

# AMPUTATIONS AND DIABETES MELLITUS: AN INSTITUTIONAL EXPERIENCE

ABDUL RASHID SURAHIO, ASHAR AHMAD KHAN

## ABSTRACT

*Objective* To find out pattern and causes of amputations in patients presenting to surgical units at our hospital.

*Study design* Descriptive study.

*Place & Duration of study* Al-Noor Specialist Hospital, Makkah, Saudi Arabia, from March 2004 to June 2005.

*Patients and Methods* Data was collected from patient's record files for those who were admitted to the hospital for amputation during this period.

*Results* The analysis of data was done for 50 patients who were amputated during the study period. Males were 36 (72%) and females 14 (28%). Forty two (84%) were Saudi's and 8 (16%) belonged to other nationalities. Fifty percent were middle aged (45-64 years). Duration of stay was 3 days to 48 days and maximum number (44%) of patients stayed for 3-7 days. Service units were noted that showed 82% in general surgery ward. There were 43(86%) amputations due to diabetes with peripheral neuropathy and circulatory disorder. Forty-two (84%) patients improved and 5(10%) were discharged against medical advice (DAMA) after amputation whereas 3 patients (6%) died. Twenty two (44%) patients had only single admission while one (2%) patient was admitted for nine times. Maximum amputations were at the level of toes (54%) followed by around knee 17(34%). In 19 (38%) patients amputation was done under general anesthesia. Five (10%) patients were amputated more than one time at different levels with same problem.

*Conclusions* Diabetes with peripheral vascular disease and neuropathy were the main causes of amputations in our study and foot amputations were more than half of the total amputations. Special emphasis should be paid to foot care services and patient's education to prevent amputations and subsequent high disability.

*Key words* Diabetic, Traumatic, Peripheral circulatory disorder, Neuropathy.

## INTRODUCTION:

Amputation is a global problem. It is a procedure by which removal of a limb or other appendages or outgrowth of

the body is done. In one study from United Kingdom hospitals, approximately 5500 amputations are performed each year in England. The number increases as population age increases. Seventy five percent patients are more than 60 years of age and 65% are men. Major limb amputations are rarely required (3% of total). Indications for amputations are usually vascular diseases, diabetes (85%), trauma (10%) and tumors (3%).<sup>1</sup>

## Correspondence:

Dr Abdul Rashid Surahio  
Department of General Surgery  
Al-Noor Specialist Hospital, Makkah, Saudi Arabia  
E-Mail – a\_surahio@yahoo.com

The epidemiological impact of diabetes is evidenced by the

growing morbidity and mortality rates and by causing permanent disabilities such as blindness, diabetic retinopathy, end stage renal failure and lower extremity amputations. Among risk factors in lower extremity amputation in diabetic patients are; long duration of the disease, prolonged hyperglycemia and neuropathy. Peripheral, symmetric sensorimotor neuropathy with paresthesia is common in diabetic patients and is found in most patients after 5-10 years of diabetes. Development of neuropathy has been attributed to the polyol pathway with sorbitol accumulation in Schwann cells during periods of hyperglycemia, damaging to the nerve fibers.<sup>1</sup> Most common manifestation is peripheral neuropathy of the feet and distal lower limb with loss of protective sensation in the foot. Minor trauma may develop into serious necrotizing infection with tissue loss.

Foot problems are the most common indication for hospital admission in diabetics<sup>2</sup> as are patients with dyslipidemia, smoking, drinking, neuropathy and peripheral vascular disease.<sup>3,4</sup> Although amputee limb salvage rates for patients with peripheral vascular diseases have improved substantially but still amputation may be the only practiced treatment for a limb severely affected by trauma, infection, tumor or the end stages of ischemia. Unfortunately, vascular surgeons have traditionally viewed amputations as manifestations of failure to control the disease process, failure of the referring physician or patient to seek help in a timely fashion or failure of vascular surgeon to perform successful revascularization. Immediate aims of amputations are removal of diseased tissues, relief of pain, primary healing of the amputation at the level chosen, construction of a stump and provision of a prosthesis that will permit useful function.<sup>3</sup> In the view of these facts, we undertook this study to find out frequency of amputation in our hospital.

**PATIENTS AND METHODS:**

This study was carried out over a period of 16 months from March 2004 to June 2005 at Al-Noor Specialist Hospital, Makkah, Saudi Arabia. The data was collected from index cards and files, sorted out by the codes for amputations from medical record department on the performa. Certain variables documented included demography, clinical aspects and outcome of amputation. Data had been categorized into age groups i.e. <44 years, 45-64 years, >64 years, their duration of stay i.e. 3-7days, 8-14days and >15days, frequency of admission i.e. single, 2-3times, >3times, level of amputation and anesthesia given i.e. general and other type. Chi-square test was applied to the difference in gender, number of amputations and upper and lower limb amputations among diabetics and non-diabetics. Student's t-test was applied to mean age difference of diabetics and non-diabetics. P value <0.05 was considered as significant.

**RESULTS:**

During the defined period of 16 months, 50 patients were found to be amputated. These amputations were of either

part of upper or lower limbs. Males outnumbered females with ratio of 2.5:1. Saudis were dominant (42-84%), while non-Saudis were almost all Nigerians. Only one (2%) was of Mali. Mean age of patients was 53 years. The mean ages of diabetics and non-diabetics were 58.1 years and 21.3 years respectively ( $p=4.9 \times 10^{-7}$ ). Most amputations were done in 45-65 years age group. Personal history highlighted that only 5 (10%) were smokers, moreover 2 (4%) were students, 2 (4%) government employee and for 32 (64%) occupation was not documented (table 1).

