analytical study of 150 patients admitted in Surgery Department diagnosed with foot ulcer and study period from January 2015 to December 2017.

Inclusion Criteria- All patients of leg ulcers admitted in ward (IP).

Exclusion Criteria- OPD patients.

RESULTS

About 48% of leg and foot ulcers are due to vascular aetiology and arterial ulcers alone account for 32% and venous ulcers 16% in our study. Traumatic ulcer constituted next major category (24%). Diabetic ulcers constituted 18.67% among leg ulcers in our study.

CONCLUSION

This is unlike other studies, about 95% of leg ulcers are due to vascular aetiology and venous ulcers account for upto 90% and 5%-10% arterial ulcers. Diabetic ulcers constituted 18.67%, a relatively higher number as compared to western countries (5%-10%).

KEYWORDS

Arterial Ulcer, Venous Ulcer, Diabetic Ulcer, Traumatic Ulcer.

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BACKGROUND

Hippocrates, the legendary father of medicine himself had a leg ulcer that was the age when anaesthesia, anatomy and physiology were never heard of. He treated multiple varicose veins by puncturing them at different levels to avoid non-healing of ulcers in about 400 years B.C.¹

Gay and Spencer's in 1868 wrote two important books on venous ulcers, which stressed the role of deep vein thrombosis and other lesions of arteries and veins (both superficial and deep) in the aetiology of leg ulcerations. Gay also described perforating ankle veins and suggested use of the term venous ulcerations.²

Linton drew attention to incompetence of communicating calf veins as potential cause of venous ulcerations.³

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From the 10th and 18th centuries various physicians including Halu, Abbas, Avicenna, Falopio and Pare attributed ulceration of the leg to accumulation of black bile and believed that ulcerations of the leg served useful purpose in getting rid of those live substances.⁴

The prevalence of leg ulcer is probably between 0.18% and 1% of the population.⁵ The site of ulceration is analysed, around 90% of the ulcers were present in the gaiter area, 2% in the foot and 8% in the leg.⁶

During the past three decades considerable knowledge has been gained regarding the anatomy, physiology, pathology and management of chronic leg ulcers. Despite all this, the management of 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 aetiology 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.

I have therefore in my present study attempted to analyse the ulcers of the leg and foot.

Aims and Objectives

1. To compare and analyse the distribution of age, sex, systemic disease and location of the ulcer among the study group.
2. To study the clinical features of various types of leg ulcers.
3. To study the usefulness of applied investigations for the effective management.
4. To study the order of aetiological prevalence of various leg ulcers in India, particularly in Sri Venkateshwaraa Medical College Hospital and Research Centre, Ariyur, Puducherry.

MATERIALS AND METHODS

This is a retrospective observational study conducted in the Department of General Surgery, Sri Venkateshwaraa Medical College Hospital and Research Centre, Ariyur, Puducherry.

This study consists of 150 patients who were admitted in surgical ward from January 2015 to December 2017 with the complaint of leg ulcer of any cause, any age of both sexes, after obtaining their informed consent.

A careful history was taken regarding mode of onset, progression and duration of ulcer with associated symptoms. Each patient was interviewed to collect the information on past history, family history and personal history and in women, menstrual history and obstetric history in a properly designed questionnaire (Annexure 1).

All patients underwent a general physical examination, systemic examination and local examination of ulcer with regional lymph node. Clinical examination of arterial system and venous system in relevant cases. Clinical diagnosis of the ulcer was made, and patients were subjected to routine investigation as per the hospital protocol. A formal consent from the College Ethical Committee was taken.

Venous blood was taken on admission and was sent to the laboratory for estimation of haemoglobin, total leukocyte count and differential count and blood grouping. Biochemical investigation included random blood sugar and serum creatinine levels. If sugar levels were found to be raised, then complete blood sugar profile is obtained; HIV and HBsAg if required. Fresh urine for routine and microscopic examination. Lipid profile in selected cases.

