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Original Research Article

Analysis of Stump Complications Following Major Amputation in Diabetic Foot Complications using Amit Jain's Principle and Practice for Diabetic Foot

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Abstract: Diabetic foot is a known devastating complication of diabetes. It is known to be associated with lower extremity amputation. Major amputation is associated with a variety of complications at stump. Around 43.75% of the patients develop stump complications after major amputation for diabetic foot complications. As high as 78.6% of these patient with stump complications suffered from Type 1 diabetic foot complications with diabetic foot abscess being the commonest type 1 diabetic foot complications. 5 patients [35.7%] with stump complications had debridement prior to major amputation being performed. Majority of the patients [35.71%] belonged to high risk category and amputation inevitable category each. 28.57% of the patients with stump complications underwent revision surgeries. This studies for the first time studies the stump complication through the new Amit Jain's principle and Practice of diabetic foot.
Keywords: Diabetic foot, Amit Jain, Scoring, Grading, Stump

INTRODUCTION

Diabetes is currently considered a pandemic, affecting both developed and developing countries [1]. Foot disease is a well-known complication that occurs as a consequence of diabetes leading to amputation.

Amputation, which was earlier considered a tragedy, is now considered a treatment [2]. Therapeutic amputation is one of the most ancient surgical procedures that have a history of more than 2500 years dating back to the time of Hippocrates [3-5].

Diabetic foot constitutes one of the most frequent reasons for hospitalization in diabetic patients [6]. Foot ulcer and amputation are disabling complications that can lead to significant morbidity and mortality [7]. The amputation rates differ across the globe and further within the countries [8].

Major amputation is just not the end of the story of the diabetic foot. There are various problems that can occur at stump which further adds to the morbidity, cost and increase duration of hospital stay.

The aim of this study was to analyse the stump complications occurring after the major amputations due to diabetic foot problems using the Amit Jain's principle and practice of diabetic foot [9-14].

METHODS AND MATERIAL

A retrospective analysis was done from May 2008 to April 2014, in Surgical Unit '3' of Department of Surgery at St John's medical college, Bangalore, India, which is a tertiary care referral institute. All patients who had stump complications following major amputation due to diabetic foot complications were included in this study. Patients from other units were excluded from the study.

RESULTS

We were able to review stumps of 32 patients who underwent major amputation due to diabetic foot complications. Around 24 of these patients [75%] had closed stump following surgery whereas 8 patients [25%] had open stump following major amputation.

A total of 14 patients [43.75%] had documented stump complications which we studied in detail. Twelve patients were males [85.7%] and 2 were females [14.3%]. Eleven patients [78.57%] had below knee stump infection and 3 patients [21.43%] had stump infection after above knee amputation.

Eleven patients [78.57%] with stump complications were operated for type 1 diabetic foot complications, one patient [7.01%] for type 2 diabetic foot complications and 2 patients [14.3%] for type 3 diabetic foot complications [Table 1]. Stump complication was most common in patients having

diabetic foot abscess [Table 2] followed by wet gangrene [21.4%], necrotizing fasciitis [14.3%] and Charcot foot with infected ulcer [14.3%]. The patient who had type 2 diabetic foot complications had large ischemic ulcer with severe peripheral arterial disease.

Around 11 patients [78.57%] developed stump complication in primary closure of the stump category following major amputation. Three patients [21.43%] developed stump complications in open stump category who were subjected to secondary surgeries requiring stump closure.5 patients [35.7%] with stump complications had debridement prior to major amputation where 3 patients had Amit Jain's grade 3 debridement and 2 patients had grade 4 debridement.

The commonest stump complication was infection. A total of 9 patients [64.29%] developed stump abscess/cellulitis, 6 in primary stump closure category and 3 in open stump category that were closed secondarily. 5 of these patients had only abscess, 2 patients had abscess along with surrounding cellulitis whereas 2 patients had abscess along with cellulitis and extensive skin necrosis in combination [Figure 1].Two patients had developed flap necrosis and 2patients' had extensive oedema with blister formation [Table 3]. One of the 14 patients had developed wound dehiscence of the stump following a fall [Figure 2].

Majority of the patients [35.71%] belonged to high risk category and amputation inevitable category each [Table 4]. The lowest score for stump complication was 10 belonging to low risk category and highest was 34.