**Table 1: - Socio-demographic Data of Amputated Subjects**

		Variables	(n = 50)	%	
Demographic Data	Sex	M	36	72	
		F	14	28	
	Nationality	Nationals	42	84	
		Non-national	8	16	
	Age (Years)	<44	11	8	
		45-64	25	4	
		>64	14	10	
	Personal History	Smoking	Smoker/ ex-smoker	8	16
			Non-smoker/ not documented	42	84

Duration of stay ranged from 3 days to 48 days with median stay of 8 days. Most of the patients, (41-82%), were referred to general surgery ward. Amputations due to diabetes were 43 (86%), ( $p<0.001$ ). Almost all cases (42-84%) of amputations got improved. Most of the subjects (28-56%) got multiple admissions (more than one time) table 2.

There were 27 (54%) patients amputated at the level of toes followed by around knee 17(34%). We found a significant difference in upper and lower limb amputations in diabetics ( $p<0.001$ ) while no difference was found in non-diabetics ( $p=0.99$ ). Only 5 (10%) cases had more than one amputation on the same limb. Nineteen (38%) patients were amputated under general anesthesia. Five (10%) patients were amputated more than once (table 3)

**DISCUSSION:**

Our study allowed us to list up all the cases of amputations carried out in this tertiary care referral teaching hospital. Males were dominant, showing correlation to study done by Al-Turaiki,<sup>6</sup> Trautner,<sup>7</sup> Dangelser,<sup>8</sup> Agarwal,<sup>9</sup> Leung,<sup>10</sup> and Mohamed<sup>11</sup> but contrary to Johannesson.<sup>12</sup> Diabetes was most common cause of amputation in our study which correlates with the studies of Trautner<sup>7</sup> and Dangelser.<sup>8</sup> Presently more than two thirds of amputations on civilians in Western society are performed for peripheral vascular

Table 2: Clinical Data of Amputated Subjects

Variables		(n= 50)	%		
Duration of stay in hospital Range (3-48 days)	3-7	22	44		
	8-14	16	32		
	> 15	12	24		
Service units (Wards)	General surgical ward	41	82		
	Orthopedic ward	5	10		
	Male vascular surgical ward	1	2		
	Male Urology, Plastic, Vascular Ward	1	2		
	Female Medical ward	1	2		
	FUPD	1	2		
Associated illnesses	None				
	DM alone / with complication	28	56		
	Multiple Illnesses	15	30		
Final diagnoses	ICD-10 Codes	E14.5	Unspecified DM with peripheral circ. disorder	43	86

Table 3: Profile of Amputations (n=50)

Features regarding amputations		(n= 50)	%	
Level of amputations	Lower limb	Toes	27	54
		Knee (below)	13	8
		Knee (above)	4	26
		Foot	1	2
	Upper limb	Fingers	4	8
		Elbow	1	2
One amputation		5	10	
Anesthesia given	General Anesthesia	19	38	
	Other Types of Anesthesia e.g. spinal, lumbar, ankle block etc.	31	62	

diseases.<sup>13-16</sup> Amputations were performed for four main categories of vascular diseases (1) arteriosclerosis obliterans (2) arteriosclerosis obliterans with diabetes (3) thromboangiitis obliterans and (4) miscellaneous conditions such as embolic occlusion, peripheral aneurysm, vascular trauma, and venous obstruction.<sup>13</sup>

Diabetes is an etiologic factor in one quarter of patients requiring lower limb amputations.<sup>11</sup> Likewise diabetes was the cause of up to 70 per cent of all the non traumatic amputations in the world. This can be explained by the fact that the number of persons with diabetes is increasing rapidly.<sup>17</sup> The peak age for amputation was 45-65 years in our study contrary to the peak values in age between 65-74 years in diabetics and 55-64 years in non-diabetics in the

study of Nazim<sup>18</sup> and also peak incidence of amputations was observed in decade of 67-76 years in both age groups.<sup>19</sup> The mean age group of amputees was 70 years or more than this according to Trautner,<sup>5</sup> Leung,<sup>9</sup> Laaperi,<sup>14</sup> Eskelinen,<sup>16</sup> while according to Nazim<sup>18</sup> it was 64.7 years and was higher than those of Al-Noors amputees, but on the other hand Mohamed<sup>9</sup> and Ebskov<sup>20</sup> pointed out the mean age less than ours study. Similarly 5-72 years was the range of age of the amputees according to Mohamed,<sup>11</sup> while ours had more wide range of age than this one. According to study of AL-Turaiki,<sup>6</sup> Agarwal,<sup>9</sup> Mohamed,<sup>11</sup> and Stinus<sup>15</sup> traumatic amputations shared more than ours.

The risk of lower extremity amputation was 15 times more in diabetics than in age matched non-diabetics<sup>21</sup> but was different with Al-Turaiki<sup>6</sup> where amputations due to disease was less common than that of trauma. Regarding the level of amputations, in our study below knee amputations were more than above knee, showing correlation with Mohamed,<sup>16</sup> but contrary to the studies of both Laaperi<sup>14</sup> and Eskelinen.<sup>16</sup> Similarly according to Hussein,<sup>17</sup> 24% of diabetic amputations were of the toe, 5.8 % were mid-foot, 38 % below knee and 21.4% above knee; the remaining 10% included other sites.

#### CONCLUSIONS:

Diabetes was the major cause for amputation in this study and foot amputations were more than half of the total amputations. Hence, special emphasis should be paid to foot care services and patient's education regarding blood sugar control, proper diet, foot wear and change in life style.

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