In suspected arterial leg ulcer, colour Doppler of lower limb arterial system was carried out to rule out atherosclerosis and Buerger's disease. Venous Doppler study for venous valve incompetence and deep vein thrombosis.

Pus was taken from the ulcer for pus culture and sensitivity. In suspected tuberculous ulcer, chest x-ray, erythrocyte sedimentation rate and pus for AFB staining was carried out. If tuberculosis was proved, patient was started on anti-tuberculous treatment under Category 1. In proved leprotic ulcer, anti-leprosy treatment was started.

Initially, prophylactic antibiotics and daily dressing was done for all the cases. After proving the pathology, specific management of the leg ulcer was started. Specific antibiotics were given according to the pus culture and sensitivity.

Daily assessment of the wound healing and progression was noted in the proforma of the particular patient. Some patients underwent amputation of leg and toes, the mean healing time of the stump reconstruction was noted. Some patient underwent skin grafting and flap construction. Healing time with graft uptake was noted.

Inclusion Criteria

All patients of leg ulcers were admitted in the ward (In-Patient).

Exclusion Criteria

Nil.

Statistical Analysis

All data were examined for their distribution and results given in percentage.

RESULTS

"Clinical study of ulcers of the leg" was carried out in the Department of General Surgery, Sri Venkateshwaraa Medical College Hospital and Research Centre, Ariyur, Puducherry, conducted from January 2015 to December 2017 with 150 patients.

The study reveals certain important data. The highest number of cases was found to be ulcer of the leg associated with ulcers due to arterial occlusion secondary to atherosclerosis and TAO followed by leg ulcers due to trauma, diabetic ulcer and ulcers due to varicose vein. Other ulcers include trophic ulcers associated with leprosy, polio, paraplegia etc., tubercular ulcers and Marjolin's ulcer.

Sl. No.	Aetiological Type	No. of Patients	Percentage
1	Arterial ulcer	48	32
2	Traumatic ulcer	36	24
3	Diabetic ulcer	28	18.67
4	Venous ulcer	24	16
5	Trophic ulcer	6	4
6	Malignant ulcer	2	1.33
7	Others	6	4
	Total	150	100

Table 1. Distribution of Various Types of Leg Ulcers

Among the 150 cases studied, the commonest was found to be Arterial ulcer accounting for 48 cases (32%) followed by Traumatic ulcer (24%), Diabetic ulcer (18.67%), Venous ulcer (16%), Trophic ulcer (4%) and others (4%) and malignant (1.33%). According to Gilliland, 95% of leg ulcers are due to vascular aetiology.⁷

Incidences of various chronic ulcers are shown graphically in Graph No. 1 above.

Sex	No. of Patients	Percentage
Male	133	88.67
Female	17	11.33

Table 2. Sex Distribution of Various Types of Chronic Leg Ulcers

The above figures indicate that leg ulcers were more common in males than in females- males accounting for 88.67%.

Sl. No.	Age Groups	No. of Cases	Percentage
1	0 – 10	3	2
2	11 – 20	8	5.33
3	21 – 30	16	10.67
4	31 – 40	30	20
5	41 – 50	30	20
6	>50	61	40.67

Table 3. Age Distribution of Various Types of Leg Ulcers

Incidences of leg ulcers in this study group were found to be maximum in the age group of 51 and above. In this study all age groups were included, even the paediatric patients who were admitted in surgical ward. Cornwall et al⁸ in their study had 70% of the patients over the age of 70 years and according to a study done by Callam MJ,⁹ ulceration began before the age of 40 years in 22% of the patients.

Arterial Ulcers

Out of 150 cases, 48 were arterial ulcers. Arterial ulcers were found to be the most common ulcers in the age group above 50 years. Peripheral vascular diseases are 7 times more frequent in 60-year-olds when compared to 70-year-olds according to Hanson Carita.

Buerger's disease was found to be the common association with arterial ulcers constituting 75%. The only other association with arterial ulcers was atherosclerosis accounting for 25%.