Four patients [28.57%] had revision amputation, 2 of them having conversion from below knee to above knee amputation. The 4 patients with stump revision had score of 18, 24, 26 and 33. 2 patients [14.29%] with stump complications had mortality.

Table 1: showing distribution of patients with stump complications using Amit Jain's classification for diabetic foot complications

Sl No	Type of Diabetic foot complications	Number	Percentage
1	Type 1 diabetic foot complication	11	78.6%
2	Type 2 diabetic foot complication	1	7.14%
3	Type 3 diabetic foot complication	2	14.28%
	Total	14	100%

Table 2: showing the pathological lesion in patients in who stump complications developed

Sl No	Primary foot Lesion/pathology	Number	Percentage
1	Abscess	7	50%
2	Wet gangrene	3	21.4%
3	Necrotizing fasciitis	2	14.3%
4	Charcot foot with infection	2	14.3%
	Total	14	100%

Table 3: showing the distribution of different types of stump complications

Sl No	Type of stump complications [predominant]	Number	Percentage
1	Wound Infection	9	64.29%
2	Flap necrosis	2	14.28%
3	Extensive oedema + blister formation	2	14.28%
4	Wound dehiscence	1	7.14%
	Total	14	100%

Table 4: showing distribution of the cases of stump complications in different risk category of major amputation using Amit Jain's scoring system

Sl No	Risk category	Score	Number	Percentage
1	No Amputation	< 5	0	0
2	Low risk	6-10	1	7.14%
3	Moderate risk	11-15	1	7.14%
4	High Risk	16-20	5	35.71%
5	Very High Risk	21-25	2	14.28%
6	Amputation inevitable	>26	5	35.71%
	Total		14	100%

Fig. 1: Showing stump complication with abscess, skin necrosis and cellulitis occurring in combination

Fig. 2: showing wound dehiscence at below knee stump. It occurred secondary to fall

DISCUSSION

Major lower limb amputations are still being performed widely in different parts of the world [15]. It is well known that higher level of amputations are more debilitating in diabetic amputee compared to lower level of amputation [16]. Major amputations are associated with a high morbidity and mortality [15]. Patients with major lower extremity amputations can have systemic complications like cardiac, pulmonary, bed sores, etc as well as local complications related to the stump [15].

The stump related complications are of major concern as they impact the patient's ability to walk with artificial/prosthetic limb [17]. The common stump related complications include infection, tissue necrosis, phantom limb, haematoma, joint contracture, wound dehiscence, etc. [18].

Different series shows different types of stump complications. Majority of the studies shows that infection of the stump is the commonest complication seen in the stumps of the major amputation. In Chalya*et al* series [3],infection was the commonest stump complication accounting for 21%. In Ajibade*et al* series [19], 31% had stump complications with commonest stump complications being wound infection in 41.5% followed by phantom limb in 14.6%.

Another study [18, 20] showed that the commonest stump complications were wound infection (70%), poorly fashioned stump (20%) and phantom limb (10%). In our study, the commonest complications were wound infection accounting for (64.29%). Stump complications were common in type 1 diabetic foot complications which is the commonest diabetic foot complications seen in hospitalised patients in India [21, 22].

In Sadiq*et al* series [20], it was seen that common factors that increases the risk of stump infections in diabetics are irregular treatment, presence of Peripheral arterial disease, glycosylated haemoglobin of more than 7, postoperative blood transfusion, performing amputation at unhealthy site and non-sutured wounds. Below knee amputations were

associated with more complications than above knee amputations [15, 20].

In Ploeg*et al* series [15], the BKA to AKA conversion rate was 14.3%. The commonest cause for revision in literature [4] was infections, prominent bone, stump necrosis and ulcerations. In our studies, 2 patients' [18.18%] with stump complications had conversion from BKA to AKA.

The lowest score in this study seen in patients with stump complication was 10 and highest score was 34. The limitation of our study was that we couldn't analyse late complications associated with stump.

CONCLUSION

Stump complication following major amputation is associated with a high morbidity. Our series shows that overall stump complications occur in 43.75% of the cases. 78.6% of these patients with stump complications suffered from Type 1 diabetic foot complications. Wound infection is the commonest stump complication. The mortality in our series was 14.29%. This study for the first time analysis stump complications using Amit Jain's principle and practice of diabetic foot complications.

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