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Original Article

Two faces of major lower limb amputations

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Abstract
Objectives: To review the indications for major lower limb amputations in adults and children in our patient population and to compare our experience in prosthetic rehabilitation with that of other published information. **Material and Methods:** We retropectively reviewed charts of patients who underwent amputation between 1997 to 2004 at the Orthopaedic Department of B& B Hospital (BBH) , Gwarko and Hospital and Rehabilitation center for Disabled Children (HRDC), Banepa. There were 113 patients at BBH & 89 patients at HRDC . Major amputation was defined as any amputation at or proximal to wrist and ankle. **Results:** Major lower limb amputations constituted 73.58 %(39/53) of all major amputations at BBH and 97.77% (44/45) at HRDC.Road traffic accident was found to be number one cause for major lower limb amputations (74.29%) in adult population. In children postburn contracture was the leading cause for amputation (29.54 %) folowed by Congenital limb conditions (22.72%) ,Spina bifida with trophic ulcers (20.45 %), Tumor (13.63%), Chronic Osteomyelitis (6.81%), Trauma (4.54%) and Arthrogryposis (2.27%). Prosthetic fitting and rehabilitation is as yet far from satisfactory in the adult population but all the children who had amputation at HRDC were fitted with prosthesis. **Conclusion:** Main causes of major lower limb amputation in both population is largely preventable by instituting safty measures and conducting awareness program. There is a need for an effective prosthetic fitting center for adults.

Key Words: Major lower limb amputations, Prosthesis fitting

Amputation is the most ancient of all surgical procedures with a history of over 2500 years going back to the time of Hippocrates. Amputation is generally performed for a variety of indications including trauma, peripheral vascular disease, tumor, infection and congenital anomalies. A retrospective review of amputations at our two medical centers reveals a unique pattern of indications which is in the sharp constrast with those in most Western populations. Many differences and deficiencies in prosthetic rehabilitation were noted in our patients in comparision to published reports from other countries.

Material and Methods

We retropectively reviewed charts of civil patients who had undergone amputation s between 1997 to 2004 at department of orthopaedic surgery and traumatology at the B& B Hospital (BBH) and the Hospital and Rehabilitation Center for Disabled Children (HRDC). BBH is a private hospital with a wide range of general and specialist services and HRDC is a comprehensive paediatric orthopaedic hospital and rehabilitation center catering to needy children under 16 years of age . Major amputation was defined as any amputation at or proximal to wrist and ankle. Major lower limb amputation was defined as any amputation at or proximal to the ankle.Only amputaions at or proximal to the ankle level were included in this study. Amputations of toes, foot and upper extremity were excluded. Data was analyzed according to the demographic characteristics of the patients, etiological basis, level of amputation and prosthetic history.

Results

Amputation in general

Amputation works constituted about 2.51% of total surgical load of the Department of Orthopaedic surgery and traumatology of BBH (113 / 4500) and about 1.76 % of total surgical load of HRDC (89/5059). Major amputation consituted about 1.17% of all surgery at BBH (53/4500) and about 0.89 %of all surgery at HRDC (45/5059). Major lower limb amputation constituted 73.58 %(39/53) of all major amputations at BBH and 97.77% (44/45) at HRDC.

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Road traffic accident, machine injury, crush injury by rock, physical assaults, bomb blast, gun shot, electric shock, peripheral vascular disease, diabetic foot, frost bite , chronic osteomyelitis, postburn contracture and tumour were reasons for amputations at BBH. Postburn contracture, congenital limb conditions, spina bifida complicated by trophic ulcer, chronic osteomyelitis, arthrogryposis, tumour and trauma were reasons for amputations at HRDC

There were a total 39 and 44 major lower limb amputations of 35 patients (23 male and 12 female, 4 patients had bilateral amputations) at BBH and 42 patients (22 male and 20 female, 2 patients had bilateral amputations) at HRDC respectively. (TableI)

Major lower limb amputations in adults (Table I)