Charcot has been credited with description of intermittent claudication (IC).¹⁰ The concept of sympathetic denervation as therapy for arterial occlusive disease was first elaborated and tested by Leriche and Jaboulay in 1913.¹¹

Heuser performed the first contrast study of blood vessels in 1919 by injecting potassium iodide into the dorsal vein of a child with congenital syphilis.¹²

In 1924, Leo-Buerger published a book containing detailed clinical and pathological study of TAO. He described giant cells and the purulent foci in the occluding mass in the vessels.¹³

Adson and Brown applied the technique of sympathetic ganglionectomy in 1925 to relieve debilitating lower extremity vasospasm with better long-term results.¹⁴

Robert Linton's espousal of the reversed saphenous vein in 1952 established the procedure of choice for peripheral vascular reconstruction for many years.¹⁵

Venous Ulcers

Out of the 150 cases studied, ulcers associated with venous causes were 24 cases. Venous ulcers were found to be the commonest between the age group 41 - 50 years.

Males were more commonly affected accounting for 95.83%. In other published studies, it is noted that females have a slightly more preponderance compared to males.

In this study, long saphenous system was found to be by far the commonest system affected in case of venous ulcers accounting for 83.33%.

Ulcers associated with Diabetes Mellitus

Out of 150 cases studied, ulcers associated with diabetes mellitus accounted for 28 cases.

From the above study, it is noted that diabetic ulcers were relatively common in the right limb accounting for 57.14% of cases.

From the above study, it is noted that diabetic ulcers were relatively common in males accounting for 78.57% and less common in females accounting for only 21.43%.

As noted above, the maximum no. of patients suffering from diabetic ulcers were in the age group of above 50 years accounting for about 67.85% of the cases.

The venous ulcers occurred more commonly in the gaiter zone (91.67%), whereas arterial and diabetic ulcers occurred mainly in the foot i.e. 79.17% and 75% respectively. All

malignant ulcers occurred in the foot in the leg. According to Hanson Carita ulcers below the line of shoe and feet are considered, mostly caused by arterial insufficiency and/or diabetes. Ulcers on the gaiter zone are mostly caused by venous insufficiency.

Only 51 cases were sent for culture and sensitivity tests. Staphylococcus and Klebsiella were found to be the most common pathogen accounting for 29.41%, each of the bacteriological isolates. This was followed by Proteus which accounted for 17.65%, streptococcus and pseudomonas accounting for 7.84% and 1.96% each.

Staphylococcal infection is the most common infection in diabetic foot. 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. Common organisms like Staph. aureus and Klebsiella are mostly sensitive to Amikacin, gentamicin and penicillin. Proteus sensitive to Cefotaxime, gentamicin, amikacin and ofloxacin. Pseudomonas mostly sensitive to Pipzo-T and Imipenem.

Traumatic Ulcer

Traumatic ulcers were found in all age groups, more with males and were due to avulsion injuries with some degree of skin loss. One of the underlying causes for non-healing was anaemia. Most of them were due to sutured wound which got infected and tissue necrosis resulting in skin loss leading to non-healing ulcer. The commonest organisms cultured from the wounds were found to be staphylococcus, streptococcus, pseudomonas and Klebsiella.

Other Causes of Leg Ulcer

Patients with trophic ulcer were found to be suffering from leprosy for which they were under treatment with anti-leprosy drugs, polio, paraplegia and one child with meningomyelocele. Among the other ulcers, one case with snakebite resulting in cellulitis and tissue necrosis had extensive skin loss leading to non-healing ulcer.

Though, the causative factors are varied, arterial occlusion, trauma and diabetes were by far the more common factors. Underlying vascular disorders are the main aetiological factors for leg and foot ulcers with diabetes forming a major risk factor. Arterial occlusion due to TAO was the commonest disease associated with leg ulceration. Thus, the study of various cases of leg ulcers arouses lot of interest and is mind boggling as far as the treatment of these cases are concerned. With the availability of arsenal of investigations, wide range of antibiotics and with ever improving dressing material, there is certainly a great improvement in treatment of leg ulcers. Skin grafting when it becomes a choice for chronic ulcers with wide defects is indeed the right one.

