Evaluation and Management of Cellulitis and its Local Complications in Diabetic Lower Limb using the New Amit Jain's Staging System for Cellulitis – A Retrospective study

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ABSTRACT

Introduction: Cellulitis affecting the lower limb is a common type 1 diabetic foot complication, yet there are very few studies done on it over last few decades. **Aim:** To study cellulitis in diabetic lower limb through Amit Jain's staging system, the first specific focussed classification system for cellulitis and its local complications in diabetic lower limb. **Methods:** A retrospective analysis was carried out in a single surgical unit of department of surgery of St John's medical college, Bangalore, India. **Results:** A total of 26 patients were included in this study. 76.92% were males. Stage 2 was the commonest stage of presentation. 23.07% of the patients had history of known preceding trauma. Debridement was the commonest procedure done in cellulitis. **Conclusion:** Cellulitis in lower limb in diabetes is a common condition that can lead to serious complication. Stage 2 is the commonest presentation to a hospital. This is the first study on cellulitis in diabetic lower limb through the new Amit Jain's staging system from Indian subcontinent.

Keywords: Amit Jain's, Cellulitis, Necrotizing Fasciitis, Staging

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INTRODUCTION

Cellulitis is a severe spreading inflammation of the skin and subcutaneous tissue, usually due to an infection[1, 2]. Cellulitis in general accounts for 2-3% of hospital admissions[3]. The U.K hospital incidence data reported 69,576 cellulitis episodes over a 12 month period from 204 to 2005[4]. In 2008-9, there were 82,113 hospital admission in England and Wales lasting a mean length of 7.2 days[1].

Cellulitis is a common emergency, the severity of which varies from mild to life threatening situation[5]. Although it can affect any part of the body, lower limb cellulitis is most common site affecting as many as 70% of the cases [3, 5]. The relative frequency of foot cellulitis is more than

nine times greater in diabetic than in non-diabetic[6].

In spite of being a common condition, there are very few studies done on cellulitis in diabetic lower limbs, In fact over last 2-3 decades, there are hardly any series on cellulitis in diabetic lower from Indian subcontinent, where the incidence of diabetes is rapidly increasing over years.

This study is unique as it not only studies cellulitis and its local complication in diabetic lower limbs, but also analyses it through the new Amit Jain's staging system for cellulitis[7], the first focussed classification for diabetic lower limb cellulitis [Table 1].

STAGE 1	Cellulitis without abscess or necrosis
STAGE 2	Cellulitis with either localised abscess or skin necrosis or both
STAGE 3	Necrotizing fasciitis without myonecrosis
STAGE 4	Necrotizing fasciitis with myonecrosis

Table 1 showing the new Amit Jain's staging system for cellulitis in diabetic lower limb

METHOD AND MATERIALS

A retrospective analysis was carried out in surgical unit III in department of surgery of St John's medical college, Bangalore, India, which is a tertiary care referral hospital of high repute that caters patients from different parts of the country. The study period was from November 2011 to January 2014. The following were inclusion and exclusion criteria.

INCLUSION CRITERIA

1] All type 2 diabetic patients

2] Cellulitis and its local complication [Figure 1] affecting foot and leg [also cases where it extended to the thigh]. All inpatients were used for the study

Figure 1: Cellulitis [resolving] affecting the left lower limb. Note the deroofed blister. This is stage 1 cellulitis according to Amit Jain's staging system.

EXCLUSION CRITERIA

1] All non-diabetics

2] Patients in other surgical units

3] Patients with inappropriate records

4] Patients in whom thigh is alone involved without involvement of foot and leg were excluded in this study [Figure 2]

5] Diabetic foot ulcers with small surrounding cellulitis were also excluded

6] All outpatients were excluded

Figure 2: showing necrotizing infection over left upper thigh sparing foot and leg. Such cases were not included this study.

OBSERVATION & RESULTS

There were 49 cases of cellulitis affecting lower limb out of which only 26 patients were included in this study fulfilling the above criteria's.

There were 20 males [76.92%] and 6 females [23.08%] [Table 2]. The average age for males was 57.8 years with a range from 40 -83 Years. The average age for females was 54.5 years with a range from 40 -80 years.

Sl No	Sex	Number	Percentage
1]	Males	20	76.92%
2]	Females	06	23.08%
	Total	26	100%

Table 2: showing distribution of the cases according to the sex.

Right lower limb was affected in 12 patients [46.15%], left lower limb [Table 3] in 13 patients [50%] and 1 patient [3.85%] had bilateral cellulitis.

Sl No	Side of Limb involved	Number	Percentage
1]	Right	12	46.15%
2]	Left	13	50%
3]	Bilateral	01	3.85%
	Total	26	100%

Table 3: showing distribution of cases according to the side of lower limb involved.

14 patients [53.85%] with cellulitis had diabetes of less than 5 years duration, 8 patients [30.77%] had diabetes between 5 - 10 years duration [Table 4]. 6 patients [23.08%] had diabetes detected during admission and they were not aware of it till they developed cellulitis. 4 patients [15.38%] had diabetes of more than 10 years duration. One patient had chronic kidney disease and one had history of stroke.

Sl No	Duration of diabetes	Number	Percentage
1]	< 5 years	14	53.85%
2]	5 – 10 Years	08	30.77%
3]	> 10 years	04	15.37%
	Total	26	100%

Table 4: showing distribution of cases according to duration of diabetes mellitus.

8 patients [30.77%] had presented with pain, 17 patients [65.38%] had history of lower limb swelling and 9 patients [34.61%] had history of fever. 7 patients [26.92%] had symptoms of less than 3 days duration, 16 patients [61.57%] had symptoms between 4- 7 days of duration and 3 patients [11.54%] had symptoms of more than 1 week duration.