In the adult population represented by BBH data (3 patients were children under age 16 years) road traffic accident (RTA) was found to be a leading cause for major lower limb amputations (74.29%) followed by bomb blast (5.71%), peripheral vascular disease (PVD,8.57 %) and crush injury by rock, electric injury, dibetic foot and physical assault (2.86% each). Male patients of ages between 20 to 50 years made main bulk of our adult amputee population. Transtibial to transfemoral to Syme to knee disarticulation to hip disarticulation ratio was 0.46:0.28:0.10:0.07:0.07. Traumatic transtibial to transfemoral ratio was 0.56:0.44. There were 3 below knee amputations indicated by peripheral vascular disease and 1 below knee amputation indicated by a complicated diabetic foot.

Major lower limb amputations in Children (Table I)

In the paediatric population represented by HRDC data, postburn contracture was the leading cause for amputation (29.54 %) folowed by congenital limb conditions (22.72%) , spina bifida with trophic ulcers (20.45%), Tumor (13.63%), chronic Osteomyelitis (COM,6.81%),trauma (4.54%) and arthrogryposis(2.27%). Transtibial to Syme to knee disarticulation to hip diarticulation to transfemoral amputation ratio was 0.40: 0.27:0.18:0.11:0.02 .

In Post burn contracture (PBC) transtibial to Syme to knee disarticulation ratio was 0.46:0.46:0.08. There was bilateral below knee amputation in one patient and bilateral Syme amputation in another patients. The ratio of right to left limb was 0.56:0.44. Female to male ratio was 0.73:0.27. All patients had sustained burns before age of three years.

Every spectrum of congenital anomaly from Apodia to Amelia to Tibial hemimelia to Fibular hemimelia to congenital below knee amputation to congenital pseudoarthrosis (CPA) to Streeter's dysplasia were seen as causes for amputations in children. Transtibial to knee disarticulation to Syme amputation ratio was 0.70:0.20:0.10. Male to female ratio was 0.89:0.11. Right to left ratio was 0.63:0.37 and one patient had bilateral tibial hemimelia.

There was one knee disarticulation in arthrogryposis.

In Spina bifida (S. bifida) complicated by nonhealing trophic ulcer transtibial to Syme amputation ratio was 0.44:0.56 ,male to female ratio was 0.44:0.56 and right to left limb ratio was 0.56:0.44. Average age of amputation was 11.7 years.(Range 9-15).

Osteosarcoma (OSA) and Klippel -Trenaunay Weber (KTW) syndrome were two reason for amputation due to tumor or tumor-like condition. 5 hip disarticulations and 1 above knee amputation were performed.

There were three knee disarticulations performed for chronic osteomyelitis and one below knee amputation and one knee disarticulation for trauma in children.

Prosthetic fitting

Only two patients from BBH were using prosthesis where as all patients from HRDC were provided prosthesis. Patients who had bilateral transfemoral amputations or hip disarticulation were not compliant to prosthesis.

Table1: Data of amputees from both centers

BBH					HRDC			
Amputation levels	No of limbs	No. of patients	Causes of amputation	Remarks	No. of limbs	No. of patients	Causes of amputation	Remarks
Hip disarticulation	3	2 1	RTA Physical assaultt	 Gas gangrene	5	3 2	OSA Femur KTW syn	
Transfemoral	11	7 1 1	RTA Bombblast Electricshock	2 B/L	1	1	OSA Tibia	
Knee disarticulation	3	1 1	Bombblast RTA	B/L	8	1 1 2 1 1 2	Tibialhemimelia Cong. BK amp. PBC Posttraumatic Arthrogryposis COM	
Transtibial	18	12 1 3 1	RTA Crushby rock PVD Dibetic foot	1 B/L	17	1 1 1 2 4 5 1	Apodia Tibialhemimelia Streeterdysplasia CPA S. bifida PBC Posttraumatic	 1B/L
Syme's	4	3 1	RTA COM		13	5 7 1	S. bifida PBC Fibularhemimelia	 1 B/L
Total	39	35			44	42		

Discussion

Major lower limb amputation is considered the last resort when limb salvage is impossible or when the limb is dead or dying ,viable but nonfunctional or endangering the patient's life.Only civillian were included in this study. The large majority of limb injuries resulting from the armed conflict are being managed at special government or military / police institutions. Major lower limb amputations in adults and children will be discussed separately.