DISCUSSION

The prevalence of leg ulcers is probably between 0.18% and 1%.⁵ 95% of leg ulcers are due to vascular aetiology¹⁶ and among all chronic wounds, lower extremity venous ulcer dominates the differential diagnosis accounting for up to 90% of the cases.^{17,18} Arterial diseases account for 5% to 10%, most others are due to neuropathy or a combination of both.⁷

In this study, leg ulcer with vascular aetiology accounted for 48% of all leg ulcers. Out of this, arterial ulcers accounted for 32% and venous ulcers accounted for 16%. Leg ulcers associated with diabetes accounted for nearly 18.67%. Traumatic ulcers accounted for 24% of the cases. Malignant ulcers accounted for 1.33% and other 4%.

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

- The study group of 150 patients was too small a number to draw any comparative conclusions.
- The other published studies were population based, controlled randomised or a group-based study which included different specialties, whereas this study was a non-randomised and uncontrolled study.

Buerger's disease accounted for most arterial ulcers (75%). This could be due to widespread smoking of 'Bidis' in this region and perhaps a genetic predisposition to TAO which needs further studies.

Some investigators have classified diabetic ulcers as metabolic. The most important factors responsible for causation of ulcer in diabetes are peripheral neuropathy, micro and macrovascular complications of leg arteries and high sugar level in the tissue predisposing to infection. Even if diabetic ulcers in our study are considered as vascular aetiology rather than metabolic, the percentage of vascular ulcers in our study is about 66.67%. This is not comparable to the above study (95%), because in our study traumatic ulcers constitute 24% of leg ulcers. This could be poor wound care immediately after trauma including neglect, inexpert suturing and lack of asepsis.

As per studies done by Hansson Carita¹⁹ 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.

Present study agrees with Hansson Carita, 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 42.86% of patients in our study have 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 higher incidence of arterial and diabetic ulcers in our study.

The median age of all patients in this study was 45 years and 20% of the patients between the age group of 40 to 50 years, 40.64% of the patients over the age of 50 years and 38% of the patients below 40 years of age. It is not comparable with the study by Cornwell et al,²⁰ had 70% of patients over the age of 70 years. But according to study done by Callam MJ,¹⁸ 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, Peripheral vascular diseases were found to be maximum in the age group above 50 years. This is comparable with (Hansson's Carita).¹⁹ This peripheral vascular disease increases with the age and is 7 times more frequent in 60 years old compared to 20 years old. This is a minor discrepancy. 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 ulcers were found to be more common around 50 years, which is rather early as compared to western studies. In our study there are significantly high number of TAO cases, which are more common in young adults. In our study, there were more men (88.67%) than women (11.33%) with leg and foot ulcers. This is comparable with Hansson's Carita,¹⁹ in which leg ulcers are more common in men (more than 90%).

Elastic crepe bandages are the most important forms of treatment for venous ulcer patients.²¹ In our study, all the 24 patients who had venous ulcers wore elastic crepe bandages stretched to 50% providing of around 14 mmHg compression pressure under one layer. Only one patient has venous leg ulcer due to deep vein thrombosis. It was treated with heparin, intravenous antibiotics and local dressings.

6 out of the 24 patients with venous ulcers underwent subfascial ligation, one patient of DVT and one patient of varicose ulcer underwent skin grafting. Rest 16 patients were managed conservatively, and spontaneous wound healing achieved. The mean time for ulcer healing was 20.83 days. The patient of DVT who underwent skin grafting had his ulcer healed in 45 days only. A study of recurrences of venous ulcers could not be made due to inadequate time for follow-up.

