



Late Stump Infection of Lower Limb Amputation in North India

KEYWORDS

late infection; sinus tract; osteomyelitis.

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ABSTRACT

There is very few published data on the diagnostic and therapeutic management of late lower limb stump infections. We carried out a retrospective observational study on 40 lower limb stumps presenting with late infection between January 2012 to December 2014 at a tertiary referral center in North India. Results of study showed sinus tract (55%) as most common sign of late infection followed by ulceration (25%), abscess (20%) and pain during the prosthetic fitting (5%). *Pseudomonas aeruginosa* followed by *E.coli* as the most common bacteria in amputated limb due to trauma. Surgical intervention required in case of discharging sinus and / or osteomyelitis.

To summarize, treatment of lower limb late stump infection should be multidisciplinary (orthopedic surgeons, physiatrist, and infectious diseases physicians) to achieve the final objective, to allow using prosthesis so that the patient can walk with ease and comfort.

Introduction

As per Dillingham TR, Pezzin LE and Mc Kenzie EJ (2002), estimated the prevalence of limb amputations is 0.7% in the global population. Cerveira JJ, Lal BK, Padberg Jr FT, Pappas PJ, and Hobson RW (2003) stated that, amputations can be complicated by stump wound infections, leading to morbidity, poor quality of life, and additional health care costs. de Godoy JM, Ribeiro JV, Caracanhas LA and de Godoy MF (2010), observed 13 to 40% wound infections were following major lower-limb amputation. However, there are only few published studies on the diagnostic and therapeutic management of these infections. We carried out an observational study of patients presenting with late stump infection after lower-limb amputation. We focused on bacteriological study of late stump infection, therapeutic management, and the patient's outcome at tertiary referral center in North India.

Material and Methods

This was a retrospective type of study, it includes, all the indoor patients treated for lower limb stump infection (excluding toe and forefoot amputation), in the Dept. of Physical Medicine and Rehabilitation at King George's Medical university, Lucknow, from January 2012 to December 2014. King George's Medical College is the major tertiary referral center not only for north India but also for neighboring country like Nepal and Bhutan. It has biggest artificial limb center in North India.

Stevens DL, Bisno AL, Chambers HF and Everett ED (2005) defined, soft tissue infection as extensive inflammation,

or a subcutaneous or muscular abscess confirmed by ultrasonography. Spelberg B and Lipsky B (2012) stated always suspect, Infectious osteomyelitis on physical examination whenever there is bone contact with a sterile metal probe and there is radiologic and / or computed tomographic anomalies. Dutronc H., Gobet A. and Dauchy F.A. (2013) stated that, role of radiological examinations are to determine the site and extent of infection.

In this study, X - ray of stump was done to see bony changes and sinography to determine the extent of abscess cavity or sinus. Radiological examination were performed according to clinical signs and symptom for all patients. The diagnosis of infection had been confirmed by microbiological culture of soft tissue and/or of bone samples. This study included only late stump infection, which was defined as infection diagnosed more than 6 week after amputation (Dutronc H. et al, 2013)

Results

Study include 30 patients (20 unilateral and 10 bilateral) with 40 lower limb stump infections. There were 25 male (83.33%) and 5 female (16.77%) patient with male to female ratio 5: 1. The mean age was 30 years (range: 2 – 60 years) of which 4 patients (13.33%) were less than 18 years, 23 patients (76.66%) were between 18-50 years, and 3 patients (10%) were more than 50 year. Cause of primary amputation were traumatic in 21 limbs (52%), infection in 15 limbs (37.5), peripheral vascular disease in 6 limbs (15%), leprosy in 5 limbs (12.5%) and malignancy in 3 limbs (7.5%). All patients were given prophylactic preoperative

antibiotic therapy. The level of amputation was transfemoral in 20 limbs (50%), transtibial in 16 limbs (40%), at knee level in 2 limbs (5%) and at ankle level in 2 limbs (5%). The presence of a sinus tract was the most common and the most significant sign of stump infection; which was observed in 22 limbs (55%), other sign of infection like, ulceration was found in 10 limbs (25%), abscess was found in 8 limbs (20%), and pain during the prosthetic fitting was found in 2 limbs (5%) at the initial evaluation.

On radiological examinations, X - ray of all the stumps showed, bony spur in 16 stumps.



Figure 1. X- ray showing bony spur

Sinography of discharging sinus was performed on 22 stumps which allowed diagnosis of soft tissue infection in 17 stumps and osteomyelitic changes in 5 stumps.



Figure 2. Sinograph showing spread of contrast dye in sinus tract.

Microbiological test results were obtained by open wound

swab in 18 (45%) stump and needle aspiration of discharge from discharging sinus in 22 (55%) stump.

The microbiological and antibiotic sensitivity results are shown in table 1.