Adult

Leading cause for major lower limb amputation varies from one series to another.[1-13] In developed countries peripheral vascular disease or/and complications related to Dibetes mellitus ranks first as cause for amputation whereas trauma is still the leading cause for amputation in developing countries.Trauma related major lower limb amputation varies from 3 to 47 % of all amputations in different series[1-2,10-13] . Trauma (mainly road traffic accident-74.29%.) was found to be the leading cause for major lower limb amputations in our population.

Nepal is a developing country and a number of vehicles registered in Nepal is increasing. There are no effective road and transport policies geared to prevent or reduce road traffic accident. Traffic density has increased remarkably in different zones of Nepal . On the other hand our roads are not of international standards and moving violations are almost unchecked leading to an escalation in the number of accidents[14]. Male patients of ages between 20 to 50 years made the main bulk of our amputee population. This is due to the fact that as of now, males are still more out of doors and exposed to more hazards.The male population on wheels still overwhelmingly exceeds female riders.

Children

Acquired limb deficiency ranks higher in North America than congenital deficiency[15] whereas in Australia number of congenital deficiency is greater[16.] In our children population post burn contracture was a leading cause for amputation . Spina bifida with trophic ulcer, congenital limb

deficient conditons, tumour , chronic osteomyelytis and trauma were other major causes of amputation in our children population.

Most of our population lives in rural areas (85.8%)[17] and there is widespread poverty particularly at the rural areas. About 76 percent of households have been using solid fuel as their major type of cooking fuel. This includes wood and santhi / guitha (cow-dung).[17] Female burn patients were encountered more frequently at HRDC, possibly reflecting the lower priority many rural Nepali families put on the female child for education, timely health care etc. All amputee had sustained their burns before the age of three years.

It is not surprising to see that trophic ulcer secondary to Spina bifida was the third most common cause for amputation in children at HRDC. Only 35 % of Nepalese pregnant women have adequate access to appropriate antenatal care, where preventive measures could be enforced.[18] Illiteracy (literacy rate 53.7%)[17] also contributes to the complications suffered by children with spina bifida. Nonavailability of appropriate foot wear and lack of adequate health education are so crucial in myelodysplastic patients.

Although uncommon, amputation may rarely become necessary in chronic osteomyelytis. We performed knee disarticulation in two patients with chronic osteomyelitis. One of them had ostomyelitis of tibia at the age of 2 years and when she presented to us at age of 13 years she had only a pencil thin tibia with tibiofibular synostosis making her functionally disabled. The other case was followed from age of 1 month and after failure of all treatment measures , a disarticulation was performed.

Prosthetic fitting and Rehabilitation

Prosthetic fitting and rehabilitation for our adult patients is far from satisfactory.In trauma amputation, the choices available for ideal amputation stump are often not available.Infection and poor skin coverage are challenging aspects in the posttraumatic stump for prosthetic considerations. An intensive, preferably hospital based adult prosthetic unit might be an answer to improve this black scenrio. On the other hand HRDC has an orthotic and prosthetic department with well trained orthotists and prosthotists who are capable of fabricating any kind of prosthesis and orthosis as required. That is why all the patients who had amputation at HRDC were fitted with prosthesis as soon as stump was ready for prosthesis fitting.

Conclusion

The major indication for lower limb amputation in both populations is preventable. Road safety measures should be implemented to reduce amputation due to road traffic accident. There is a need for an effective prosthetic fitting and rehabilitation center for adults. Amputation secondary to postburncontracture and spina bifida can be reduced by implementing awareness programs and implementing hazard reduction and home safety measures.

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