Appropriate antidiabetic therapy in forms of Human insulin, antibiotics, debridement and regular dressings were the important methods of treatment for diabetic ulcers in our study. Out of the 28 patients, 9 patients were managed conservatively, and spontaneous wound healing achieved. One patient underwent below knee amputation as a life saving measure and four patients underwent great toe and other toes amputation. 12 patients underwent skin grafting and had his ulcer healed in 16.58 days. However, the mean healing time was 10.68 days in overall diabetic ulcers. One patient expired because of septicaemia and acute renal failure, and one patient voluntarily departed from the study.

In this study, ulcers secondary to trauma were noted in 36 patients. Most of them developed ulcer following a primarily sutured wound at primary care centre, which got infected. 9 out of the 36 patients were anaemic. Rest of the patients had avulsion and lacerated injuries with some degree of skin loss. 16 patients out of the 36 underwent skin grafting. One patient who underwent Myocutaneous flap got healed in 30 days. Five patients underwent toes amputation. The mean healing time of these traumatic ulcers were 18.66 days. Those managed conservatively had a mean healing time of 16.95 days and those who had undergone skin grafts and myocutaneous flap had a mean healing time of 20.38 days.

Skin is the best dressing (Lister). It is best reserved for large ulcers on those, which will not heal by conservative management.¹⁶

CONCLUSION

- About 48% of leg and foot ulcers are due to vascular aetiology and arterial ulcers alone account for 32% and venous ulcers 16% in our study. This is unlike other studies. About 95% of leg ulcers are due to vascular aetiology and venous ulcers account for upto 90% and 5%-10% arterial ulcers.

- Among 48 patients of arterial ulcer, 8% underwent below knee amputation, 10.41% of patients with atherosclerosis in major vessels referred to vascular surgeon, 2 of them lost for follow-up and 77.08% of patients were managed conservatively including conservative toe amputations. The overall mean healing time for arterial ulcers is 21.66 days.
- Traumatic ulcer constituted next major category (24%). This seems to be because of neglect, inadequate or inexpert care available at the time of injury, thereby making a seemingly small wound into a chronic, poorly healing ulcer.
- Among 36 patients of traumatic ulcer, 44.44% underwent skin grafting and one patient underwent myocutaneous flap, healed in 30 days. 1% of them underwent conservative toe amputations and rest were managed conservatively. 4% of them were anaemic. The mean time for the ulcer to heal in patients who were skin grafted and myocutaneous flap done was noted to be 20.38 days as against 16.95 days of those who did not undergo skin grafting.
- Diabetic ulcers constituted 18.67%, a relatively higher number as compared to west (5% - 10%). It again seems to be due to lack of education, neglect, inexpert and inadequate care before and after onset of lesion.
- Among 28 patients of diabetic ulcer, 42.85% underwent skin grafting with mean healing time of 16.58 days. One patient underwent below knee amputation as a life-saving procedure. Rest of them were managed conservatively including conservative toe amputations. The overall mean healing time of diabetic ulcer is 10.68 days.
- Among 24 patients of varicose ulcer, 25% underwent operation i.e., subfascial ligation. One patient with DVT underwent skin grafting that healed in 45 days and one patient of varicose ulcer also underwent skin grafting healed in 21 days. Rest 66.67% of them were managed conservatively. The overall mean healing time for venous ulcers was 20.83 days. No recurrences of ulcers were noted.
- Two patients of Marjolin's ulcer in the leg underwent wide excision and split skin grafting. The mean healing time was 14.50 days.
- Trophic ulcers are 100% in foot and malignant ulcers (Marjolin's ulcer) were situated in the leg in our study.
- The highest age incidence of leg and foot ulcers in this study was in the age group of 51 years and above (40.67%).
- The median age was 45 years and the mean age was 44.28 years.
- There was a marked male predominance of 88.67%.
- Foot was the most commonly affected region, 54% in our study.
- 79.17% of the arterial ulcers were situated in the foot.
- 91.67% of venous ulcers were situated in the gaiter zone.
- 75% of diabetic ulcers were situated in the foot.
- Staphylococcus and Klebsiella were found to be the most common pathogen to be isolated from the ulcers, i.e. 29.4%.

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