Gram-negative bacteria, especially *Pseudomonas aeruginosa* [16 stumps (40%)], followed by *E.coli* [13 stumps(32.5%)] were the most common bacteria cultured. In antibiotic sensitivity results 36/40 stumps (90%) were sensitive for imipenem, 34/40 stumps (85%) were sensitive for Piperacillin and tazobactam, 28 stumps(70%) were sensitive for levofloxacin. Complete relief from symptom and correction of hematological parameter were considered as complete cure of infection and indication to stop antibiotics.

Soft tissue stump infection in the form of open wound were treated by regular dressing appropriate antibiotics based on sensitivity report for 15 – 30 days. Soft tissue stump infection in the form of discharging sinus were treated by surgical debridement followed by antibiotics for 15 – 45 days. Stump infection in the form of osteomyelitis were treated with surgical debridement and bone excision followed by antibiotics for 15 – 60 days.

Discussion

There are very few studies available for assessment and management of late stump infection of lower limb. Most of the patients presenting with bone infection required surgical revision in addition to antibiotic treatment. The main surgical procedure were excision of necrotic soft tissues and resection of infected bone according to radiological results. Dutronc H., et al (2013) stated, the presence of a non healing discharging sinus tract is the most frequent clinical sign indicating chronic infection, as in this study. They found ultrasonography can be used for the rapid detection and sample collection in case of a soft tissue abscess for microbiologic culture and CT scan with or without sinography is very sensitive to detect the presence of soft tissue as well as bony infection and guide for surgical revision of infected stump, thus diagnostic radiology play a vital role in management of stump infection. In this study, only X- ray of stump and sinography were used as radiological parameter due to poor financial condition of patients. Cerveira JJ, et al (2003) found, *Staphylococcus* as the most frequently isolated bacteria, in lower-limb infections. In this study Gram-negative bacilli, especially *P. aeruginosa*, were most common isolated bacteria as most patients were amputated for traumatic reasons, as a consequence of telluric contamination and *E. coli* were the second most common isolated bacteria which can be explained, as most patient were uneducated villagers coming from low socioeconomic strata, and they were unable to maintain hygienic condition of wound even after proper guidance. Therefore, physicians should use a first-line antibiotic therapy active against methicillin resistant *Staphylococcus*, in case of lower-limb stump infections, until microbiological results are available. Furthermore, broad-spectrum penicillin (e.g.: piperacillin / tazobactam) should be added in case of infection following amputation after trauma. There are only a few published studies dealing with antibiotic therapy after amputation. Cerveira JJ, et al (2003) suggested that, antibiotics are essential in lower limb stump infection. In our study, the duration of antimicrobial therapy were 15 to 45 days for soft tissue infection, and 15 to 60 days for osteomyelitis. However, there are no recommendations on the duration of antibiotic therapy, and further studies are needed to validate the optimal antibiotic course.

Bamberger DM (1993) proposed, two therapeutic options for stump infection, antibiotics alone or antibiotics associated with surgery ranging from debridement of necrotic tissues to bone resection. In this study, both were applied based on need of case. Lew DP, and Waldvogel FA(1997) recommends performing bone biopsy for microbiological cultures when there are radiological signs of osteomyelitis. The risks of additional surgery include a shorter stump and a poor rehabilitation out-come. Nevertheless, the amputation scar may adhere to the underlying subcutaneous tissues with repeated infections, a process that induces more ulceration and erosion. Surgical revision can help free the scar and can allow using prosthesis effectively. In our study, patients with bone infection were treated with revision surgery. The microbiological data did not indicate

super infection, thus patients with osteomyelitis probably presented with a more severe and extensive infection initially. Thus, we suggest considering bone resection in case of extensive osteomyelitis with bone destruction, and in such cases, it is sometimes necessary to significantly raise the level of amputation, which may have negative consequences for the fitting of prosthesis. It is also advisable to collect microbiological samples from the osteotomy site to check its sterility. The treatment of lower-limb stump infection should be multidisciplinary (orthopedic surgeons, physiatrist, and infectious diseases physicians) to achieve the final objective, to allow using prosthesis so that the patient can walk with ease and comfort. In most cases, this can be achieved after treating the infection.

Table 1. Microbiological and Antibiotic sensitivity

Sr. No.	Bacteria	No. of Stump Infection	No. of antibiotic sensitive stump									
			Amoxi-clav	Piperacilin & tazobactum	Ceftriaxone	Ceftazidime	Cefipime	Cefaperazone & Sulbactam	Imipenem	Gentamicin	Amikacin	Levofloxacin
1	Pseudomonas	16	0	16	1	4	7	1	16	5	5	9
2	E.coli	13	2	13	1	0	1	1	12	2	5	11
3	Acenatobacter	6	0	2	0	0	1	0	5	2	2	5
4	Staph. Aureus	2	0	0	0	0	0	0	0	1	0	2
5	Proteus	2	1	2	0	0	0	0	2	0	0	1
6	Klebsiella	1	0	1	0	0	0	0	1	0	0	0
	TOTAL	40	3	34	2	4	9	2	36	10	12	28

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