6 patients [23.07%] had history of known preceding trauma that incited cellulitis.

10 patients [38.5%] had stage 1 cellulitis, 11 patients [42.31%] belonged to stage 2 [Figure 3 and 4], 4 patients [15.39%] were in stage 3 and 1 patient [3.85%] belonged to stage 4 [Table 5].

Figure 3 showing cellulitis of the left lower limb with blister and localised skin necrosis. This is stage 2 cellulitis as per Amit Jain's staging system.

Figure 4: of the above patient [Figure 3] showing resolving cellulitis and a well demarcated skin necrosis.

Sl No	Stage of Cellulitis	Number	Percentage
1]	Stage 1	10	38.50%
2]	Stage 2	11	42.31%
3]	Stage 3	04	15.39%
4]	Stage 4	01	3.85%
	Total	26	100%

Table 5: showing distribution of cases according to Amit Jain's staging system.

Out of 11 patients in stage 2, 7 patients [63.63%] had abscess whereas 4 patients [36.36%] had skin necrosis.

A total of 7 patients [26.92%] had blisters at presentation. All the 26 patients had undergone lower limb duplex study for deep vein thrombosis. None of them had DVT. 4 patients [15.38%] had past history of lower limb cellulitis.

A total of 7 patients [26.92%] were managed conservatively with intravenous antibiotics alone. They all were started with Amoxycillin + Clavulinic acid initially as a protocol and is shifted to higher antibiotics in unresponsive cases or based on cultures. 17 patients [65.38%] had undergone debridement [Table 6], one patient underwent below knee amputation [3.85%] and one patient had undergone above knee amputation [3.85%].

Sl No	Treatment	Number	Percentage
1]	Conservative	07	26.92%
2]	Debridement	17	65.38%
3]	Below knee amputation	01	3.85%
4]	Above knee amputation	01	3.85%

Table 6: showing the management of the cases.

Out of 17 patients with debridement, 11 patient had undergone grade 2 debridement [Figure 5], 3 patients had undergone grade 1 and grade 3 debridement each. 2 patients who underwent major amputation had preceding grade 4 debridement.

Figure 5 showing the above patient with stage 2 cellulitis [Figure 4] who underwent Amit Jain's grade 2 debridement.

Out of 17 debridements, 3 patients [17.65%] had associated amputation. 2 patients had toe amputation and 1 had transmetatarsal amputation.

Only 7 patients [26.92%] had organisms grown out of which streptococci was the commonest isolate in 3 cases.

There was only one mortality [3.85%] in this series and the patient was in stage 3. He expired due to septic shock.

DISCUSSION

Cellulitis in the lower limb is potentially serious infection that commonly occurs and recurs in diabetics[5,8]. A typical lower limb cellulitis is characterized by progressive painful swelling and erythema with pyrexia and

general malaise[2]. The redness may not be very evident in dark skin patients.

Majority of cellulitis are caused by streptococcus or staphylococcus[1, 5]. The common risk factors include tinea pedis, venous eczema and lymphedema[1, 3].

Under normal circumstances, the skin provides an effective barrier against invasion by microorganism that lives on the skin or that are present in environment[9].

The development of cellulitis can be simplified as 3 steps – bacterial adherence to host cells, invasion of tissue with evasion of host defences and elaboration of toxins[10].

Cellulitis of lower limb often requires hospitalization and intravenous antibiotics initially along with limb elevation and crepe bandage elevation.

Stage 1 cellulitis is treated conservatively. Cellulitis may progress to form abscess or localised necrosis or both [Stage 2]. The stage 2 cellulitis in most of the cases requires surgical intervention. Often one needs to identify necrotizing fasciitis [Stage 3] which may evolve from cellulitis[2, 9]. Severe necrotizing fasciitis may lead to myonecrosis [Stage 4].

Although bilateral cellulitis is uncommon and is occasionally reported in large study[2], it is now considered to be extremely rare. In our study, only one patient was reported to have bilateral cellulitis.

29% of the patients are known to develop recurrent lower limb cellulitis[3]. In our study, 4 patients [15.38%] had prior history of cellulitis affecting lower limb.

The commonly used antibiotics for cellulitis include penicillins, cephalosporins and fluroquinolones[2]. The stage 2, 3 and 4 as per Amit Jain's staging system requires higher spectrum of antibiotics like ciprofloxacin + clindamycin combination or pipercillin-tazobactum combination along with anaerobic coverage based on clinical scenario and hospital protocols.

The optimal duration of therapy for uncomplicated cellulitis remains undefined although it requires 7-10 days of course[4].

Advance stages of cellulitis like abscess formation and necrotizing fasciitis may require surgical intervention. Debridement was the commonest surgical procedure [65.38%] with grade 2 being the commonest debridement as per Amit Jain's grading of debridement[11, 12].

In a study on cellulitis[4], 20% of them developed necrotizing fasciitis. In our study, 19.23% developed necrotizing fasciitis. The overall mortality for

complicated cellulitis was 5%. In our study, the mortality was 3.85%.

The one major limitation of this study was that the records did not mention the presence of tinea pedis or presence of venous eczema which also commonly leads to cellulitis.

CONCLUSION

Cellulitis in diabetic lower limb is a common clinical condition presenting as acute emergency. Stage 2 was the commonest type of presentation [42.31%]. Majority of cellulitis occurs in patients with less than 5 years duration of diabetes. Debridement [65.38%] was the commonest surgical intervention in complicated cellulitis in this study. There was one mortality [3.85%] in this series. This is the first detailed series on cellulitis in diabetic lower limb from Indian subcontinent that studies it through the new Amit Jain's staging system of cellulitis.

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